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Davis

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1971-72**

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It is the responsibility of the individual student to familiarize himself with the announcements and regulations of the University printed in this catalog, the *Schedule and Directory*, and on official notices posted on bulletin boards.

Contents

| | |
|---|---|
| GENERAL | 7 |
| Calendar, 4. The University of California, Davis, 7. History of the Campus, 7. Present State of the Campus, 8. Student-Faculty-Staff Cooperation, 10. The Davis Community, 10. Transportation, 10. Research Facilities on the Campus, 11. University Library, 11. Summer Sessions, 12. University Extension, 12. | |
| ADMISSION AND REGISTRATION | 14 |
| Admission to Freshman Standing, 14. Graduation from High School, 14. Special Requirements for Out-of-State Applicants, 16. Admission to Advanced Undergraduate Standing, 17. Educational Opportunity Program, 18. Admission to Applicants from Other Countries, 18. Requirements for Admission to Graduate Standing, 19. Special Admission Categories, 19. Application Procedures, 20. General Registration Procedure, 23. Adding or Dropping Courses, 24. Changes of Major, College or School, 24. Change of Name, 24. Withdrawals, 25. Readmission after an Absence, 25. Rules Governing Residence, 25. | |
| SCHOLASTIC REQUIREMENTS | 27 |
| Evaluations, 27. Scholastic Deficiencies, 28. Transcripts of Record, 29. Mid-Term Grade Standing, 29. Final Examinations, 29. Degree Requirements, 30. Honors and Prizes, 32. | |
| STUDENT EXPENSES, HOUSING, AND FINANCIAL AID | 33 |
| Financial Aid Program, 33. Expenses, 33. Application Procedure, 34. Types of Aid Available through the Financial Aid Office, 35. Student Aid Funds Not Handled by Financial Aid Office, 40. Living Accommodations, 40. | |
| STUDENT SERVICES AND ACTIVITIES | 43 |
| Student Health Program, 43. Placement Services, 44. Counseling Center, 45. Educational Opportunity Program Counseling, 45. Peer-Advising Center, 45. Probe Work-Learning Programs, 46. Selective Service, 46. International Student Services, 47. Student Conduct and Discipline, 48. The Associated Students and Student Activities, 50. Recreational Facilities, 50. | |
| REQUIREMENTS AND CURRICULA | 52 |
| College of Agricultural and Environmental Sciences, 53 | School of Medicine, 156 |
| College of Engineering, 109 | Professional School Requirements and Preparation, 160 |
| College of Letters and Science, 140 | School of Veterinary Medicine, 165 |
| School of Law, 153 | Graduate Division, 171 |
| INDEX OF COURSE OFFERINGS | 177 |
| COURSES OF INSTRUCTION | 180 |
| Explanatory Note, 180. Symbols, 183. | |
| OFFICERS OF ADMINISTRATION | 429 |
| INDEX | 435 |

UNIVERSITY CALENDAR

1971-72

Davis Campus

| | Fall 1971 | Winter 1972 | Spring 1972 | (Fall 1972) |
|---|----------------------------------|------------------------------------|------------------------------------|-------------------------|
| Pick up registration and course enrollment materials from Registrar's Office (all continuing students). | May 24—Sept. 1 Monday—Wednesday† | Nov. 16–18, Tuesday—Thursday† | Feb. 17–21, Thursday—Monday† | |
| All continuing students obtain adviser's approval of preferred program.† | May 26–28 Wednesday—Friday | Nov. 17–18, Wednesday—Thursday† | Feb. 18, 21, Friday & Monday† | |
| Turn in registration and course enrollment materials (all continuing students). Course enrollment priority will be random within class level. | June 1—Sept. 1 Tuesday—Wednesday | Nov. 19–23, Friday—Tuesday† | Feb. 22–24, Friday—Tuesday† | |
| Late registration for continuing students. | Sept. 2—Oct. 15, Thursday—Friday | Nov. 24—Jan. 18, Wednesday—Tuesday | Feb. 25—Apr. 11, Friday—Tuesday | |
| Quarter begins. | Sept. 27, Monday | Jan. 3, Monday | Mar. 27, Monday | Sept. 25, Monday (1972) |
| Orientation and testing. | Sept. 27—Oct. 2, Monday—Saturday | Jan. 3—4, Monday—Tuesday | Mar. 27—28, Monday—Tuesday | |
| Registration in person. | Sept. 29, Wednesday | Jan. 3, Monday | Mar. 27, Monday | |
| Instruction begins. | Oct. 4, Monday | Jan. 5, Wednesday | Mar. 29, Wednesday | |
| File study lists by mail (continuing students only). | Oct. 4–12, Monday—Tuesday | Jan. 5–13, Wednesday—Thursday | Mar. 29—Apr. 6, Wednesday—Thursday | |
| File study lists in person. | Oct. 13–15, Wednesday—Friday | Jan. 14–18, Friday—Tuesday* | Apr. 7–11, Friday—Tuesday* | |
| Last day of late registration. | Oct. 15, Friday | Jan. 18, Tuesday | Apr. 11, Tuesday | |
| Final date to file petitions with the Registrar to add courses to study list. | Oct. 15, Friday | Jan. 18, Tuesday | Apr. 11, Tuesday | |
| Final date to file petitions to drop courses. Thereafter permission may be granted by the dean of school or college only under exceptional circumstances. | Nov. 5, Friday | Feb. 8, Tuesday | May 2, Tuesday | |

* Weekends and holidays excepted.

† Adviser's signature required of students enrolled in the College of Engineering and the Graduate Division (except Graduate Engineers), and students in the College of Agricultural and Environmental Sciences who did not obtain their adviser's signature on their preferred program card.

‡ Dates are subject to change and should be checked with appropriate *Schedule and Directory*.

| | Fall 1971 | Winter 1972 | Spring 1972 | (Fall 1972) |
|--|---------------------------|--------------------------------|--------------------------|---------------------------------|
| Final date to file petitions to take courses on a Passed/No Record basis (or change option to letter grade basis) with students' school or college. Exceptions rarely approved. | Nov. 5, Friday | Feb. 8, Tuesday | May 2, Tuesday | |
| Final date for graduate students to file petitions with the Dean of the Graduate Division to take courses on a Satisfactory/Unsatisfactory basis. | Nov. 5, Friday | Feb. 8, Tuesday | May 2, Tuesday | |
| Final date to file Independent Study Program project proposal form (available in the dean's office) either with the student's college dean or directly with Independent Studies Board. | May 10, Monday | Nov. 2, Tuesday | Feb. 3, Thursday | |
| Applications for admission to undergraduate standing, including applications for intercampus transfer, must be filed with complete credentials with the Office of Admissions on or before this date. | Nov. 30, Monday (1970) | (Closed to new undergraduates) | Oct. 1, Friday (1971) | Nov. 1, Monday (1971) |
| Credentials and applications for admission to graduate standing must be filed with the Dean of the Graduate Division on or before this date. | June 1, Tuesday | Oct. 1, Friday | Jan. 1, Saturday | June 1, Thursday (1972) |
| Applications for admission to the School of Medicine for 1972-73 must be filed with the School before this date. | | — | — | Dec. 31, Friday (1971) |
| Applications for admission to the School of Veterinary Medicine for 1972-73 must be filed with the Office of Admissions on or before this date. | | — | — | Nov. 1, Monday (1971) |
| Applications for admission to the School of Law for 1972-73 must be filed with the School on or before this date. | — | — | — | Mar. 1, Wednesday (1971) |
| Applications for readmission to graduate status must be filed with the Registrar on or before this date. | Aug. 16, Monday (1971) | Nov. 22, Monday | Feb. 11, Friday | Aug. 14, Monday (1972) |
| Applications for readmission to undergraduate status must be filed with the Registrar on or before this date. | Aug. 30, Monday | Dec. 6, Monday | Feb. 28, Monday | Aug. 28, Monday (1972) |
| Candidates who expect to complete work for A.B. and B.S. degrees must file an announcement of candidacy with the Registrar on or before this date. | Oct. 15, Friday | Jan. 18, Tuesday | Apr. 11, Tuesday | |
| Candidates who expect to complete work for masters' degrees must file applications for candidacy with the Dean of the Graduate Division on or before this date. | Oct. 8, Friday | Jan. 7, Friday | Apr. 4, Tuesday | June 30, Friday (Sept. 1972) |
| Theses for masters' degrees must be filed with the committees in charge on or before this date. | Nov. 19, Friday | Feb. 18, Friday | May 16, Tuesday | Aug. 11, Friday (Sept. 1972) |

| | Fall 1971 | Winter 1972 | Spring 1972 | (Fall 1972) |
|--|--------------------------------|--------------------------------|---------------------------------|---|
| Theses for masters' degrees must be filed with the Dean of the Graduate Division on or before this date. | Dec. 17, Friday | Mar. 17, Friday | June 18, Tuesday | Sept. 8, Friday (Sept. 1972) |
| Candidates who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering must file applications for candidacy with the Dean of the Graduate Division on or before this date. | Aug. 25, Wednesday | Dec. 1, Wednesday | Mar. 1, Wednesday | May 26, Friday (Sept. 1972) Aug. 23, Wednesday (Dec. 1972) |
| Theses for the degrees of Doctor of Philosophy and Doctor of Engineering must be filed with the committees in charge on or before this date. | Oct. 1, Friday | Dec. 30, Thursday | Mar. 28, Tuesday | June 23, Friday (Sept. 1972) |
| Theses for the degrees of Doctor of Philosophy and Doctor of Engineering must be filed with the Dean of the Graduate Division on or before this date. | Nov. 29, Monday | Feb. 25, Friday | May 23, Tuesday | Aug. 18, Friday (Sept. 1972) |
| Applications for fellowships and graduate scholarships for 1972-73 must be filed on or before this date. | — | Jan. 15, Saturday | — | — |
| Applications for 1972-73 undergraduate scholarships must be filed on or before this date. | — | Jan. 15, Saturday | — | — |
| Instruction ends. | Dec. 11, Saturday | Mar. 11, Saturday | June 5, Monday | |
| Final examinations. | Dec. 13-18, Monday-Saturday | Mar. 13-18, Monday-Saturday | June 7-13, Wednesday-Tuesday | |
| Quarter ends. | Dec. 18, Saturday | Mar. 18, Saturday | June 13, Tuesday | |
| Academic and administrative holidays. | Nov. 25-26, Thursday-Friday | — | May 29, Monday | |
| | Dec. 24, Friday | Feb. 21, Monday | — | |
| | Dec. 31, Friday | Mar. 24, Friday | — | |
| Commencement Week | — | — | Mid June | |

THE UNIVERSITY OF CALIFORNIA, DAVIS

be created. In 1873, the University moved to Berkeley, when the first buildings were completed.

Today the University has nine campuses to serve the State of California. Davis campus, which was originally only an agricultural school, continues to be the center for agricultural teaching and research. The other campuses are Berkeley, Irvine, Los Angeles, Riverside, San Diego, San Francisco, Santa Barbara, and Santa Cruz. Each campus has its own distinct atmosphere and special features, but all share the same high standards and adhere to the same admission regulations.

Each campus is headed by a chancellor, and the principal Universitywide officer is the president. The government of the University is entrusted to a corporation called The Regents of the University of California. There are twenty-four Regents: sixteen are appointed by the Governor; the others, including the President of the University, serve *ex officio*. An Academic Senate governs the academic activities of the University; it is composed of the president, chancellors, vice-chancellors, vice presidents, deans, directors, registrars, librarians, and all professors and instructors responsible for courses.

The Davis Division of the Academic Senate determines for the Davis campus the conditions for certificates and degrees (subject to the approval of The Regents) and authorizes and supervises all courses of instruction in the academic and professional colleges and schools.

THE HISTORY OF THE CAMPUS

A spirit of service and an atmosphere of closeness and friendliness accompany the commitment to academic excellence on the Davis campus. They grew naturally from the first days of regular instruction in 1909, when the student body consisted of twenty-eight young men who wanted to become efficient farmers.

Originally known as the University Farm, the campus was acquired to serve the rural population of California, offering three years of instruction in the principles and practice of managing soils, crops, and animals. The need for such training had been anticipated by the late Judge Peter J. Shields, who helped write the legislative Act of 1905 establishing the Farm, and who is known as "the Father of the Davis Campus."

The need for greater educational opportunities in the state increased rapidly, and in 1922, in conjunction with the 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. In 1946 the School of Veterinary Medicine was established. Mean-

while, from its beginnings as an institution which had offered only a few basic, practical courses emphasizing agriculture, a full-fledged University campus was beginning to emerge.

The period of most rapid change and expansion began in 1951 when the College of Letters and Science was founded, and more degree programs became available. Although Davis had long offered courses in the humanities and social sciences, the faculty in these disciplines now joined with the natural sciences faculty to offer fully developed University curricula. By 1961 graduate programs were so extensive and so numerous that a Graduate Division was established as a separate academic unit. The College of Engineering was formed in the following year, owing much to the foundation already provided by the curriculum in agricultural engineering which had been offered on the campus for many years. 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 PRESENT STATE OF THE CAMPUS

The University of California, Davis, has now been a general campus for almost twenty years. With an enrollment of over 13,300 students, more than 3,300 of whom are graduate students, a faculty of some 2,400, and a staff of almost 5,000, we are encountering, in common with all other university campuses in the nation, problems which our own rapid growth, complicated by changes in society, have forced upon us, and which the founders of the "University Farm" could not have foreseen.

At Davis we are attempting to develop the means to address ourselves to these urgent problems from within and without the University. We are asking ourselves, as a campus, what the purpose of the University is and what role Davis is to play in the overall mission of the University. The faculty, students, and staff are reexamining the entire learning process and the environment of the student. We are working toward a formalized structure for decision-making on matters of common concern to the entire community—some sort of community council representing the organized groups on campus: the Academic Senate, the Associated Students, the Academic Staff Organization, and the University Staff Assembly.

We feel that we have many advantages to bring to this attempt to solve our problems. Our location permits us to be somewhat insulated from the immediate thrust of society's urban problems. The spirit of friendliness and openness, maintained in the face of rapid growth, makes possible good communication between all segments of the campus. The fact that interdisciplinary groups have been present from the beginnings of this campus makes mutual respect and cooperation between departments, colleges, and schools the accepted rather than the extraordinary thing. The movement of the new administration toward decentralization of decision-making, involvement in the decision-making process of individuals affected by the decisions, and provision of administrative procedures for effecting responsible change should insure that our advantages are utilized.

We are moving ahead: strengthening our two young professional schools; expanding our established colleges to meet our share of the projected under-

graduate enrollment; developing new interdisciplinary programs to respond to verifiable changes in student needs. Unafraid of change we yet require that change be made in a responsible fashion—cooperatively, deliberately, and with confidence that our strength and our willingness to listen to each other will carry us on.

STUDENT-FACULTY-STAFF COOPERATION

Faculty Advisers

The spirit of student-faculty cooperation on the campus is especially evidenced by the willingness of the faculty advisers to furnish academic counsel when needed. Every student has access to faculty counsel and is encouraged to contact his departmental or area adviser during orientation week and preregistration periods to seek advice on course selection and information about college or university requirements. The various academic deans are also available at all times to furnish assistance with any academic problem.

Administrative Committee System

The administrative committee system of the University of California, Davis, provides the Chancellor with a means of seeking and obtaining policy recommendations and advice on a wide range of topics from members of the student body, faculty, and staff. A developing campus presents many opportunities for innovative approaches to insure the best use of the resources available. By appointing interested members of the campus community who have talents in solving problems of the various aspects of the campus, the Chancellor can bring many viewpoints to bear on an assessment of the widely varying needs of the campus population.

The Honor Spirit

A long-time tradition on the Davis campus, the Honor Spirit is most evident at examination time when there are no proctors in the classrooms and students are relied on to do their own work.

But the Honor Spirit is not limited to student behavior during examinations. According to its code, the responsibility for good conduct rests with the individual student; this attitude pervades all student activities. It is largely responsible for the atmosphere of mutual respect and confidence that exists between students, faculty, and staff, as well as among the students themselves.

THE DAVIS COMMUNITY

Davis is a rapidly growing residential community of 23,450. Its population 20 years ago was 3,500 and the projection for 10 years from now in the Davis urban area is 62,000. It is located in the Sacramento Valley, 15 miles west of Sacramento, 72 miles northeast of San Francisco, and connected to each by a major freeway, Interstate 80. It is a junction of the Southern Pacific Railroad, has a Greyhound bus depot, and is 20 minutes from the Sacramento Airport. Its climate is temperate. There is no snow in winter and the minimum average

temperature is 36°. Summers are dry and warm with a maximum average temperature of 95°.

Davis is ideally situated for access to outdoor recreation areas. In less than an hour, going west, one arrives at Lake Berryessa or, going east, at Folsom Lake, both of which are recreation areas featuring boating, picnicking, and swimming. An hour's drive brings one to Clear Lake and the famed Napa Valley to the west or the historic Mother Lode country to the east. Two hours away to the west are the coastal areas, Mendocino in the north and Santa Cruz in the south. Lake Tahoe and the Sierra Nevada mountains, with excellent ski areas such as Squaw Valley, lie two hours to the east.

The community offers many facilities. Twenty-two churches serve the area. There are six elementary schools, two junior highs, and one senior high in the district. Students rank very high in comparative achievement tests. Excellent facilities are provided for the needs of special children and school services are wide-ranging. A favorable pupil-teacher ratio is maintained.

A great variety of planned programs is offered, for all ages, in performing and fine arts, athletics, and special group recreation. Instructional programs are given on a year-round basis in aquatic and other sports, and facilities for swimming, tennis, and other sports are provided in the community's central and neighborhood parks and at the 18-hole municipal golf course.

Cultural opportunities are outstanding for a small community. In addition to the University's Professional Resident Theatre and full schedule of professional concerts, lectures, and exhibits, the Davis Art Center provides directed workshops and classes in fine arts, music, dance, and language and a permanent gallery featuring the work of local artists and offering rental services. Many of the classes perform for the public. There are two movie houses in town, one showing popular features and one specializing in art films. A new branch of the Yolo County Free Library, housing 40,000 volumes, was completed in 1968. There are two local newspapers, and home delivery of the Sacramento and San Francisco papers is available.

Professional services offered in town include those of physicians and surgeons, dentists, optometrists, attorneys, architects, and engineers. Davis has two convalescent hospitals and a 50-bed general hospital; there are several large private hospitals and a Kaiser facility hospital, as well as the UCD School of Medicine affiliated Sacramento Medical Center, in nearby Sacramento. There are banks, restaurants, clothing stores, travel agencies, and many other facilities in the downtown business area and three shopping centers in the peripheral areas.

TRANSPORTATION

The central campus is closed to vehicular traffic from 7 a.m. to 6 p.m. Monday through Friday, except on University administrative holidays. Parking permits are required for all campus lots. Permit fees in 1970-71 range from \$8 for motorcycles through \$20 for Residence Hall lots and \$30 for perimeter lots open to students to \$40 for central campus lots open only to faculty and staff. A small number of metered and daily permit spaces are open for visitors. Most members

of the campus community ride bicycles. Bicycle and pedestrian lanes are clearly marked on campus and bicycle parking is available near all major buildings. The City of Davis has bicycle lanes (which are closed to vehicular traffic) on the major arteries. Bicycles must be registered with the city and riders are subject to traffic regulations and citations for rule infractions.

There is no public transportation in the city, but the Associated Students (ASUCD) operate Unitrans, a service of three buslines to North, West, and East Davis (the University campus constitutes the southern portion of town). These buses run on a schedule convenient to class times and evening visits to labs or the libraries. Schedules and ride tickets are available at the beginning of every quarter.

RESEARCH FACILITIES ON THE CAMPUS

A number of centers, institutes, and laboratories supplement the extensive departmental research facilities on the campus: the Agricultural History Center, the Center for Administration of Criminal Justice, the Computer Center, the Food Protection and Toxicology Center, the International Agricultural Center, and the National Center for Primate Biology; the Institute of Ecology and the Institute of Governmental Affairs; the Crocker Nuclear Laboratory, the Kearney Foundation, Foundation of Soil Science, the Laboratory for Research in Fine Arts and Museology, the Radiobiology Laboratory, and the Arboretum. The diversity of the areas of research illustrate the breadth of interests pursued on the Davis campus.

UNIVERSITY LIBRARY

The Library on the Davis campus contains about 930,000 volumes and annually receives 25,000 current periodicals and serials including government publications. Its holdings in the natural sciences and agriculture are outstanding, and collections in the humanities, social sciences, fine arts, engineering, law, and medicine are being rapidly developed. In addition to the main library, there are branch libraries for health sciences, physical sciences, and agricultural economics; a law library; and several specialized departmental collections.

To accommodate the rapidly growing collection and satisfy the need for additional reading space, a wing was added to the General Library in 1964, and a second wing, completed in 1967, doubles the space available for books and readers. The collection will include almost 1,000,000 volumes by 1972.

The Library is operated on the "open stack" principle, permitting direct access to volumes shelved there. The Reference Department provides orientation and assistance in using the collection. In addition to the main stack collection, there are a number of special collections, including a Bibliographic Center collection, over 600,000 items on various forms of microscopy, some 30,000 maps, more than 350,000 pamphlets, a number of speech and music phonorecords, about 300,000 items in the F. Hal Higgins Library of Agricultural Technology, and a rare book collection of 13,000 volumes.

The Government Documents Department provides service for readers re-

quiring use of government publications. The Library is an official depository for United States government publications and for all publications of the State of California. The Atomic Energy Commission reports and the National Aeronautics and Space Administration unpublished research reports are located in the Physical Sciences Library.

The Reserve Book Service makes available for short-term loan periods a collection of several thousand volumes that are heavily used because of assigned class reading.

The Periodicals Room houses over 5,000 currently received, unbound titles of periodicals in a closed stack area. They are available for use only in the Library. A coin-operated copying machine in the Periodicals stack area can supply facsimiles of articles for \$.05 per exposure.

The Department of Special Collections provides readers with assistance in the use of rare books, University Archives, and the F. Hal Higgins Library of Agricultural Technology. Other special facilities include a browsing collection for recreational reading, headphones for music listening, audio-visual equipment, a typing room, an outdoor reading area, and a copying service that provides facsimiles of printed materials at a nominal cost.

The Library provides its users with a series of information leaflets explaining in more detail the various aspects of its services and resources.

SUMMER SESSIONS

In 1971 there will be two regular six-week Summer Sessions running from June 21 to July 30 and August 2 to September 10. The Summer Sessions will offer a number of lower division, upper division, and graduate courses of interest to students who may wish to maintain or accelerate progress toward their degree objectives. A substantial offering of upper division and graduate courses of interest to teachers and teacher candidates will also be provided, including courses for teacher candidates who have been admitted to internship programs and for other qualified graduate students who may wish to complete requirements for teaching credentials or degrees. In addition, variable unit courses in the 98-99, 198-199 and 298-299 series, group study, advanced special study, and research, will be available for qualified students in many departments.

Summer Sessions will also be conducted on the Berkeley, Irvine, Los Angeles, Riverside, Santa Barbara, Santa Cruz, and San Diego campuses. Information about these Summer Sessions is available in the Summer Sessions bulletin, obtainable from the Admissions Office, or from the Office of Summer Sessions on the respective campuses.

Announcement concerning Summer Sessions in 1972 will be issued by the Registrar and the Office of Summer Sessions.

UNIVERSITY EXTENSION

University Extension, Davis, has a twofold function: (1) through classes, workshops, and conferences in the fields of liberal arts, education, public affairs, health sciences, and management it offers continuing university edu-

cation to adults of the twenty-nine county area served by UCD; (2) through its program of community development it offers the University's resources to local communities to assist in the solution of social, economic, and cultural problems.

The Continuing Education Program is self-supporting, generating its budget from student enrollment fees. A catalog, published four times yearly by University Extension, lists the courses available for the coming quarter. Many of these offer units of Extension credit (which in some cases, may be counted toward regular academic degree programs with the permission of the appropriate University department and academic dean). Instructors are drawn from the University faculty, nearby university and college faculties, and from the ranks of professionals in the various fields of instruction. Guest speakers of national and international reputation participate in courses built around lecture series.

Extension's Community Development Program is funded through foundation and government grants, and through contracts with groups requesting assistance. Programs are developed, as the need for them arises, in such areas as low-income housing, drug abuse, aging, cultural conservation, and educational and economic opportunity. Community Development also assists in establishing lines of communication between area residents and local government, and in training local community development workers.

Detailed information on University Extension courses and programs may be obtained by writing University of California Extension, University of California, Davis, California 95616, or by telephoning (916) 752-0880.

Admission and Registration

The University's undergraduate admission requirements, which are the same on all campuses, are based on two principles. Simply stated, they are: first that the best predictor of success in the University is high scholarship in previous work, and second that the study of certain subjects in high school gives a student good preparation for University work and reasonable freedom in choosing an area for specialized study.

ADMISSION TO FRESHMAN STANDING

Each campus of the University has enrollment quotas which limit the number of new freshman students which may be admitted for each term.

The University defines a "freshman applicant" as a student who has graduated from high school but who has not enrolled since then in a regular session in any collegiate-level institution. To be eligible for admission to the University as a freshman, applicants must meet the Subject Requirement, the Scholarship Requirement, and the Examination Requirement, which are described below. Special requirements for nonresident applicants will be found on page 19.

GRADUATION FROM HIGH SCHOOL

SUBJECT REQUIREMENTS

Courses offered in satisfaction of the following requirements must appear on a list certified by the high school principal as meeting the subject requirements and be approved by the Director of Admissions of the University of California.

a. History, 1 unit*

This consists of 1 unit of United States history, or $\frac{1}{2}$ unit of United States history and $\frac{1}{2}$ unit of civics or American government.

b. English, 3 units

These consist of 6 semesters of English composition, literature, or oral expression.

c. Mathematics, 2 units

These consist of 2 units of subjects such as elementary algebra, geometry, trigonometry, calculus, elementary functions, matrix algebra, probability, statistics, or courses combining these topics. Arithmetic and such nonacademic subjects as shop mathematics and business mathematics are excluded.

d. Laboratory Science, 1 unit

This consists of a tenth-, eleventh- or twelfth-grade year course in one laboratory science. Both semesters must be in the same subject field.

e. Foreign Language, 2 units

These must be in one language. Any foreign language with a written literature is acceptable.

* A year course in high school is equivalent to one unit.

f. Advanced course, 1 (or 2) unit

This is to be chosen from the following:

Mathematics, a total of 1 unit of second-year algebra, solid geometry, trigonometry, or other certified advanced courses.

Foreign Language, either 1 additional unit in the same foreign language offered under e above or 2 units of another foreign language.

Science, 1 unit of a laboratory science completed subsequent to the laboratory science used for d above. Both semesters must be in the same subject field.

g. Electives

Additional elective units to complete the minimum of 15 standard high school entrance units are also required.

SCHOLARSHIP REQUIREMENTS

At least a B average is required in courses taken after the ninth year and used to meet the subject requirements. Grades received in elective courses or in courses taken in the ninth year or earlier are not used in computing this average. Subject requirements are satisfied by courses in which a grade of C or higher has been earned. Grades are considered on a semester basis except from schools that give only year grades. Grades, including those earned in accelerated and advanced courses, are accepted as they appear on the transcript.

In determining the B average, a grade of A in one course will be used to balance a C in another, but an A may not be used to compensate for D, I, or F grades. Courses taken in the ninth year or earlier in which a grade of D or lower is received may be repeated to establish subject credit.

Courses taken after the ninth year in which a grade of D or F is received may be repeated to establish subject credit and to improve scholarship. Courses may be repeated in an amount not to exceed a total of 1 unit of the a-f pattern. Grades earned in such repetitions will not be counted higher than a C in determining scholarship average.

EXAMINATION REQUIREMENTS

As a requirement for admission, all freshman applicants (and advanced standing applicants who have earned less than twelve units of college credit subsequent to high school graduation) must submit scores from the following examinations.

- 1) College Entrance Examination Board Scholastic Aptitude Test
- 2) Three CEEB Achievement Tests, which must include:
 - a. English composition,
 - b. social science or foreign language,
 - c. mathematics or science.

Applicants whose scholarship average in the required high school subjects is 3.00 to 3.09 inclusive must achieve a minimum total score of 2500 on the examinations. Applicants whose scholarship average is 3.1 or above are not held

for a minimum test score but must submit the required test pattern. The test results of all applicants will be used for the purposes of counseling, guidance, placement, and, when possible, in satisfaction of the Subject A requirement.

Examination Arrangements

Applicants for the fall quarter are urged to take the required examinations as early as possible. Those taking the examinations any later than January will delay the processing of their applications.

Arrangements to take the tests should be made with the Educational Testing Service, P.O. Box 1025, Berkeley, California 94701, or P.O. Box 592, Princeton, New Jersey 08540. The fees are to be paid to the Educational Testing Service. Scores will be regarded as official only if they are received by the Office of Admissions directly from the Educational Testing Service. Admissions applications cannot be processed until scores from the CEEB tests have been received by the Admissions Office.

ADMISSION BY EXAMINATION ALONE

A high school graduate who has not satisfied the entrance requirements as a result of his high school record and who has not attempted college work subsequent to high school (except during summer session immediately following high school graduation) may qualify for admission if he achieves the prescribed minimum scores in the required examinations taken after the first half of the eleventh grade. See Examination Requirement above.

For admission by examination alone the total score on the Scholastic Aptitude Test must be at least 1100; the scores on the three Achievement Tests must total 1650, and the score on any one Achievement Test must not be less than 500.

SPECIAL REQUIREMENTS FOR OUT-OF-STATE APPLICANTS

GRADUATION FROM HIGH SCHOOL

The acceptability of records from high schools outside California will be determined by the Office of Admissions.

SUBJECT REQUIREMENTS

The same subject pattern as for a California resident is required (see page 14).

SCHOLARSHIP REQUIREMENTS

The scholarship requirements for a nonresident applicant are the same as those for a resident except that the scholarship average must be 3.4 or higher in the required high school subjects taken in tenth, eleventh, and twelfth years.

EXAMINATION REQUIREMENTS

A nonresident applicant must take the same College Entrance Examination Board tests as those required of a resident applicant (see page 15). The test scores submitted will be used for the purposes of counseling, guidance, placement, and, when possible, in satisfaction of the Subject A requirement.

ADMISSION BY EXAMINATION ALONE

A nonresident applicant who is ineligible for admission to freshman standing and who has not attempted college work subsequent to high school (except during the summer session immediately following high school graduation) may qualify for admission on the basis of examination alone. The tests required of a nonresident applicant are the same as those for a resident except that the scores on the three Achievement tests must total at least 1725.

High School Preparatory Subjects

In addition to the high school subjects required for admission to the University, certain preparatory subjects are recommended for many University curricula to give the student an adequate background for his chosen field of study. Lack of a recommended high school course may delay graduation from the University. Details of these recommendations will be found in the bulletin *Prerequisites and Recommended Subjects*, which is ordinarily in the hands of high school and junior college counselors.

A student needing additional preparation is advised to attend one of the many excellent California junior colleges. There he can take courses applicable toward the requirements of the college or school of the University in which he wishes to enroll.

ADMISSION TO ADVANCED UNDERGRADUATE STANDING

Each campus of the University has enrollment quotas which limit the number of new advanced-standing students which may be admitted each term.

Applicants who have registered since high school graduation in any collegiate institution, including junior colleges, summer school, or extension courses, must apply for admission to advanced standing. An applicant may *not* disregard his previous college record and apply as a freshman. However, an advanced standing applicant who has earned less than twelve units of college credit subsequent to high school graduation must satisfy the examination requirement for freshman applicants as described on page 15. The examination requirement may be disregarded in determining eligibility for freshman standing if the applicant has earned more than 12 units of college credit subsequent to high school graduation.

Regulations applying to admission to advanced standing are as follows:

1. Those eligible for admission from high school, but who attended another collegiate institution, must present from that institution a statement of good standing and a grade-point average of 2.0 (2.8 for nonresidents).
2. Those *ineligible* for admission from high school because of subject omissions may establish eligibility by completing, at an accredited college, the required courses with at least C grades, and by maintaining an average of 2.0 (2.8 for nonresidents).
3. Those *ineligible* for admission from high school because of grade-point deficiency may establish eligibility by completing, at an accredited college, a minimum of 56 acceptable semester units (or 84 quarter credits), with an average of 2.4 or better (2.8 for nonresidents).

4. Subject deficiencies of not more than 2 units may be waived for those who present the 56 or more semester units (or 84 quarter credits) and the 2.4 grade-point average mentioned above (2.8 for nonresidents). Deficiencies in excess of 2 units must be satisfied.

The University grants credit for courses consistent with its curriculum that have been completed in accredited colleges and universities. The University accepts approved transfer courses completed with satisfactory grades in the public junior colleges of the state. Frequently, students who intend to complete their advanced studies at the University will find it to their advantage to complete the first two years of the college work in a California public junior college. However, not more than 105 quarter units in a junior college (70 semester units) are acceptable toward a University degree, although subject credit may still be earned. Entering transfer students earning credit by this means will not be penalized for changes that occur in University graduation requirements while they are attending junior colleges.

The acceptability of extension courses taken at an institution other than the University is decided by the Office of Admissions. The faculty of the particular school or college in which the student plans to enroll, however, decides upon the applicability of such course work in satisfaction of degree requirements. Under the Advanced Placement Program of the College Entrance Examination Board, entering freshmen may receive advanced standing credit for Advanced Placement Examinations completed with scores of at least 3, 4, or 5 on both essay and objective sections of the tests.

EDUCATIONAL OPPORTUNITY PROGRAM

The Educational Opportunity Program provides entrance to the University for students from racial minority groups and/or low income groups who may or may not have had adequate high school preparation. Under this program EOP recruits Blacks, Asians, Native Americans, Chicanos, and Others. The "Others" group includes white applicants and persons not wishing to be identified in one of the preceding ethnic categories who have a history of low income during the primary and secondary school years.

The Educational Opportunity Program accepts and considers all applications from eligible students. The program is limited, however, by admission spaces and funds. Interested applicants are encouraged to apply to the other Educational Opportunity Programs throughout the state, as well as to the program on the Davis campus.

An application for admission to the Educational Opportunity Program at the Davis campus may be obtained by writing to the Educational Opportunity Program, Admissions, 175 Mrak Hall, University of California, Davis, California 95616.

ADMISSION OF APPLICANTS FROM OTHER COUNTRIES

Applicants from other countries will be admitted in accordance with the general regulations governing admissions. An application, official certificates, and detailed transcripts of record should be submitted to the Office of Admis-

sions early in the appropriate filing period (see page 21). Doing so will allow time for exchange of necessary correspondence and, if the applicant is admitted, will help him in obtaining the necessary passport visa.

An applicant from another country whose native language is not English may be admitted only after demonstrating that his command of English will permit him to profit by instruction in the University. An applicant's knowledge of English is tested by an examination given by the University. Admission of an applicant who fails to pass this examination will be deferred until he has acquired the necessary proficiency in the use of English.

Foreign students whose schooling has not been in English are urged to take the Test of English as a Foreign Language (TOEFL). Arrangements to take the test may be made in writing directly to TOEFL, Educational Testing Service, P. O. Box 592, Princeton, New Jersey 08540, U.S.A. Results of the test should be forwarded to the Office of Admissions, University of California, Davis, California 95616.

A student from a non-English speaking country is given college credit in his own language and literature only for courses completed in his country at institutions of college level, or for upper division or graduate courses taken in the University of California or in another English-speaking institution of approved standing.

Undergraduate Financial Aid. Effective July 1, 1970, there will be no grants or loans awarded by the University of California at Davis to undergraduate international students during their first year of study. There is no guarantee of financial help from the University following the first year.

REQUIREMENTS FOR ADMISSION TO GRADUATE STANDING

See page 172 or the *Announcement of the Graduate Division*.

SPECIAL ADMISSION CATEGORIES

In the case of a student who is technically ineligible for admission to the University, the Admissions Officer has authority and responsibility to consider other evidence of ability to pursue University work.

Conditions for admission to *special* or *limited status* are assigned by the Admissions Officer and are subject to the approval of the dean of the college or school in which the applicant plans to study. Admission is for a specified time only, and a prescribed scholarship average must be maintained. No degree can be granted to students in special or limited status. Applicants must submit transcripts of record from all schools attended beyond the eighth grade. They may also be required to take the examination in Subject A.

Special Status

Students admitted to special status are those twenty-one years of age or older who have not completed the University admission requirements but whose special attainments may qualify them for certain courses in the University toward a definite and limited objective.

No applicant will be admitted directly from high school, and only cases of unusual merit will be considered. A personal interview is usually required before final action can be taken.

A special status student will be admitted to courses for which, in the judgment of the instructor, he has satisfactory preparation. Students in this category will seldom be able to undertake the work of engineering and professional colleges or schools.

An applicant will not be admitted to special status for the purpose of making up requirements for admission to the University as a regular student.

Limited Status

Students in limited status are those with a bachelor's degree who are not candidates for an advanced degree, or those without a bachelor's degree who have completed a substantial amount of college work with a satisfactory scholarship average and whose special attainments may qualify them for certain courses in the University toward a definite and limited objective.

An applicant will not be admitted to limited status for the purpose of raising a low scholarship average.

(Enrollment pressures have necessitated closing this status to applicants desiring admission to the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science.)

Applicants for a Second Bachelor's Degree

The second bachelor's degree is limited to students who have completely changed their objective. Those admitted to this status must indicate very strong probability of academic success.

Admission is subject to the approval of the Admissions Officer and of the dean of the school or college in which the applicant plans to enroll.

(Enrollment pressures have necessitated closing this status to applicants desiring admission to the College of Letters and Science.)

APPLICATION PROCEDURES

Applicants are expected to study the admission requirements (starting on page 14) to determine as closely as possible their eligibility before following the steps outlined below. Application should be directed to only one campus of the University.

Admission to the University is not an assurance of financial aid nor does it guarantee assignment to University housing. Separate applications are required of applicants desiring financial aid or University housing.

For Freshman Standing

1. Application Form

An application for admission is obtained by writing the Office of Admissions, University of California, Davis, California 95616. Applications (and application fees) are to the University and not to a particular campus even though the applicant sends them to a campus of first choice. Consequently, the fee is not

refundable if a particular campus cannot accommodate the applicant. The opening dates listed below are the dates on which application materials are first made available; however, they may be requested in advance. All campuses observe these dates for the beginning of application filing. Each campus will accept for consideration all applications filed during the first month of the filing period. After the first month the deadline will vary from campus to campus. Each campus has enrollment quotas that limit the number of new freshman and new advanced standing students that may be admitted. Once these quotas have been filled, additional applications cannot be accepted and will be redirected to another University campus where enrollments are still open. For this reason, applicants should give careful thought to the order in which alternate campus preferences are listed on the application form. Equally important, the completed application should be filed very close to the appropriate opening date shown below.

| <i>Quarter</i> | <i>Applications Available</i> |
|---|-------------------------------|
| 1972 Winter Quarter (begins January 3) | (Closed to new students) |
| 1972 Spring Quarter (begins March 27) | October 1, 1971 |
| 1972 Fall Quarter (begins September 25) | November 1, 1971 |

2. Application Fee

The completed application form accompanied by a \$10 (\$20 effective winter quarter 1972) nonrefundable application fee should be returned to the Office of Admissions as promptly as possible. (The application fee should be in the form of a check or money order made out to The Regents of the University of California.) An application received without the fee will be returned to the applicant.

3. Transcript of Record

The applicant is responsible for arranging to have transcripts sent and for insuring their early arrival at the Office of Admissions, University of California, Davis.

Students still in high school should request the school to send directly to the Office of Admissions an official transcript of all work completed through the junior year and a list of courses in progress during the final two semesters. A complete and final transcript, including a statement of high school graduation, must be submitted for each applicant by the high school from which he graduated. Any additional schools attended after an application for admission has been filed are considered to be a part of the applicant's record and are to be reported to the Office of Admissions. Transcripts and other documents submitted become the property of the University and are not returnable.

4. Notification of Eligibility

Applicants will be notified of eligibility providing appropriate transcripts are on file. A delay will occur if required documents or fees have not been received. Applicants for the fall term will be notified of their eligibility status after their records have been evaluated and after February 15. Transfer students in semester-system schools will be notified after the fall grades and a list of spring courses

in progress have been received. Transfer students in quarter-system schools will be notified after winter quarter grades and a list of spring courses in progress have been received. The notification period is from February 15 through May 15.

5. "Statement of Intention to Register" Form

Admitted applicants will receive a "Statement of Intention to Register" form with their notification of eligibility. The form should be completed and returned along with a \$50 nonrefundable fee. This fee will be credited to the University registration fee if the student registers for the quarter in which he is accepted.

6. Smallpox Vaccination Certificate

During the registration period every new student and every student returning to the University after an absence of one or more quarters must present at the time of examination by the University medical examiners, a certificate establishing the fact that he has been successfully vaccinated against smallpox within the last three years. A form for this purpose is routinely sent to all new students.

7. Change of Campus

If, after an applicant has filed for admission, his plans change and he prefers to register on a different campus, he must write to the Director of Admissions, University Hall, University of California, Berkeley, California 94720, indicating his reason for the change. His records will be transferred to the campus he wishes to attend provided facilities are available there. Such requests must be received before the end of the filing period.

8. Reapplication

An applicant who is not eligible for admission, or one who has been admitted but does not register in the quarter for which he applied and who later desires to attend the University, must submit a new application for admission with the \$10 (\$20 effective winter quarter 1972) fee. The new application will be acted upon in light of the current availability of facilities and current admission requirements.

For Advanced Undergraduate Standing

Applicants for admission to advanced undergraduate standing should follow all steps outlined above for freshman standing and in addition arrange with each college or university attended since graduation from high school to send directly to the Office of Admissions, University of California, Davis 95616, an official transcript of work completed or in progress.

For Intercampus Transfer

An undergraduate student who is registered on any campus of the University, or who was previously registered in a regular session of the University and has not since been registered in another institution may apply for transfer to another campus of the University by filing the proper forms *on the campus where he last registered*. The intercampus transfer application forms and application for

transcript of record forms may be obtained from the Office of the Registrar and must be filed with that office. There is a fee of \$10 (\$20 effective winter quarter 1972) at the time of filing. Dates for filing are the same as those listed for new applicants.

For Graduate Standing

An application form and information are obtained by writing directly to the Office of the Graduate Division, Room 252, Mrak Hall, University of California, Davis 95616.

For Professional School Admission

School of Law

The requirements for admission to the School of Law are described on page 154. More detailed information and the appropriate application form may be obtained by writing the School of Law, University of California, Davis 95616.

School of Medicine

The requirements for admission to the School of Medicine are described on page 156. More detailed information may be obtained by writing to the School of Medicine, University of California, Davis 95616.

School of Veterinary Medicine

The requirements for admission to the School of Veterinary Medicine are described on page 166. More detailed information may be obtained by writing the School of Veterinary Medicine, University of California, Davis 95616. The application form may be obtained from the Office of Admissions, University of California, Davis 95616.

GENERAL REGISTRATION PROCEDURE

All students must complete registration requirements. These requirements include:

1. Obtaining registration materials from the Registrar at the designated time and place. (Detailed information may be found in the *Schedule and Directory* available from the UCD Bookstore and the Information Desk in the lobby of Mrak Hall shortly before the opening of each quarter.)

Late registration privileges will be granted through the tenth day of instruction. A \$10 fee will be assessed to defray the extra clerical costs of late registration.

2. Preparing with the faculty adviser, when necessary or required of a student, a study program of courses and obtaining the adviser's signature on the Study List Card, when such signature is required by instructions issued at the time of filing.

3. Entering students must enroll in the Subject A course if they have not satisfied this requirement (see page 30).

4. Students who wish to continue a foreign language studied only in high

school will take a placement test to determine the appropriate level of language ability for proper placement in class (see page 147).

5. Entering students must satisfy the American History and Institutions requirement (see page 30).

6. Maximum and minimum limits are placed on the number of units for which a student may enroll each term. These vary with each college or school. However, the University considers 12 quarter units a minimum full-time load. All students participating in student and intercollegiate activities must carry this minimum number of units.

7. Paying the prescribed fees (see page 33).

For all nonimmigrant international students, the Associated Students Supplementary Health Insurance program is required (see page 43).

8. Passing a physical examination given by the University Medical Examiners (see page 43).

5. Submitting a Statement of Residence. This is required of all new and returning students, including new graduate students who may have been registered previously as Davis campus undergraduates, and those whose residency status has changed recently (see page 31).

10. Familiarizing themselves with the requirements of their particular college or school.

11. Presenting completed registration forms and packets to the Registrar by the prescribed times (see the *Schedule and Directory*).

ADDING OR DROPPING COURSES

Adding or dropping courses after the registration materials have been submitted to the Registrar requires the filling out of the appropriate petition (with approval from the student's adviser and the dean of his college, when required, according to instructions on the petition) which is subsequently presented to the Registrar. Since this entails a considerable amount of work for everyone, students are encouraged to keep these requests to a minimum by determining from the instructor as early as possible the nature of the course requirements such as the number of term papers required, examinations, reading lists, etc. The student's appreciation of this problem will be of great help.

CHANGES OF MAJOR, COLLEGE, OR SCHOOL

With the approval of the appropriate dean or deans, a student in good standing can transfer from one area of study to another. Petition forms for this purpose may be obtained from the Registrar.

CHANGE OF NAME

Petition forms for this purpose may be obtained from the Registrar. Changes for reasons other than marriage must be accompanied by evidence of legality of change.

WITHDRAWALS

Withdrawals may be granted by the University for *emergency* reasons or for *good cause*. Unauthorized withdrawals may jeopardize the student's registration privileges and result in failing grades. Forms for this purpose must be obtained from the Registrar's Office.

It is also important that students who have been receiving veterans benefits or who have been deferred by Selective Service because of registration in the University report immediately, in person or by mail, to the Office of Student Affairs.

READMISSION AFTER AN ABSENCE

All former students who wish to re-enter the University of California, Davis, must file an application for readmission with the Registrar and submit the non-transferable, nonrefundable fee of \$10 (\$20 effective winter quarter 1972). (Former students are those who have interrupted the completion of consecutive quarters of enrollment on the Davis campus.) Official transcripts of all work attempted in the interim must be submitted. Final dates for filing for readmission are listed on page 5.

RULES GOVERNING RESIDENCE

Students who have not been legal residents of California for more than one year immediately prior to the opening day of the quarter in which they register are charged, along with other fees, a tuition fee (\$500) for the quarter (see page 33). Legal residence is the combination of *physical presence* in California and the *intention* of making it one's permanent home, coupled with the relinquishment of legal residence in any other state. The student who is within the state primarily for educational purposes does not gain the status of legal residence regardless of the length of his stay in California. In general, the unmarried minor (any person under 21 years of age) derives legal residence from his father; or from his mother if the father is deceased; or, in the case of divorced parents, from the parent awarded legal custody by the court. The married woman derives legal residence from her husband from the date of marriage. (Government Code Section 244 and Education Code Sections 23054, 23055, 23057, 23058, and 23059.)

The attention of the following students is directed to the fact that presence in California for more than one year does not, in itself, entitle them to resident classification: 1) those under 22 whose parents are not California residents; 2) servicemen stationed in California who were not California residents at the time of entry into the military service; 3) alien students who first must qualify for permanent residence status according to the applicable laws of the United States.

Exemption from payment of the nonresident tuition fee is available to the unmarried minor whose natural or adoptive parent is in the active military service of the United States and is stationed in California on the opening day of the quarter for which he registers, or is stationed outside the United States

immediately after having been stationed on active duty in California. This waiver is also available to the spouse of a member of the military service of the United States with an active duty station as described above.

New and returning students are required to fill out a Statement of Legal Residence, a form that is issued at the time of registration. Their status is determined by the Attorney in Residence Matters deputy, who is located in the Registrar's Office. Inquiries from prospective students regarding residence requirements for tuition purposes can be made by writing to the Attorney in Residence Matters, 590 University Hall, University of California, Berkeley, California 94720. *No other University personnel are authorized to supply information relative to residence classification.*

Those classified incorrectly as residents are subject to reclassification as non-residents. If incorrect classification results from false or concealed facts, the student is subject to University discipline and is required to pay all back fees he would have been charged as a nonresident. Resident students who become nonresidents must immediately notify the Attorney in Residence Matters or his deputy. Application for a change in classification with respect to a previous quarter cannot be accepted.

Scholastic Requirements

EVALUATIONS

Every instructor is required to assign a letter grade for each student registered in his course. The QUALITY of a student's work will be reported in one of the following grades:

Passing work: A, excellent; B, good; C, fair; D, barely passing.

Failing work: F, work so poor that it must be repeated to receive recognition.

Undetermined: I, work is satisfactory but incomplete for good cause.

Passed (P) or No Record: Subject to regulation by the faculties of the various colleges and schools, a student in good standing is authorized to undertake one course each term on a *Passed* or *No Record* basis and is allowed to accumulate this option when it is not used. Units thus earned will be counted in satisfaction of degree requirements, but such courses will be disregarded in determining the student's grade-point average. Students wishing to exercise this option should familiarize themselves with the requirements of their particular college or school.

In specific courses which have been approved by the respective departments and by the appropriate Committees on Courses of Instruction, individual instructors may assign *only* Passed or Not Passed grades. A student electing such a course may do so in addition to using *his* Passed/No Record options.

Satisfactory (S) or Unsatisfactory (U): Graduate students, under certain circumstances, may be assigned grades of S or U, but in calculating the grade-point average, units gained in this way will not be counted.

Evaluation of the student's performance may be deferred in certain sequential courses (those that carry the designation *Deferred Grading Only, pending completion of the sequence*). In order to gain credit toward graduation, a student must successfully complete the entire sequence in successive quarters. Such courses may not be taken by students on probation, nor may the student take such a course using the Passed/No Record or Satisfactory/Unsatisfactory option.

Quality points (grade points) will be assigned each grade as follows:

| | | | |
|----|--------|----------|----------|
| A+ | = 4.0, | A = 4.0, | A- = 3.7 |
| B+ | = 3.3, | B = 3.0, | B- = 2.7 |
| C+ | = 2.3, | C = 2.0, | C- = 1.7 |
| D+ | = 1.3, | D = 1.0, | D- = 0.7 |
| F | = 0.0 | | |
| I | = 0.0 | | |

All grades except I are final when filed by an instructor in his end-of-term course report. No final grade except I may be revised by reexamination. A student whose record shows more than 16 units of incomplete will be subject to probation or disqualification. While I grades do not count in the grade-point average for or against the student's record during his enrollment, they could weigh negatively at the time of his graduation. In determining whether a bachelor's degree candidate has achieved the 2.0 grade-point average, an I grade

is counted as though it were an F. Hence, it is recommended that students do not delay the clearance of incomplete grades as graduation may well be jeopardized.

A student may repeat only those courses taken on the Davis Campus in which he has received a grade of D, F, Not Passed, or No Record. In computing the grade-point average of an undergraduate who repeats courses in the University in which he received a D or F, only the most recently earned grades and grade points shall be used for the first 16 units repeated. Thereafter the student will receive the grade assigned and the corresponding grade points earned for each time he takes the class. However, when a course is repeated, the units completed will be credited towards a degree only once.

The QUANTITY of work attempted by the student is measured in quarter units (see page 180) which are assigned by the faculty for each individual course. To convert these units to semester units multiply by 2/3; from semester to quarter units by 3/2.

The student's course work is recorded in terms of units, grades, and grade points. The ratio of grade points over units attempted determines the grade-point average. The student is expected to maintain a C (2.0 grade-point average) or better on all work undertaken in the University. If he falls below a C average, he will be scholastically deficient.

SCHOLASTIC DEFICIENCIES

The following provisions apply to all undergraduate students in the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science.

Probation. A student shall be placed on probation if at the end of any term his grade-point average for that term, or his cumulative grade-point average, is less than C (2.0) computed on the total of all courses undertaken at the University of California.

To be removed from probationary status, a student must achieve an overall grade-point average of at least C (2.0) on all work attempted in the University of California, including courses graded I (incomplete).

Disqualification. A student shall be subject to disqualification from the University if:

- a. His grade-point average falls below 1.5 for any term, or
- b. After two consecutive terms on probation he has not achieved an overall grade-point average of at least C (2.0) on all work attempted in the University of California, or
- c. He has accumulated more than 16 units of I (Incomplete).

The student subject to disqualification is subject to such action as the faculty of his college or school may determine. The faculty may:

- a. Disqualify such a student from the University, or
- b. Suspend his disqualification, continuing him on probation.

The faculty of his school or college is also the body which may authorize the return on probation of a disqualified student.

To transfer from one campus of the University to another, or from one college or school to another on the same campus, a student who has been disqualified or is on probation must obtain the approval of the dean whose jurisdiction he is seeking. After making the transfer, the student is subject to supervision by the faculty of the new college, school or campus.

Graduate and professional students with scholarship deficiencies are subject to action at the discretion of their respective deans.

The School of Veterinary Medicine has the following provisions:

Probation. A student shall be placed on probation if at the close of his first term in the School of Veterinary Medicine his record for that term falls below a C average, computed on the total of all courses taken in the veterinary medical curriculum.

Disqualification. A student shall be subject to disqualification from the School of Veterinary Medicine:

a. If at the end of any term subsequent to his first he has failed to maintain a grade-point average of 2.0 (a C average), computed on the total of all courses taken in the veterinary medical curriculum, subsequent to his admission to the School, for which he has received a final report; or

b. If during any term he fails to pass with a grade of C or higher courses totaling at least 4 units; or

c. If at any time he has, in the judgment of the faculty of the School, failed to meet the professional and ethical standards of the profession of veterinary medicine.

TRANSCRIPTS OF RECORD

Upon written request to the Office of the Registrar, a student will be provided with an official transcript of work he has completed at the Davis campus of the University of California. Transcripts of work completed at any other University campus or any other institution must be requested directly from the school concerned.

A fee of \$1 per copy of each graduate and each undergraduate record should accompany each request. Graduate and undergraduate transcripts are individual records and must be requested separately.

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

MID-TERM GRADE STANDING

Students wishing to know their cumulative grade at the mid-quarter may inquire from their instructor. Those who have deficient grades (D, F, or Not Passed) should confer with their adviser. The Office of Student Affairs may also be of assistance.

FINAL EXAMINATIONS

The *Schedule and 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 students can avoid final examination conflicts.

Final examinations are mandatory in all undergraduate courses except independent study courses, courses which consist of laboratory work only, and courses for which the final examination has been waived by the Academic Senate. On courses which have the final examination waived, the course description will include the statement, "no final examination."

Wherever practicable, final examinations are written and must be completed within a previously announced time limit. Examinations in non-laboratory courses may not exceed two hours.

Under certain prescribed conditions a student may receive Credit by Examination without formal enrollment in a course. The rules governing such examinations may be obtained from the Registrar.

Final grade notices will be sent to the student if, before the end of the term, he has deposited with the Registrar a self-addressed, stamped envelope.

DEGREE REQUIREMENTS

Three groups of requirements must be satisfied before the student can become eligible for candidacy for the bachelor's degree. They are: 1) college or school requirements; 2) individual departmental requirements, which are all specific and vary as to particulars; and 3) the University requirements, which are general and apply to all schools and colleges. For information on college, school, or departmental requirements see the appropriate section of this catalog.

The University requirements are as follows:

Subject A: English Composition

Every entering student must satisfy the Subject A requirement. This requirement is designed to assure a level of competence in written English essential to satisfactory progress as a University student. The requirement can be met:

1. By achieving a grade of 5, 4, or 3 in the College Entrance Examination Board (CEEB) Advanced Placement Examination in English, *or*
2. By achieving a score of 550 or higher in the CEEB Achievement Test in English Composition, *or*
3. 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.

Satisfaction of the Subject A requirement is determined by the Office of Admissions. Students not meeting the requirement in one of the ways described above must enroll in the non-credit course in Subject A during their first quarter of residence in the University. A fee of \$45 is charged for the course.

International students whose native language is not English can meet the Subject A requirement by passing a special examination in English composition and, if necessary, completing English 26 with a minimum grade of C.

American History and Institutions

Every student must demonstrate a knowledge of American History and Institutions. Every graduating student should 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.

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

1. One high school unit in American history, or $\frac{1}{2}$ high school unit in American history and $\frac{1}{2}$ high school unit in civics or American government, with a grade of C in each course.

2. By completing any one of the following courses: History 17A, 17B, 21A, 21B, 27A, 27B, 170A, 170B, 170C, 171A, 171B, 171C, 174A, 174B, 175A, 175B, 176A, 176B, 178A, 178B, 179A, 179B, 180, 183A, 183B; Political Science 1A, 1B, 100, 102, 103A, 103B, 104, 105, 106, 113, 128A, 128B, 163, 164, 166A, 166B; Economics 111; Sociology 30A, 30B, 30C. Students taking these courses are subject to the rules that apply for prerequisites and majors. Upper division history courses may be taken to satisfy the requirement only with the permission of the instructor.

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

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

International students studying at the University on F class (student) or J class (exchange visitor) visas should call at the American History and Institutions office to secure exemption from the requirement. They should bring their passports, visas, and registration cards with them.

Further information may be obtained from the Supervisor of the American History and Institutions Requirement, 227 Voorhies Hall.

Residence Requirement

The minimum residence requirement for a bachelor's degree at the University of California is one academic year. Each summer session in which a student completes a course of at least 3 quarter units may be counted as half a quarter's residence. Thirty-five of the final 45 quarter units completed by each candidate must be earned in residence in the college or school of the University of California in which the degree is to be taken; no more than 18 of these 35 quarter units may be completed in summer session courses on the campus of residence.

Exceptions to this rule are candidates for the Juris Doctor degree, and those who have been in the military service. With the approval of the dean of his college or school, a candidate for the bachelor's degree who was in active service in the armed forces of the United States in the year preceding the award of the degree may be recommended for the degree after only one quarter of University residence in which he completes at least 16 units or passes a comprehensive examination in his major or field of concentration.

Scholarship Requirement

To receive a bachelor's degree, a student must obtain twice as many grade points as units for all courses attempted by him in the University. An exception to this rule is authorized for honors students undertaking certain courses (see conditions for Credit by Examination, page 30).

Unit Requirement

Every candidate will present a minimum of 180 quarter units as partial satisfaction of the requirements for the bachelor's degree.

Filing for Degree Candidacy

Each candidate for a degree must file an Announcement of Candidacy with the Registrar at the beginning of the quarter in which he plans to receive it. The dates for filing are published on page 5 of this catalog and in the *Schedule and Directory*.

HONORS AND PRIZES

Deans' Honors List

The names of all students, with the exception of Letters and Science students (see page 149), who have completed a minimum of 12 units of work on the Davis campus and who have achieved a 3.2 cumulative grade-point average or better in all work undertaken in the University and in the college will be listed by the various deans and submitted to the ASUCD for publication in the *Student Directory* each year.

Honors students may request credit by examination in courses without formally enrolling in them, or in subjects appropriate to their curriculum but not offered as courses in the University. Arrangements should be made with the dean, and his consent and that of the instructor appointed to give the examination are necessary before the examination can be given. Application forms for such examinations may be obtained from the Registrar.

Graduation Honors

Graduating students may qualify for honors, high honors, or highest honors. The names of recipients are published in the commencement program and the appropriate notation is made on diplomas and on permanent records in the Registrar's Office.

Prizes

Prizes for student achievement and scholarship on the Davis campus consist of inscribed plaques and cash awards. The University Medal is the highest honor awarded to a graduating senior in recognition of superior scholarship and achievement. In addition, a College Medal is given to the outstanding graduating senior of each of the colleges and professional schools.

Student Expenses, Housing, and Financial Aid

In addition to budgetary advice and counsel, financial assistance consists of scholarships, grants, loans, and employment—offered singly or in various combinations—to meet the difference between the student's resources and the cost of attending the University.

The University expects parents to make a maximum effort to assist their sons and daughters with college expenses. The student's desire to be independent of his parents or rejection of their support is not held to be a valid reason for granting financial aid. The University also expects that all students will provide a part of the total cost of attending the University from resources outside the University. The financial assistance given by the University should be viewed only as supplementary to the resources of the applicant and his family. These premises are assumed in determining the type and amount of assistance necessary to meet the student's financial deficit.

The following information will introduce you to the various types of financial assistance available on the Davis campus as well as to the procedures for making application for assistance. We invite you to make further inquiries about our Financial Aid Program and about the various ways in which a college education might be financed.

EXPENSES

Legal residents of California are not required to pay tuition at the University. (Students classified as nonresidents must pay a tuition of \$500 per quarter.) Nevertheless, there are certain other expenses that have to be considered. Although each student must determine his own budget in keeping with his needs and resources, the following approximated costs per quarter are presented as a guide.

Registration:

| | <i>Undergraduates</i> | <i>Graduates</i> |
|--------------------------------------|-----------------------|------------------|
| University Registration fee | \$ 100.00 | \$ 100.00 |
| Memorial Union fee | 3.50 | 3.50 |
| Student body membership fee | 7.00 | ... |
| Education fee | 100.00 | 120.00 |
| Total for California residents | \$ 210.50 | \$ 223.50 |
| Tuition for nonresidents | 500.00 | 500.00 |
| Total for nonresidents | \$ 710.50 | \$ 723.50 |

Additional approximated costs:

| | |
|--|---------------|
| Room and board | \$ 350–500.00 |
| Books and supplies (costs may exceed \$75.00 in special cases, such as for students in medicine or veterinary medicine) | 35– 75.00 |
| Miscellaneous (includes travel, health insurance, laundry and clothing, recreation, medical and dental care, and toiletries) | 150–250.00 |

The costs listed above are average costs and fees are subject to revision.

FINANCIAL AID PROGRAM

The primary purpose of the Financial Aid Program at Davis is to provide financial assistance and advice to students who would be unable to pursue their education at the University without such help.

In addition to budgetary advice and counsel, financial assistance consists of scholarships, grants, loans, and employment—offered singly or in various combinations—to meet the difference between the student's resources and the cost of attending the University.

The University expects parents to make a maximum effort to assist their sons and daughters with college expenses. The student's desire to be independent of his parents or rejection of their support is not held to be a valid reason for granting financial aid. The University also expects that all students will provide a part of the total cost of attending the University from resources outside the University. The financial assistance given by the University should be viewed only as supplementary to the resources of the applicant and his family. These premises are assumed in determining the type and amount of assistance necessary to meet the student's financial deficit.

The following information will introduce you to the various types of financial assistance available on the Davis campus as well as to the procedures for making application for assistance. We invite you to make further inquiries about our Financial Aid Program and about the various ways in which a college education might be financed.

Students should have enough funds with them at the beginning of the fall quarter to cover registration fees, books, and the first month's room and board, as scholarship, grant, work-study, and loan checks will not be available until after registration.

Students may be subject to the following fees for optional services: parking, \$30 or \$20 for cars, depending on the type of permit desired, and \$8 for motorcycles; \$26 for health insurance; \$3 for changes in study lists after the announced deadlines; \$10 for late filing of study lists; \$10 for late payment of fees; \$10 for late registration; \$1 for each transcript requested; \$10 for applications for re-admission or intercampus transfer. The \$50 undergraduate Acceptance of Admission Fee is nonrefundable and is applied toward the University Registration Fee at the first registration.

APPLICATION PROCEDURE

Application forms may be obtained from the Office of Financial Aid, North Hall, University of California, Davis, California 95616. To facilitate the granting of monies to students, one application form has been developed to handle all of the undergraduate scholarships, loans, grants, and Work-Study jobs administered by the Davis campus.

The application, which consists of the student's personal and budgetary information and the Parents' Confidential Statement, is reviewed by the financial aid committee to determine eligibility for, and dollar amount of, a scholarship, loan, grant, employment under the Work-Study Program, or a combination of these.

A Parents' Confidential Statement must accompany the student's personal and budget information page in order for the application to be complete and to permit an evaluation of need. The Parents' Confidential Statement form may be obtained from the high school or college and must be sent to the College Scholarship Service, P.O. Box 1025, Berkeley, California 94701 for evaluation at least one month before the deadline stated below.

Application Deadline. Applications are available in November for the following academic year. In order to be given consideration for a scholarship, the completed application and Parents' Confidential Statement must be received by the Financial Aid Office no later than *January 15*.

For other types of financial assistance (loans, jobs, grants) applications and supporting information must be received no later than *March 1*.

Applications submitted after these dates will be considered only as funds become available.

Notification of awards will be made to students by

April 30—for scholarships

July 1—for other types of financial aid (loans, jobs, grants).

TYPES OF AID AVAILABLE THROUGH THE FINANCIAL AID OFFICE

Undergraduate Scholarships

Regents Scholarships. These awards, granted by the President of the University and the Chancellor of the Davis campus, are among the highest honors that may be conferred upon an undergraduate student. Recipients are selected on the basis of academic excellence and exceptional promise. Students are eligible for Regents Scholarships upon graduation from high school or upon completion of the sophomore year at the University, at one of California's public junior colleges, or at another accredited collegiate institution. All scholarship applicants who meet the qualifications are considered for these awards.

The amount of each scholarship is based on the student's financial need. Awards may be honorary in nature or may be accompanied by a stipend to cover the difference between family resources and the yearly standard cost of education at the University. *If you wish to be considered for a Regents Scholarship with honorarium only, you should so indicate, and you need not file a Parents' Confidential Statement.*

The term of appointment is four years for students entering from high school and two years for students appointed on completion of the sophomore year. Regents' scholars are expected to maintain at least a B average in course work undertaken at the University.

President's Scholarships. These one-year awards are made annually to entering and continuing students, including junior college transfers. They are granted by the President of the University and the Chancellor of the Davis campus. Again, all scholarship applicants are considered for these awards.

President's scholarships are awarded on the basis of scholastic attainment, financial need, and promise. The awards carry a maximum stipend of \$500. In cases where the established financial need exceeds this amount, the awards will be supplemented by additional scholarship funds, grants, loans, and/or part-time work under the College Work-Study Program.

University, Alumni, Endowed, and Agency Scholarships. These scholarships are made possible through funds provided by individual donors, private corporations and agencies, the alumni associations, and The Regents of the University. These awards vary considerably in amount but normally average between \$400 and \$500 per year.

Most scholarships are open to all undergraduate students on a competitive basis. Although some are restricted by the donors to recipients who meet given criteria, students need not apply for any specific scholarship, but should indicate on the application form all the listed qualifications which they can satisfy.

These scholarships, with the exception of some agency grants, are awarded by the Chancellor of the Davis campus on the advice of the faculty. They are granted on the basis of academic achievement, financial need, and promise.

Normally, scholarships are awarded for one year; financial assistance for succeeding years will depend upon the academic performance in the University and continued financial need. An average of B in the University is generally re-

quired for a recipient to be considered for awards after the first year. Where the established financial need exceeds the amount of the awards, the awards will be supplemented by additional scholarship funds, grants, loans and/or part-time work under the College Work-Study Program.

Educational Opportunity Grants

Eligibility for Educational Opportunity Grants is limited to undergraduate students of exceptional financial need, as measured on a scale of parent contribution which has been established by the Federal Government. Upon receipt of the completed Financial Aid Application and the Parents' Confidential Statement, the Financial Aid Office determines the parents' contribution by using College Scholarship Need Analysis procedures. The amounts of the grants range from \$200 to \$1,000 per academic year. The amount of the grant may not exceed one half of the total financial aid award, as the grant must be matched on an equal basis with some other form of financial aid (i.e., a scholarship, grant, loan, or job from the University, or a scholarship, grant, loan, or job from outside sources).

UC Grants

All full-time graduate or undergraduate students with an established need may apply for assistance under the University of California (UC) Grants Program. These grants are ordinarily given only to students with exceptional financial need and are usually given in conjunction with other aid.

EOP Grants

The Educational Opportunity Program (EOP) grants are available only to students who are officially identified as participants in the Educational Opportunity Program and who also demonstrate financial need.

College Work-Study Program

The College Work-Study Program enables the University to offer employment to financially needy students during the school year and vacation periods. The program is designed to assist those students who are from low- or middle-income families, who need funds to continue their education, and who are enrolled or accepted for enrollment for a full-time course of study at the University. The on-campus and off-campus jobs are limited to an average of 15 hours per week for any one quarter. During scheduled holidays or vacations of at least one week in length, the student may work a 40-hour week without having these hours count as part of the 15-hour weekly average. Work-study jobs are primarily awarded to assist students in meeting their college expenses and secondarily to provide practical job experience in an area closely related to the student's academic endeavors. The number of working hours awarded to any one student will be dependent on his financial need. In other cases of demonstrated financial need, Work-Study jobs may be awarded during the summer on a full-time basis.

These jobs should not be confused with the employment offered by the Student Employment Center, as the jobs under the Work-Study Program are limited to those students demonstrating a definite financial need.

Loans

National Defense Education Act Loans (NDEA). Regularly enrolled students, or applicants for admission to the University, who are United States citizens or permanent residents of the United States, are eligible for NDEA loans to meet their financial need.

The maximum loan that any *undergraduate* student may obtain for one academic year (three quarters) is \$1,000. A fraction thereof may be awarded for one or two quarters. The total amount which may be borrowed by undergraduate students under this program—including loans granted by other collegiate institutions—is \$5,000. For *graduate* students, the maximum for one academic year (three quarters), is \$2,500 or a fraction thereof for one or two quarters. The total that may be borrowed by graduate students under this program is \$10,000 (including loans granted as undergraduates and by other institutions of higher education). However, when demand exceeds the funds available, loans will be granted on a competitive basis and amounts restricted.

Repayment of NDEA loans begins nine months after graduation or withdrawal from the Davis campus and may be extended over a ten-year period at 3 percent interest on the unpaid balance. Members of the armed forces, members of the Peace Corps, members of VISTA, and students who transfer to other schools may defer payment and extend the repayment period.

Up to 50 percent of the loan may be canceled by active duty in the armed forces. Such cancellation will apply only to loans made after April 13, 1970, the date of enactment of Public Law 91-230, for military service *performed after June 30, 1970*. Cancellation will be at the rate of 12½ percent per annum of the total amount of such a loan (plus interest) for each year of consecutive military service, not to exceed 50 percent of the total loan.

Up to 50 percent of the loan (and interest thereon) may be forgiven those entering the teaching profession, at the rate of 10 percent for each year of full-time teaching in public or nonprofit (1) elementary and/or secondary school or (2) institution of higher education. A cancellation of 15 percent is made for each year of service as a full-time teacher of handicapped children or a full-time teacher in public or other nonprofit elementary or secondary school which is in an area designated by the Commissioner of Education as a poverty area. Hence, the total amount of the loan may be canceled by teaching the handicapped or teaching in a deprived area for seven years.

Regents' Loan Funds. These funds are principally used to supplement stipends of scholarship and fellowship recipients but may also be granted to other qualified students. Regents' Loans, normally repayable in five years, bear an interest rate of 3 percent on the unpaid balance, beginning upon graduation or withdrawal from the University of California. Students who undertake graduate studies at the University of California may defer payment until they complete or terminate such studies. Regents' loans are limited to \$1,500 a year or \$6,000 per student.

Educational Fee Deferral Loan. Regularly enrolled students who are residents of California may apply to defer payment of their Educational Fees until after

they graduate or leave school. Deferral of fees is based on demonstrated financial need as determined by the student's application for aid.

To defer fees the student signs a promissory note requiring repayment of the fees commencing nine months after the student graduates or withdraws from the University. Interest on the unpaid balance accrues at the rate of 3 percent per year commencing nine months after termination of enrollment. Interest and installments may be postponed for a period not exceeding four years while the student is on active duty with the armed forces or with the Peace Corps or VISTA.

University Short-Term Loans. To be eligible for a short-term loan, a student ordinarily must have attended the University for at least one quarter. These funds, made possible by gifts to the University, are granted in small amounts, \$100 to \$500, to help students with educational expenses. Although repayment schedules are determined individually for each loan, these loans are usually repaid within the academic year or with earnings from employment the following summer.

Emergency Loans. These loans, not to exceed \$100, are available for emergency educational expenses. Repayment is normally made within 30 days. Interest at the rate of 1 percent per month is charged on the unpaid balance after the loan has been outstanding more than 30 days.

Federally insured loans are available through local banks, credit unions, and savings and loan associations for citizens and nationals of the United States or those in the country for other than a temporary purpose.

The maximum loan amount for any student is \$1,500 per academic year, with an aggregate maximum of \$7,500. The loan may be made only for meeting costs of the student's education while he is attending school and carrying at least one half of the normal full-time workload as determined by the school. It is the lender's option to make or deny the loan.

Applications may be obtained from the Financial Aid Officer, eligible lenders, or the U.S. Office of Education in San Francisco. The student completes his portion of the application and then submits it to the Financial Aid Office for proper attestation of his status. When the application is returned the student presents it to an eligible lender. If the lender is willing to make the loan, the application is forwarded to the U. S. Office of Education in San Francisco where it is reviewed for compliance with governing regulations. If the student meets all requirements the lender is issued an insurance commitment. Upon receipt of the commitment the lender sends the check to the Financial Aid Office for disbursement to the student.

Loan repayment may be deferred while the student is in the armed forces, Peace Corps, or VISTA.

Veterans Benefits

Students who qualify for veterans benefits under the program established by Public Law 89-358, will be certified to the Veterans Administration by the Financial Aid Office.

Eligibility for educational benefits is dependent on service in the U. S. Armed Forces for at least 181 days, any part of which was after January 31, 1955. For each month of active duty, a veteran is entitled to one and one half months of educational assistance, up to a maximum of 36 months.

Application forms for veterans benefits may be obtained in the Financial Aid Office as well as the Regional Office of the Veterans Administration. These should be filled out and submitted to the Veterans Administration, Regional Office, 49 Fourth Street, San Francisco, California 94103. This should be done well in advance of the date of enrollment in the University.

Dependents of deceased or disabled veterans are entitled to certain educational benefits under California and Federal laws. Certification of their enrollment is also a function of the Financial Aid Office.

Health Professions Student Assistance Program

Health Professions Student Loan Program and the Health Professions Scholarship Program are designed to assist students needing financial aid to pursue a course of study leading to the degree of Doctor of Medicine or Doctor of Veterinary Medicine. Eligible students should contact the Schools of Medicine or Veterinary Medicine for applications.

Awards are made on the basis of financial need. The maximum loan in a 9-month academic year is \$2,500 and the maximum scholarship in a 12-month period is \$2,500. Interest at the rate of 3 percent per year accrues one year after the borrower ceases to pursue a full-time course of study, at which time the aggregate of loans is repayable over a 10-year period. There are various conditions of deferment and cancellation of the loan which may be discussed at the time of application.

Student Employment Center

Many students who attend the University expect to earn part of their expenses. However, the undergraduate curricula are organized on the assumption that a student will give most of his time and attention to college studies. If possible, the student should avoid outside employment until he has become adjusted to his new environment, has established sound study habits, and is maintaining a good scholastic standing. By the end of the first quarter the student should know the demands of University life and his own capabilities well enough to plan a program combining studies and work.

Placement advisers help students to find part-time and summer employment. The office receives job listings from employers and refers qualified students to these openings. To receive assistance students must be interviewed personally, as satisfactory arrangements cannot be made by correspondence. Interested students should register with the Part-Time and Summer Employment Division after arriving on campus.

Vocational Rehabilitation Services

Students having an employment handicap due to a medically diagnosed condition may qualify for counseling and financial assistance through the Uni-

versity of California in cooperation with the California State Department of Rehabilitation. Services include vocational counseling and guidance, training (with payment of costs such as books, fees, etc.), and job placement. Under certain circumstances students may also qualify for help with medical needs, or supplemental living expenses, or transportation. Further information may be obtained through the Department of Rehabilitation at 923 Twelfth Street, Sacramento, California 95814; telephone, 916-445-6011.

STUDENT AID FUNDS NOT HANDLED BY THE FINANCIAL AID OFFICE

Graduate Scholarships and Fellowships

Information about scholarships or fellowships, etc., for graduate students may be obtained from the Dean of the Graduate Division, Room 252, Mrak Hall. Applications for fellowships and graduate scholarships must be filed with the Dean of the Graduate Division, University of California, Davis 95616, not later than January 15 prior to the academic year for which the award is sought.

Army ROTC Scholarship Program

One-, two-, three-, and four-year ROTC scholarships, which provide \$50 a month plus payment of all tuition, fees, books, and school supplies, are available to selected students. Four-year scholarships are limited to high school seniors, with applications due prior to January. One-, two-, and three-year scholarships are limited to students enrolled in ROTC. Additional information and application blanks may be obtained from the Department of Military Science.

California State Scholarships

Scholarship awards administered by the California State Scholarship and Loan Commission cover mandatory registration fees and are for a maximum of four years. At the University of California, State Scholarship awards will range from \$300 to \$600, depending on financial need. To qualify for renewal as a California State Scholar in the University, a student must have continuing financial need and maintain at least a C average.

California State Scholars who elect to attend a public junior college before enrolling in the University may have their scholarships held and activated upon entering the University. Information and application forms have been sent to all schools and colleges in the state, and may be obtained from local school counselors or by writing to the California State Scholarship and Loan Commission, 714 P Street, Suite 1640, Sacramento, California 95814.

LIVING ACCOMMODATIONS

Residence Halls

The University provides housing for approximately 3,000 students in a variety of residence halls on campus. Some 23 residences are clustered around three dining commons and each of these areas has its own individual architecture and ambiance. In addition there is space for approximately 900 single students in

off-campus University Affiliated Residence Halls. Each of these halls is staffed with professional personnel who work in conjunction with the residents, striving to create and maintain an environment conducive to the achievement of educational goals.

Each hall elects its own student officers to act on matters such as student government, planning programs, and helping to solve problems of student discipline. Annual hall dues average about \$12. The Residence Hall Association is a coordinating governing body for all of the residence halls.

The room and board rates (which include either Meal Plan A: 20 meals per week; or Meal Plan B: 14 meals per week) for the 1970-71 academic year were \$1,175.00 for Plan A and \$1,137.00 for Plan B and are subject to change. All students planning to live in residence halls sign a contract for one academic year. Payment is usually made in installments according to a payment schedule. Rooms in the residence halls contain all of the necessary furniture and also include study lamps, linen, and blankets. Telephones and weekly laundering of linen are included in the room and board rate. Further information and applications for housing are sent as part of the University admissions procedure. Specific questions should be directed to the Contracts Office, 111 South Hall, University of California, Davis 95616. Since accommodations are in great demand, early application is advised. A deposit will be required when a signed contract is returned. If a student withdraws *and sends written notice to the Housing Office* before July 1, a total refund will be made; after this date, only a partial refund will be possible.

Housing for Married Students

There are 476 apartments for married students on the Davis campus. Some of these apartments have one bedroom, but most are two-bedroom units. Both furnished and unfurnished accommodations are available. Apartment rates for 1970-71 were: one bedroom, unfurnished, \$83; two bedrooms, unfurnished, \$95; two bedrooms, furnished, \$110. Rates include water, gas, trash collection, and electricity. Applications for these units can be obtained by writing the Contracts Office, 111 South Hall, University of California, Davis 95616.

Off-Campus Accommodations

The members of the Housing Office staff believe that living in the community is an integral part of the university experience and a student's total educational growth. Our staff works closely with the members of the ASUCD Student Fair Housing Committee, the Fraternity Presidents' Council, and the Davis Apartment Owners and Managers Association, and is committed to a program of expanding our services to meet the ever-increasing housing needs of the University community.

One of the services of the Housing Office staff is to assist students, faculty, and other University personnel by maintaining lists of private rooms, apartments, duplexes, trailers, and houses available for rent in the Davis area. Since these listings change quite rapidly as the different units are rented, prepared lists are

not furnished by mail. It is suggested that those who wish to find off-campus housing plan to make arrangements early by consulting the list of vacancies in the Housing Office. Also on file are lists of "Roommates Wanted." Students may advertise here for roommates or may use the file to contact others who have already obtained living accommodations.

Rental arrangements should be made in person with the manager or owner and a clear understanding reached on the conditions of occupancy. If a lease is required, we recommend the "Model Lease," a document written jointly by the ASUCD Student Fair Housing Committee and the Davis Apartment Owners and Managers Association.

The Student Fair Housing Committee publishes a viewpoint on housing which is a helpful guide to living in the community. Additional material is available at the Housing Office in South Hall.

For those who live off-campus without kitchen facilities, meal plans which allow students to eat in any one of the residence hall dining rooms or the Memorial Union are available.

Fraternities

Thirteen national fraternities are represented on the Davis campus, providing living quarters and meals for their more than 350 undergraduate members and pledges. The fraternities, under their system of self-government, provide social, recreational, and academic programs for their members as well as some experience with business activities. This unique "total" living experience gives fraternity members the opportunity to secure a progressive education both in and out of the classroom.

The size of fraternity live-in groups ranges from 20 to 50. The monthly cost of fraternity living at Davis varies from \$110 in some houses to \$130 in others.

Membership in fraternities is by invitation. Men who are interested in fraternities should write or call on the Fraternity Adviser in the Housing Office.

The national fraternities are—Alpha Gamma Rho, Chi Phi, Delta Sigma Phi, Farm House, Kappa Sigma, Phi Delta Theta, Phi Sigma Kappa, Sigma Alpha Epsilon, Sigma Nu, Sigma Phi Epsilon, Theta Chi, Theta Xi, Zeta Beta Tau.

Sororities

There are no sororities on the Davis campus.

Student Services and Activities

STUDENT HEALTH PROGRAM Medical Evaluation

To safeguard the health of the student and the University community, every new student, as a part of registration, must be examined by the University Medical Examiners. Every new student should have at the time of registration a certificate of successful vaccination against smallpox performed within the last three years. A form for certification is provided by the University. Tests for tuberculosis are a part of the physical examination of all new students.

Applicants with contagious diseases will be excluded. Any student having a physical condition that might grossly disturb the classwork of other students should not apply for admission as he will be disqualified at registration.

Each prospective student is advised to have a physical examination by his own physician to determine his fitness for college work before coming to the University. Any defects capable of remedial treatment, such as diseased tonsils or imperfect eyesight, should be corrected to prevent possible loss of time from studies.

Students returning after an absence must comply with the Student Health Service requirement regarding smallpox vaccination and must have a health evaluation at the Student Health Service.

Supplementary Health Insurance

A supplementary health insurance plan is available at the time of registration. This insurance supplements the student health program and is used for medical care needed between quarters and when away from the campus. It likewise provides for surgical-professional fees and other benefits as outlined in the Supplementary Health Insurance brochure. Procurement of this insurance is strongly urged.

International Students. The acquisition of health insurance is a condition of registration for all nonimmigrant international students. At the time of registration, all nonimmigrant international students must enroll in the Associated Students Supplementary Health Plan. Students who present documentary evidence of equivalent insurance coverage may petition the Office of International Student Services for permission to waive the Associated Students Supplementary Health Plan.

Those sponsored students who do not pay the registration fees are not eligible for Student Health Service or the Associated Students Supplementary Health Plan without making special arrangements.

Student Health Service

The Student Health Service, by preventing and treating acute illnesses, conserves the time of students for their classwork and studies. This service is made possible, for the most part, by the registration fee. It is not a health insurance. Each regularly enrolled student may have such medical care as the Health

Service is staffed and equipped to provide from the first day of the quarter through the last day of the quarter. Hospitalization, up to ten days per quarter, is provided for illnesses.

Continuing students not enrolled during a quarter or summer session but remaining in residence in Davis, may maintain their eligibility for the medical services of the Student Health Service by paying an appropriate fee to the Cashier. Enrollment in this program may be initiated only during the registration period for each quarter or summer session.

When, in the opinion of the Director of the Student Health Service, serious illness or injury requires prolonged care and will obviously prevent continuation in college during the current quarter, the patient will be returned to his community or home for definitive treatment.

The Student Health Service does not take responsibility for dealing with chronic physical defects or illnesses present at the time of entrance to the University. The Student Health Service does not assume responsibility for dental treatment. It does not take responsibility for treatment of remediable defects where medical or surgical treatment is elective and not of an emergency nature, and where the student's best interest will be served by treatment during vacation.

The Student Health Service is designed as a medical facility to provide medical care while the student is away from home and in attendance at the University; it does not supplant the medical care of the family physician. Full cooperation is encouraged between the student, the Student Health Service, and the family physician.

STUDENT AND ALUMNI PLACEMENT SERVICES

Placement advisers assist students in their career planning, in locating initial positions following graduation, and in relocating positions as alumni. Students dropping out of the University for a term or longer who are interested in employment or military service should see a placement adviser. The services of the Placement Center are available without cost to students and alumni.

Occupational Information—Career Planning

A library of vocational information is maintained by the Placement Service and the Counseling Service (see below). Students may use this library at their convenience. Placement advisers encourage students of all levels to discuss their career planning and the various occupational opportunities available.

Career Placement Service

Students and alumni seeking careers in business, industry, agriculture, and government are invited to use the services of the Placement Center. Placement advisers discuss matters of job choice and methods of obtaining jobs with registrants. In addition, they arrange employment interviews, receive job listings from employers, and refer suitable registrants to these employers. Graduating students regardless of impending military service, graduate school or other plans are encouraged to register with the Placement Center early in their final year of

study. Alumni may use the placement services for initial or subsequent placement at any time.

Educational Placement Service

Placement service is available to students and alumni who are interested in teaching. Information on the background, training, and professional experience of its candidates, which is kept in confidential files, enables this office to match qualifications with specifications of available positions. Placement advisers counsel candidates, communicate with employers, receive vacancy data, and arrange interviews. The University reserves the right to refer only those persons who are considered to be fully qualified.

COUNSELING CENTER

The Counseling Center is staffed with psychologists who provide educational-vocational and personal-social counseling to all regularly enrolled students. Through individual interviews and group discussions, they

Help students with personal and interpersonal concerns.

Assist students in their choice of academic majors and future occupational goals.

Provide a wide range of psychological testing when appropriate.

Make available information about various occupational opportunities for which students may wish to prepare.

Work with students who are involved in the process of self-exploration.

Organize and lead encounter or self-awareness groups as staff resources and the demand for this type of experience indicate.

EDUCATIONAL OPPORTUNITY PROGRAM COUNSELING

Counseling services available to minority students at the University level are of two basic types—traditional counseling, which is available to all University students, and the EOP counseling services entirely devoted to minority and/or low income students.

EOP counselors are concerned and involved with the financial, social, physical, academic, and overall campus adjustment of the students they serve.

EOP counselors represent four major ethnic backgrounds: Black, Chicano, Asian-American, and Native American.

Tutorial Services

Tutoring is a free service available to EOP students. The tutor coordinator establishes and supervises tutorial services in areas of student need. The tutoring program is complemented by academic support classes taught by EOP staff or sponsored by the program. These classes are directed towards improving study skills.

PEER-ADVISING CENTER

The First Resort, located in East Hall, is an advising center staffed by students. These student-advisers work with other students on academic questions, career interests, and personal concerns.

The First Resort is sponsored by the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science and by the Office for Student Affairs. Its staff works closely with these Colleges throughout the year and is prepared to advise students (particularly those who are new to campus and haven't selected an academic major) on academic requirements, course selection, and program planning.

Beyond this, the staff of The First Resort assists students in finding other members of the University community who are helpful in problem-solving.

PROBE WORK-LEARNING PROGRAMS

PROBE (P*rofessional and Occupational Broadening Experience*) complements classroom instruction with University supervised field experience, usually employment. By working besides career people in business, government, or private agencies as well as in the professions, PROBE students explore potential careers and develop vocational skills.

Participants often earn academic credit either by enrolling in special "Intern" or "Field Work" courses—some departments have these—or via the 98-99 or 198-199 group and individual study mechanisms. Credit may be granted for research papers, directed reading, and other projects completed under faculty supervision. While many PROBE interns are paid employees, others work on a contract or volunteer basis. In either case the professional supervisor is expected to help the student learn not only his own job but also what the professionals do and how they function.

All UCD students in good academic standing are welcome to apply.

SELECTIVE SERVICE

The Office of the Dean of Men assists students who have inquiries and problems regarding their Selective Service status. It is up to each individual, however, to request educational or other deferments from his local draft board, which has exclusive authority over all deferments. The Dean of Men's Office will, upon request of the student, certify information about the student's educational progress to the local board. Under existing Selective Service regulations, a student must make satisfactory unit progress toward his degree to be eligible for a student deferment. All male students (undergraduate and graduate) will find it to their advantage to continually keep themselves aware of Selective Service laws and procedures.

Students attaining their eighteenth birthday may register for Selective Service at the Office of the Dean of Men.

Individual counseling in all areas relating to the draft is available at any time through the "Draft Help" Center in the office of the Dean of Men.

The University has an Army Reserve Officers' Training Corps unit at Davis which offers both basic and advanced courses in general military science. Enrollment in military science is on a voluntary basis. The ROTC Program is described in detail with the course offerings of the Department of Military Science.

INTERNATIONAL STUDENT SERVICES

Students from abroad may obtain from the staff of the International Student Services Office assistance, information, and advice on all matters pertaining to their attendance at the University and to their residence in the United States.

EDUCATION ABROAD

The University of California's Education Abroad Program offers graduate and undergraduate students an opportunity to study overseas and receive academic credit from the University. The primary purpose of the program is to provide an academic experience in a different educational system. Through this academic experience the student is able to become involved in the language and culture of the host country.

Eligibility requirements for undergraduate students include: junior or senior standing by the time of participation in the program; the equivalent of two years of University-level language preparation with a B average; and the ability to adapt successfully to a different culture. Students planning to study abroad during the senior year are advised to investigate academic residency requirements. In addition to the teaching credential program described below, graduate students are eligible for consideration at some centers if they have completed at least one year of graduate work at the University of California, have the support of their department and the Graduate Division, meet the language requirements, and acquire the endorsement of the Education Abroad Selection Committee on the Davis campus.

In 1971-72, nine-month programs for undergraduates will be continued in the United Kingdom, Japan, Sweden, Norway, Hong Kong, France, Lebanon, Germany, Italy, Israel, Ireland, Spain, Kenya, and Ghana; and a new ten-month program will be in effect at Mexico City. Special teaching credential programs are given in Mexico City and Paris for graduate students who intend to teach Spanish or French. At many centers, an intensive language and orientation program precedes the undergraduate academic schedule. The centers are administered overseas by University of California faculty members who assist students in meeting their educational objectives and help with living arrangements and personal problems.

Estimated minimum costs for the nine-month program ranges from \$2,550 (for Tokyo) to \$3,270 (for Lund or Bergen). Estimated cost for the graduate teaching credential program is \$1,560 for Mexico City and \$1,615 for Paris.

The Education Abroad Program is administered centrally from the Santa Barbara campus. Detailed information on the program and application forms are available at UCD from the Education Abroad section of the International Student Services Office, Room 323, South Hall. Information pertaining to other opportunities for study, travel, and employment abroad is available at the same office.

STUDENT CONDUCT AND DISCIPLINE

Students enrolled in or individuals seeking enrollment in the University assume an obligation to conduct themselves in a manner compatible with the University's function as an educational institution. Misconduct for which such persons are subject to discipline falls into the following categories:

1. Dishonesty, such as cheating, plagiarism, or knowingly furnishing false information to the University;
2. Forgery, alteration, or misuse of University documents, records, or identification;
3. Obstruction or disruption of teaching, research, administration, disciplinary procedures, or other University activities, including its public service functions, or of other authorized activities on University premises, or, during times of campus emergencies, within one mile thereof;
4. Physical abuse or conduct which threatens the health or safety of any person on University-owned or -controlled property or at University-sponsored or -supervised functions, or, during times of campus emergencies, within one mile of a University campus or facility;
5. Theft or destruction of or damage to property of the University or of a member of the University community or campus visitor or, during times of campus emergencies, destruction of, or damage to property on campus or within one mile thereof;
6. Unauthorized entry to or use of University facilities;
7. Violation of University policies or of campus regulations, including campus regulations concerning the registration of student organizations, the use of University facilities, or the time, place, and manner of public expression;
8. Manufacture or attempted manufacture of or use, possession, or distribution of narcotic or dangerous drugs, including but not limited to marijuana and lysergic acid diethylamide (LSD), except as expressly permitted by law;
9. Violation of the rules governing residence in University-owned or -controlled property;
10. Disorderly conduct or lewd, indecent, or obscene conduct or expression on University-owned or -controlled property or at University-sponsored or -supervised functions;
11. Participation in mass disorder, disturbance of the peace, or unlawful assembly, on a University campus or facility, or, during times of campus emergencies, within one mile thereof;
12. Failure to comply with directions of a University official or other public officials acting in the performance of their duties while on a University campus or other University facility, or, during times of campus emergencies, within one mile thereof, or resisting, delaying, or obstructing such University or other public officials in the performance of or the attempt to perform their duties; or
13. Conduct which adversely affects the student's suitability as a member of the academic community.

Students are subject to disciplinary action for misconduct on other campuses of the University.

Administration

The President of the University, through the Chancellor, has ultimate authority for the administration of student discipline. Assistance in this area is provided by members of the teaching staff, the administrative officers concerned with student welfare, the Student Conduct Committee, and several student hearing bodies.

Types of Discipline

The major types of disciplinary actions are:

Warning: Notice to the student that continuation or repetition of specified conduct may be cause for other disciplinary action;

Censure: Written reprimand for violation of specified regulation;

Probation: Exclusion from participation in privileges or extracurricular University activities as set forth in the notice of probation for a specified period of time. If a student while on probation violates any of the terms set forth in the notice of probation or violates the Standard of Conduct, as determined after the opportunity for a hearing, he shall be subject to further discipline in the form of suspension, dismissal, or expulsion;

Interim Suspension: Exclusion from classes and other privileges or activities as set forth in the notice of interim suspension, pending final determination of an alleged violation;

Suspension: Exclusion from classes, and exclusion from other privileges or activities or from the campus as set forth in the notice of suspension, for a definite period of time with reinstatement thereafter dependent upon a showing of observance during the period of suspension of the terms set forth in the notice of suspension. If a student while on suspension violates any of the terms set forth in the notice of suspension or violates the Standard of Conduct while on a campus of the University or in relation to a University-sponsored activity, as determined after the opportunity for a hearing, he shall be subject to further discipline in the form of dismissal or expulsion;

Dismissal: Termination of student status for an indefinite period and, if as specified in the notice of dismissal, exclusion from the campus for a period not to exceed one year. The student may be readmitted to the University only with the specific approval of the Chancellor of the campus to which he applies. If a dismissed student violates the Standard of Conduct while on a campus of the University or in relation to a University-sponsored activity, or if he violates any of the terms set forth in the notice of dismissal as determined after the opportunity for a hearing, he shall be subject to further discipline in the form of expulsion;

Expulsion: Permanent termination of student status without possibility of readmission to any campus of the University;

Other: Other types of discipline as set forth in campus regulations.

Student Relations Council

The Student Relations Council of the Associated Students deals with student welfare, student conduct, student-faculty relations, and ASUCD Constitution

interpretation. The Council fosters the honor spirit, a code which places the responsibility for classroom and campus conduct with the individual student.

THE ASSOCIATED STUDENTS AND STUDENT ACTIVITIES

The entire undergraduate student body holds membership in the Associated Students, University of California at Davis (ASUCD). Graduate students may become members by paying the fee. The ASUCD, through its elected governing body (the Legislative Assembly), and appointed activities chairmen, is responsible for many student services and student activities on campus.

ASUCD administers valuable student services such as a low-cost health insurance program; Unitrans, the only mass transit system in Davis; a convenient copying service; a free legal counseling service; a travel service for students traveling abroad during summer vacation; and the Coffee House.

The ASUCD publishes the *California Aggie*, a daily campus newspaper; *El Rodeo*, the yearbook; and has Committees on Fair Housing (which publishes the annual *Housing Viewpoint*), Consumer Rights, and Academic Affairs.

A major effort of the ASUCD is Picnic Day, the campus open house welcoming the public each spring. Other special ASUCD events or activities include Experimental College, Judging Day (competition in agricultural skills and knowledge for high school students), Cal Aggie Camp (an annual summer encampment for underprivileged children in the area, financed by student fund-raising events), many community service projects, Homecoming, Radio KDVS FM and AM, the Cal Aggie Marching Band, Student Forums, Blood Bank, Spring Sing, and the all-important Orientation Week for incoming students. The ASUCD Entertainment Board presents a continuing entertainment program and concert series for students.

Independent student organizations are served by the Student Activities Office which is located in the Memorial Union. Included in this category are departmental, honor, service, special interest, political, and religious organizations, as well as an International Club.

Davis students join those of all other University campuses in All-University festivals featuring the arts and intramurals.

RECREATIONAL FACILITIES

Student recreational activities at Davis are centered in the Memorial Union, the Recreational Swimming Pool Complex, the Putah Creek Recreational Area, the Silo Barn Student Center, the Coffee House and snack bars, the Gym and Intramural Playing Fields, and the campus theatres. The Memorial Union, located at the North end of the quad, is a center containing conference rooms; offices for the Student Activities staff and the ASUCD staff, activities chairmen, and officers; lounges equipped with comfortable furniture, magazines, and newspapers; the Coop and Dining Commons (largest meal and snack centers on campus); the UCD Bookstore and campus post office branch; KDVS, the campus radio station and *The Cal Aggie*, the campus newspaper; the Art Gallery;

the Craft Center with photo facilities, jewelry and small metal sculpture rooms, weaving equipment, and facilities for sewing, silk screening, block printing, leather work, and wood carving; the Campbell Library for recreational reading; the Cameron Music Listening room; the music rehearsal room with piano, music stands and chairs reserved for rehearsals by individuals, groups, or small bands and choruses; the Games Area with bowling lanes, billiard tables and facilities for shuffleboard, table tennis, and cards; Freeborn Hall, the largest campus auditorium for concerts, dances, banquets, and conferences; the MU Box Office; the Information Desk where the campus Master Calendar of events is compiled; the Reservation Desk where reservations for campus facilities are made; and the outdoor plazas.

The Recreational Swimming Pool complex includes a large, cloverleaf-shaped swimming pool with a water capacity in excess of half a million gallons, separate wading pool, bath house, snack bar, terrace, shuffleboard courts, and a lodge. The lodge, newest recreation facility on campus, has a main floor lounge with a fireplace, a well-equipped kitchen, and meeting rooms on the second floor.

The Putah Creek Recreation Area features bicycle paths and hiking trails with footbridges at convenient intervals, a well-developed arboretum, bridal path, picnic areas, and a small lake with boating facilities. Recreational as well as instructional sailing and canoeing are offered fall and spring quarters. The Putah Creek Rec Lodge, set on a grassy area suitable for small-team sports has outdoor barbecue pits and tables as well as an indoor fireplace, kitchen, and lounge suited to dancing. Located along Putah Creek, just east of the Putah Creek Rec Lodge, are the UCD Horse Barn and Recreational Horse Arena. Throughout the year, recreational horseback riding instruction is offered.

Complementing the recreational boating and horseback riding instruction, is the recreational skiing instruction offered winter quarter. The instruction includes numerous ski trips to the Sierras.

The Silo Barn Student Center has a main floor meeting room, student office space on the second floor, and a snack bar area.

The Associated Students run a Coffee House in East Hall where delicatessen-type food, coffee, tea, cider, and soft drinks are sold. There is live entertainment on weekend evenings and recorded music during the week in an informal atmosphere with small tables and a sawdust covered floor. Other snack bars on campus, in addition to the MU Coop, are "The Roost" in Segundo Dining Hall at the dorms; "The Silo" in the Silo Barn Student Center, serving the Vet Med, Medical School, engineering, and chemistry building portion of the campus; the Wyatt Pavilion snack bar on Putah Creek; and the Rec Pool Snack Bar. These are run by the campus food service and serve limited menus designed for the needs of each area. Vending machines are located conveniently around the campus.

The Intramural Recreation Program is a major feature of the Davis Campus. Hundreds of students, male and female, participate in individual and team sports scheduled during all three quarters. They use the several gymnasiums; the

Physical Education Pool; badminton, handball, volleyball, and tennis courts; playing fields; the MU Games Area; the track at Toomey Field; and off-campus facilities such as the Davis Municipal Golf Course. The well-attended competitions provide not only active sports participation but spectator sports for all living units of the campus—dorms, fraternities, and off-campus housing.

The campus theatres house a rich fare of dramatic art and concerts throughout the year. The Dramatic Art Department's Professional Resident Theatre brings professional actors and directors to work with faculty and students in productions given in the 500-seat, proscenium stage, Main Theatre of the Dramatic Art Building or in Wyatt Pavilion Theatre, a former horse-judging pavilion converted into an octagon-shaped Elizabethan theatre with thrust stage. Faculty and student productions utilize Theatre Labs A and B for dramatic readings and intimate theatre productions where arena performance is more suitable, as well as the two larger theatres. Most off-campus groups perform in Freeborn Hall when visiting on the Committee for Arts and Lectures or ASUCD Entertainment Board sponsored series.

Requirements and Curricula

The programs and majors described in the following pages have been developed by the colleges and schools to aid students in achieving their educational goals. Self-designed and self-initiated programs of study can be arranged for students who, after a serious attempt, find an existing program which meets their needs. Academic advisers and deans will assist such students to draw up acceptable programs.

| | |
|---|-----|
| College of AGRICULTURAL AND ENVIRONMENTAL SCIENCES (includes College faculty listing) | 53 |
| College of ENGINEERING | 109 |
| College of LETTERS AND SCIENCE | 140 |
| School of LAW | 153 |
| School of MEDICINE | 156 |
| PROFESSIONAL School Requirements and Preparation | 160 |
| School of VETERINARY MEDICINE | 165 |
| GRADUATE DIVISION | 171 |

College of Agricultural and Environmental Sciences

- Instruction in the College is administered by six divisions. The major programs within these divisions vary in their requirements but reflect the common desire:
- to ignite curiosity
 - to increase understanding of the significance, methods, and interrelations of the various ways of studying the universe
 - to cultivate the skills and self-discipline essential for successful inquiry and action
 - to develop understanding of the students' own and other cultures
 - to permit the student to develop an educational program which utilizes to greatest advantage his individual abilities and interests
 - to provide the knowledge and sense of competence necessary for successful pursuit of a career.

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Challenge and opportunity as a result of social and technological changes characterize these times. Today's challenges—protection of the environment from man's diverse activities, prevention of starvation in major segments of the burgeoning population, total development and utilization of human as well as renewable natural resources—are challenges of special significance.

Teaching and research in the College of Agricultural and Environmental Sciences now extend far beyond the traditionally important mission of food and fiber production. Activities reach from the soil to the home; from the farms to the cities. The needs and interests of families, rural as well as urban, are served. The wise and perpetual use of land and forest areas and control of water for home, agriculture, and industry, as well as for fish and wildlife and recreational purposes are studied. These areas, along with industries which serve the needs associated with the production, processing, and marketing of more than 200 crops, offer special challenges as well as outstanding career opportunities.

The educational objective is the application of the biological, physical, and social sciences to resource management, farming and ranching, business, education, conservation, recreation, and the family and community.

Social problems as well as technological advances are major considerations. The goal is to develop concern within people, not only with technology, but with the human problems that such technology might create. The teaching and research programs of the College of Agricultural and Environmental Sciences were designed to meet these challenges and to contribute significantly to progress in these changing times.

THE ADMINISTRATIVE STRUCTURE OF THE COLLEGE

In the fall of 1970 the College began operating under a new administrative structure. This new method of operation was designed by students, faculty, and administrators as a mechanism for insuring the continuing flexibility, responsiveness, and rigor of the College's programs in the face of perpetually changing

educational needs. Embodied in the program is a new freedom of action for students in choosing courses and forming curricula. From the institution's point of view this freedom has brought with it the need to assist students in the development of the maturity required for such judgmental responsibility. The challenge of meeting these objectives has been placed in the care of six teaching divisions, each representing a wide variety of course and curricular opportunities, and each administered by a chairman having but one concern: quality education. The divisions and their chairmen are concerned not only with the provision of good teaching in important areas of knowledge but also in student receptivity to subjects being taught. Thus, good advising has assumed an importance equivalent to good teaching. The College is organized to help a student determine what he wants and needs to learn and then assist him in achieving it. Furthermore, the focus of the College's programs is to educate students for activities for which there is a societal demand. Thus, the program provides students with an opportunity to explore the utility of their training in study-internship situations. Division offices provide career guidance and the Bixby Agricultural Practices office provides work experience opportunities for the student in areas varying from ranching to city planning, laboratory research, child development, marketing, resource management, veterinary medicine, teaching, etc. The College is geared toward preparing people to meet successfully the challenge of leading productive lives, both from the personal and the societal points of view.

College Administration

Administrative Office: 228 Mrak Hall, telephone 916-752-0107

Administrative Officers of the College:

Alex F. McCalla, Ph.D., *Dean*

Sterling Chaykin, Ph.D., *Associate Dean*

Glenn R. Hawkes, Ph.D., *Associate Dean*

Donald R. Nielsen, Ph.D., *Associate Dean*

Harry O. Walker, Ph.D., *Associate Dean*

Teaching Divisions:

I. Agricultural Sciences

II. Biological Sciences*

III. Environmental Studies*

IV. Foods and Consumer Sciences

V. Resource Sciences

VI. Applied Economic and Behavioral Sciences

Agricultural Practices:

Research Departments:

Agricultural Economics

Chairman

D. S. Brown

S. R. Snow**

J. H. Snyder†

W. L. Dunkley

L. D. Whittig

G. R. Hawkes
(Acting)

H. O. Walker

H. O. Carter

Location

265 Hoagland

150 Mrak

469 Academic Office
Building III

165 Everson

265 Hoagland

165 Everson

TB-10

112 Voorhies

Telephone

752-0265

752-0391

752-3026

752-0610

752-0265

752-0769

752-2861

752-1532

* An intercollegiate division.

** Associate Dean of the Division of Biological Sciences.

† Assistant Dean of the Division of Environmental Studies.

| | | | |
|-------------------------------|------------------|--------------------------------|-------------|
| Agricultural Engineering | J. R. Goss | 2030 Bainer | 752-0102 |
| Agronomy and Range Science | P. F. Knowles | 131 Hunt | 752-1713 |
| Animal Physiology | J. M. Boda | Temporary Building 30 | 752-0203 |
| Animal Science | M. Ronning | 130 Animal Science | 752-1250 |
| Applied Behavioral Sciences | O. E. Thompson | 206 Walker | 752-0770 |
| Avian Sciences | C. R. Grau | 109 Asmundson | 752-1300 |
| Biochemistry and Biophysics | J. R. Preiss | 554 Hutchison | 752-0210 |
| Consumer Sciences | M. A. Morris | 148 Everson | 752-0668 |
| Entomology | O. G. Bacon | 120 Robbins | 752-0475 |
| Environmental Horticulture | H. C. Kohl, Jr. | 140 Environmental Horticulture | 752-0130 |
| Environmental Toxicology | W. W. Kilgore | 111 Environmental Toxicology | 752-1142 |
| Food Science and Technology | B. S. Schweigert | 126 Cruess | 752-1465 |
| Genetics | R. W. Allard | 201 Hutchison | 752-0200 |
| Nematology | D. J. Raski | 223 Hoagland | 752-1403 |
| Nutrition | F. W. Hill | 109 Everson | 752-0851 |
| Plant Pathology | R. G. Grogan | 354 Hutchison | 752-0300 |
| Pomology | R. S. Bringhurst | 1035 Wickson | 752-0122 |
| Soils and Plant Nutrition | V. V. Rendig | 139B Hoagland | 752-1406(7) |
| Vegetable Crops | J. M. Lyons | 150 Hunt | 752-0516 |
| Viticulture and Enology | H. W. Berg | 1023 Wickson | 752-0380 |
| Water Science and Engineering | V. H. Scott | 119 Veihmeyer | 752-0453 |

STUDENT RESPONSIBILITIES AS MEMBERS OF THE COLLEGE COMMUNITY

In recent years student point of view has had a significant impact on both educational programs and College governance. Students participated in the design of the new look which characterizes the College's programs, and are actively participating in the implementation of the College plan. A wide spectrum of the College, division, and departmental committees which determine educational and administrative policy includes student members. Any student desirous of taking part in the committee system of college governance may do so. All that is required is an indication of interest to the Dean's Office, 228 Mrak Hall. The maintenance of standards of excellence in teaching is dependent on constructive help from every student concerning both courses and programs. Students in the College of Agricultural and Environmental Sciences, as full participants in the educational process, are expected to provide both the chairmen of the teaching divisions and the Deans with candid appraisals of the College's programs. Formal procedures for the distribution and collection of questionnaires concerned with immediate student reactions to specific courses are currently in use. Furthermore, students are encouraged to communicate with the Dean's office at any time, in person or by letter, concerning the impact of the College's programs on their education. Suggestions which could lead to the improvement of the courses and teaching programs are also encouraged. Such information would be invaluable to the College community as plans are laid for meeting the educational needs of future classes of students.

UNDERGRADUATE PROGRAMS

Program Planning

University life is a complicated, sometimes bewildering, process. For example, the student who has the academic side of his existence under control may be in need of a small "assist" in dealing with some other area such as registration procedures, or vice versa. The College offers a variety of mechanisms by which students can obtain advice or help in solving such problems.

The Faculty Adviser

Each student in the College is assigned a faculty adviser to help him with the planning of a program in the area of his educational interests. Students who have not decided on a specific course of study and who would normally spend a year or two in the exploratory program are assigned advisers especially familiar with the breadth of course offerings available in this and the other colleges.

The function of the adviser is to sensitize the student to the educational opportunities which the Davis campus represents, to discuss the implications of the choice of one option or another, and to generally use his experience to help each student meet his own educational goals. The great potential which the adviser-student relationship can hold for the student has long been recognized in the College. As a result, students are required to consult with their advisers prior to each time they register for classes. The requirement is only that the student receive the benefit of the advice of a faculty adviser, not that he adopt the advice. It is the student who must weigh the benefits of a particular course of action and ultimately make his own decision.

As a student's educational objectives evolve he may choose a new adviser whose area of expertise corresponds more directly with his own educational objectives. Because of his knowledge, experience, and interest in a particular field, the faculty adviser can be of particular value to the student.

The Peer Adviser

The faculty adviser is often quite removed from some of the day-to-day problems faced by a student, and may be unable to provide guidance on such matters. For this reason a team of student-advisers has made itself available at the Peer Advising Center—*The First Resort*, 161 East Hall. The student-advisers keep themselves up-to-date on the "how's," "where's," and "why's" of University operating procedures. The advisers are prepared to help other students with a variety of scholastic questions about courses, requirements, and enrollment procedures. They are both a source of information and a means of referral to appropriate action offices.

Associate Deans of Resident Instruction

The College has three associate deans who work with students toward the realization of their educational objectives. Students are encouraged to consult with a dean on all matters related to the success of their academic programs.

Although the deans excel in educational problem-solving, they welcome the opportunity to become acquainted with individual students and engage in informal conversations. It is through such mechanisms that the deans keep themselves apprised of the state of the educational process for which they are responsible.

Work-Learn Adviser

It is not unusual for a student to be preparing himself for a career about which he knows very little. As a result the usefulness and vital importance of the course program which leads toward competence in that career can elude him. Other students take courses in the hope that through them they will happen upon an acceptable career possibility. This is where job experience can create in the individual student needs for particular kinds of training, and in the process a highly motivated and successful student can result.

The College maintains an endowed program through which students may participate in work-learn experiences with selected employers. The Bixby Agricultural Practices Program was originally directed toward experience in production agriculture; it has expanded to encompass the many career possibilities for which the College now prepares students. The program is voluntary and designed so that supervised work-learn experience complements the student's academic training. Work-learn experiences may take place in the summer or any quarter during the academic year. They can be either full-time or part-time. Interested students should stop in or write to the Agricultural Practices Office, TB-10.

The Student

Although a variety of services are provided to assist the student in program planning, it is he who, in the last analysis, determines the program he will pursue. The most crucial decision the student makes in this process is the selection of his career and/or educational objectives. These may or may not require enrollment in a university. As part of making these decisions students should investigate their educational opportunities in the College by visiting the campus prior to applying for admission and talking with the deans, faculty and students. If the University is to be a means of reaching a career decision, its potential in that regard should be ascertained.

Once the student has decided to enroll in the College and has chosen an educational objective, be it specific or exploratory, the advising services enumerated above can be of assistance to him. Our advisers know the resources of the College and can help the student in using them to accomplish his specific goals. They can be called upon long before a student plans to appear on campus. High school students desiring information about proper 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. It is best that this be done in person, but information can be provided by letter or phone.

It has been the experience of advisers that much of the inflexibility attributed to college programs exists only in the mind of the student. Recommendations

meant to serve as guidance are sometimes understood to be hard and fast rules. The citation of "courses normally taken by students" often leads to students believing the examples to be requirements.

The concept of prerequisite knowledge which underlies the listing of prerequisite courses in the course descriptions is particularly misunderstood. Education is a building process. It is difficult or impossible to learn advanced principles without first understanding elementary ones. As a matter of convenience most students acquire prerequisite knowledge through prerequisite courses, but that is not the only route available. Students who have acquired the prerequisite knowledge need not take a course in order to so certify. Courses may be challenged by examination. Instructors will often indicate to a student, on the basis of an informal discussion, that he is prepared for advanced study without the need for examinations or courses. Students should also note that many upper division courses have no special requirements and are within a student's intellectual capacity as early as the freshman year.

Flexibility in planning has also been constrained by the belief that students in one college can not take courses in other colleges. This is not true. Within the boundaries of enrollment limitations and the student's ability to acquire useful knowledge as a result of taking a particular course, a student may elect to enroll in any course listed in this catalog.

General Requirements

It is the *student's responsibility* to see that he fulfills all requirements for graduation. In brief these are:

University Requirements: Subject A; American History and Institutions requirement; Residence requirement; total of 180 quarter units of work with a C average or better; Announcement of Candidacy at the beginning of the quarter in which student plans to graduate (see pages 30 to 32 for complete details).

College Requirements: Completion of Bachelor of Science requirements in a major as prescribed by the faculty; not more than 6 units of the required total of 180 units may be Physical Education 1, and 54 units must be upper division work.

Major Requirements: See various majors beginning on page 68 of this section.

Natural Sciences, Social Sciences, and Humanities Requirements: The purpose of these requirements is to provide breadth to a student's program. Since the broadening effect of any particular course is dependent on the student's major and his general interests, it is not possible to be specific as to what is desirable and what is not. The faculty adviser has guidelines for each major showing what the student should consider. In the last analysis it is the student, with the counsel of his adviser, who selects the breadth courses.

For example, natural science courses add more breadth to an agricultural economics major than they would to a biochemistry major.

Study List

The student has the authority to structure his program any way he wishes provided he shows academic responsibility toward meeting the above require-

ments at a normal pace. The signature of the adviser must be obtained on either the Preferred Program Card used in early registration or on the Official Study List Card. Signature on the final study list is required only if there is a change in program prior to final filing.

RESPONSIBLE PLANNING on the part of the student is shown by:

1. Taking an average course load of 15 units per quarter. Regular students are limited to a program of not less than 12 (including Subject A which earns no units) or more than 18 units unless an exception is approved by the dean. A lower division physical education course may be added to the maximum number of units without the dean's approval. Students should consider that each unit normally requires three hours of student effort per week.

2. Taking courses in appropriate sequence so that course prerequisites are met and maximum benefits achieved.

In addition, the following details may prove important:

1. Assure adequate high school preparation in trigonometry and advanced algebra or the equivalent, by correspondence if necessary. Some courses at the University that are required for majors in the College of Agricultural and Environmental Sciences have prerequisites of mathematics equivalent to three years of high school mathematics, whereas the University admission requirement is only two years.

2. Foreign language is not generally required, except in the case of the major in International Agricultural Development, but it is recommended for the Biochemistry major. (See major requirements.)

Passed or No Record Option

To enable students to enroll in courses outside their major area of study without jeopardizing their grade-point average, a Passed or No Record option has been approved by the faculty of the College. Students in good standing (not on probation) may take an average of one *elective-type* course each term on a Passed or No Record basis. Grades of D or better are designated as Passed for courses *taken in any college for students enrolled in the College of Agricultural and Environmental Sciences*. Units attempted shall be disregarded in calculating grade-point average, but those passed may be used to satisfy elective unit requirements indicated in the various majors by a double asterisk(**). Permission of the adviser and the dean is required on petitions, which are available at the Dean's Office, 228 Mrak Hall. The petitions must be completed and filed during the period announced at the beginning of each quarter.

Special courses may be authorized in which only Passed or Not Passed grades are given. Such courses may be taken in addition to those which a student takes on his own Passed or No Record option.

Credit by Advanced Placement Tests

Students who have taken advanced courses in high school may earn up to 10 units advanced standing credit for each College Entrance Examination Board Advanced Placement Test successfully passed with a score of 5, 4, or 3.

The credit allowed will fulfill requirements within the College equivalent to

the courses listed in the table on page 151. Students should consider the list carefully in selecting course work in the same areas to avoid taking equivalent courses and thus duplicating credit.

Transfer Students

The breadth requirements of the College of Agricultural and Environmental Sciences at Davis are designed to provide a balanced program in the natural sciences, the social sciences and humanities, and the agricultural sciences. The 180 units required for graduation cover a variety of fields. The preparatory courses indicated may be taken at the University of California or elsewhere. The list of courses and their descriptions may be used by prospective transfer students as a guide in selecting courses of similar content and purpose offered in their own institutions. Students attending a California junior college should consult their counselors to determine which junior college courses are appropriate and are accepted in satisfaction of the breadth requirements of the college in which they plan to enroll.

These students are also encouraged to write directly to the division chairman responsible for their intended major for specific information regarding lower division course work and to plan a visit to the campus to discuss their programs with a faculty adviser.

Honors

Undergraduate Honors

The Dean's Honors List, published at the end of each quarter, includes the names of all students in the College of Agricultural and Environmental Sciences who have completed at least 12 units on the Davis campus and have a cumulative grade-point average of at least 3.2 for all work undertaken in the University.

Senior students in honors status have the privilege of taking courses in the 194H series entitled "Special Study for Honors Students."

Honors at Graduation

The graduating student who is completing his major with distinction may be recommended for honors or highest honors. The names of students to whom honors and highest honors have been awarded are published in the commencement program, and the distinction is noted on their transcripts and diplomas. The minimum grade-point averages required to qualify for these honors are shown in the following table:

| <i>Units Completed at the University</i> | <i>Grade-Point Average</i> | |
|--|----------------------------|-----------------------|
| | <i>Honors</i> | <i>Highest Honors</i> |
| 135 or more | 3.20 | 3.60 |
| 90-134 | 3.40 | 3.70 |
| 45- 89 | 3.50 | 3.80 |
| Less than 45 | | not eligible |

College Medal

Each year the outstanding graduating senior in the College is awarded a silver medal bearing the University Seal and known as the "Agricultural and Environ-

mental Sciences Medal." Scholastic excellence is the primary basis for choosing the recipient, but other considerations also receive attention.

Scholarships

To encourage capable young men and women to pursue a career in the agricultural and environmental sciences, many companies and private individuals have established scholarships restricted to students majoring in the College.

Approximately one third of the scholarships administered by the Committee on Undergraduate Scholarships are awarded to students in the College of Agricultural and Environmental Sciences. Students with high scholastic standings who need additional financial support are, therefore, encouraged to apply (see page 34).

Teaching Credentials

Inquiries concerning preparation for teaching credentials in subject matter taught in the College should be addressed to the Department of Applied Behavioral Sciences, University of California, Davis 95616. Teacher education is provided not only in such specialized fields as home economics and vocational agriculture but also in more general areas.

Choosing a Major

There are several alternatives available to undergraduate students:

1. a regularly established major program
2. an individually designed major program
3. preprofessional programs (preveterinary medicine and preforestry)
4. the exploratory program leading to the selection of one of the first two alternatives above.

MAJORS AND SPECIAL PROGRAMS

Below is a complete listing of the special programs and majors along with the appropriate teaching division of each (shown with Roman numerals) available to students enrolled in the College. On subsequent pages many of these are described in detail. The expanded descriptions are provided as a convenience to the many students who need complete information about these particular programs. Economic constraints prevent a full description of all programs. However, students interested in full expositions of the *other* major programs may obtain them by writing to the Associate Dean of Resident instruction, College of Agricultural and Environmental Sciences, University of California, Davis 95616.

Questions regarding majors should be directed to the teaching division chairman (see page 54).

Majors

Agrarian Studies (I)
*Agricultural Economics and
Business Management (VI)

* Described in detail on following pages.

*Agricultural Education (VI)
*Agricultural Genetics (II)
*Agricultural Science and Management (I)

- Animal Science (I)
- Applied Behavioral Sciences (VI)
- Atmospheric Science (V)
- Avian Sciences (I)
- Biochemistry (II)
- Biological Sciences (II)
- Child Development (VI)
- Community Nutrition (IV)
- Consumer Food Science (IV)
- Crop Protection (I)
- Design (VI)
- Development, Resource and Consumer Economics (VI)
- Dietetics (IV)
- Entomology (I)
- Environmental Planning and Management (III)
- Fermentation Sciences (IV)
- Food Biochemistry (IV)
- Food Science (IV)
- Food Service Management (IV)
- Home Economics (IV)
- International Agricultural Development (I)
- Nutrition Science (IV)
- Physiology (II)
- Plant Pathology (I)
- Plant Science (I)
- Range Science (V)
- Renewable Natural Resources (V)
- Soil and Water Science (V)
- Textiles (IV)
- Wildlife and Fisheries Biology (V)
- Individual Major
 (Dean's Office, 228 Mrak Hall)
- Non-degree programs
 (Dean's Office, 228 Mrak Hall)
- Exploratory
- Preforestry
- Preveterinary

Exploratory Program—an aid to finding a major

Many freshman students are undecided about the major they really want to pursue and are unaware of the alternatives available to them. The *Exploratory Program* permits students, with the assistance of specially selected advisers, to take courses which pinpoint more accurately individual interests and aptitudes. This is not a degree program, but is an *aid to the student in finding a major best suited to him and his needs*. He should not expect to stay in the program more than two years as further delay in selecting a major may delay graduation. For registration purposes, students should indicate *Exploratory* on admission materials and study list cards.

Individually Designed Major Programs

An individual major may be organized for a student having a specific academic interest not represented by an established major. Such a major involves interrelated courses of 45 upper division units from two or more areas of study. After preliminary consultation with the dean of the College about this special program, the student plans his major with an adviser. He then submits the proposed program to the dean for review at least four quarters before he plans to graduate. This proposal must include: (1) a description of the special educational aims of the student and (2) a list of the planned courses. For further details concerning the Individual Major, contact one of the associate deans, 228 Mrak Hall.

* Described in detail on following pages.

Field of Interest

The fields of interest that are broadly grouped under the agricultural and environmental sciences differ in nomenclature or major title depending upon differences in subject matter emphases. The following list is given as a cross-reference to majors offered by the College:

| Field of Interest | Corresponding Majors |
|---|--|
| Agricultural Business Management | Agricultural Economics and Business Management |
| Agricultural Policy, Banking, or Appraisal | Agricultural Economics and Business Management; Animal Science; Development, Resource, and Consumer Economics |
| Agronomy | Plant Science, Agricultural Science and Management, Range Science |
| Animal Husbandry | Animal Science, Agricultural Science and Management, Agrarian Studies |
| Asian American Studies | Applied Behavioral Sciences |
| Bee Biology | Entomology |
| Behavioral Sciences | Applied Behavioral Sciences, Child Development, Design |
| Biochemistry | Biochemistry, Food Biochemistry |
| Biological Control | Entomology, Crop Protection |
| Biology | Entomology, Animal Science, Plant Science, Agricultural Genetics, Biochemistry, Nutrition Science, Physiology, Avian Sciences, Food Biochemistry, Wildlife and Fisheries Biology, Plant Pathology |
| Biometeorology | Atmospheric Science |
| Biophysics | Biochemistry |
| Brewing Technology | Fermentation Sciences, Food Science |
| Business Management | Agricultural Economics and Business Management, Agrarian Studies, Food Service Management |
| City Planning | Environmental Planning and Management |
| Clothing | Textiles, Design |
| Community Development, Education, Inter-group Relations | Applied Behavioral Sciences; International Agricultural Development; Development, Resource, and Consumer Economics; Child Development; Design; Environmental Planning and Management; Home Economics |

| | |
|------------------------------|---|
| Conservation | Range Science, Preforestry, Renewable Natural Resources, Soil and Water Science, Wildlife and Fisheries Biology |
| Consumer Economics | Development, Resource, and Consumer Economics |
| Consumer Sciences | Consumer Food Science, Home Economics |
| Costume Design | Design, Textiles |
| Dairy Husbandry | Animal Science, Agricultural Science and Management |
| Dairy Industry | Food Science, Food Biochemistry |
| Dietetics | Dietetics, Nutrition Science, Community Nutrition, Food Service Management |
| Ecology | Renewable Natural Resources, Wildlife and Fisheries Biology |
| Enology | Fermentation Sciences, Food Science |
| Entomology | Entomology, Crop Protection |
| Environmental Design | Environmental Planning and Management, Applied Behavioral Sciences, Atmospheric Science, Design |
| Environmental Education | Environmental Planning and Management, Renewable Natural Resources |
| Environmental Studies | Renewable Natural Resources, Wildlife and Fisheries Biology |
| Environmental Horticulture | Plant Science, Environmental Planning and Management, Plant Pathology |
| Fabrics | Textiles |
| Family and Consumer Sciences | Child Development, Applied Behavioral Sciences, Home Economics |
| Family Life Education | Child Development, Applied Behavioral Sciences, Home Economics |
| Farm Management | Agricultural Economics and Business Management, Animal Science |
| Farming | Agricultural Economics and Business Management, Agricultural Science and Management, Animal Science, Plant Pathology, Entomology, Crop Protection, Plant Science, Range Science, Soil and Water Science, Agrarian Studies |
| Finance | Agricultural Economics and Business Management |

| | |
|---------------------------------|---|
| Fish and Game Management | Wildlife and Fisheries Biology |
| Floriculture | Plant Science, Crop Protection, Plant Pathology |
| Food Technology | Food Science, Agricultural Science and Management, Fermentation Sciences, Food Biochemistry, Consumer Food Science |
| Foreign Service for Agriculture | International Agricultural Development; Agrarian Studies; Agricultural Education; Soil and Water Science; Development, Resource, and Consumer Economics |
| Forestry | Preforestry, Renewable Natural Resources, Range Science |
| Genetics, Animal or Plant | Biochemistry, Agricultural Genetics, Animal Science, Plant Science, Avian Sciences |
| Health Sciences | Avian Sciences, Nutrition Sciences, Physiology, Biochemistry, Agricultural Genetics, Biological Sciences |
| Horticulture | Plant Science (Landscape Horticulture Specialization), Agricultural Science and Management, Plant Pathology, Crop Protection, Renewable Natural Resources |
| Home Management | Home Economics |
| Housing | Design, Applied Behavioral Sciences |
| Human Development | Applied Behavioral Sciences, Child Development, Home Economics |
| Institution Management | Food Service Management |
| Interior Decoration | Design |
| Irrigation | Soil and Water Science |
| Laboratory Technician | Biological Sciences, Biochemistry, Physiology, Nutrition Science, Agricultural Genetics |
| Land Management | Environmental Planning and Management, Renewable Natural Resources, Range Science, Soil and Water Science, Wildlife and Fisheries Biology, Agricultural Economics and Business Management |
| Law | Agrarian Studies, Applied Behavioral Sciences |
| Landscape Horticulture | Plant Science, Plant Pathology |

| | |
|------------------------------------|---|
| Landscape Management | Environmental Planning and Management |
| Marketing | Agricultural Economics and Business Management; Consumer Food Science; Textiles; Development, Resource, and Consumer Economics |
| Meat Science | Animal Science |
| Meat Technology | Food Science, Food Biochemistry |
| Medicine and Paramedical Sciences | Biological Sciences, Biochemistry, Physiology, Food Biochemistry, Nutrition Science, Agricultural Genetics |
| Merchandising | Design; Textiles; Development, Resource, and Consumer Economics |
| Meteorology | Atmospheric Science |
| Microbiology | Fermentation Sciences, Biological Sciences, Biochemistry, Food Science, Renewable Natural Resources, Agricultural Genetics |
| Molecular Biology | Biochemistry, Agricultural Genetics |
| Native American Studies | Applied Behavioral Sciences |
| Natural Resources | Renewable Natural Resources, Soil and Water Science, Wildlife and Fisheries Biology |
| Nematology | Crop Protection, Plant Science, Plant Pathology |
| Nursery Education | Child Development |
| Nursery Production or Management | Plant Science, Plant Pathology |
| Nutrition | Dietetics, Nutrition Science, Animal Science, Food Biochemistry, Home Economics, Community Nutrition, Avian Sciences, Food Service Management, Food Science |
| Ornamental Horticulture | Plant Science (Landscape Horticulture Specialization), Plant Pathology |
| Outdoor Education | Environmental Planning and Management |
| Packaging | Agricultural Economics and Business Management, Design, Food Science |
| Park and Recreation Administration | Environmental Planning and Management, Renewable Natural Resources |
| Physiology | Animal Science, Physiology, Avian Sciences |
| Plant Disorder Diagnosis | Crop Protection, Plant Pathology |
| Plant Pathology and Physiology | Plant Science, Crop Protection, Plant |

| | |
|-----------------------|---|
| | Pathology, Renewable Natural Resources |
| Plant Nutrition | Soil and Water Science, Plant Science |
| Plant Protection | Crop Protection |
| Pomology | Plant Science, Agricultural Science and Management |
| Poultry Husbandry | Avian Sciences, Agricultural Science and Management, Nutrition Science |
| Production Management | Animal Science, Plant Science, Avian Sciences |
| Public Health | Community Nutrition, Dietetics |
| Quantitative Biology | Biochemistry, Nutrition Science, Physiology |
| Ranching | Agricultural Economics and Business Management, Agricultural Science and Management, Agrarian Studies, Animal Science, Avian Sciences, Entomology, Crop Protection, Plant Science, Plant Pathology, Range Science, Soil and Water Science |
| Resource Sciences | Range Science; Development, Resource, and Consumer Economics; International Agricultural Development; Renewable Natural Resources; Atmospheric Science; Soil and Water Science; Wildlife and Fisheries Biology |
| Rural Development | Applied Behavioral Sciences |
| Soils | Soil and Water Science, Range Science |
| Teaching | See Division VI, College of Agricultural and Environmental Sciences or Department of Education |
| Textiles | Home Economics, Textiles |
| Toxicology | Food Science, Soil and Water Science |
| Truck Crops | Plant Science, Agricultural Science and Management |
| Turf Management | Plant Science (Landscape Horticulture Specialization), Plant Pathology |
| Urbanization | Environmental Planning and Management |
| Vegetable Crops | Plant Science, Agricultural Science and Management |
| Veterinary Medicine | Preveterinary Medicine, Animal Science, Biochemistry, Physiology, Avian Sciences, Nutrition Science |

| | |
|-----------------------------|---|
| Viticulture | Fermentation Sciences, Plant Science, Agricultural Science and Management |
| Vocational Agriculture | Agricultural Education |
| Water Science | Soil and Water Science |
| Weed Science | Crop Protection, Plant Science |
| Wildlife | Renewable Natural Resources, Wildlife and Fisheries Biology |
| Wine Making | Fermentation Sciences, Food Science |
| Wood Science and Technology | Preforestry |

THE MAJORS

AGRICULTURAL ECONOMICS AND BUSINESS MANAGEMENT focuses on the student's understanding of the total economic and social environment through study of the agricultural, biological, physical, and social sciences. The major offers an option of two areas of specialization:

The *Agricultural Economics* option is preprofessional, essentially preparation for continued study at the graduate level. The emphasis is on the theoretical aspects which lie behind decisions concerning production, marketing, use of resources, prices, and policy. Supplemental courses are offered in statistics, effects of governmental policy, rural appraisal, and related topics.

The *Agricultural Business Management* option, while considering the theoretical, deals more with the practical managerial problems. Emphasis is on the decision-making function of management, use of scientific management controls and organization, personnel policies, and procurement and marketing methods.

Both options prepare graduates for professional management positions in financial and research institutions not necessarily limited to agriculture.

Bachelor of Science Major Requirements*

| | UNITS |
|--|-------|
| <i>Preparatory Subject Matter</i> | 40 |
| English (choose from English 1, 2, 3, 4A, 4B, or 5) | 4 |
| English (from above list) or Rhetoric (Rhetoric 1 or 2) | 4 |
| American History and Institutions† | 8 |
| Economics 11A and (Economics 1A-1B or 2A-2B-2C) | 14 |
| Mathematics (including Mathematics 13 and 16A) | 10 |
| <i>Depth Subject Matter</i> | 45-47 |
| Theory (Agricultural Economics 100A, 100B) | 6 |
| Statistics: Agricultural Economics 106A and (Agricultural Economics 106B or 155) | 6 |

*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.

† Students meeting the American History and Institutions requirement may substitute social science and humanities as interpreted under the Social Sciences and Humanities requirement.

| | |
|---|----------------------------|
| Senior research (Agricultural Economics 190A, 190B) | 4 |
| <i>Agricultural Economics Option (Preprofessional)</i> | 29 |
| Mathematics 16B | |
| Agricultural Economics 100C | |
| Economics 101 | |
| Additional upper division agricultural economics or economics or | |
| <i>Agricultural Business Management Option</i> | 31 |
| Economics 11B | |
| Agricultural Economics 18 | |
| Additional upper division agricultural economics or economics | |
| <i>Breadth Subject Matter</i> | 32 |
| Agriculture (excluding agricultural economics)** | |
| Natural science (including mathematics beyond preparatory subject matter)** | |
| Social science—excluding economics and humanities, other than history and philosophy** | |
| Required: 8 units in one area and 12 units in each of the other two. | |
| <i>Unrestricted Electives**</i> | 62-64 |
| | Total Units for the Degree |
| | 180 |

The AGRICULTURAL EDUCATION major serves those interested in teaching agricultural sciences in high schools or junior colleges as well as those preparing for a service-type career in agriculture. It prepares graduates whose function will be to supervise youth and adult groups and to direct programs requiring preparation in both agricultural and human resources. State and federal requirements for instructors participating in federally funded vocational programs are also met. The need for scientists, technicians, and creative educators to assist in domestic and international agricultural programs has created a continuing demand for qualified instructors and supervisory personnel. This major also provides general preparation which is appropriate for work in banking, sales and service, rural recreation, and related agricultural industries. Students interested in obtaining breadth in both agricultural and environmental sciences will appreciate the scope and flexibility which this program provides.

Bachelor of Science Major Requirements*

| | UNITS |
|---|-------|
| <i>Preparatory Subject Matter</i> | 42 |
| Biological sciences (including genetics) | 21 |
| Chemistry (including organic) | 15 |
| Physics (chosen from Physics 2A, 2B, or 2C) | 6 |
| <i>Depth Subject Matter</i> | 64 |
| Agricultural economics | 9 |
| Agricultural Education 160, 320A | 4 |
| Agricultural engineering | 11 |
| Animal sciences | 16 |

* 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.*

** These elective courses may be taken on a Passed or No Record basis.

| | |
|---|-----------|
| Environmental sciences (includes offerings in environmental horticulture, environmental studies, environmental toxicology, renewable natural resources, and wildlife and fisheries biology) | 8 |
| Plant and soil sciences | 16 |
| Breadth Subject Matter | 33 |
| English (choose from English 1, 2, 3, 4A, 4B, or 5) | 12 |
| Economics 1A or 1B | 5 |
| Social sciences and humanities electives**† | 16 |
| Restricted Electives to supplement or expand any of the above areas | 14 |
| Choose from the following: Entomology 110, Environmental Horticulture 1, Nutrition 103, Plant Pathology 120, Soil and Water Science 1, Water Science 110A, 110B. | |
| Unrestricted Electives** | 27 |
| Total Units for the Degree | |
| | 180 |

Teacher Credential. Students may make appointments with credential counselors and obtain a statement of the complete requirements for the credential at the Applied Behavioral Sciences departmental office. Required courses for professional preparation include: Education 110, 120; Agricultural Education 160, 320B, 320C, 320E; and 9 postgraduate quarter units of subject matter courses.

The **AGRICULTURAL GENETICS** major emphasizes the study of heredity in plants and animals, with the aim of improving domestic species. Genetics uses information taken from many other disciplines, but makes special use of chemistry, physics, and mathematics. Students majoring in agricultural genetics take basic courses in these subjects, as well as courses designed to give broad training in biology. These undergraduate studies prepare a student not only for graduate work in genetics, but also for careers in private industry, governmental agricultural agencies, medical technology, and teaching.

Bachelor of Science Major Requirements*

| | UNITS |
|--|-------|
| <i>Preparatory Subject Matter</i> | 52 |
| Biological sciences, including one animal-oriented and one plant-oriented course | 20 |
| Chemistry, including organic chemistry (Chemistry 1A, 1B, 8A, 8B) | 16 |
| Mathematics, including calculus and/or statistics (Mathematics 13, 16A) | 7 |
| Physics (Physics 2A, 2B, 2C) | 9 |
| <i>Depth Subject Matter</i> | 44-45 |
| Biochemistry 101A, 101B | 6 |
| Chemistry 1C | 5 |
| Mathematics 16B, 16C, or 21B, 21C, and 105A, 105B or 130A, 130B | 13-14 |
| Genetics 100A, 100B, 100L | 7 |
| Additional genetics | 9 |
| Animal, microbial or plant physiology | 4 |

* 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.

** These elective courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

| | |
|---|------------|
| <i>Breadth Subject Matter</i> | 36 |
| English and/or rhetoric (choose from English 1, 2, 3, 4A, 4B, 5 or Rhetoric 1, 3) | 8 |
| Social sciences and humanities**† | 28 |
| <i>Restricted Electives</i> approved by adviser, including 9 upper division units each in agricultural and biological sciences | 24-25 |
| <i>Unrestricted Electives**</i> | 23 |
| <i>Total Units for the Degree</i> | 180 |

The **AGRICULTURAL SCIENCE AND MANAGEMENT** major is designed to provide the training required by business or industry to function in the management of the larger, more diverse agricultural operations. Students may specialize in one of three areas: animal science, food science and technology, or plant science. Course work in the biological, physical, social, and agricultural sciences with supporting courses in economics, business, and management permits individual flexibility. In addition to the Bachelor of Science, normally completed in four years, a fifth year Master of Science program is offered.

Bachelor of Science Major Requirements*

| | UNITS |
|---|------------|
| <i>Preparatory Subject Matter</i> | 48 |
| Biological Sciences (including Biology 1 and Botany 2) | 16 |
| Chemistry (Chemistry 1A, 1B, 8A, 8B) | 16 |
| Mathematics (including calculus and statistics) | 10 |
| Physics (Physics 2A and 2B or 2C) | 6 |
| <i>Depth Subject Matter</i> | 53 |
| Agricultural sciences (including at least one course in animal science, food science, plant science, soil and/or water science) | 20 |
| Agricultural economics (including Agricultural Economics 100A and two courses chosen from 112, 114, 117, and 140) | 15 |
| Specialization (animal science, food science and technology, and plant science) | 18 |
| <i>Breadth Subject Matter</i> | 36 |
| English and/or rhetoric (choose from English 1, 2, 3, 4A, 5 and/or Rhetoric 1, 3) | 8 |
| Economics (Economics 1A, 1B) | 10 |
| Social science and humanities electives** | 18 |
| <i>Restricted Electives</i> to supplement or expand any of the above areas | 19 |
| <i>Unrestricted Electives**</i> | 24 |
| <i>Total Units for the Degree</i> | 180 |

ANIMAL SCIENCE is the study of man's domestic animal resources through the integration of genetics, biochemistry, physiology, nutrition, economics, and other social sciences for improvement and expansion of these resources for food and recreation. A student may emphasize scientific, production, or management

* For convenience in program planning the *usual* courses taken to satisfy the requirement are shown in parentheses. Equal or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*

** These elective courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

aspects and may focus on animals for milk, meat fiber, work, or recreation. This major leads to a variety of career opportunities in management and production including positions in feed and food processing, financial institutions, chemical industries, private and public extension services, education, and government service. *Preveterinary medicine* requirements may also be met through this major by the student electing qualitative and quantitative chemistry, embryology, and sufficient social science courses.

Bachelor of Science Major Requirements*

| | UNITS |
|--|------------|
| <i>Preparatory Subject Matter</i> | 43 |
| General biological sciences (including Biology 1, Zoology 2, plus one from Bacteriology 2, Botany 2, or Entomology 1) | 17 |
| Physical sciences (including 13 units of chemistry and 10 units of physics and/or mathematics) | 23 |
| Animal science (Animal Science 2) | 3 |
| <i>Depth Subject Matter</i> | 49-50 |
| Biochemistry (Biochemistry 101A-101B or Physiological Sciences 101A-101B) | 6-7 |
| Nutrition (Nutrition 110) | 5 |
| Physiology (Physiology 110A, 110B) | 6 |
| Genetics (Genetics 100A and 100B) | 6 |
| Animal science: | 26 |
| Choose 8 units from Animal Science 114, 115 and 116. Choose 18 units from Biochemistry 102, Genetics 107, 107A, 107B, 107C, 108, 108L, 109, 131; or Animal Science 21, 31, 123, 124, 190, 194H, 197T, 198, 199, Epidemiology and Preventive Medicine 111, Nutrition 117, 121, 122, 123, Physiology 111A, 111B, 121, 121L, 130, 148, 149. | |
| <i>Breadth Subject Matter**†</i> | 20 |
| Social science and humanities and/or art of communication | 20 |
| <i>Unrestricted Electives**</i> | 68-69 |
| Selected by the student according to individual interests and objectives. Advisers will provide lists of recommended courses and will assist in the selection therefrom. | |
| Total Units for the Degree | 180 |

APPLIED BEHAVIORAL SCIENCES prepares students for creative work with people in helping them improve their social and their physical environments. The study of human social behavior together with the study of processes and strategies of social change are emphasized. Knowledge of the behavioral and environmental sciences is integrated with the development of skills necessary to apply this knowledge to the solving of complex social problems. The curriculum is intended primarily for students whose career goals are oriented toward public and community service. Community development, education, environmental design, and inter-group relations are examples of fields offering opportunities for employment of graduates in a wide variety of settings. The

* 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.

** All unrestricted elective and breadth subject matter courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

preparatory subject matter is designed to provide foundations of knowledge in the natural and social sciences and the humanities and to develop skills of inquiry and creative endeavor. The student and his adviser select course sequences most appropriate for the student's educational and career goals. *The Applied Behavioral Sciences majors are student designed programs and are available upon special application after admittance to the college through an entry major such as Exploratory.*

Bachelor of Science Major Requirements

| | UNITS |
|---|-----------------------------------|
| <i>Preparatory Subject Matter</i> | 48 |
| A minimum of 12 units in each of the following areas* | |
| Inquiry: intellectual skills of inquiry and critical analysis | |
| Ecological-Environmental Studies: understanding the dynamic interaction of man and his environment | |
| Personal and Social Behavior: understanding the dynamics of human relationship extending from the individual to the international level | |
| Creative Expression: the student explores and develops his own creative powers, intellectual and aesthetic | |
| <i>Depth Subject Matter</i> | 60 |
| Individualized program, including senior project, to be determined by student and advisory committee | |
| <i>Breadth Subject Matter</i> | 32 |
| Additional units in one or more of the areas in Preparatory Subject Matter above | |
| <i>Unrestricted Electives**</i> | 40 |
| | Total Units for the Degree |
| | 180† |

Note Other Requirements. *Admission:* Development in consultation with adviser, a statement of academic and career objectives and plan for attaining stated goals. *Graduation:* Minimum of one year in residence in the major and satisfactory completion of supervised field experience, internship, thesis or other creative activity.

ATMOSPHERIC SCIENCE is the study of the physics of meteorological processes, including atmospheric circulation and weather systems; mass and energy transfers between atmosphere and surface and within the atmosphere; radiation; turbulence and diffusion; condensation and precipitation mechanisms; air pollution meteorology; and developments in meteorological instrumentation. This field is now a fully developed branch of applied physics, with impressive credentials of achievement and exciting prospects for the future. Numerous opportunities exist in the federal government, industrial research and development, and education. Examples of federal government projects are the weather satellite, hurricane research, and numerical weather forecasting. The course of study is designed to provide a strong mathematical and physical science back-

* List of suggested courses in each of these areas may be obtained from the Department of Applied Behavioral Sciences.

** These elective courses may be taken on a Passed or No Record basis.

† It is recommended that a student take 15-20 units in the Applied Behavioral Sciences course series.

ground on which the student can build a career in research, education, resource management, or various areas of direct problem solving. In addition to a broad background in the basic meteorological elements, the major includes a strong emphasis on the biological and environmental sciences. Many students specialize in particular areas of atmospheric science through graduate study.

| Bachelor of Science Major Requirements* | UNITS |
|---|--------------|
| <i>Preparatory Subject Matter</i> | 69 |
| Mathematics (including Mathematics 21A, 21B, 21C, 22A, 22B, 22C) | 24 |
| Physics (Physics 4A, 4B, 4C, 4D) | 16 |
| Chemistry | 10 |
| Biology and botany (Biology 1 and Botany 2)..... | 11 |
| English and/or rhetoric | 8 |
| <i>Depth Subject Matter</i> | 30 |
| Resource sciences | 6 |
| Atmospheric science (Atmospheric Science 110A, 110B, 110C, 120, 121A 121B, 123, 124) | 24 |
| <i>Breadth Subject Matter</i> | 28 |
| Social sciences and humanities electives**† | 28 |
| <i>Restricted Electives**</i> | 21 |
| Biological sciences** | 14 |
| Resource and environmental sciences electives** | 7 |
| <i>Unrestricted Electives**</i> | 32 |
| Total Units for the Degree | 180 |

BIOCHEMISTRY considers the quantitative, organic, and physical-chemical aspects of living systems as these relate to the broad areas of zoology, botany, microbiology, and chemistry. Graduates may be employed as teachers, research technicians, and in chemical industries. Students may also use this major to prepare for graduate study in biochemistry and a number of the biological sciences or as preprofessional training for medicine, veterinary medicine, or dentistry.

This major can be adopted by students in either the College of Agricultural and Environmental Sciences or the College of Letters and Science.

| Bachelor of Science Major Requirements* | UNITS |
|--|--------------|
| <i>Preparatory Subject Matter</i> | 59-19 |
| Chemistry 1A, 1B, 1C, 5; or 1A, 4A, 4B | 15-19 |
| Mathematics 16A, 16B, 16C or 21A, 21B, 21C and one additional course (e.g., Mathematics 13 or 131A)..... | 13 |
| Physics 2A, 2B, 2C and 3A, 3B, 3C or 4A, 4C, 4D | 12 |
| Biology 1 and at least one course from the following: Bacteriology 2, Botany 2, Zoology 2 or Physiology 101 and 101L | 11-12 |

* For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.

** These elective courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

| | |
|--|--------------|
| English and/or rhetoric | 8 |
| Foreign language: No foreign language required but students are strongly urged to complete at least 12 units of college level foreign language (or place in the appropriate course). Students electing not to take foreign language should consider devising a one-year foreign culture course sequence. Foreign languages may be used to fulfill the Social Science and Humanities requirement of this major. | |
| Depth Subject Matter | 46-48 |
| Biochemistry 101A, 101B, 101L and one additional course recommended (e.g., Biochemistry 108, 122, 190) | 12-14 |
| Genetics 100A, 100B | 6 |
| Chemistry 112A, 112B, 112C | 15 |
| Physical chemistry (Chemistry 110A, 110B, 110C) and one additional recommended chemistry course | 13 |
| Breadth Subject Matter | 28 |
| Social sciences and humanities**† | 28 |
| Restricted Electives to supplement or expand any of the above areas..... | 15 |
| Additional courses in areas related to biochemistry (e.g., chemistry, biology, zoology, botany, genetics, bacteriology, food science, nutrition, physics, mathematics, engineering, etc.). At least one upper division course must be taken in a biological science other than biochemistry..... | 15 |
| Unrestricted Electives** | 25-32 |
| Total Units for the Degree | 180 |

The **BIOLOGICAL SCIENCES** major provides a choice of two options. Both are preparation for careers as teachers, laboratory technicians, or medical technologists and serve as a preprofessional basis for medicine, dentistry, and pharmacy or graduate study leading to advanced degrees and careers in research.

Plan I: Students interested in a career as laboratory technician, admission to professional schools, or graduate work in physiology or chemical biology should consider taking Chemistry 5 and a year laboratory course in physics. For those contemplating medical technology, Veterinary Microbiology 127, and courses such as Medical Microbiology and Parasitology are recommended in addition to the above.

Plan II: Should be selected by students who plan to go on to graduate school and who are interested in the study of the chemical and molecular aspects of life.

This major can be adopted by students in either the College of Agricultural and Environmental Sciences or the College of Letters and Science.

Bachelor of Science Major Requirements

| | UNITS |
|---|-------|
| Preparatory Subject Matter | 65-70 |
| Plan I: | |
| Bacteriology 2 | 5 |
| Biology 1 | 6 |

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

** For students enrolled in the College of Agricultural and Environmental Sciences elective courses may be taken on a Passed or No Record basis.

| | |
|--|----|
| Botany 2 | 5 |
| Chemistry 1A, 1B, 1C or 4A, 4B, 4C; 8A, 8B or 112A, 112B, 112C or 112A, 112D, 112E..... | 21 |
| Mathematics 16A, 16B, 16C; 13 or 131A..... | 13 |
| Physics 2A, 2B, 2C | 9 |
| Zoology 2 | 6 |
| Recommended: Chemistry 5, Geology 3, Physics 3A, 3B, 3C | |

Plan II:

| | |
|---|----|
| Bacteriology 2 | 5 |
| Biology 1 | 6 |
| Botany 2 | 5 |
| Chemistry 1A, 1B, 1C, 5, or 4A, 4B, 4C | 15 |
| Mathematics 21A, 21B, 21C, and 13 or 131A..... | 13 |
| Physics 4A, 4B, 4C, 4D, 4E | 20 |
| Zoology 2 | 6 |
| Recommended: Geology 3, Mathematics 22A, 22B, 22C | |

| | |
|-----------------------------------|-----------|
| Depth Subject Matter | 45 |
|-----------------------------------|-----------|

Plan I:

A total of 45 upper division units in biological sciences including Biochemistry 101A, 101B or Physiological Sciences 101A, 101B, and Genetics 100A, 100B; and course or course sequence from each of the following groups, including one course each in animal biology, microbiology, and plant biology.

- a) Organismal biology: Bacteriology 105, 105L, 150, 151; Botany 105, 108, 114, 118, 119; Entomology 101, 103; Zoology 100, 106A, 106B, 110, 112, 133A, 133B, 135, 136, 137.
- b) Population biology and ecology: Botany 117, 141; Entomology 104; Genetics 105; Zoology 116, 125, 147.
- c) Evolutionary biology: Botany 116, 140 (same course as Geology 140); Genetics 103; Geology 107; Zoology 148.
- d) Physiology: Physiology 101, 101L, 110A, 110B; Bacteriology 106, 106L, 130A, 130B, 130L; Botany 111; Entomology 102; Physiological Sciences 140A, 140B; Zoology 142.
- e) Cell biology: Physiology 100A, 100B, 103; Botany 130A (same course as Zoology 130A); Zoology 120, 121A, 121B.

Plan II:

A total of 45 upper division units in biological sciences including Biochemistry 101A, 101B, 101L or Physiological Sciences 101A, 101B, 102A; Chemistry 109A, 109B or 110A, 110B, 110C and 112A, 112B, 112C or 112A, 112D, 112E; Genetics 100A, 100B; and one course from groups *a*, *b*, and *c* and one course from group *d* or *e* (see above).

| | |
|--|--------------|
| Breadth Subject Matter | 30 |
| English and/or rhetoric | 8 |
| Social sciences and humanities** † | 22 |
| Restricted Electives | 9 |
| Additional courses to make a minimum of 54 upper division units. | |
| Unrestricted Electives** | 26-31 |

** For students enrolled in the College of Agricultural and Environmental Sciences, elective courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

| | | |
|---------------|----------------------------|-----|
| Plan I | 31 | |
| Plan II | 26 | |
| | Total Units for the Degree | 180 |

CHILD DEVELOPMENT is an appropriate undergraduate major for students who plan to work with people in a wide variety of situations—in teaching, counseling, or in welfare or community agencies for children and youth. It is valuable preparation for working with the "normal" child as well as the disadvantaged, the retarded, the handicapped, and the gifted. It is also an appropriate major for those students planning to pursue advanced degrees in the behavioral sciences. Students of Child Development observe infants, children, and their parents in a variety of situations: in real life, in films, and on closed-circuit television. They may participate in study projects with children from different socioeconomic and cultural backgrounds who need special counseling or educational services. They study intelligence, personality, and special abilities. The emphasis is on the interrelationship of the child, his family, and the community.

The major provides academic preparation for those who plan to pursue a teaching credential.

Bachelor of Science Major Requirements

| | UNITS |
|--|----------------------------|
| <i>Preparatory Subject Matter</i> | 42 |
| Cultural anthropology | 4 |
| Introductory psychology | 13 |
| Introductory sociology | 8 |
| Supervised observation of children | 2 |
| General biology | 4 |
| Nutrition | 3 |
| Physiology | 4 |
| Statistics | 4 |
| <i>Depth Subject Matter</i> | 34-35 |
| Human development 131, 133, 136, 137, 139, 140, 141, 142, and 133L or 136L | 29-30 |
| Human genetics | 5 |
| <i>Breadth Subject Matter</i> | 20 |
| English composition | 4 |
| English 103 | 4 |
| History 17A-17B or 174A-174B | 8 |
| Physics or chemistry | 4 |
| <i>Restricted Electives</i> | 4 |
| To supplement the depth subject matter students should complete at least 4 units of upper division psychology | |
| <i>Unrestricted Electives**</i> | 79-80 |
| | Total Units for the Degree |
| | 180 |

The major in **CONSUMER FOOD SCIENCES** is designed to provide students with a background in the biological and social sciences sufficient to prepare them for careers dealing with the utilization of foods by the consumer.

** These elective courses may be taken on a Passed or No Record basis.

Emphasis is placed on both the biological properties of foods and on the socio-economic and cultural aspects of foods as they relate to consumer acceptability and use. Students are provided with sufficient range in study of the biological, natural, and social sciences to prepare them for a variety of careers dealing with the utilization of food by the consumer. Employment opportunities include research and development, marketing and product control, teaching, extension service, journalism, and community service.

Bachelor of Science Major Requirements*

| | UNITS |
|---|------------|
| <i>Preparatory Subject Matter</i> | 43 |
| Biology (Biology 1) | 6 |
| Chemistry, general and organic (Chemistry 1A, 1B and 8A, 8B) | 16 |
| Microbiology (Bacteriology 2) | 5 |
| Physics (Physics 10 or 2A, 2B, 2C) | 4 |
| Statistics (Mathematics 13) | 4 |
| Written or oral expression (choose from English 1, 2, 5, and/or Rhetoric 1A) | 8 |
| <i>Depth Subject Matter</i> | 49 |
| Courses in foods and food science and technology, including Foods 100A, 100B, 101A, 101B and Food Science and Technology 107A, 107B | 32 |
| Nutrition 102A, 102B, 102L or equivalent | 9 |
| Consumer Economics 141, 142 | 8 |
| <i>Breadth Subject Matter</i> | 24 |
| Courses from at least three of the following: cultural anthropology, economics, psychology, sociology, applied behavioral sciences** | 24 |
| <i>Unrestricted Electives**</i> | 64 |
| Recommended additional courses: Foods 20, 134A, 134B; Food Science and Technology 1, 101, 103, 113, 122, 131; a course in institution management; a course in physiology, Biochemistry 101A, 101B. | |
| Total Units for the Degree | 180 |

The CROP PROTECTION major focuses on the study of sciences related to the control of agricultural pests. The philosophy on which the program is predicated is that increased production and quality of food and fiber is possible through the control of harmful insects, nematodes, plant disease, and weeds. To gain competence in diagnosing ills of agricultural crops and prescribing treatment, students in this major pursue studies in plant physiology and pathology, weed science, entomology, nematology, agricultural engineering, toxicology, and wildlife. Career opportunities are available as research technicians and in technical sales and service with chemical companies, food processing firms, farm adviser offices, and grower organizations.

* 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.*

** These elective courses may be taken on a Passed or No Record basis.

Bachelor of Science Major Requirements*

| | UNITS |
|--|-------|
| <i>Preparatory Subject Matter</i> | 43 |
| Biology 1 | 6 |
| Botany 2 | 5 |
| Zoology 2 | 6 |
| Chemistry 1A, 1B, 8A, 8B | 16 |
| Mathematics, statistics | 4 |
| Physics 2A, 2B | 6 |
| <i>Depth Subject Matter</i> | 48 |
| Plant Science 1 | 3 |
| Soil and Water Science 1 | 3 |
| Agricultural Engineering 110 | 3 |
| Environmental Toxicology 180 | 3 |
| Wildlife and Fisheries Biology 151 | 3 |
| Botany 107, 111 | 9 |
| Entomology 110, 112, 130 | 12 |
| Nematology 100 | 4 |
| Plant Pathology 120, 125 | 8 |
| <i>Breadth Subject Matter</i> | 20 |
| English and/or rhetoric | 8 |
| Social sciences and humanities electives**† | 12 |
| <i>Restricted Electives</i> | 28 |
| To provide a specialization in the following: agronomy, floriculture, landscape horticulture, nursery management, pomology, vegetable crops, or viticulture. | |
| <i>Unrestricted Electives**</i> | 41 |
| Total Units for the Degree | 180 |

DESIGN emphasizes textiles, costume, interiors, and environmental concerns. Graduates will be prepared for advanced study in design, for teaching, for entry into professional schools, and for the satisfaction of being a creative member of society. The design program is based on the unequivocal commitment that the designer should be an innovator with a broad understanding of his culture. Two approaches are offered:

Plan I: The designer-craftsman program is a general education in design. Emphasis is placed upon the exploration of expanding design areas without definite boundaries, on stimulating a joy in doing, on instilling a sense of intrinsic motivation. Concentration in a design area (costume, textiles, interior, or environmental) develops competence, maturity and aesthetic reaction to personal solutions of design problems.

Plan II: The environmental design program is intended as a preprofessional exploration of ideas and processes. The designer is seen not only as an individual creator but also as a participant in the group study of environmental problems such as the home, urban and rural environments, and design for specific groups or purposes. Group study presupposes interaction with other environmental disciplines and the behavioral sciences.

* For convenience in program planning, the usual courses taken to satisfy the requirements are shown. Equal or more comprehensive courses are acceptable.

** These elective courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

Bachelor of Science Major Requirements

| | UNITS |
|--|------------|
| <i>Preparatory Subject Matter</i> | 28-36 |
| Introduction to design: Design 6A, 6B, 6C | 8-12 |
| Design 30A-30B-30C (elect four or five different sections) | 16-20 |
| A. Graphic Presentation | |
| 1) Drafting and perspective | |
| 2) Calligraphy | |
| 3) Figure drawing | |
| B. Structure of Materials | |
| 1) Two dimensional form | |
| 2) Three dimensional form | |
| C. Materials and Processes | |
| 1) Non-loom textiles | |
| 2) Model construction | |
| 3) Personal adornment | |
| Additional studio courses from design or art | 4 |
| <i>Depth Subject Matter</i> | 33-36 |
| <i>Plan I, Designer-Craftsman Program:</i> | |
| Junior Year | 18 |
| Design 120A, 120B, 120C | 9 |
| Choose three courses from Design 140A, 140B, 142A, 142B, 143, 144 | 9 |
| Senior Year | 15 |
| Choose four courses from Design 160A, 160B, 160C, 170A, 170B, 170C, 180A, 180B, 180C | 12 |
| Design 196 | 3 |
| <i>Plan II, Environmental Design program:</i> | |
| Junior Year | 18 |
| Design 120A, 120B, 120C, 140A, 140B, 144 | |
| Senior Year | 18 |
| Design 180A, 180B, 180C, 196, 198 or 199 | |
| <i>Breadth Subject Matter</i> | 81 |
| Natural sciences** | 27 |
| Humanities** | 27 |
| Social sciences**† | 27 |
| <i>Unrestricted Electives**</i> | 27-38 |
| The following courses in art are recommended: Art 1A, 1B, 16 and two courses from Art 14, 112A, 112B, 128A. | |
| Total Units for the Degree | 180 |

The DIETETICS major provides students with training in the nutritional, general biological and social sciences, communications, and management. The program fulfills the academic requirements for admission to dietetic internship training, for membership in the American Dietetic Association, and for professional employment in this field. Dietitians are sought for administrative, teaching, and research positions in hospitals, schools, and other food-centered institutions. Employment in product development and research in human and animal nutrition are further opportunities for graduates of this major. Graduates are

** These elective courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

qualified for admission to graduate programs in dietetics, nutrition science, public health nutrition, or food service management.

Bachelor of Science Major Requirements*

| | UNITS |
|---|-----------------------------------|
| <i>Preparatory Subject Matter</i> | 42-43 |
| Written or oral expression (English 1, 2, 5 and/or Rhetoric 1A) | 8 |
| Statistics (Mathematics 13) | 4 |
| Physics (Physics 2A, 10) or calculus (Mathematics 16A) | 3-4 |
| Chemistry (Chemistry 1A, 1B, 8A, 8B) | 16 |
| Biology (Biology 1) | 6 |
| Bacteriology (Bacteriology 2 and 3) | 5 |
| <i>Depth Subject Matter</i> | 49 |
| Biochemistry 101A, 101B | 6 |
| Physiology with laboratory 101, 101L | 6 |
| Foods 100A, 100B, 101A, 101B | 9 |
| Nutrition 110, 111, 111L, 116A, 116B | 16 |
| Institution Management 123, 123L, 124 | 12 |
| <i>Breadth Subject Matter</i> | 21 |
| Principles of economics (Economics 1A) | 5 |
| Sociology or cultural anthropology | 4 |
| General psychology (Psychology 1A or 10) | 4 |
| Principles of learning or methods of teaching (Education 110) | 4 |
| Principles of accounting (Economics 11A) | 4 |
| <i>Unrestricted Electives**</i> | 67-68 |
| | Total Units for the Degree |
| | 180 |

The ENTOMOLOGY major provides students an opportunity for extensive study of insects—their behavior, classification, structure, and physiology. Some of the special branches of entomology are: transmission of plant and animal pathogens, control of insects with natural enemies and chemicals, and management of honeybees for honey production and crop pollination. Excellent employment opportunities are available in managerial and technical positions with agricultural chemical companies and state and federal agencies concerned with insects and their control. Some entomology graduates prepare to teach zoology, biology, and entomology in high schools and junior colleges.

Bachelor of Science Major Requirements†

| | UNITS |
|--|-------|
| <i>Preparatory Subject Matter</i> | 74 |
| Biology 1 | 6 |
| Botany 2 | 5 |
| Zoology 2 | 6 |
| Bacteriology 2 | 4 |
| Genetics | 4 |
| Plant pathology, plant or animal physiology, or biochemistry | 4 |
| Chemistry 1A, 1B, 8A, 8B | 16 |
| Mathematics, including statistics | 6 |
| Physics | 4 |

* 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.

** These elective courses may be taken on a Passed or No Record basis.

† For convenience in program planning the *usual* courses taken to satisfy the requirements are shown. Equal or more comprehensive courses are acceptable.

| | |
|---|------------|
| Earth or atmospheric science | 3 |
| Electives in biological sciences (exclusive of entomology) | 15 |
| <i>Depth Subject Matter</i> | 26 |
| Entomology 1, 101, 102, 103, 104, 105 or 109 and another upper division course in entomology which requires a collection of insects | 26 |
| <i>Breadth Subject Matter</i> | 36 |
| English and/or rhetoric | 8 |
| Electives in social sciences and humanities**† | 28 |
| <i>Unrestricted Electives**</i> | 44 |
| Total Units for the Degree | 180 |

ENVIRONMENTAL PLANNING AND MANAGEMENT is the study of the planning, design, management, administration, and interpretation of urban and natural environments that can include: the city or suburb, public or private outdoor recreation areas, scenic roadways, new communities, wilderness areas, and shopping, educational, or industrial centers. A student can emphasize professional or preprofessional training in these program options: 1) *landscape management*, 2) *park and recreation administration*, 3) *environmental education*, 4) *planning*. All options emphasize an interdisciplinary approach to problem solving that is based on a balanced program in the social and natural sciences. Graduates can expect career opportunities as: directors of public park systems or private resort complexes, city planners, outdoor education teachers, landscape contractors, park rangers, recreation planners, landscape managers, and park naturalists.

Bachelor of Science Major Requirements*

| | UNITS |
|--|-------|
| <i>Preparatory Subject Matter</i> | 39 |
| Biology (Biology 10) | 4 |
| Botany (Botany 2) | 5 |
| Environmental studies (Environmental Studies 10) | 4 |
| Resource sciences (Resource Sciences 100, 190) | 6 |
| Geology, geography, or soil and water science (Geology 1 or Geography 1 or Soil and Water Science 1) | 3 |
| Chemistry (Chemistry 10) | 3 |
| Physics (Physics 10) | 4 |
| Mathematics (Mathematics 13, 16A, and 19) | 10 |
| <i>Depth Subject Matter</i> | 31-33 |
| <i>Park and Recreation Administration Option:</i> | |
| Landscape Design (Environmental Horticulture 1, 1L) | 5 |
| Introduction to Environmental Plants (Environmental Horticulture 5) | 2 |
| Landscape Horticulture: Environmental Horticulture 128A, 128B | 5 |
| Urban and Regional Planning (Environmental Planning and Management 110) | 3 |

* 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.*

** These elective courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

| | |
|--|---|
| Outdoor Recreation: Environmental Planning and Management 116 | 3 |
| Recreation Policy: Environmental Planning and Management 122 | 3 |
| Leisure Systems: Environmental Planning and Management 124 | 3 |
| Planning of Recreation Environments: Environmental Planning and Management 134 | 3 |
| Design of Recreation Environments: Environmental Planning and Management 136 | 3 |
| Environmental Quality (Environmental Planning and Management 1) | 3 |
| Landscape Management Option: | |
| Economic Entomology (Entomology 110) | 4 |
| Introduction to Weed Science (Plant Science 120) | 2 |
| Plant pathology (Plant Pathology 120) | 4 |
| Ecology of Cultivated Plants (Plant Science 101) | 3 |
| Environmental Quality (Environmental Planning and Management 1) | 3 |
| Landscape design (Environmental Horticulture 1, 1L) | 5 |
| Taxonomy and Ecology of Environmental Plants (Environmental Horticulture 105) | 4 |
| Landscape Construction (Environmental Horticulture 104) | 3 |
| Landscape Horticulture (Environmental Horticulture 128A, 128B) | 5 |
| Environmental Education Option: | |
| Soil, Water, and Air Resources (Soil and Water Science 1)..... | 3 |
| Environmental Quality (Environmental Planning and Management 1) | 3 |
| Protecting the Quality of the Environment (Environmental Toxicology 10) | 3 |
| Conservation of Resources and Environment (Geography 161) .. | 4 |
| Urban and Regional Planning (Environmental Planning and Management 110) | 3 |
| Outdoor Recreation (Environmental Planning and Management 116) | 3 |
| Landscape design (Environmental Horticulture 1, 1L) | 5 |
| Taxonomy and Ecology of Environmental Plants (Environmental Horticulture 105) | 4 |
| Environmental Interpretation (Environmental Planning and Management 160) | 3 |
| Additional units to be selected in consultation with adviser | 2 |
| Planning Option | |
| Environmental Quality (Environmental Planning and Management 1) | 3 |
| Introduction to Landscape Design (Environmental Horticulture 1, 1L) | 5 |
| Drafting and Perspective (Design 30A) | 4 |
| Urban and Regional Planning (Environmental Planning and Management 110) | 3 |
| Urban Geography (Geography 155) | 4 |
| History of Urban Form (Art 168) | 4 |

* 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.

| | |
|--|-----------------------------------|
| Urban Society (Sociology 143) | 4 |
| Local Government and Politics: Urban Problems (Political Science 103B) | 4 |
| Land Use Controls (Environmental Planning and Management 198) | 2 |
| Breadth Subject Matter | 36 |
| English (English 1), rhetoric (Rhetoric 1A), and (Agricultural Education 188) | 12 |
| Upper division courses in at least two social sciences | 12 |
| Social sciences and humanities electives† | 12 |
| Restricted Electives | 36 |
| Courses selected with approval of adviser to complement student's program option in this major. | |
| Unrestricted Electives** | 36 |
| | Total Units for the Degree |
| | 180 |

The focus of the **FOOD SCIENCE** major is on the maintenance of product quality, especially in terms of controlling chemical and microbiological changes during processing and between processing and consumption. Emphasis in the major is given to the important roles of engineering, biological, physical, and behavioral sciences in the development of new food sources, food processing methods, and the evaluation, improvement, packaging, and distribution of food. Students also may specialize in *Food Processing or Food Technology and Management*. Graduates qualify for careers in supervisory, technical, sales, and executive positions in food processing, food research, and other food-related fields, or may qualify for graduate study leading to the M.S. degree in Food Science or the Ph.D. degree in such fields as agricultural chemistry, microbiology, biochemistry, and nutrition.

Bachelor of Science Major Requirements*

| | UNITS |
|---|-------|
| Preparatory Subject Matter | 62 |
| Biology and microbiology (Biology 1, Bacteriology 2) | 11 |
| Chemistry and biochemistry (Chemistry 1A, 1B, 1C or 4A, 4B, 4C; 8A, 8B; Biochemistry 101A, 101B) | 27 |
| Mathematics and physics (Mathematics 13, 19; Physics 2A, 2B, 2C) | 16 |
| Written or oral expression (choose from English 1, 2, 5 and/or Rhetoric 1A) | 8 |
| Depth Subject Matter | 28 |
| Food science (Food Science and Technology 1, 49, 103, 104A, 104B, 105A, 105B, 111A, 111B, 131) | 28 |
| Breadth Subject Matter | 28 |
| Social sciences and humanities electives**† | 28 |
| Restricted Electives suggested for students who elect to follow one of the three programs below | 38 |
| General Program: | |
| Food science and related courses | 38 |
| Food Technology and Management: | |

* For convenience in planning your program the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses will be accepted upon approval by adviser.

** These elective courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

| | |
|---|----------------------------|
| Agricultural economics and economics | 33 |
| Related courses | 5 |
| Food Processing: | |
| Mathematics and physics | 12 |
| Food Science and Technology 110A, 110B, 110C, 130 | 12 |
| Related courses | 14 |
| Unrestricted Electives** | 24 |
| | <hr/> |
| | Total Units for the Degree |
| | 180 |

The **HOME ECONOMICS** major, through the study of the humanities, biological, physical and social sciences, along with depth subject matter, provides an excellent background for professional home economists. Employment opportunities exist in governmental, industrial, and community agencies dealing with social services, private industry, extension services, and teaching at the secondary and junior college levels. The program encompasses the broad field of family and consumer sciences combining laboratory work along with academic theory in such areas as child development, foods, nutrition, and textiles. Graduates are qualified for admission to programs leading to a master's degree with study in the areas of child development, consumer economics, foods, nutrition, or textiles.

This major provides academic preparation for those who plan to pursue a teaching credential.

Bachelor of Science Major Requirements*

| | UNITS |
|---|----------------------------|
| Preparatory Subject Matter | 60-61 |
| Biological and Physical Sciences: | |
| Biology 1 | 6 |
| Chemistry 1A, 1B, 8A, 8B | 16 |
| Mathematics 13 or Economics 12 | 4-5 |
| Physiology (Physiology 2 or 101) | 4 |
| Social Sciences and Humanities: | |
| Anthropology 2 or sociology | 4 |
| Introduction to design | 4 |
| Economics 1A, 1B | 10 |
| Written or oral expression (English 1, 2, 5 and/or Rhetoric 1A) .. | 8 |
| Psychology 1A or 10 | 4 |
| Depth Subject Matter | 60 |
| The following courses may be used to satisfy the above requirement: | |
| Applied Behavioral Sciences 150 | |
| Consumer Economics 141, 142 | |
| Foods 100A, 100B, 101A, 101B | |
| Human Development 131, 133, 136, 137 | |
| Home Management 140, 140L | |
| Nutrition 102A, 102B, 102L | |
| Textiles and Clothing 6, 7, 17A, 17B, 160, 172 | |
| Unrestricted Electives** | 59-60 |
| | <hr/> |
| | Total Units for the Degree |
| | 180 |

* 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.

** These elective courses may be taken on a Passed or No Record basis.

The INTERNATIONAL AGRICULTURAL DEVELOPMENT major provides an opportunity for a student to develop competence in a technical field and, in addition, to acquire those special qualities of mind and spirit requisite for effective performance in underdeveloped areas of the world. These individuals must also be perceptive, sensitive, understanding, and possess knowledge of the social-political-economic-cultural relationships existing among people. Graduates concerned with resource development, whether American or foreign, will find opportunities in government service and commercial firms with overseas departments, providing a wide variety of career opportunities.

Students in this major may select their areas of technical specialization from any of the fields of interest broadly grouped in agriculture and the environmental sciences. A wide selection of courses emphasizing development in the humanities, social sciences, and economics are available to students in order to develop some understanding of the broad cultural and economic environments in which agriculture operates in particular areas outside the United States.

Bachelor of Science Major Requirements*

| | UNITS |
|--|------------|
| <i>Preparatory Subject Matter</i> | 52 |
| Chemistry, including organic (Chemistry 1A, 1B, 8A, 8B) | 16 |
| Physics | 4 |
| Mathematics, statistics (Mathematics 13) | 4 |
| Economics | 5 |
| Biological sciences (animal or plant physiology, bacteriology, biochemistry, botany, genetics, zoology) | 15 |
| English and/or rhetoric | 8 |
| <i>Depth Subject Matter</i> | 29 |
| International agricultural development (International Agricultural Development 10, 101, 102, 190, and other courses with international development emphasis) | 29 |
| <i>Breadth Subject Matter</i> | 23 |
| Social sciences and humanities | 23 |
| <i>Restricted Electives</i> | 50 |
| Agricultural and other science electives | 12 |
| Economics or agricultural economics | 6 |
| Humanities and social science courses relevant to an understanding of development | 17 |
| Foreign language or demonstrated proficiency in a single foreign language equivalent to passing Course 4 | 15 |
| <i>Unrestricted Electives**</i> | 26 |
| Total Units for the Degree | 180 |

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 nutrition of specific species or groups, as human, domestic animals, avian, and wildlife; 2) study of medicine, veterinary medicine, and other medical sciences; 3) technical work in nutrition in animal, foods, and

* 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.*

** These elective courses may be taken on a Passed or No Record basis.

pharmaceutical industries; 4) journalism and technical writing; and 5) health education. It is assumed that students will be advised and will take additional courses appropriate to their specific interest.†

Bachelor of Science Major Requirements*

| | UNITS |
|---|-------|
| <i>Preparatory Subject Matter</i> | 49 |
| Biochemistry (Biochemistry 101A, 101B) | 6 |
| Biology (Biology 1) | 6 |
| Chemistry, general and organic (Chemistry 1A, 1B; 8A, 8B) | 16 |
| Microbiology (Bacteriology 2) | 5 |
| Physics (Physics 10 or 2A, 2B, 2C) | 4 |
| Statistics (Mathematics 13) | 4 |
| Written or oral expression (choose from English 1, 2, 5 and/or Rhetoric 1A) | 8 |
| <i>Depth Subject Matter</i> | 34 |
| Physiology (must include Animal Physiology 110A, 110B) | 10 |
| Foods (Foods 100A, 100B) | 6 |
| Nutrition and nutrition laboratory (must include Nutrition 110) | 18 |
| <i>Breadth Subject Matter</i> | 28 |
| Courses from at least three of the following: cultural anthropology, economics, psychology, sociology, applied behavioral sciences, history, political science** | 28 |
| <i>Unrestricted Electives**</i> | 69 |
| | <hr/> |
| Total Units for the Degree | 180 |

The PHYSIOLOGY major is designed to provide students with an understanding of the vital functions of living organisms and includes a systematic study of the functional properties of tissues and organs and comparison of processes among different kinds of animals. It will provide the foundations for a challenging career in physiology and also serve as a basis for further training in schools of human and veterinary medicine, medical technology, pharmacy, dentistry, optometry, and other health sciences. Students interested in research and advanced teaching may use the program as preparation for continued study leading to the M.S. and Ph.D. degrees.

This major can be adopted by students in either the College of Agricultural and Environmental Sciences or the College of Letters and Science.

Bachelor of Science Major Requirements*

| | UNITS |
|--|-------|
| <i>Preparatory Subject Matter</i> | 53-54 |
| Biological sciences (Biology 1) | 6 |
| Chemistry (Chemistry 1A, 1B, 1C, 5, 8A, 8B) | 25 |
| Mathematics (Mathematics 13, 16A, 16B, 16C or Physiology 108) | 13-14 |

* For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.

** These elective courses may be taken on a Passed or No Record basis.

† Recommended Courses for students preparing for laboratory work or for graduate work in nutrition: analytical chemistry (Chemistry 1C, 5; Food Science and Technology 103), biochemistry laboratory (Biochemistry 101L or Animal Biochemistry 102), calculus (Mathematics 16A, 16B, 16C), computer science, food laboratory (Foods 101A, 101B), physiology laboratory (Animal Physiology 111A, 111B).

| | |
|--|-------|
| Physics (Physics 2A, 2B, 2C) | 9 |
| <i>Depth Subject Matter</i> | 36 |
| Physiology (including Physiology 100A, 100B, 100L, 110A, 110B, 111A, 111B) | 36 |
| <i>Breadth Subject Matter</i> | 16 |
| Social science and humanities (including 8 units of English and/or rhetoric) | 16 |
| <i>Restricted Electives</i> *** | 40 |
| Upper division units in mathematics and/or the physical and biological sciences in addition to the 36-unit physiology requirement to be selected with the approval of the adviser. Course sequences with emphasis in the following fields are available from the adviser: systemic physiology—preprofessional; systemic physiology—systems analysis; general physiology; comparative physiology, endocrinology, and metabolism. | |
| <i>Unrestricted Electives</i> ** | 34-35 |
| Total Units for the Degree | 180 |

The objective of the **PLANT SCIENCE** major is to train students in the biological and physical sciences as applicable to the technology required for the production and maintenance of plants. A student may specialize in agronomy, floriculture, landscape horticulture, nursery management, pomology, vegetable crops, or viticulture, or prepare for graduate work in the plant sciences. Occupational opportunities exist in nursery and greenhouse management, farming, technical and sales positions in agricultural business and associated enterprises (such as equipment and supply companies), as well as in private, state, and federal service in consulting or research.

Bachelor of Science Major Requirements†

| | UNITS |
|---|-------|
| <i>Preparatory Subject Matter</i> | 37 |
| Biology 1 | 6 |
| Botany 2 | 5 |
| Chemistry 1A, 1B, 8A, 8B | 16 |
| Mathematics (statistics) | 4 |
| Physics 2A, 2B | 6 |
| <i>Depth Subject Matter</i> | 33 |
| Plant Science 1, 2 | 7 |
| Soil and Water Science 2 | 3 |
| Entomology 110 or 112 | 4 |
| Nematology or weed science | 4 |
| Genetics 100A, 100B | 6 |
| Plant Pathology 120 | 4 |
| Botany 111 | 5 |
| <i>Breadth Subject Matter</i> | 20 |
| English, rhetoric, or technical writing | 8 |
| Social sciences and humanities electives**‡ | 12 |

* For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.

** For students enrolled in the College of Agricultural and Environmental Sciences, elective courses may be taken on a Passed or No Record basis.

*** May be taken on a Passed or No Record Basis subject to approval of adviser.

† For convenience in program planning the *usual* courses taken to satisfy the requirements are shown. Equal or more comprehensive courses are acceptable.

| | |
|---|-----------------------------------|
| Restricted Electives | 45 |
| Courses in specialization and the natural sciences supportive of major. Specialization may be taken in: agronomy, floriculture, landscape horticulture, nursery management, pomology, vegetable crops, and viticulture. | |
| Students wishing to prepare for graduate training should elect at least 24 units from the following: Bacteriology 2; Biochemistry 101A, 101B, 101L; Botany 105, 108, 117, 130A; Mathematics 15, 16A, 16B, 16C; Physics 2C; Plant Science 116; and Zoology 2. | |
| Unrestricted Electives** | 45 |
| | Total Units for the Degree |
| | 180 |

PREFORESTRY students may be admitted to the School of Forestry and Conservation located on the Berkeley campus, following completion of the sophomore year. The preparatory programs offered at Davis provide full preparation for admission to the School. To qualify for such admission, a student must complete at least 84 quarter units of credit with a grade-point average of C or higher. In addition, he must satisfy the preparatory subject matter requirements for one of the two majors offered.

For full details on the majors in general forestry and in wood science and technology, please consult the *Announcement of the School of Forestry and Conservation*, which may be obtained from the School of Forestry and Conservation, 145 Mulford Hall, Berkeley, California 94720.

PREVETERINARY MEDICINE students may apply for admission to the School of Veterinary Medicine on the Davis campus following completion of at least 90 quarter units, including the requirements listed below. This normally requires a minimum of two years of study and satisfies the course requirements for admission to the School of Veterinary Medicine. For further information write to the Office of the Dean, School of Veterinary Medicine, Davis 95616.

| <i>Preveterinary Medical Subject and Unit Requirements</i> | <i>UNITS</i> |
|--|--|
| Chemistry (general, qualitative, organic, and quantitative) | 25 |
| Genetics | 3 |
| Physics (general) | 9 |
| Biology, zoology, embryology | 17 |
| English composition and additional English or rhetoric | 8 |
| Restricted electives in social sciences and humanities *** †† | 17 |
| Additional electives in social sciences, humanities or agriculture† | 11 |
| Animal science no longer required, but recommended | |
| | Total Units for the Requirement |
| | 90 |

** These elective courses may be taken on a passed or No Record basis.

*** May be used in partial satisfaction of the Social Sciences and Humanities requirement in addition to fulfilling the requirement of the major.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

†† Refer to School of Veterinary Medicine recommendations regarding Passed or No Record options.

The **RANGE SCIENCE** major includes the fields of study applicable to the development and management of public and private lands used primarily for grazing. However, this program also takes into account the demands imposed on these lands for recreation, forestry, and watershed. Students learn to make decisions affecting the multiple-use potential of an area as they draw upon the animal, plant, soil, water, and social sciences. Graduates will be prepared for positions in governmental agencies such as the Bureau of Land Management, the Soil Conservation Service, and the Forest Service, as well as for self-employment as consultants, ranch managers, or ranchers.

Bachelor of Science Major Requirements*

| | UNITS |
|---|--------------|
| <i>Preparatory Subject Matter</i> | <i>45</i> |
| Biology (Biology 1) | 6 |
| Botany (Botany 2) | 5 |
| Chemistry (Chemistry 1A, 1B, 8A, 8B) | 16 |
| Physics (Physics 2A, 2B) | 6 |
| Mathematics (Mathematics 13, 16A) | 7 |
| Economics (Economics 1A or 1B) | 5 |
| <i>Depth Subject Matter</i> | <i>63-67</i> |
| Botany (Botany 108, 111) | 10 |
| Geology (Geology 1) | 3 |
| Soil and water science (Soil and Water Science 2) | 3 |
| Agronomy and Range Science 2 or 112-112L | 3-4 |
| Animal science (Animal Science 1, 2, 118A) | 9 |
| Nutrition 103 or Wildlife and Fisheries Biology 108 | 4 |
| Plant Science 1 or Range Management 1 | 3-4 |
| Resource sciences (Resource Sciences 100, 190) | 4 |
| Genetics | 3 |
| Ecology (Plant Science 101) | 3 |
| Animal physiology or zoology | 4-6 |
| Range Management 100, 103, 105, 133, 198, or 199 | 14 |
| <i>Breadth Subject Matter</i> | <i>32</i> |
| English and/or rhetoric | 8 |
| Social sciences and humanities electives**† | 12 |
| Upper division social sciences courses in at least two of the following: agricultural economics, economics, geography, or political science | 12 |
| <i>Unrestricted Electives**</i> | <i>36-40</i> |
| Total Units for the Degree | 180 |

The **RENEWABLE NATURAL RESOURCES** major provides for a comprehensive and exploratory study of environmental problems related to climate, air, water, land, vegetation, and animals. The emphasis is on an integrated approach to development, management, and protection of such resources. Students with definite interests in ecology and conservation but uncertain as to specialization may select this major to achieve a general undergraduate prepa-

* 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.*

** These elective courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

ration. Graduates from the program are prepared for positions in wildlife and fisheries biology, microbiology, physiology, environmental education, forestry, Bureau of Land Management, and for graduate study in a number of related fields. Essential social, biological, and physical sciences are combined with a large block of elective courses to allow for individualized programming. Emphasis may be directed to the economic, engineering, atmospheric, horticultural, geographical, geological, recreational, or wildlife aspects of resource availability and use.

Bachelor of Science Major Requirements*

| | UNITS |
|--|-----------------------------------|
| <i>Preparatory Subject Matter</i> | 74 |
| Biology 1 | 6 |
| Choose two courses from: | |
| Animal Science 1, 2; Plant Science 1, 2 | 6 |
| Additional courses in the biological sciences | 14 |
| English and/or rhetoric | 8 |
| Physics and chemistry | 22 |
| Mathematics (Mathematics 13) | 9 |
| Soil and/or water science | 6 |
| Geology or physical geography | 3 |
| <i>Depth Subject Matter</i> | 9 |
| Resource sciences (including Resource Sciences 100) | 6 |
| Agricultural Economics 148 or 176 | 3 |
| <i>Breadth Subject Matter</i> | 30 |
| Biological, physical, environmental sciences electives** | 18 |
| Social sciences and humanities electives**† | 12 |
| <i>Restricted Electives**</i> | 27 |
| Program must include at least one upper division course from three of the following: agricultural economics, agricultural engineering, animal science, atmospheric science, environmental horticulture, geography, park administration, plant science, range management, soil science, water science, and wildlife and fisheries biology. | |
| <i>Unrestricted Electives**</i> | 40 |
| | Total Units for the Degree |
| | 180 |

SOIL AND WATER SCIENCE is concerned with the use and protection of our vital and limited land and water. The major is designed for students wishing to make a career involving these resources as well as for those who have a more general interest in their use and protection, but whose educational objectives are less sharply focused. While the major has a "core" of required courses, programs can be designed to meet the needs of students having different objectives. For example, those wishing to emphasize resource use and management would include more than the minimum number of units of physical and biological sciences, while those more interested in resource allocation and land-use plan-

* 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.

** These elective courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

ning would choose more courses in the social, political, and economic area. The flexibility of this major makes possible a wide variety of career opportunities which include managerial and technical positions with agri-businesses such as equipment and supply companies, farm management, and positions involving advising, planning, land appraisal, research, and teaching with private, district, county, state, federal, and international organizations dealing with soil and water development, use, and conservation.

Bachelor of Science Major Requirements*

| | UNITS |
|---|------------|
| <i>Preparatory Subject Matter</i> | 49 |
| Biology and botany | 11 |
| Mathematics (including introductory computer programming) | 9 |
| Chemistry and physics (Chemistry 1A, 1B or 4A, 4B, 4C; Physics 2A, 2B, 3A, 3B or 4A, 4B, 4C or 10) | 18 |
| Economics or agricultural economics | 3 |
| English and/or rhetoric | 8 |
| <i>Depth Subject Matter</i> | 29 |
| Renewable natural resources | 3 |
| Soil and water science (including Soil and Water Science 2, 130, 140, and 3 units of 199) | 26 |
| <i>Breadth Subject Matter</i> | 17 |
| Social sciences and humanities**† | 17 |
| <i>Restricted Electives</i> to supplement or expand any of the above areas | 51 |
| At least 30 of these units must be in physical and biological sciences and mathematics. | |
| <i>Unrestricted Electives</i> ** | 34 |
| Total Units for the Degree | 180 |

The **TEXTILES** major is concerned with studying the chemical and physical properties, applications, and care of fibers and fabrics; their use in design; and the socioeconomic aspects of clothing. There are two options offered in this major.

Plan I stresses the *creative disciplines* and can lead to careers in teaching, extension service, merchandising, design, and journalism.

Plan II places more emphasis on the *scientific disciplines* related to textiles and, in addition to the above-mentioned opportunities, can lead to careers in research and development, technical service, marketing, and product control. Students graduating with this option are qualified to enter graduate programs with specialization in textile science. Students planning to enter the graduate program in agricultural chemistry should consult with their advisers for selection of suitable electives.

* 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.*

** These elective courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

Bachelor of Science Major Requirements*

| | UNITS |
|--|-------|
| <i>Preparatory Subject Matter</i> | 29-30 |
| Textiles and Clothing 6, 7 | 5 |
| Two courses in cultural anthropology, psychology, or sociology | 8 |
| Mathematics 13 | 4 |
| Written or oral expression (English 1, 2, 5 and/or Rhetoric 1A) | 8 |
| Principles of economics | 4-5 |

PLAN I

| | |
|--|-------|
| <i>Depth Subject Matter</i> | 45-46 |
| Textiles and Clothing 17A, 17B, 162, 162L, 170, 172, 197 | 21 |
| Anthropology 2 | 4 |
| Chemistry (Chemistry 10) | 4 |
| Design 143, 170A, 170B | 9 |
| History of art or design | 3-4 |
| Psychology 1A or 10 | 5-4 |
| <i>Restricted Electives</i> | 42 |
| Required units chosen from: | |
| Agricultural Economics 112 | |
| Applied Behavioral Sciences 150 | |
| Consumer Economics 141, 142 | |
| Design 142A, 142B, 160A, 160B, 160C, 170C | |
| Economics 1A, 1B, or 2A, 2B, 2C | |
| Mathematics 19 | |
| Physics 10 | |
| Psychology 145 | |
| Textiles and Clothing 47 | |
| <i>Unrestricted Electives**</i> | 62-64 |

PLAN II

| | |
|---|-------|
| <i>Depth Subject Matter</i> | 39-41 |
| Textiles and Clothing 160, 161, 161L, 162, 162L, 172, 197 | 19 |
| Chemistry 1A, 1B, 8A, 8B | 16 |
| Physics (Physics 2A and 2B, or 10). | 4-6 |
| <i>Restricted Electives</i> | 52 |
| Required units chosen from: | |
| Agricultural Economics 112 | |
| Bacteriology 2 | |
| Biology 1 | |
| Chemistry 1C, 5, 10, 109A, 109B, 112D, 112E | |
| Consumer Economics 141, 142 | |
| Design 143 | |
| Economics 1A, 1B, or 2A, 2B, 2C | |
| Mathematics 15, 16A, 16B, 16C, 29 | |
| Physics 2C | |
| Psychology 1A or 10 | |
| Textiles and Clothing 47 | |
| <i>Unrestricted Electives**</i> | 57-60 |

| | |
|-----------------------------------|------------|
| Total Units for the Degree | 180 |
|-----------------------------------|------------|

* 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.

** These elective courses may be taken on a Passed or No Record basis.

The WILDLIFE AND FISHERIES BIOLOGY major deals with the interface between the needs of man and wildlife which must be maintained for the sake of future generations, both as to recreation and to food supply. Certain species of wildlife are threatened because they cannot adapt to man's activities, whereas others have thrived so well under man-made changes in the environment that their numbers must be controlled. Emphasis is placed on a balanced program in the social, biological, and physical sciences, with a specialization in one of two plans: wildlife or fisheries. This program prepares students for careers as wildlife or fisheries biologists, animal control specialists, game technicians, or, following additional academic preparation, for careers in research and administration of those areas.

Bachelor of Science Major Requirements*

| | UNITS |
|---|------------|
| <i>Preparatory Subject Matter</i> | .91-93 |
| Biochemistry (Biochemistry 101A, 101B or Physiological Sciences 101A, 101B) | 6-7 |
| Biology (Biology 1) | 6 |
| Botany (Botany 2) | 5 |
| Chemistry (Chemistry 1A, 1B, 1C, 8A, 8B) | 21 |
| Ecology (Entomology 104 or Zoology 125) | 3-4 |
| Genetics (Genetics 100A, 100B) | 6 |
| Mathematics (Mathematics 18, 16A, 16B or 21A, 21B, 105A) | 14 |
| Nutrition | 4 |
| Physics (Physics 2A, 2B, 2C) | 9 |
| Physiology (Physiology 110A, 110B) | 6 |
| Zoology (Zoology 2, 106A) | 11 |
| For Plan I, Wildlife Biology specialization | 4 |
| Plant taxonomy (Range Management 100) | 4 |
| For Plan II, Fisheries Biology specialization | 9 |
| Entomology (Entomology 116) | 3 |
| Mathematics (Mathematics 19, 105B) | 6 |
| <i>Depth Subject Matter</i> | 20 |
| Wildlife and fisheries biology (Wildlife and Fisheries Biology 2, 101, and additional courses selected with the approval of the adviser). | |
| <i>Breadth Subject Matter</i> | 16 |
| Social sciences and humanities (including 8 units of English and/or rhetoric)**† | |
| <i>Restricted Electives**</i> | 4 |
| One course selected with the approval of the adviser from the following: Zoology 113, 116, 135, 136, 137, 140 or 144. | |
| <i>Unrestricted Electives**</i> | 38-45 |
| Plan I, Wildlife Biology specialization | 43-45 |
| Plan II, Fisheries Biology specialization | 38-40 |
| Total Units for the Degree | 180 |

* 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.

** These elective courses may be taken on a Passed or No Record basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

Faculty of the College of Agricultural and Environmental Sciences

- Ursula K. ABBOTT, Ph.D., *Professor of Avian Sciences, Department of Avian Sciences, 752-1300*
- Hans (Johannes) ABPLANALP, Ph.D., *Professor of Avian Sciences, Department of Avian Sciences, 752-1300*
- Barbara A. ADAMS, M.P.H., *Lecturer in Applied Behavioral Sciences, Department of Applied Behavioral Sciences, 752-0770*
- Fredrick T. ADDICOTT, Ph.D., *Professor of Agronomy, Department of Agronomy and Range Science, 752-1703*
- Norman B. AKESSON, M.S., *Professor of Agricultural Engineering, Department of Agricultural Engineering, 752-0102*
- Daniel G. ALDRICH, Ph.D., *Professor of Soils, Department of Soils and Plant Nutrition, 752-1406*
- Robert W. ALLARD, Ph.D., *Professor of Genetics and Professor of Agronomy, Department of Genetics, 752-0200*
- Frank W. ALLEN, M.S., *Professor of Pomology Emeritus, Department of Pomology, 752-0122*
- Merlin W. ALLEN, Ph.D., *Professor of Nematology, Department of Nematology, 752-1403*
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- Stanley F. BAILEY, Ph.D., *Professor of Entomology Emeritus, Department of Entomology, 752-0475*
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- Eugene L. BEGG, B.S., *Lecturer in Soils and Plant Nutrition, Department of Soils and Plant Nutrition, 752-1406*
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A. Wade BRANT, Ph.D., Lecturer in Food Science and Technology, Department of Food Science and Technology, 752-2150
Patrick J. BREEN, Ph.D., Lecturer in Pomology, Department of Pomology, 752-0122
R. William BREIDENBACH, Ph.D., Lecturer in Agronomy, Department of Agronomy and Range Science, 752-1703
Royce S. BRINGHURST, Ph.D., Professor of Pomology and Professor of Genetics, Department of Pomology, 752-0122
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Robert W. BROCKSEN, Ph.D., Assistant Professor of Fisheries Biology, Department of Animal Physiology, 752-0203
A. Lloyd BROWN, Ph.D., Lecturer in Soils and Plant Nutrition, Department of Soils and Plant Nutrition, 752-1406
Dillon S. BROWN, Ph.D., Professor of Pomology, Department of Pomology, 752-0122
W. Duane BROWN, Ph.D., Professor of Marine Food Science, Department of Food Science and Technology, 752-2507
George E. BRUENING, Ph.D., Assistant Professor of Biochemistry, Department of Biochemistry and Biophysics, 752-0210
Christine M. BRUHN, M.S., Lecturer in Foods, Department of Consumer Sciences, 752-0668
Richard G. BURAU, Ph.D., Associate Professor of Soils and Plant Nutrition, Department of Soils and Plant Nutrition, 752-1406
Glen BURCH, Ed.D., Lecturer in Adult Education, University Extension, 752-0880
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- Edward A. RHODE, Ph.D., *Professor of Physiology, Department of Clinical Sciences, 752-1363*
- Charles M. RICK, Jr., Ph.D., *Professor of Vegetable Crops, Department of Vegetable Crops, 752-0516*
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- David W. ROBINSON, Ph.D., *Associate Professor of Animal Science, Department of Animal Science, 752-1250*
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- Dennis E. ROLSTON, Ph.D., *Assistant Professor of Soil Science, Department of Soils and Plant Nutrition, 752-1406*
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- Magnar RONNING, Ph.D., *Professor of Animal Science and Professor of Nutrition, Department of Animal Science, 752-1250*
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- Kay RYUGO, Ph.D., *Lecturer in Pomology, Department of Pomology, 752-0122*
- Roy M. SACHS, Ph.D., *Professor of Landscape Horticulture, Department of Environmental Horticulture, 752-0130*
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- William C. SCHNATHORST, Ph.D., *Lecturer in Plant Pathology, Department of Plant Pathology, 752-0300*
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COLLEGE OF ENGINEERING

Engineering is the profession in which a knowledge of the physical, biological, and social sciences is applied with judgment to develop ways to utilize the materials and forces of nature for the benefit of mankind. Engineering education is problem oriented. Undergraduates learn not only to observe and describe problems but also to seek useful solutions. For this reason engineering education has been found to be appropriate preparation for careers in management and public administration as well as for professional practice in engineering.

Seven undergraduate curricula in engineering are offered on the Davis campus: Aerospace, Agricultural, Chemical, Civil, Electrical, and Mechanical Engineering, and Materials Science. Within each curriculum, informal options are available through selection of a suitable series of technical elective courses. In addition, a curriculum called Individual Engineering Major is available for students who have specific career objectives which are not compatible with any of the seven named curricula. Specific degree requirements for each of the curricula are listed on pages 117-139.

Each curriculum is a four-year undergraduate program leading to the degree Bachelor of Science in Engineering. The curriculum name (e.g., Aerospace Engineering) is listed on the transcript but not on the diploma. Graduate programs leading to the degrees Master of Engineering, Master of Science, Doctor of Engineering, and Doctor of Philosophy are also offered.

A student cannot learn in four years all he will need to know in any profession. The objective of the undergraduate program in Engineering is to form an appropriate basis for a lifetime of learning. Extended learning after graduation, in the form of work experience, individual study, extension courses, or formal graduate study, is an essential part of engineering education. Such integrated working/learning experience also is useful prior to graduation; undergraduates are encouraged and assisted in finding engineering employment in part-time internships during the school year, in summer jobs, and in cooperative work/study programs.

Admission to Freshman Standing

General requirements for admission to the University are given on page 14. There are no separate or additional requirements for admission to the College of Engineering. However, it is advisable that students who plan to study engineering include in their high school programs the following subjects:

| | <i>Units</i> |
|---|--------------|
| Algebra* | 2 |
| Plane geometry* | 1 |
| Trigonometry* | ½ |
| Chemistry or physics (chemistry is strongly recommended; both are desirable) | 1 |

* Or equivalent integrated courses covering same subject material.

These subjects are prerequisite to certain basic courses in the freshman engineering program. A student who is admitted without this preparation will be required to make up equivalent work while in college. As a result, he may be delayed in graduating.

In addition, a year of high school mechanical drawing is recommended but not required.

Admission to Advanced Standing

A student who is admitted with less than 84 quarter units (or 56 semester units) of college work is classified in lower division standing, and is required to complete one of the two lower division programs listed on pages 117-118. Such a student is advanced to upper division standing on completion of 84 units.

A student who is admitted with 84 or more units is classified in upper division standing, but is required to complete the equivalent Lower Division Program for Transfer Students listed on page 119.

Students who elect to take a portion of their work at a community college are encouraged to complete two full years before transferring to the Davis campus.

Academic Advisers

In establishing the undergraduate programs in the College of Engineering, every effort has been made to provide for maximum flexibility consistent with rigorous preparation for professional practice or graduate study. The key to successful flexibility in an academic program is an effective system of advising. Every Engineering undergraduate is assigned to a professor for academic and career advising, and every Engineering instructor has 15 to 20 advisees. Adviser assignments are made and coordinated through the Undergraduate Office of the College. Initial assignments are made prior to the student's first term on campus, and each individual is encouraged to select and change to an adviser of his own choice whenever he has an alternative preference. A close relationship between the student and his academic adviser can be one of the most important factors in a successful educational experience.

To encourage communication between students and advisers, Engineering students are required to obtain their faculty adviser's signature on their study list card (i.e., the card listing the program of courses to be taken in a given quarter). For new students, individual appointments with Engineering faculty advisers are scheduled during Summer Advising or before classes begin during the first week of the quarter.

Engineering Undergraduate Office

The Undergraduate Office of the College, located in Room 2132 Bainer Hall, operates as a service center for Engineering students. Information and assistance on academic, career, and personal matters are available either directly or through individual referral to other offices on campus.

Choosing a Major

Many students who enter the College of Engineering have well-defined career objectives. Others do not. All students in Engineering are formally classified as *Engineering—Lower Division* until 84 quarter units of college work have been completed. The official designation of one of the Engineering curricula does not take place until the end of the sophomore year. However, students who plan to graduate under the *Chemical Engineering* curriculum need to make that decision during the freshman year and plan their entire program accordingly. During the first two years a student who is uncertain about his future choice of curriculum is encouraged to make use of the many sources of advising and counseling available to him. These include his academic adviser, his instructors, the academic deans in the College Office, and personnel in the Counseling Center, the Office of Placement Services, and the Office of the Dean of Men or Dean of Women.

A number of freshmen courses in Engineering are designed to describe the role of the engineer in society and the similarities and differences among the branches of engineering. Included are: Engineering 3—Introduction to Engineering Systems, Agricultural Engineering 1—The Agricultural Engineer in Tomorrow's World, Chemical Engineering 1—The Scope of Chemical Engineering, Civil Engineering 1—The Civil Engineer in Society, Electrical Engineering 1—Introduction to Electrical Engineering, and Mechanical Engineering 1—Mechanical Engineering. Working/learning experiences in the form of internships, summer jobs, and cooperative study programs also are valuable aids in the evolution of a career objective.

Options

Within the formal curricula, informal options may be structured by selection of a suitable series of technical elective courses. Individual options are described on pages 121–138. With the help of the academic advisers, options other than those named may be tailored to suit the interests of individual students. Broader flexibility is available through the Individual Engineering Major discussed on page 139.

Dual Degrees

Individual engineering students who can afford the time are encouraged to enroll for simultaneous bachelor's degrees in an engineering major and a non-engineering major of their choosing. Such "dual degree" students must satisfy the requirements for both degrees. Most students have found five years to be necessary for dual degrees.

Planning a Program

The student is responsible for planning his own program. Many sources of assistance are available. Primary among these is the individual's academic adviser. Program planning assistance is also available through the Undergraduate Office of the College, The First Resort (the Peer Advising Center) in East Hall, and the Resident Adviser in the student's dormitory.

Degree requirements in Engineering are given on pages 113-139. The minimum number of required units ranges from 180 in some curricula to somewhat higher in others. The programs normally require twelve quarters of study at an average of approximately 15 units per quarter. Students may not enroll for more than 19 or less than 12 units, exclusive of physical education, without approval of the Dean of the College. New students are encouraged to carry a light load (12 to 14 units) during their first quarter on campus.

Program Flexibility

In the Engineering Lower Division Program for all curricula except Chemical Engineering, only mathematics and four additional required courses are prerequisite to required upper division Engineering-prefix courses (as distinguished from Agricultural Engineering, Civil Engineering, etc., courses). The four courses are: Engineering 17, Engineering 35, Physics 4A, and Physics 4C. (Exception: Engineering 45 is prerequisite to Engineering 188, a required course in the Materials Science curriculum.) These four courses and the lower division mathematics requirements should be completed in the first two years, and can be scheduled in only a limited variety of ways. The other required physics, chemistry, engineering, humanities, and social sciences courses in the lower division program are requirements for graduation, but their scheduling may be timed to suit the undergraduate program of the individual student.

In planning the four-year program care must be taken to observe course prerequisite requirements, or a delay in graduation may result. Course prerequisites are specified to help the student avoid courses for which he is unprepared, and to guide the instructor in the establishment of a starting point for a given course. The prerequisites for any course may be waived for good cause for individual students by the course instructor.

Suggested Course Priorities for First Quarter of Freshman Year

An extensive background in mathematics is prerequisite to the junior-year courses in the Engineering curricula. Therefore both students who are enrolled in Engineering and those who are considering possible future enrollment in Engineering should include mathematics in their program from the outset. A suggested sequence of course priorities for the first quarter of the freshman year is listed below:

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

Students who plan to graduate, or are considering the possibility of graduating, under the Chemical Engineering curriculum should take Chemistry 4A-4B-4C in their freshman year.

Technical Electives

Technical electives permit a student to develop a major area of emphasis within his chosen curriculum. Each Upper Division Program listing includes a group of "Suggested Technical Electives." Other technical courses may be elected. Courses in engineering, mathematics, and the physical and biological sciences are suitable, as are technical courses in the social sciences such as accounting and urban administration. For credit as technical electives, courses in mathematics and physics must be upper division courses. Decisions regarding suitability of particular courses for technical elective credit are made in the Undergraduate Office on advice of the Undergraduate Study Committee.

Special Study Courses

Attention is directed to the Special Study Courses (98, 99, 198, and 199) described in detail on page 182. A maximum of 5 units of elective credit per quarter may be made up of such courses.

University Extension Courses

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

Cooperative Program

A cooperative work/study program is available in the College of Engineering in cooperation with the campuswide Project PROBE (PProfessional Occupational Broadening Experience). Quarters of study may be alternated with quarters of engineering employment on a schedule individually tailored to meet the requirements of the student, his employer, and his curriculum. Information on the cooperative study program is available in the Undergraduate Office.

Degree Requirements

GENERAL UNIVERSITY REQUIREMENTS

The degree of Bachelor of Science is awarded to those candidates who satisfy the requirements of the University (pages 30-32) in regard to:

Subject A

American History and Institutions

Scholarship

Residence (See additional College requirement specified below)

Application for Degree Candidacy

COLLEGE OF ENGINEERING REQUIREMENTS

The candidate for the degree of Bachelor of Science in Engineering must satisfactorily complete an approved curriculum in Engineering. Detailed requirements for seven approved curricula (in Aerospace, Agricultural, Chemical,

Civil, Electrical, and Mechanical Engineering, and Materials Science) are given on pages 117-139. Each of the curricula consists of a specified Lower Division Program (or, for students who transfer into the College with 84 or more quarter units, an approved equivalent program) and a specified Upper Division Program. As an alternative to following one of these curricula, a student may tailor an Individual Engineering Major with the help of his academic adviser, and submit it to the College Committee on Undergraduate Study for approval. Requirements for the Individual Engineering Major are given on page 139.

The student is held responsible for planning his program and for satisfactory completion of graduation requirements.

Individual students, for good cause, may request waiver of particular degree requirements of the College of Engineering by submitting a Student Petition. Petition forms are available in the Undergraduate Office. Such petitions may be approved only by the Undergraduate Study Committee or by majority vote of the entire faculty of the College, not by an adviser or dean. Five professors and five students serve on the committee.

Residence Requirement

Of the total units required for the Bachelor of Science in Engineering degree, at least the final 45 units characteristic of the student's curriculum must be completed while he is registered in the College of Engineering.

Credit by Advanced Placement Examinations

University credit allowed for College Entrance Examination Board (CEEB) Advanced Placement Examinations is counted in partial fulfillment of the requirements for the Bachelor of Science in Engineering degree to the extent that the UCD course equivalences (see page 151) satisfy parts of the student's chosen curriculum. Duplicate credit may not be earned in courses for which Advanced Placement Credit has been allowed.

Humanities-Social Sciences Electives

Humanities-social sciences electives are intended to improve the effectiveness of the graduate as an individual and as a professional engineer in society. In general any humanities course or social sciences course is suitable for credit as a humanities-social sciences elective. In this sense a course in, say, statistical methods in sociology is considered to be a technical rather than a social sciences course. Decisions regarding suitability of particular courses for humanities-social sciences elective credit are made in the Undergraduate Office on advice of the Undergraduate Study Committee.

Engineering degree programs must include a minimum of 31 quarter units of study in the humanities and social sciences. The 31 units must be selected from an approved list (see below). They must include English 1 and either English 3 or Rhetoric 1, except that subject (but not unit) credit for English 1 may be obtained by satisfactory completion of an appropriate proficiency examination specified by the Committee on Undergraduate Study. The proficiency examination may be taken only after satisfaction of the Subject A requirement.

Both subject and unit credit for English 1 is given for a score of 5, 4, or 3 on the CEEB Advanced Placement Examination (see page 30).

At least 8 of the 31 units of humanities-social sciences courses must be completed after the student has received credit for 84 units of college work. With certain exceptions (listed below), any course taken in any of the following groups is considered to be an acceptable humanities-social sciences elective:

| | |
|-------------------------------|--------------------------------|
| Afro-American (Black) Studies | Foreign Languages (all groups) |
| American Studies | Geography |
| Anthropology | History |
| Applied Behavioral Sciences | Human Development |
| Art | Music |
| Asian American Studies | Philosophy |
| Classics | Political Science |
| Dramatic Art | Psychology |
| Economics | Rhetoric |
| English | Sociology |

The exceptions which are *not* acceptable as humanities-social sciences electives are the following:

| | | |
|------------|--|--|
| Economics | 11A, 11B 12 | Elementary Accounting Introduction to Quantitative Methods in Economics |
| English | 25, 26 | English for Foreign Students |
| Geography | 1 3 4 105 106 107 108 162 | Physical Geography Climate and Weather Introduction to Maps Cartography Interpretation of Aerial Photography Advanced Cartography Analysis of Land Forms Geography of Water Resources |
| German | 1G | German for Graduate Students |
| Music | 10 | Basic Musicianship |
| Psychology | 107 108 | Psychometric Methods Physiological Psychology |
| Sociology | 106 | Quantitative Methods of Research |

In addition, not more than 4 units in any course which may be repeated for credit (such as Music 42 or Dramatic Art 30) may be counted toward satisfaction of the requirement.

Passed/No Record Grading

A student registered in the College of Engineering may elect to enroll in not more than one course each quarter in which he shall be graded Passed or No

Record. Such a course may be in addition to any courses offered only on a P/Not Passed basis. The following conditions must be met for the elected P/No Record course:

1. The student must have a 2.0 overall average and not be subject to academic disqualification.
2. He must be enrolled in a program of at least 12 units, including the course to be taken on a P/No Record basis.
3. The course to be taken on a P/No Record basis must not be specified (i.e., required) in the curriculum. (Exception: required courses in English and rhetoric may be taken on a P/No Record basis.)
4. A petition to take the course on a P/No Record basis must be approved by the Dean or his designated representative. (Petition will be approved if all of the listed conditions are met.)

The units earned in courses taken P/No Record are counted in satisfaction of degree requirements, but such courses are disregarded in determining the student's grade-point average. A student registered in the College of Engineering who enrolls in a course offered by any department of the University for a P/No Record grade receives a grade of Passed if his work in the course is of quality equivalent to a grade of C- or better, under the general letter grade system. A course in which a grade of D or F has been recorded may not be repeated on a P/No Record basis.

Honors at Graduation

Honors at graduation may be awarded to students who achieved distinguished scholarship records in all courses completed in the University. Students who display marked scholarship superiority may receive High Honors or Highest Honors. The minimum grade-point averages for Engineering students are as follows:

| Total quarter units completed at UC | Honors | High Honors | Highest Honors |
|-------------------------------------|--------|-------------|----------------|
| 45- 89 | 3.5 | 3.65 | 3.8 |
| 90-134 | 3.4 | 3.55 | 3.7 |
| 135- | 3.2 | 3.4 | 3.6 |

Dean's Honors List

The Dean's Honors List includes the names of all students who have completed 12 or more units in the University and earned a cumulative grade-point average of 3.2 or higher in all courses taken in the University.

Lower Division Programs

The Lower Division Programs for six of the seven curricula—Aerospace, Agricultural, Civil, Electrical, and Mechanical Engineering and Materials Science—are the same with minor exceptions, which are noted. The Lower Division Program for the Chemical Engineering curriculum is different because students who plan to graduate under that curriculum must include a larger number of chemistry courses in their program. A separate, equivalent Lower Division Pro-

gram is listed for students who transfer into the College with 84 or more quarter units of college credit.

**LOWER DIVISION PROGRAM—ALL ENGINEERING CURRICULA
EXCEPT CHEMICAL ENGINEERING**

| | Units | Quarter Usually Taken |
|--|-------|-----------------------------|
| Chemistry 4A–4B (General Chemistry) | 10 | |
| Engineering 3 (Introduction to Engineering Systems)..... | 3 | 1 or 3 |
| Engineering 4 (Engineering Graphics in Design)*..... | 3 | 1 or 2 |
| Engineering 5A (Engineering Applications of Computers).. | 3 | 2 or 3 |
| Engineering 17 (Circuits)..... | 3 | 5 or 6 |
| Engineering 35 (Statics)..... | 3 | 4 or 5 |
| Engineering 45 (Properties of Materials)..... | 4 | 4 or 6 |
| English 1 (Expository Writing) | 4 | |
| English 3 (Introduction to Literature) or Rhetoric 1 (Introduction to Public Speaking)..... | 4 | |
| Mathematics 11** (Analytic Geometry) | 2 | 1 |
| Mathematics 21A–21B–21C (Calculus)..... | 9 | 1–2–3 |
| Mathematics 22B (Differential Equations)..... | 3 | 5 |
| Mathematics 22C (Vector Analysis)..... | 3 | 4 |
| Physics 4A–4C–4E (General Physics)..... | 12 | 2–4–6 |
| Electives in natural sciences***..... | 12 | |
| Electives in humanities or social sciences..... | 8 | |
| Unrestricted electives**** | 3 | |
| | <hr/> | |
| Total | 89 | |

Sample Lower Division Program

(Aerospace, Agricultural, Civil, Electrical, and Mechanical
Engineering and Materials Science curricula)

| Freshman Year | Fall | Winter | Spring |
|-----------------------|-------|-----------------------|--------|
| Chemistry 4A | 5 | Chemistry 4B | 5 |
| Engineering 4 | 3 | Engineering 5A | 3 |
| Mathematics 21A | 3 | Mathematics 21B | 3 |
| Elective§ | 3 | Physics 4A | 4 |
| | <hr/> | <hr/> | <hr/> |
| | 14 | 15 | 15 |

* Students who graduate under the Electrical Engineering curriculum take 3 units of humanities or social sciences in place of Engineering 4.

** Students who have completed analytic geometry in high school may substitute 2 units of unrestricted electives for Mathematics 11.

*** The 12 units of natural sciences must be selected from among the following courses: Astronomy 1A, 1B; Bacteriology 2; Biology 1, 10; Botany 2; Chemistry 4C, 8A, 8B, 9; Geology 1, 1L; Genetics 10; Mathematics 22A; Physics 4B, 4D; Physiology 2; Zoology 2. (Students may petition to add other courses to the list, including upper division courses.)

**** Students who graduate under the Civil Engineering curriculum or the Forest Engineering option of the Agricultural Engineering curriculum take Civil Engineering 10 in place of 3 units of unrestricted electives.

§ The elective courses must include 12 units of natural sciences and 8 units of humanities or social sciences. Students who have not completed analytic geometry in high school should take Mathematics 11 in the first quarter of the freshman year.

Sophomore Year

| | | | | | |
|----------------------|----|----------------------|----|----------------------|----|
| Engineering 35 | 3 | Engineering 17 | 3 | Engineering 45 | 4 |
| Mathematics 22C ... | 3 | English 1 | 4 | English 3 | 4 |
| Physics 4C | 4 | Mathematics 22B ... | 3 | Physics 4E | 4 |
| Elective* | 3 | Elective* | 6 | Elective* | 4 |
| | 13 | | 16 | | 16 |

LOWER DIVISION PROGRAM—CHEMICAL ENGINEERING CURRICULUM

| | <i>Units</i> | <i>Quarter Usually Taken</i> |
|---|--------------|------------------------------|
| Chemistry 4A–4B–4C (General Chemistry)..... | 15 | 1–2–3 |
| Chemistry 112A (Organic Chemistry) | 5 | 6 |
| Engineering 3 (Introduction to Engineering Systems)..... | 3 | 1 or 3 |
| Engineering 5A (Engineering Applications of Computers) .. | 3 | 5 |
| Engineering 17 (Circuits) | 3 | 5 |
| Engineering 35 (Statics) | 3 | 4 |
| English 1 (Expository Writing) | 4 | |
| English 3 (Introduction to Literature) or Rhetoric 1 (Introduction to Public Speaking) | 4 | |
| Mathematics 11** (Analytic Geometry) | 2 | 1 |
| Mathematics 21A–21B–21C (Calculus) | 9 | 1–2–3 |
| Mathematics 22A (Linear Algebra) | 3 | 6 |
| Mathematics 22B (Differential Equations) | 3 | 5 |
| Mathematics 22C (Vector Analysis) | 3 | 4 |
| Physics 4A–4B–4C–4D–4E (General Physics) | 20 | 2–3–4–5–6 |
| Electives in humanities or social sciences | 11 | |
| | Total | 91 |

Sample Lower Division Program
(Chemical Engineering curriculum)

| <i>Freshman Year</i> | <i>Fall</i> | <i>Winter</i> | <i>Spring</i> |
|----------------------|-------------|---------------------|---------------|
| Chemistry 4A | 5 | Chemistry 4B | 5 |
| Engineering 3 | 3 | English 3 | 4 |
| Mathematics 21A ... | 3 | Mathematics 21B ... | 3 |
| Elective† | 2 | Physics 4A | 4 |
| | 13 | 16 | 16 |

Sophomore Year

| | | | | | |
|----------------------|---|----------------------|---|---------------------|---|
| Engineering 35 | 3 | Engineering 5A | 3 | Chemistry 112A | 5 |
| Mathematics 22C ... | 3 | Engineering 17 | 3 | Mathematics 22A ... | 3 |

* The elective courses must include 12 units of natural sciences and 8 units of humanities or social sciences.

** Students who have completed analytic geometry in high school may substitute 2 units of unrestricted electives for Mathematics 11.

† Students who have not completed analytic geometry in high school must take Mathematics 11 in the first quarter of the freshman year.

| | | | | | |
|-------------------------|---|---------------------------|---|-------------------------|---|
| Physics 4C | 4 | Mathematics 22B | 3 | Physics 4E | 4 |
| Humanities-Social | | Physics 4D | 4 | Humanities-Social | |
| Sciences Elective . . . | 4 | Humanities-Social | | Sciences Elective . . . | 3 |
| | | Sciences Elective . . . | 4 | | |
| — | | — | | — | |
| 14 | | 17 | | 15 | |

LOWER DIVISION PROGRAM FOR TRANSFER STUDENTS

A student who transfers into the College of Engineering with *less* than 84 quarter units is required to complete one of the Lower Division Programs listed above. Courses completed at another institution are evaluated on the basis of substantial equivalences.

A student who transfers with *84 or more* quarter units is required to have completed the minimum number of quarter units in the subjects specified in the following table before he is considered to have completed a Lower Division Program:

| <i>Subject Areas</i> | <i>Minimum Quarter Units</i> |
|--|------------------------------|
| Mathematics (Recommended: analytic geometry, calculus, differential equations, vector analysis) | 18 |
| Physical and biological sciences (at least 10 units must be in chemistry for engineering and science students and at least 12 units in physics for engineering and science students) | 27 |
| Engineering (lower division subjects such as graphics, properties of materials, surveying, computer programming, statics, and circuit theory. Students preparing for the Chemical Engineering curriculum at Davis may elect to take only 12 units of engineering in their lower division program) | 15 |
| Humanities-social sciences (must be selected from a list of course groups approved by the Committee on Undergraduate Study, and must include the equivalent of English 1 and either English 3 or Rhetoric 1) | 9 |
| Unspecified subjects (9 units may be in humanities or social sciences; the remaining units may include units in mathematics, physics, chemistry and engineering in addition to the minimum numbers specified above. None of these units may be in military science or physical education. Students preparing for the Chemical Engineering curriculum at Davis should take in their sophomore year quantitative analysis and one course in organic chemistry with laboratory) | 15 |
| — | |
| Total | 84 |

A student who has completed the Lower Division Program on this basis is not required to take additional lower division courses, except those which are prerequisite to upper division courses in his curriculum.

The above subject requirements are minimum. Additional units must be added to these and the units listed in the respective Upper Division Program to total the minimum number of units (180 to 195) required for graduation under each curriculum.

Upper Division Programs

AEROSPACE ENGINEERING CURRICULUM

Minimum Units Required: 180.

Aerospace engineering is the application of scientific knowledge to flight or movement in the atmosphere. Specific objectives are the design, development, and manufacture of airplanes, V.T.O.L. aircraft, and high speed ground transports. Within this context aeronautics becomes an essential branch of mechanical engineering in which knowledge in certain areas related to transportation is strengthened. For example the aerodynamic and structural design of a high speed train and a low speed airplane have much in common. The undergraduate curriculum combines the study of basic engineering disciplines with courses in aerodynamics, propulsion, power plant structures, and control. A broad range of technical elective courses is available from which the student may select subjects of a more specialized nature.

The curriculum is organized to develop the student's ability to apply basic engineering principles in the design of engineering systems. This training is intended to prepare him for technical leadership in this rapidly changing field.

UPPER DIVISION PROGRAM—AEROSPACE ENGINEERING

| Required Subjects | Units | Courses |
|--|-------|---|
| Electronic circuits | 4 | Engineering 100 |
| Applied mechanics | 15 | Engineering 102A, 102B, 103A, 103B, 104A |
| Applied thermodynamics | 6 | Engineering 105A, 105B |
| Aerodynamics | 3 | Mechanical Engineering 127 |
| Systems | 4 | Mechanical Engineering 171 |
| Structures | 6 | Engineering 104B, Civil Engineering 135 |
| Aerospace design | 3 | Mechanical Engineering 128 |
| Laboratory | 8 | Mechanical Engineering 111, 126A, 126B |
| Mathematics | 3 | Engineering 180 |
| Technical electives* | 21 | |
| Humanities-social science electives | 15 | |
| Unrestricted electives | 3 | |
| Total | 91 | |

* At least 12 units of technical electives must be chosen from the following list: Mechanical Engineering 121, 125, 126C, 135, 172, 185, 186; Engineering 190; Civil Engineering 133; Electrical Engineering 150. Other suggested technical electives: Mechanical Engineering 124; Applied Science 115, 135A, 144; Civil Engineering 131, 133, 135; Electrical Engineering 110A, 111A, 112A, 130A, 157A, 157B; Engineering 106, 183, 187, 188.

Recommended Sequence of Courses

| <i>Junior Year</i> | <i>Fall</i> | <i>Winter</i> | <i>Spring</i> |
|--------------------------|--------------------------|----------------------------|---------------|
| Engineering 102A . . 3 | Engineering 100 . . . 4 | Mechanical | |
| Engineering 103A . . 3 | Engineering 102B . . 3 | Engineering 111 . . 4 | |
| Engineering 104A . . 3 | Engineering 103B . . 3 | Civil Engineer- | |
| Engineering 105A . . 3 | Engineering 104B . . 3 | ing 135 3 | |
| Elective 3 | Engineering 105B . . 3 | Engineering 180 . . . 3 | |
| | | Humanities- | |
| | | Social Sciences . . . 4 | |
| — | 15 | — | 14 |
| <i>Senior Year</i> | | | |
| Mechanical | Mechanical | Humanities- | |
| Engineering 126A . 2 | Engineering 126B . 2 | Social Sciences . . . 4 | |
| Mechanical | Mechanical | Technical Electives . . 11 | |
| Engineering 127 . . 3 | Engineering 128 . . 3 | | |
| Humanities- | Mechanical | | |
| Social Sciences . . . 4 | Engineering 171 . . 4 | | |
| Technical Elective . . 7 | Humanities- | | |
| | Social Sciences . . . 3 | | |
| | Technical Elective . . 3 | | |
| — | 16 | — | 15 |

AGRICULTURAL ENGINEERING CURRICULUM

Minimum units required

All Agricultural Engineering options except Forest Engineering: 180
Forest Engineering: 195*

Agricultural engineers apply engineering principles to problems of food and fiber production, storage, and processing; animal and plant environment; agricultural wastes management; soil and water control and conservation; and other phases of agriculture and related industries. Agricultural engineering is unique in that it requires a general understanding and appreciation of the biological, soil-management, and environmental aspects of agriculture in addition to a thorough knowledge of basic and applied engineering.

The upper division program includes fundamental engineering courses in mechanics, fluid mechanics, thermodynamics, and electronics. It also contains a substantial number of technical electives, thus permitting the student to choose courses appropriate for specialization in *agricultural processing, power and machinery, structures and environment, soil and water engineering, or forest engineering*.

Agricultural Processing

This area of specialization is concerned with the transformation of raw agricultural products into different, more usable, or more valuable forms or ma-

* A ten-week summer field program offered by the School of Forestry and Conservation at the UC Forestry camp in Plumas County provides a unique opportunity to develop an understanding of the whole series of related elements which constitute a forest environment. This summer program, which should be taken between the sophomore and junior years, accounts for the 15 additional units required for the Forest Engineering option as compared with other Agricultural Engineering options.

terials. The fundamental concepts of drying, sorting, cleaning, handling, storage, size reduction, and heat and energy transfer, as well as the biological and physical characteristics of agricultural materials, are considered as factors in research, development, and design for processing systems and operations.

Power and Machinery

This area of specialization is concerned with the design, development, and application of field machines and power units for soil preparation, crop production, and related activities. The economic aspects of mechanization and the effects of machines on soils and crops are considered. Procedures for developing machine components and synthesizing them into an engineering system are studied.

Structures and Environment

This area of specialization is concerned with the design of agricultural structures and analysis of their functional effectiveness, efficiency of space and labor utilization, and economic value to an overall enterprise. The structure is considered as a means of providing an optimum environment for animal production, product storage and conditioning, or crop production in greenhouses. Agricultural wastes management, environment modification, and micrometeorology may also be studied.

Soil and Water Engineering

This area of specialization is concerned with those aspects of soil and water that depend upon a blending of agricultural and environmental sciences with engineering. The planned development, use, and management of agricultural land and water resources involves consideration of new concepts in hydraulics, hydrology, irrigation and drainage systems, water and soil quality, and plant-soil-water relations. The Soil and Water Engineering option is administered with the cooperation of the Department of Water Science and Engineering.

Forest Engineering

This area of specialization is concerned with the application of engineering principles and silviculture knowledge to the engineering aspects of the management of forest lands for the production of wood products, with due regard for the ecological and aesthetic aspects and recreational uses of this renewable natural resource. Forest Engineers are concerned with systems and equipment for forest production and harvesting, reforestation, forest waste management, forest recreational development, soil and water control and conservation, developing forest road systems, materials handling in the forest and at the sawmill, and other phases of forestry and related industries. The Forest Engineering option is administered with the cooperation of the School of Forestry and Conservation at Berkeley.

UPPER DIVISION PROGRAM—AGRICULTURAL ENGINEERING*Courses Common to all Agricultural Engineering Options:*

| | Units | Courses |
|--------------------------------------|----------|--|
| Required Subjects | | |
| Electronic circuits | 4 | Engineering 100 |
| Applied mechanics | 9 | Engineering 102A, 103A, 104A |
| Applied thermodynamics | 3 | Engineering 105A |
| Design and analysis | 3 | Civil Engineering 131 or Mechanical Engineering 118 |
| Professional responsibilities .. | 3 | Engineering 190 |
| Mathematics† | 2 | Mathematics 22A, 24, 130A, or Applied Science 115 |
| Humanities-social science | | |
| electives | 15 | |
| Unrestricted electives | 3 | |
| Total | <hr/> 42 | |

*All Agricultural Engineering Options Except Forest Engineering:***Required Subjects**

| | |
|-----------------------------|----|
| Applied mechanics | 6 |
| Engineering economics | 3 |
| Technical electives | 40 |

Engineering 104B, 102B or 103B
Engineering 106

18 units must be selected from the courses whose numbers are in **heavy type** in the list of suggested technical electives. These 18 units must include at least 3 units in each of three of the four areas. In addition, the technical electives must include at least two courses from the list of suggested Agricultural and Biological Sciences electives, one of which must be an upper division course.

—
Total 91

*Forest Engineering Option:***Required subjects**

| | | |
|---|----|--|
| Silviculture | 4 | General Forestry 125° |
| Forest regulation and planning | 4 | General Forestry 113° |
| Forest utilization facilities ... | 4 | General Forestry 103° |
| Summer field courses | 15 | General Forestry 100A°, 100B°, 100C°, 100D° |

° Offered by the Berkeley campus.

† The mathematics course must be three or more units if Mathematics 11 is not taken in the lower division program. It is recommended for the Forest Engineering Option that Mathematics 130A be included and be taken in the sophomore year.

| | |
|---------------------------|-----|
| Technical electives | 37 |
| | — |
| Total | 106 |

12 units must be selected from the list of General Forestry courses offered at the Berkeley campus. These 12 units must include General Forestry 110, 112, or 114. In addition, one course in engineering design, such as Agricultural Engineering 117, 126, or Civil Engineering 160, must be selected. Excess units of required subjects earned by taking equivalent courses at the Berkeley campus may be applied toward the total technical elective requirement.

All Agricultural Engineering Options—Except Forest Engineering

Sample Sequence of Courses

| <i>Junior Year</i> | <i>Fall</i> | <i>Winter</i> | <i>Spring</i> |
|--|------------------------|------------------------|---------------|
| Engineering 102A .. 3 | Engineering 100 4 | Engineering 102B | |
| Engineering 104A .. 3 | Engineering 103A .. 3 | or 103B 3 | |
| Engineering 105A .. 3 | Engineering 104B .. 3 | Electives** | 12 |
| Elective** 6 | Elective** 6 | | |
| — | — | 16 | 15 |
| <i>Senior Year</i> | | | |
| Civil Engineering 131 or Mechanical En- gineering 118 3 | Engineering 106 3 | Engineering 190 3 | |
| Electives** 12 | Electives** 12 | Electives** 12 | |
| — | — | — | 15 |

Forest Engineering Option

Sample Sequence of Courses

| <i>Junior Year</i> | | <i>Summer</i> |
|-------------------------------------|-----------------------------------|-------------------------------------|
| General Forestry 100A° | 4 | |
| General Forestry 100B° | 4 | |
| General Forestry 100C° | 3 | |
| General Forestry 100D° | 4 | |
| — | — | 15 |
| <i>Fall</i> | <i>Winter</i> | <i>Spring</i> |
| Mechanical Engineering 103° .. 4 | Mechanical Engineering 105B° 5 | Civil Engineer- ing 130° 4 |
| Mechanical Engineering 105A° 4 | General Forestry 125° 5 | Electives** 11 |
| Electrical Engineering 100A° 3 | General Forestry 113° 4 | |
| Elective** 4 | General Forestry 103° 3 | |
| — | — | 15 |

* Offered by the Berkeley campus.

** The electives are to be distributed among required and elective subjects as indicated in the Upper Division Program.

| Senior Year | Fall | Winter | Spring |
|---|------------------------|---|--------|
| Civil Engineering 131 or Mechanical En- gineering 118 . . . 3 | Electives** 15 | Engineering 190 . . . 3 Electives** 12 | |
| Electives** 12 | | | |
| | — | — | — |
| | 15 | 15 | 15 |

Suggested technical electives are:

Agricultural Processing—Agricultural Engineering 132, 141; Applied Science 115; Chemistry 109A; Electrical Engineering 150; Engineering 105B, 186; Food Science and Technology 100; Mathematics 105A; Mechanical Engineering 185A, 185B.

Power and Machinery—Agricultural Economics 140; Agricultural Engineering 110, 114, 116, 117, 118, 141; Applied Science 115; Engineering 105B, 184; Mathematics 105A; Mechanical Engineering 114, 115, 121.

Soil and Water—Applied Science 115; Civil Engineering 141, 142, 144; Soil and Water Science 2, 101; Water Science 110A, 110B, 141, 160.

Structures and Environment—Agricultural Engineering 107, 125, 126; Applied Science 115; Atmospheric Science 20, 123, 124; Civil Engineering 132A, 132B, 132C, 133, 134, 142, 148, 171; Engineering 186.

Agricultural and Biological Sciences—Agronomy and Range Science 100; Animal Science 2; Biology 10; Botany 2; Plant Science 2, 112; Physiology 149; Soil and Water Science 2; Vegetable Crops 100, 101.

Forest Engineering—Agricultural Economics 176; Agricultural Engineering 107, 110, 116, 117, 118, 126; Atmospheric Science 120, 123; Civil Engineering 160, 171; Geography 161; General Forestry (Berkeley campus) 101, 102, 104, 110, 112, 114; Mathematics 22A; Mechanical Engineering 114, 121; Resource Sciences 100; Soil and Water Science 101; Water Science 120.

CHEMICAL ENGINEERING CURRICULUM

Minimum units required: 182.

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

^{**}The electives are to be distributed among required and elective subjects as indicated in the Upper Division Program.

The chemical engineering curriculum has been planned to give the student a sound knowledge of engineering and chemical sciences so that he 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 and mass transfer. In the senior year these fundamentals are drawn together and applied in process design and process dynamics. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

The curriculum includes 17 credit hours of technical electives which allow for special training in an area of particular interest. For students electing the normal chemical engineering program 5 of the 17 credit hours would consist of courses Engineering 101 and 104A. It is strongly recommended that two of the additional technical elective courses in the normal program be chosen from Chemistry 111A, 112E, Applied Science 115, Mathematics 118A, 118B, 130A, 130B. For students in other areas, the 17 credit hours of technical electives may be chosen from one of the following options.

Environment Engineering

The environment engineering option prepares the student to deal with problems of environmental quality by developing his knowledge of fundamental chemical and transport phenomena, that is, chemical reaction processes coupled with fluid mechanics, heat transfer, and mass transfer. Such a foundation in basic chemical engineering science, plus the usual chemical engineering analysis and design courses, along with other courses involved specifically with environmental topics, prepares the student to seek employment with industry or government. For this option the following six courses should be taken: Civil Engineering 147, 148, 149, 242 and Atmospheric Science 121.

Premedical and Prebiomedical Engineering

This option has been specifically designed so that a student may prepare himself for graduate work in biomedical engineering or meet the undergraduate requirements for entrance into medical school. Because of the emphasis on the natural sciences and their application to fluid mechanics, mass transport, heat transfer, thermodynamics, reaction kinetics, and process dynamics, the student is unusually well prepared to understand similar problems in living systems. Many biological phenomena such as blood flow, passive solute transport, and energy exchange can be dealt with using the theoretical tools learned as an undergraduate student. The inclusion of both organic and physical chemistry in the curriculum allows the student to complete the premedical requirements and also to complete the requirements for a Bachelor of Science degree in Chemical Engineering. The following courses are recommended for this option: Biology 1, Physiology 110A, 110B, and 111A, 111B, and Chemistry 112E.

Food Process Engineering

This option is designed to prepare students for graduate work in food science and technology and to work in the food processing industry. Technical elective courses should be chosen from the following: Food Science and Technology 104A, 104B, 106, 113, 122, 130, 198 and Bacteriology 2.

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 the advanced undergraduate courses chosen from the following: Chemistry 111A, 112E (or 112B, 112C), 121, 124, 124L, 126, 130, 131, and 150A, 150B.

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 abstract algebra, advanced calculus, and the theory of differential equations, provide a sound theoretical background, while courses in analytical and numerical analysis provide the techniques for solving a wide range of engineering problems. Recommended technical electives should be chosen from the following: Mathematics 24, 118A, 118B, 119, 127A, 127B, 127C, 128A, 128B, 128C, 130A, 130B, 132A, 132B, 185A, 185B, Applied Science 115, Engineering 180, and Chemical Engineering 159.

UPPER DIVISION PROGRAM—CHEMICAL ENGINEERING

| <i>Junior Year</i> | <i>Fall</i> | <i>Winter</i> | <i>Spring</i> |
|--|--|---------------|----------------------------------|
| Chemical Engineering 151 . . 3 | Chemical Engineering 150A. 3 | | Chemical Engineering 150B. 3 |
| Chemistry 110A . . . 3 | Chemical | | Chemical Engineering 152B. 3 |
| Chemistry 112D . . . 3 | Engineering 152A. 3 | | Chemical |
| Engineering 102A . . 3 | Chemistry 110B . . . 3 | | Engineering 153.. 4 |
| Humanities-Social Sciences Elective . 4 | Technical Elective .. 3 | | Chemistry 110C . . . 3 |
| | Humanities-Social Sciences Elective . 4 | | Technical Elective .. 3 |
| — | — | — | — |
| 16 | 16 | 16 | 16 |
| <i>Senior Year</i> | | | |
| Chemical Engineering 154A. 3 | Chemical Engineering 154B. 3 | | Chemical Engineering 155B. 2 |
| Engineering 100 . . . 4 | Chemical | | Chemical Engineering 156B. 3 |
| Technical Elective .. 3 | Engineering 155A. 2 | | Chemical Engineering 157... 4 |
| Humanities-Social Sciences Elective . 4 | Chemical Engineering 156A. 3 | | Chemical Engineering 158... 3 |
| | Technical Elective .. 6 | | Technical Elective .. 3 |
| — | — | — | — |
| 14 | 14 | 14 | 15 |

CIVIL ENGINEERING CURRICULUM

Minimum units required: 180.

Civil engineering is devoted to the improvement of the human environment for the purposes of making the activities of people productive, safe, and enjoyable, and providing aesthetically pleasing surroundings. The profession contributes directly to humanity's continued health and well-being by the design of systems that provide plentiful supplies of healthful and potable water; freedom from disease-carrying wastes; land-, water-, and air-transportation; housing and other structures; flood control; and large recreational facilities. Civil engineers plan and design all or major portions of these systems that so enhance the quality of human life.

The programs in civil engineering include *civil engineering planning, environment engineering, structural engineering and mechanics, and water resources engineering*. These options are interrelated, and flexible programs are developed for individual students. Every option is designed to program educational preparation for real and significant contributions to humanity.

Civil Engineering Planning

The programs are directed toward planning of resources utilization and development projects and with planning of community, economic, and environmental development and redevelopment programs on an urban or regional scale. Civil engineering planning requires a basic understanding of the principles of engineering, economics, law, planning concepts and techniques, environmental sciences, public administration, and politics. Planning implies the formulation of program objectives; development of engineering, economic, and social data constraining alternative choices; and preparation of alternative plans that include a variety of options and opportunities for reformulation as circumstances change. Students are encouraged to plan their programs early with the aid of advisers and to complement the suggested technical electives with courses in the humanities and social sciences.

Environment Engineering

The programs are concerned with improving and maintaining the qualities of the air, land, and water environment that affect the health and well-being of man in the face of increasing population and expanding industrial activity. The program depends on a firm basic science and civil engineering foundation and emphasizes the design of waterborne, solid, and airborne waste management systems, the design of potable water-supply systems, and environment monitoring.

Structural Engineering and Mechanics

The programs are concerned with the conception, design, and construction of structures. Structural engineering involves buildings, bridges, highways, dams, economics of the construction industry, and construction practices. Consideration is given to the response of structures not only to gravity loading but

also to earthquake, wind, and blast loading. Structural mechanics emphasizes the more analytical aspects of structural engineering. Principles of structural analysis applicable to structures of all kinds, from office buildings to space vehicles, are examined. Special topics include the mechanics of deformable bodies and the theory of elasticity.

Water Resources Engineering

The programs include Hydraulics, Irrigation and Drainage, and Water Resources Systems Design. *Hydraulics* is concerned with flow in pipe and open-channel water-distribution systems and through hydraulic structures, and depends upon a strong foundation in fluid mechanics, systems analysis, and hydrology. *Irrigation and Drainage* provides a unique program aimed at the solution of water-oriented agricultural problems by emphasizing the application of hydrologic sciences, hydraulic engineering, agricultural sciences, and system analysis to the design and operation of irrigation and drainage projects. Special topics include study of water-soil-plant relations, water rights, land preparation and water application, water quality, and soil and water pollution. *Water Resources Systems Design* is concerned with the comprehensive development of water resources for multiple use. Emphasis is placed on principles of planning, analysis, and engineering design and operation as related to the water needs and wastes of industry, agriculture, recreation, and other activities. The program may include elective courses in the geography, economics, and politics of water resources.

UPPER DIVISION PROGRAM—CIVIL ENGINEERING

| | <i>Units</i> | <i>Courses</i> |
|---|--------------|---|
| Required Subjects | | |
| Electronic circuits | 4 | Engineering 100 |
| Applied mechanics | 9 | Engineering 102A, 103A, 104A |
| Applied thermodynamics | 3 | Engineering 105A or Chemistry 110A |
| Structures | 6 | Engineering 104B; Civil Engineering 131 |
| Soil mechanics | 5 | Civil Engineering 171, 172 |
| Water supply and pollution control | 9 | Engineering 103B; Civil Engineering 142, 148 |
| Civil engineering design | 6 | Civil Engineering 132B; Civil Engineering 132A or 145 |
| Economics | 3 | Engineering 106 or Agricultural Economics 148 |
| Technical electives | 21 | 12 units must be selected from Engineering courses |
| Humanities-social science electives | 15 | |

| | | |
|--|----|---|
| Mathematics electives | 5 | Selected from Mathematics 22A, 24, 128A, 128B, 128C, 130A, 130B, 131A, 131B, Applied Science 115 or Engineering 180. |
| Technical and/or humanities- social science electives | 5 | |
| Total | 91 | |

Sample Sequence of Courses*

| <i>Junior Year</i> | <i>Fall</i> | <i>Winter</i> | <i>Spring</i> |
|------------------------|------------------------|------------------------|---------------|
| Engineering 100 4 | Engineering 103A .. 3 | Civil | |
| Engineering 102A .. 3 | Engineering 104B .. 3 | Engineering 131 .. 3 | |
| Engineering 104A .. 3 | Engineering 105A .. 3 | Civil | |
| Elective** 6 | Elective** 6 | Engineering 132B . 3 | |
| — | — | Civil | |
| 16 | 15 | Engineering 171 .. 3 | |
| | | Engineering 103B ... 3 | |
| | | Elective** 3 | |
| | — | — | 15 |
| <i>Senior Year</i> | | | |
| Civil | Civil | Electives** 15 | |
| Engineering 142 .. 3 | Engineering 132A . 3 | | |
| Civil | Civil | | |
| Engineering 172 .. 2 | Engineering 148 .. 3 | | |
| Electives** 10 | Engineering 106 3 | | |
| — | Elective** 6 | | |
| 15 | 15 | — | 15 |

Suggested Technical Electives:

Because of the direct concern of professional civil engineering for the quality of human life, civil engineering majors are encouraged to include courses such as Economics 125 and 130, Environmental Planning and Management 110, and Political Science 166, 168, and 186 among their technical electives. Other technical electives of possible interest to majors in all three of the programs include Applied Science 115, Engineering 180, Mechanical Engineering 175, and Sociology 141 and 170. Additional suggested courses for students in each of the options are as follows:

Civil Engineering Planning: Agricultural Economics 148, 155; Civil Engineering 137, 143, 160; Economics 125, 130A, 130B; Engineering 106; Geography 106; Mathematics 130A, 130B; Environmental Planning and Management 110; Political Science 181; Sociology 170; Water Science 150.

* Study list arrangements are governed only by course prerequisites and the schedule of quarters in which a given course is offered. The arrangement of courses in this sample program satisfies both criteria, and lists the courses in what is probably the easiest order academically. Other course sequences are possible.

** The 46 units of electives are to be distributed among technical, mathematics, and humanities-social sciences electives as indicated in the Upper Division Program.

Environment Engineering: Applied Science 115; Atmospheric Science 120, 121A, 121B, 122, 123; Bacteriology 2; Biochemistry 101A, 101B; Chemical Engineering 154A, 154B, 156A, 156B; Chemistry 8A, 110A, 110B; Civil Engineering 145, 146, 147, 149; Mechanical Engineering 175, 185A, 185B; Water Science 120.

Structural Engineering and Mechanics: Agricultural Engineering 125, 126; Civil Engineering 132C, 133, 134, 135, 137, 138, 160, 173, 174; Engineering 122, 183, 184, 187, 188; Mathematics 185A, 185B.

Water Resources Engineering: Chemistry 5; Civil Engineering 141, 143, 144, 145, 146; Electrical Engineering 112A, 150; Mechanical Engineering 185A, 185B; Soil and Water Science 103; Water Science 10, 110A, 116, 141, 150, 160.

ELECTRICAL ENGINEERING CURRICULUM

Minimum units required: 180.

Present-day electrical engineering embraces a broad spectrum of disciplines based upon the physical and mathematical sciences. Electrical engineering encompasses such diversified fields as automation and control, information processing and computers, micro-miniaturization of circuits and components, instrumentation, communications and microwaves, and stimulated energy emission by means of quantum effects (masers and lasers). Work in these fields is being applied to medicine, communications, transportation, education, and business.

The variety of course offerings in the department permits the student to prepare himself for graduate study in electrical engineering, or for a career as a practicing engineer. In the electrical engineering curriculum close correlation between theory and experiment is emphasized.

The course of study in electrical engineering allows the student maximum flexibility to pursue studies in a special technical area of his choice or in a wide range of topics. Required courses insure his attainment of a broad background in basic electrical engineering. The engineering core courses for the lower division provide a strong foundation for the specialized topics to follow. In addition, a specified group of upper division courses in electromagnetic field theory, systems, and solid-state electronics prepares the student for the technical electives of his choice.

Technical electives are a substantial part of the upper division curricula and may be used to develop a specialty within the program. They may be selected from a wide range of courses in electrical engineering, other engineering fields, mathematics, and the physical and biological sciences. Typical fields of specialization are biomedical engineering, computer science, high-frequency phenomena and devices, information and control, solid-state devices and physical electronics, and systems and circuits.

Biomedical engineering is a rapidly growing field which applies engineering concepts to the measurement of biological systems, the processing of biological data, and the description or modeling of biological processes. The field encompasses the design and operation of instruments used in biology and medicine.

Computer science deals with the design, application, and theory of computing

machines. Specific areas such as switching theory, theory of automata, programming languages, artificial intelligence, and sequential machines are all part of the increasingly important field of computer science.

High-frequency phenomena and devices deals with the study of the generation and transmission of high-frequency electromagnetic waves and the interaction of these waves with matter, including the design of useful devices based on these interactions.

Information and control is concerned with the transfer and processing of information, and the use of information to control processes. An understanding of the transfer of information is basic to modern communication such as radio, radar, television, and data communications such as deep space telemetry. The principles of control underlie industrial automation and the control of vehicles.

Solid-state devices and physical electronics is the study of electrons in the presence of electric and magnetic fields and of quantum electronic effects. Among the devices included are transistors, diodes, vacuum tubes, lasers, masers, and traveling wave tubes.

Systems and circuits encompass a large body of engineering knowledge. A study of systems includes engineering as well as nonengineering systems such as sociological and economic systems. Circuit theory is the systematic analysis of the properties of electric networks.

UPPER DIVISION PROGRAM—ELECTRICAL ENGINEERING

Courses Common to all Electrical Engineering Options:

| Required Subjects | Units | Courses |
|---------------------------------------|-------|--|
| Electronic circuits and systems | 12 | Engineering 100, Electrical Engineering 110A, 110B, 111A |
| Applied mechanics | 3 | Engineering 102A |
| Applied thermodynamics | 3 | Engineering 105A |
| Electromagnetics | 3 | Electrical Engineering 130A |
| Linear systems | 6 | Electrical Engineering 112A, 112B |
| Physical electronics | 6 | Electrical Engineering 140A, 140B |
| Mathematics | 3 | Mathematics 22A* |
| Professional responsibilities ... | 3 | Engineering 190 |
| <hr/> | | |
| Total | 39 | |

All Electrical Engineering Options (Except Computer Science):

| Required Subjects | Units | Courses |
|---------------------------------------|-------|-----------------------------|
| Electronic circuits and systems | 2 | Electrical Engineering 111B |

* Students who have taken Mathematics 22A to satisfy the natural science elective requirement for the Lower Division Program must substitute a 3-unit mathematics course of their choice.

| | | |
|------------------------------|----|-----------------------------|
| Electromagnetics | 3 | Electrical Engineering 130B |
| Technical electives† | 29 | |
| Humanities-social science | | |
| electives | 15 | |
| Unrestricted electives | 3 | |
| | — | |
| Total | 91 | |

Computer Science Option:

Required Subjects

| | | |
|------------------------------|----|---|
| Switching theory | 3 | Electrical Engineering 172 |
| Computer organization | 3 | Electrical Engineering 174 |
| Programming | 3 | Choice of Electrical Engineering 176, 177, Applied Science 115, or Mathematics 129 |
| | — | |
| Technical electives† | 25 | |
| Humanities-social science | | |
| electives | 15 | |
| Unrestricted electives | 3 | |
| | — | |
| Total | 91 | |

The upper division program consists of required courses and elective courses. The required courses are coordinated sequences of courses that form the basis of all branches of electrical engineering. These courses are taken as early as possible, in order to prepare the student for technical elective courses in his area of interest. A typical upper division program, showing a suitable ordering of the required courses, is shown below.

Sample Sequence of Courses

| Junior Year | Fall | Winter | Spring |
|------------------------|------------------------|----------------------|--------|
| Engineering 100 4 | Engineering 102A ... 3 | Electrical | |
| Engineering 105A ... 3 | Electrical | Engineering 112B . 3 | |
| Electrical | Engineering 112A. 3 | Electrical | |
| Engineering 130A . 3 | Electrical Engi- | Engineering 140B . 3 | |
| Mathematics 22A*... 3 | neering 130B** .. 3 | Elective 9 | |
| Elective** | Electrical | | |
| | Engineering 140A . 3 | | |
| | Elective 3 | | |
| | — | — | — |
| 16 | | 15 | 15 |

* Students who have taken Mathematics 22A to satisfy the natural sciences elective requirement for the Lower Division Program must substitute a 3-unit mathematics course of their choice.

** A student in the computer science option takes Electrical Engineering 172 in the fall quarter of the junior year, and takes Electrical Engineering 174 and a choice of Applied Science 115, Electrical Engineering 176, or Mathematics 129 in place of Electrical Engineering 111B and 130B.

† The technical electives must include the following: 1) 3 units of an upper division mathematics or physics course; 2) one of the technical elective courses taken in the student's last 3 quarters must include work in an electrical laboratory.

Senior Year

| | | |
|------------------------------------|---|------------------------|
| Electrical Engineering 110A. 3 | Electrical Engineering 110B . 3 | Engineering 190 3 |
| Electrical Engineering 111A . 2 | Electrical Engi- neering 111B** .. 2 | Elective 12 |
| Elective 10 | Elective 10 | |
| 15 | 15 | 15 |

There are three kinds of electives in the Electrical Engineering curriculum: technical electives, humanities or social sciences electives, and unrestricted electives. Twenty-nine units of technical electives may be selected with the counsel of the faculty adviser from upper division courses in engineering, physics, and mathematics to suit the student's interests or career objectives. Other courses which are also acceptable as technical electives are indicated below. The choice of technical electives must include at least three units of upper division physics or mathematics. In addition, one of the technical elective courses taken in the student's last three quarters must include work in an electrical laboratory. This requirement can be satisfied by enrolling in a course consisting entirely of laboratory work, a course which combines lectures and laboratory, or an appropriate experimental individual study project under faculty supervision. The department has facilities for laboratory work in a large number of specialties.

Suggested Technical Electives:

Upper division courses in engineering, chemistry, mathematics, physics, and the biological sciences are in general acceptable as technical electives. The student is *strongly encouraged* to review his program of technical electives with his adviser to insure that it will meet his educational objectives. The technical elective offerings corresponding to the major options of electrical engineering are given in the following list. A student may sample a number of these areas, or he may prefer to specialize.

Biomedical Engineering: Chemistry 5, 8A, 8B, 109A, 109B; Physiological Sciences 101A, 101B; Biology 1; Zoology 2, 121; Animal Sciences 101, 110A, 110B, 111A, 111B; Physical Education 104A, 104B; Human Physiology 151; Engineering 103A, 103B; Electrical Engineering 150, 157A, 157B, 182, 184.

Computer Science: Mathematics 108A, 125, 128A, 128B, 128C, 129, 131, 168; Applied Science 115; Electrical Engineering 173, 175, 176, 177; Medical Sciences 151; Human Physiology 151; Economics 103.

High-Frequency Phenomena and Devices: Mathematics 185A, 185B; Applied Science 115; Electrical Engineering 131A, 131B, 131C, 133, 145A, 145B, 145C; Physics 104A, 104B.

Information and Control: Mathematics 131A, 131B, 131C, 151A, 151B, 151C, 185A, 185B; Applied Science 115; Electrical Engineering 157A, 157B, 172, 174, 182, 184.

Solid-State Devices and Physical Electronics: Mathematics 185A, 185B; Applied

** A student in the computer science option takes Electrical Engineering 172 in the fall quarter of the junior year, and takes Electrical Engineering 174 and a choice of Applied Science 115, Electrical Engineering 176, or Mathematics 129 in place of Electrical Engineering 111B and 130B.

Science 115; Engineering 130, 142, 188; Electrical Engineering 131A, 131B, 131C, 145A, 145B, 145C, 176; Physics 104A, 104B.

Systems and Circuits: Applied Science 115; Mathematics 127A, 127B, 127C, 128A, 128B, 128C, 185A, 185B; Electrical Engineering 116, 117, 157A, 157B, 182; Physics 104A, 104B.

MATERIALS SCIENCE CURRICULUM

Minimum units required: 180.

Materials science is a new discipline which applies the basic principles of physics and chemistry to the understanding of the structure, properties, and behavior of metals and other materials. The modern engineering demand for materials in supersonic transport, deep submergence vehicles, aerospace equipment and nuclear reactors has broadened the search for new and improved materials with capabilities well beyond those attainable with common metals and alloys. The development of these materials and the understanding of materials presently in use demands a thorough knowledge of the basic engineering and scientific principles such as structure and diffraction, elastic and plastic behavior of solids, thermodynamics, reaction kinetics, and physics of solids.

The undergraduate program provides the materials engineer with the background for activities in research, processing, and utilization of materials and also preparation for graduate work in materials science. The curriculum can lead to challenging work in government and industrial research laboratories, the aeronautical industries, and a wide range of production industries involving use of materials in critical applications such as in corrosive or high vacuum atmospheres, at extreme temperatures, or where subject to neutron irradiation.

The materials science curriculum is based on a common core of courses, basic to engineering, taken during the first two years. The third and fourth years are devoted to the further study of fundamental subjects and the introduction of specific materials courses. Electives are available in the third and fourth years so that students with broad interests can combine materials science with work in another engineering discipline.

UPPER DIVISION PROGRAM—MATERIALS SCIENCE

| Required Subjects | Units | Courses |
|---------------------------------|-------|-------------------------------------|
| Electronic circuits | 4 | Engineering 100 |
| Applied mechanics | 9 | Engineering 102A, 103A, 104A |
| Applied thermodynamics | 7 | Engineering 105A, 130 |
| Materials in design | 4 | Engineering 140 |
| Materials science | 7 | Engineering 142, 188 |
| Controls and systems analysis . | 4 | Mechanical Engineering 171 |
| Laboratory | 4 | Mechanical Engineering 123A, 123B |
| Applied mathematics | 9 | Engineering 180, Physics 104A, 104B |
| Technical electives | 25 | |
| Humanities-social | | |
| science electives..... | 15 | |
| Unrestricted electives | 3 | |
| Total | 91 | |

Recommended Sequence of Courses

| <i>Junior Year</i> | <i>Fall</i> | <i>Winter</i> | <i>Spring</i> |
|--------------------------------------|--------------------------------------|--------------------------------------|---------------|
| Engineering 102A .. 3 | Engineering 100 4 | Engineering 180 3 | |
| Engineering 104A .. 3 | Engineering 130 4 | Technical Elective .. 6 | |
| Engineering 105A .. 3 | Technical Elective .. 7 | Humanities- | |
| Technical Elective .. 3 | | Social Sciences ... 4 | |
| Elective 3 | | Mechanical | |
| | | Engineering 123A . 2 | |
| | — | — | — |
| | 15 | 15 | 15 |
| <i>Senior Year</i> | | | |
| Engineering 103A .. 3 | Mechanical | Engineering 188 4 | |
| Engineering 142 3 | Engineering 171 .. 4 | Mechanical | |
| Physics 104A 3 | Physics 104B 3 | Engineering 123B . 2 | |
| Technical Elective .. 3 | Engineering 140 4 | Technical Elective .. 6 | |
| Humanities— Social Sciences ... 4 | Humanities— Social Sciences ... 4 | Humanities— Social Sciences ... 3 | |
| | — | — | — |
| | 16 | 15 | 15 |

Suggested Technical Electives:

In order to complete the undergraduate materials science program, one of the following sequences of courses is recommended. Special interests of individual students will also be considered. These suggested courses are intended as guidelines to assist the student and his adviser in the preparation of study lists.

Physical chemistry: Chemistry 110A, 110B, 110C, or Chemistry 109A, 109B.

Solid-state physics: Physics 115A, 115B and 140A, 140B.

Electrical properties: Physics 121 and Electrical Engineering 145A, 145B, 145C.

Applied mechanics: Engineering 104B, 183, 187.

Dynamic response: Engineering 102B, 122, 184; Mechanical Engineering 115.

Mathematics: Mathematics 118A, 118B, 119, 185A, 185B.

Applied mathematics: Applied Science 115; Electrical Engineering 112A; Mechanical Engineering 172, 175.

MECHANICAL ENGINEERING CURRICULUM

Minimum units required: 181.

The modern mechanical engineer uses basic science in the design and manufacture of complex engineering systems. This requires the application of physical and mechanical principles in the development of machines, energy conversion systems, materials, and equipment for guidance and control. Preparation for this broad field of engineering requires a thorough knowledge of mathematics, physics, chemistry, fluid mechanics, thermodynamics, heat transfer, mass transfer, electricity, manufacturing processes, properties of materials, and economics.

The mechanical engineering curriculum is based on a common core of engineering courses taken in the first two years. The third year is spent in further study of fundamental courses, and in the fourth year the student may tailor his studies to his own interests by selecting courses in controls and systems

analysis, fluid mechanics, heat transfer, thermodynamics, mechanical design, or materials science. With the range of electives available, the student can prepare himself for graduate study in mechanical engineering, or obtain a broad background for entering engineering practice at the bachelor's level.

UPPER DIVISION PROGRAM—MECHANICAL ENGINEERING

| | Units | Courses |
|-------------------------------------|-------|--|
| Required Subjects | | |
| Electronic circuits | 4 | Engineering 100 |
| Applied mechanics | 12 | Engineering 102A, 102B, 104A, 104B |
| Applied thermodynamics | 6 | Engineering 105A, 105B |
| Fluid mechanics | 6 | Engineering 103A, 103B |
| Mechanical design | 6 | Mechanical Engineering 118, 121 |
| Controls and systems analysis | 4 | Mechanical Engineering 171 |
| Laboratory | 8 | Mechanical Engineering 111, 123A, 123B |
| Professional responsibilities | 3 | Engineering 190 |
| Applied mathematics | 3 | Engineering 180 |
| Technical electives | 22 | |
| Humanities-social | | |
| science electives | 15 | |
| Unrestricted electives | 3 | |
| | <hr/> | |
| Total | 92 | |

Recommended Sequence of Courses

| Junior Year | Fall | Winter | Spring |
|-----------------------|------------------------|--------|------------------------|
| Engineering 102A .. 3 | Engineering 100 4 | | Engineering 180 3 |
| Engineering 103A .. 3 | Engineering 102B .. 3 | | Mechanical |
| Engineering 104A .. 3 | Engineering 103B .. 3 | | Engineering 111 .. 4 |
| Engineering 105A .. 3 | Engineering 104B .. 3 | | Mechanical |
| Elective | Engineering 105B .. 3 | | Engineering 121 .. 3 |
| | <hr/> | | |
| | 15 | 16 | 14 |

Senior Year

| | | | |
|-------------------------|--------------------------|----|-------------------------|
| Mechanical | | | Mechanical |
| Engineering 118 .. 3 | Engineering 190 3 | | Engineering 123B .. 2 |
| Mechanical | | | Humanities— |
| Engineering 171 .. 4 | Mechanical | | Social Sciences ... 7 |
| Technical Elective .. 9 | Engineering 123A .. 2 | | Technical Elective .. 7 |
| | Humanities— | | |
| | Social Sciences ... 4 | | |
| | Technical Electives .. 6 | | |
| | <hr/> | | |
| | 16 | 15 | 16 |

The electives are to be distributed among technical, humanities-social science, and unrestricted electives as indicated in the Upper Division Program.

Current areas of interest in mechanical engineering are outlined in the following options. Each includes a suggested list of electives from which a student interested in a particular option can select.

System Dynamics and Control Option. Modern engineers are increasingly concerned with the performance of integrated dynamics systems in which it is not possible to optimize component parts without consideration of the overall system of which they will be used. This option 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 physical systems from the domains of the engineering sciences represented in mechanical engineering, but the techniques for studying systems apply equally well to social, economic, and other dynamic systems.

Suggested technical electives: Mechanical Engineering 122, 171, 172, 180, 185, 186; Electrical Engineering 112A, 112B.

Creative Design Option. The creation of new products, processes, or systems which are mechanical in nature is the primary goal of a professional mechanical engineer. A designer must have a solid and relatively broad background in the basic physical and engineering sciences and have the ability to organize and solve a variety of problems.

Suggested technical electives: Mechanical Engineering 114, 115, 120, 124, 128, 140, 172, 175, 185, 186; Applied Science 115; Civil Engineering 131, 135; Engineering 122, 180, 183, 184, 187; Agricultural Engineering 118.

Sociotechnological Systems Option. The objective of this option is to provide the student with the background necessary for developing mathematical models of man's impact on his environment. Geophysical, living systems, and social environments are the subjects of study. It is expected that the student will become a competent specialist in general system analysis while gaining breadth in ecology and social system analysis. Examples of specific topics of study are: 1) generation, transport, and effects of pollution; 2) interspecies and intraspecies conflict and cooperation; 3) urban dynamics.

Suggested technical electives: Mechanical Engineering 171, 172, 175, 185, 186; Civil Engineering 147, 149; Electrical Engineering 112A, 112B, 184A, 184B; Zoology 116, 140, 155.

Power, Propulsion, and Pollution Option. This option is specifically designed for students who would like to work in the fields of electric power generation, propulsion for transportation and energy conversion, where the impact of potential pollution on the environment is assuming increasing importance in the design stage.

The program of study is based on the fundamentals of fluid mechanics, thermodynamics and heat transfer with applications to such diverse components as combustion engines, gas turbines, heat exchangers, nuclear reactors, MHD power generators and so forth.

Suggested technical electives: Mechanical Engineering 125, 135, 137, 171, 175, 185, 186; Applied Science 115, 135A, 144; Electrical Engineering 130A, 130B; Engineering 180.

INDIVIDUAL ENGINEERING MAJOR

Minimum units required: 180.

Any student who has a definite career objective that is not compatible with one of the named curricula may, with the help of his adviser, propose an Individual Engineering Major. The student, on approval of his adviser, must submit his complete program of study, including a statement of objectives, to the Undergraduate Study Committee of the College of Engineering for final approval. A student must enter this program at least three quarters before his anticipated graduation date, preferably no later than the second quarter of his junior year. Such a program must include at least the following minimum number of quarter units in the specified subject areas:

| <i>Subject Areas</i> | <i>Minimum Quarter Units</i> |
|--|--------------------------------------|
| Mathematics | 18 |
| Physical and biological sciences (including at least 12 units of physics and 10 units of chemistry for engineering and science students) | 27 |
| Analytic mechanics and strength of materials | 6 |
| Applied thermodynamics | 3 |
| Applied electricity and magnetism | 5 |
| Properties of materials | 4 |
| Engineering design | 5 |
| Humanities-social sciences | 31 |

Graduate Study

The Departments of Agricultural Engineering, Applied Science (Davis-Livermore), Chemical Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering offer courses of study leading to the degrees of Master of Science and Doctor of Philosophy. These programs are particularly appropriate for those wishing to prepare themselves for careers in teaching, research or analytical design. Professional programs emphasizing design and leading to the degrees of Master of Engineering and Doctor of Engineering are offered by the Departments of Agricultural Engineering, Civil Engineering, and Mechanical Engineering.

At both master's and doctoral levels, the student plans his course of study with the help of an adviser or guidance committee. He is permitted wide latitude in the selection of courses and thesis subjects so long as his program is purposeful and well-integrated.

The graduate courses offered in the College of Engineering are described in the departmental listings (pages 250-272).

General information on graduate study may be found in the *Announcement*

of the Graduate Division which can be obtained by writing to the Dean of the Graduate Division. Detailed information on graduate engineering programs is contained in the bulletin *Graduate Study in Engineering* obtainable from the Associate Dean, Graduate Studies, College of Engineering. Students interested in programs in Applied Science should request a copy of the *Announcement of the Department of Applied Science* from the Department of Applied Science.

COLLEGE OF LETTERS AND SCIENCE

The College of Letters and Science offers curricula that enable the student to pursue fundamental knowledge primarily for its own sake and to learn basic intellectual disciplines. Programs of study in the College expose the student to man's social, aesthetic, and material achievements, as well as to the challenge of his ethical, political, and physical environment. In many cases the pursuit of cultural truths will also lead the student to an appreciation of the individual's capacity for unique creative expression. Such a liberal education has increasing vocational value, since more and more career opportunities presuppose a basic letters and science degree; nevertheless, the main emphasis in the College rests on the ends of living rather than on the means. A well-balanced liberal education, including specialized knowledge in his major field, prepares the graduate for a satisfying life whatever his career.

Graduation from the College of Letters and Science presupposes fulfillment of the general University requirements. In addition, to achieve its educational objectives, the College has established certain specific standards relating to scholarship, senior residence, and unit distribution within the student's program of study. The two most important standards determining the unit-distribution pattern are those which relate to the Breadth Requirements, and to the Departmental Major Requirement. The *Breadth Requirements* are designed to provide a broad background of knowledge and to promote awareness of the variety of interdependencies of knowledge. The *Major Requirement* enables the student to gain intellectual depth and competence in his chosen field of specialization. Requirements of the major program are determined and administered by the separate departments, or, in the case of interdepartmental or individual majors, by an interdepartmental committee or group.

The College offers the undergraduate degrees of Bachelor of Arts and Bachelor of Science. These degrees are conferred upon completion of the University, College and major requirements, detailed on the succeeding pages. Every student is responsible for seeing that he meets these requirements for graduation.

The study program or unit load may be easily changed within the established deadlines. Changes after the deadline must be justified to the satisfaction of the Dean of the College. In all cases, however, the student has the sole responsibility for initiating these changes by contacting his instructor and the Dean of the College. The student also has the full responsibility throughout the academic term to apprise himself of the quality of his performance by means of consultation with his instructors during their designated office hours.

The specific subject requirements for the bachelor's degree may be satisfied only by:

1. Courses in regular sessions of the University of California or University summer session courses identified with the letter "S."
2. Courses for which transfer credit is granted from another college or university.

Under exceptional circumstances, with prior written approval, the Dean of the College will permit students in residence to enroll in University Extension courses for elective credit only. Such units and courses cannot be applied to fulfillment of the breadth, foreign language, or upper division requirements of the college. No grade points are assigned for courses completed in University Extension.

University Requirements

All candidates for the bachelor's degree are obligated to satisfy the University requirements (pages 30-32) in regard to:

Subject A

American History and Institutions

Scholarship

Residence (for additional College stipulations, see page 143)

Policies governing maximum unit credit from junior colleges (see page 18)

Application for Degree Candidacy (see filing deadlines, page 5)

College of Letters and Science Requirements

BREADTH REQUIREMENTS

A. English Reading and Composition Requirement, A.B. and B.S. degrees:

Satisfied by passing an examination in English composition. The examination, administered at announced intervals, may be taken no earlier than the final quarter of the sophomore year (completion of 70 units).

Prerequisite: Subject A.

B. Foreign Language (for details of this requirement, see page 147).

| | |
|---|--|
| A.B. degree: 12 units or the equivalent in one language. | B.S. degree: none (some major programs have specific language requirements, however). |
|---|--|

C. Area Requirements (see page 150 for classification of courses).

| A.B. degree | Units | B.S. degree: | Units |
|--|--------------|--|--------------|
| Humanities | | Natural Sciences | 90 |
| Natural Sciences | 52 | Humanities } | 22 |
| Social Sciences | | Social Sciences } | 22 |
| (12 units in one area and 20 in each of the two remaining areas) | | (a total of 22 units in either area or in combination) | |

112

UNIT DISTRIBUTION REQUIREMENTS

Satisfactory completion of a minimum of 180 units is required for graduation. (A minimum of 75 units must be completed in institutions beyond the junior college level.)

- A. At least 150 units must be completed in courses given by teaching departments in the College of Letters and Science (page 151).
- B. At least 54 units must be in upper division course work (courses numbered 100-199) in Letters and Science teaching departments (see page 151). Upper division units taken in non-Letters and Science teaching departments may be counted toward the required 54 if these units satisfy major requirements. For the A.B. Degree, a minimum of 12 of the 54 required upper division units must be outside the major department (not applicable to interdepartmental, individual, or double majors).
- C. A combined total of 30 units may be offered toward the bachelor's degree from the following categories:
 1. Units not offered by teaching departments in the College of Letters and Science (see page 152).
 2. All military science courses.
 3. Physical Education 5 and not more than 6 units in Physical Education 1.
 4. Not more than 9 units in 300-400 series courses or University Extension courses.
- D. Total degree credit in *special study courses* may not exceed 5 units in any one quarter. Lower division courses in this category are numbered 98 and 99 (group study and individual study). A student is eligible to take the upper division equivalent courses, 198 and 199 for credit only after he has accumulated 84 units.

SCHOLARSHIP REQUIREMENTS

In addition to the general University requirement of a C average (2.0) for all University work, the College stipulates separate University averages of at least C for: 1) all courses required for the major lower division and upper division courses; and 2) all upper division courses required for the major.

At the option of the department or interdepartmental committee administering the major, students failing to meet the above conditions may be denied the privilege of pursuing that major.

PROBATION AND DISQUALIFICATION

(See page 28.)

READMISSION AFTER DISQUALIFICATION

Disqualified students should contact the Dean of the College well in advance concerning the requirements to be met before their readmission can be considered. Ordinarily, an agreement involving improved performance in a University of California Summer Session is mandatory.

PASSED OR NO RECORD PRIVILEGE

The intent of this privilege is to encourage exploration by alleviating grading pressures in areas in which a student has little or no previous experience. New students and continuing students in good standing (not on probation or subject

to academic disqualification) who are registered for at least 12 units, may take any one course each quarter on a Passed or No Record basis. A part-time student in good standing wishing to take a course on this basis must consult with the Dean's Office. More than one Passed or No Record course may be taken each quarter if a student has accumulated unused options. There is one option for each quarter completed on the Davis campus as of spring 1967, while in good standing.

P grades are awarded for work otherwise qualifying for A, B, or C grades (C- is the lowest passing grade for which a P can be awarded). Passed units are counted toward the degree, but neither a Passed nor a No Record grade affects a student's grade-point average. The unit value of a Passed grade is included in the *total units completed* on the transcript; it is not reflected in the *units attempted* column, the figure used for computing the grade-point average. No Record grades are not recorded on the transcript.

P/No Record Enrollment Procedure: P/No Record petitions are available in the Dean's Office, 150 Mrak Hall, between the dates listed below and must be filed in person. No signature other than the student's is required on the petition.

A student may change his enrollment in a particular course from the Passed/No Record basis to the regular grade, or vice versa, up to the end of the fifth week of every quarter.

After the fifth week of classes, approval to elect or reverse a Passed/No Record option is rarely given.

File Petition in Dean's Office Between the Following Dates

| | |
|---------------------|-------------------------------|
| Fall quarter 1971 | November 1 through November 5 |
| Winter quarter 1972 | February 2 through February 8 |
| Spring quarter 1972 | April 26 through May 2 |

Graduating seniors as well as any other student planning to undertake graduate or professional studies should consult an adviser before enrolling on a Passed/No Record basis in a course required in the major program.

Some courses are authorized to be given on a Passed/Not Passed basis only and are identified as such in the course description. These courses may be taken simultaneously with the courses for which a student exercises his Passed or No Record option. An NP is recorded on the transcript for courses which would otherwise be graded D or F.

RESIDENCE REQUIREMENT

All candidates for the bachelor's degree must complete 35 of the final 45 quarter units in residence in the College of Letters and Science. While up to ten of the final 45 quarter units may thus be credited from another college in the University or from another accredited institution, any student planning to take senior-year work elsewhere should secure the approval of the Dean and his major department before undertaking such work. He should realize that a delay in granting the degree may result, since credit is not allowed until an official transcript is received from the institution attended.

Students entering the College in advanced standing from another institution or from another college or school within the University, must complete 35 units of which at least 27 quarter units must be in upper division courses offered by departments in Letters and Science, including at least 18 units in the major program.

Three terms is the minimum residence at the University. Each Summer Session period may be used in satisfaction of one half a term of residence.

Students enrolled in the Education Abroad Program (junior year abroad) may not apply more than 55 units taken abroad towards the unit requirement for the degree and, following study abroad, must return and complete 12 units in residence in the College of Letters and Science.

REQUIREMENTS IN THE MAJOR

The number of upper division units a student must complete in the subject of his major varies among departments, the requirement ranging from 36 to 45 units. Major programs are designed by the faculty of the College to insure that all students pursuing the same major will acquire certain knowledge in common. In addition, advanced students are encouraged to engage in independent study within the major.

A student must declare his major program by the time he has completed 84 units, but he may designate his preference at the beginning of his sophomore year.

A student may change from one major to another with the approval of the Dean of the College and with the consent of the department or committee in charge of the new major. Petitions for Change or Declaration of Major are obtainable in Room 150, Mrak Hall. After the beginning of the senior year, a student may not transfer from one major program to another, or from B.S. to A.B. (or vice versa).

Three types of programs satisfy requirements for the major: departmental, interdepartmental, and individual major programs.

A. Departmental Majors. The requirements for departmental major programs are described in detail under departmental listings. Any student who fulfills the major requirements of two departments in the College of Letters and Science may elect to receive a bachelor's degree in both fields. Major programs leading to a Bachelor of Arts degree are offered in the following departments; those departments also offering programs leading to a Bachelor of Science degree are indicated by an asterisk (*):

| | | |
|---------------|--------------------|--------------------|
| Anthropology* | Geology* | Physical Education |
| Art | German | Physics* |
| Bacteriology* | Greek | Political Science |
| Botany* | History | Psychology* |
| Chemistry* | Italian | Rhetoric |
| Dramatic Art | Latin | Russian |
| Economics | Mathematics* | Sociology |
| English | Music | Spanish |
| French | Oriental Languages | Zoology* |
| Geography | Philosophy | |

A Bachelor of Science degree is offered in Biochemistry (see page 74), Genetics (see page 299), Physiology (see page 378).

B. Interdepartmental Majors. These programs are intended for students interested in broader scope than that provided by a departmental major. Interdepartmental major programs leading to a Bachelor of Arts degree are offered in:

- Afro-American (Black) Studies (see page 184)
- American Studies (see page 192)
- Biological Sciences (see page 216)
- International Relations (see page 324)
- Linguistics (see page 333)
- Physical Sciences (see page 371)
- Russian Literature and History (see page 402)

The Biological Sciences and the Physical Sciences programs can also lead to a Bachelor of Science degree.

C. Individual Majors. The individual major is a program organized by the student himself in consultation with a dean in the College and/or faculty advisers who are expert in the requisite fields of interest. The individual major permits students to pursue a specific academic interest which, for sound academic reasons, cannot be accommodated within the framework of an existing major program. Involving two or more departments, this major may consist of not fewer than 45 nor more than 54 upper division units selected predominantly from Letters and Science teaching departments.

A student who wishes to undertake an individual major should request the appropriate forms, which include detailed instructions, from the Dean's Office, 150 Mrak Hall.

After the final proposal has been prepared with the assistance of advisers of his choice, it is submitted with faculty letters of recommendation to the Dean's Office. The proposal is reviewed and forwarded to the Faculty Committee on Individual Majors for evaluation and final action.

A student may not elect an individual major after the beginning of the final quarter of his junior year.

BACHELOR'S DEGREE CANDIDATES

Senior Degree Check. At the beginning of his senior year, each student should request a *Degree Check* from the Dean's Office. A statement indicating any unfulfilled University and College degree requirements will be sent to the student. Information about progress in completing requirements in the *major* should be obtained by conferring with a faculty adviser authorized for the major program.

Filing for Candidacy. Each candidate for a degree must file an Announcement of Candidacy with the Registrar at the beginning of the quarter in which he plans to graduate. The filing deadlines are published on page 6 of this catalog.

Planning the Program

Before instruction begins each quarter, the student should prepare a tentative program of study and, if in need of academic counsel, meet with a faculty adviser

to review his proposed program. The official study list must be filed with the Registrar according to the procedures described in the *Schedule and Directory*, available at the beginning of each quarter.

Undeclared Status. Entering freshmen and sophomores are officially designated as *Undeclared*. To insure counseling by an appropriate academic adviser, however, each student is asked to indicate a field of interest or unofficial major while in undeclared status. (Preprofessional students see page 160.)

Declaration of Major. A student may declare his official major at the end of his freshman year; he must do so by the time he has completed 84 units. After obtaining a Petition for Change or Declaration of Major at the Dean's Office, he reports to the departmental office of his major choice to secure approval for admission to the major program. (Biological and Physical Science majors report to the Dean's Office.)

Study List Requirements.

1. Unit Limitations (without special approval).

| | |
|----------------------------------|---|
| <i>Minimum for all students:</i> | 12 units (including Subject A or repeated courses) |
|----------------------------------|---|

Maximum for freshmen and transfer students

| | |
|---------------------------------------|----------|
| <i>in first quarter of residence:</i> | 17 units |
|---------------------------------------|----------|

Study lists of fewer than 12 units per quarter must be approved by the Dean of the College. Such study lists will be approved only on grounds of poor health, regular outside employment, or personal obligations, such as small children at home or illness in the family, which prevent a student from enrolling in a full program. Students requesting a study list of fewer than 12 units for health reasons must present certification from the Student Health Service. Employed students must present a letter from their employer indicating current and expected number of hours of employment throughout the quarter. A student who, because of financial necessity, is employed throughout the quarter for at least 20 hours a week may enroll for a minimum of 8 units. Other students must see a College dean regarding reasons for requesting a reduced program.

Students interested in undertaking a limited course load, who may be willing to forego the privileges of regular student status, should investigate the advantages of enrolling in University Extension's Concurrent Enrollment Program.

2. Change of Study List.

Adding courses: During the first two weeks of classes each quarter and with the permission of the instructor a student may file a petition with the Registrar's Office to add a course to his study list. Thereafter, the Dean's permission is required as well. A \$3 administrative late fee is assessed for approved petitions.

Dropping courses. During the first five weeks of classes each quarter, a student may file a petition requesting to drop a course from his study list. The petition, noted by the instructor, is filed at the Registrar's Office. After the fifth week of classes, a student may drop a course, with the Dean's approval, only under exceptional, unforeseeable circumstances, e.g., personal illness (certified by the Student Health Service) or an unavoidable increase in hours of employment. Although each petition will be evaluated on its own merits, reasons generally

regarded insufficient justification for dropping a course after the fifth week include: 1) lack of interest or motivation, 2) anticipation of substandard grades due to poor class attendance or time-budgeting problems, 3) inability to assess performance before the deadline. A \$3 administrative late fee is assessed for approved petitions.

Faculty Advisers. The purpose of the faculty adviser in the College of Letters and Science is to counsel the student on his overall program and to insure that he acquires a meaningful liberal education, makes normal progress toward completion of degree requirements, and undertakes an appropriate program of studies. The student should consult an adviser or the Dean of the College about any additional academic problems.

1. *Entering students who participate in one of the summer advising programs* are assisted in planning their fall quarter program by a temporarily assigned summer adviser. During the fall or subsequent quarters, students wishing academic advice should request adviser assignment in the department administering the major they intend to pursue. Offices are listed in the *Schedule and Directory*.

a. *Other entering lowerclassmen* are assigned advisers following the Letters and Science Assembly scheduled during Orientation Week at the beginning of each quarter.

b. *Other entering upperclassmen* report directly to the departmental office of their major during Orientation Week. (Biological and Physical Science majors report to the Dean's Office.)

2. *All new students* are encouraged to contact an adviser. During their first three quarters in residence they are expected to consult an adviser frequently and discuss their proposed programs.

3. *Continuing students* having completed three quarters in residence in the College are no longer obligated to consult an adviser; they can elect to see an adviser when in need of counsel.

ENTERING FRESHMEN

Because of the wide choice of subjects open to the Letters and Science student, a sample first-year program is not feasible. The entering freshman should, however, be able to plan his first-year program satisfactorily by keeping in mind the following points.

1. After the Subject A requirement has been met, most students should consider taking English 1 during their first year and English 2, 3, 4A, 4B, or 5 their second year in preparation for the English Composition Examination. The examination may be taken no earlier than the final quarter of the sophomore year, i.e., upon successful completion of at least 70 units.

2. The foreign language requirement should be completed by the end of the first or second year, as program priorities permit. This is particularly important for students attempting to qualify for the University's Education Abroad Program (junior year abroad). It may be satisfied by examination or completion of language courses as follows:

- a. *Placement Examination:* A student with only high school preparation may validate his knowledge of a foreign language by earning a satisfactory score on this examination. (Further information given below.)
- b. *Course completion in high school* (tenth, eleventh or twelfth grades): earn a B average for one year's work beyond the second-year course level. This option must be validated by petition in the Dean's Office, 150 Mrak Hall.
- c. *Course Completion in College (or the equivalent):* A.B. degree—12 units in one language. B.S. degree—as required in the major program.
- d. *Proficiency Examination:* A student who has not completed the required level language course, but assumes he has attained equivalent knowledge, may elect to satisfy the language requirement by passing this examination. For information consult the appropriate foreign language department.

3. The Area Requirements in the humanities, natural sciences, and social sciences, for students enrolled in an A.B. program, require a total of 52 units; in the B.S. program, 112 (see page 150 for the three Area Lists).

These area requirements are particularly important for the entering freshman who has not decided on a major. Careful consultation with his adviser and thoughtful selection from each of the three groups will help the student to determine his preference for a major. Entering freshmen who feel certain of their major field should consult the requirements of that major in planning their first-year program, as a first-year course may be a prerequisite for further studies in that field.

FOREIGN LANGUAGE PLACEMENT EXAMINATION

A student electing to continue a language studied in high school must take the Foreign Language Placement Test in that language. The placement test does not yield unit credit; it only determines whether the requirement has been met or at which point in the elementary sequence he should enroll. Full academic credit is allowed for each foreign language course taken without regard to foreign language preparation in high school.

A student with advanced standing credit in a language does not qualify to take the Placement Examination. He should consult his status card, which is issued by the Dean's Office prior to admission to the College, for indication of further language study required.

Inquiries about the language requirement or the possibility of credit being withheld for duplication of advanced standing credit should be made at the Dean's Office, Room 150, Mrak Hall.

Preparation for Admission to Professional Schools

The College of Letters and Science does not offer special preprofessional programs. A student who plans to prepare for a professional school undertakes a normal program leading to an A.B. or B.S. degree. Most courses required by a professional school are included in the requirements for the bachelor's degree; any additional courses needed may be taken as electives. The student should

make himself aware of the requirements for his prospective professional school early in his career in order to plan a proper program (see page 160). Follow the procedures governing declaration of majors outlined on page 146.

The Teaching Credential

The teacher-training program is administered by the Graduate Division. Certain undergraduate courses, however, are required as preparation for the program. Students interested in obtaining the elementary or general secondary teaching credential should consult the appropriate adviser in the Department of Education as early as possible, preferably by the end of the freshman year (see also page 175).

Honors

THE DEAN'S HONORS LIST

The Dean's Honors List includes the names of students having earned a minimum grade-point average of 3.3 during the preceding term. A study list of at least 12 units, exclusive of units taken on a Passed/Not Passed (or No Record) basis, is required. The list is posted quarterly in the foyer of Mrak Hall.

HONORS PROGRAMS

Special honors programs are available in connection with certain major programs. These are described in the introduction to the department's course offerings. Interested students should consult their major advisers.

BACCALAUREATE HONORS

The awarding of honors at graduation is based on the following minimum criteria:

| | Honors <i>Average of All College Work</i> | High Honors <i>Average of All College Work</i> | Highest Honors <i>Average of All College Work</i> |
|--------------------------|--|---|--|
| | 3.3 | 3.5 | 3.7 |
| Total UC units completed | | <i>Average of UC Work</i> | |
| 45- 89 | 3.5 | 3.7 | 3.9 |
| 90-134 | 3.4 | 3.6 | 3.8 |
| 135 and over | 3.3 | 3.5 | 3.7 |

Recommendation from the major department, requested by the Dean's Office, is also required for students eligible for highest honors.

AWARDS FOR ACADEMIC EXCELLENCE

In addition to eligibility for the University Medal (see page 32) graduating seniors with distinguished scholastic records in the College may be recommended by the faculty for the Herbert A. Young Letters and Science Medal. Academic excellence is the primary basis for choosing the recipient of this award.

Area Requirement Lists

The undergraduate courses in the subjects listed below will be accepted in fulfillment of the area requirements of the College. Courses marked with an H, or numbered 48, 98 (formerly 38), 99 (formerly 39), 198, 199, or 300-400 may not be counted toward the breadth requirements.

Units in a foreign language may be offered toward satisfaction of the Humanities Requirement as follows:

For A.B. Candidates—All language units above the 12-unit level. Units below that level may be offered only if they are in a language other than the one serving to satisfy the Foreign Language Requirement.

For B.S. Candidates—All foreign language units.

HUMANITIES

American Studies. A.B.: Equally divide *maximum* of 16 units between Humanities and Social Sciences.
B.S.: 12 units allowed toward Social Sciences/Humanities requirement.

Art.

Classics.

Dramatic Art.

English. All courses except 25 and 26 and *first* freshman-level course (i.e., English 1, 2, 3, 4A, 4B, or 5) com-

pleted. All subsequent courses in English counted toward humanities requirement.

Foreign Language (see above).

History.

Linguistics.

Music.

Philosophy.

Rhetoric.

Sanskrit.

NATURAL SCIENCES

Animal Physiology.

Anthropology. Accepted: 1, 5, 151, 152, 153, 154A, 154B, 155, 156.

Astronomy.

Bacteriology.

Biochemistry and Biophysics.

Biology.

Botany.

Chemistry.

Entomology. Accepted: 1, 10.

Genetics.

Geography. Accepted: 1, 3.

Geology.

Mathematics.

Physics.

Physiology.

Psychology. Accepted: 1B, 108, 131, 150, 180A, 180B, 180G, 180K.

Zoology.

SOCIAL SCIENCES

American Studies. (see "Humanities" above).

Anthropology. All courses except 1, 13, 151, 152, 153, 154A, 154B, 155, 156, 195, 196.

Economics. All courses except 12.

Education. All courses except 114.

Geography. All courses except 1, 3, 105, 161.

Political Science.

Psychology. All courses except 1B, 3, 108, 131, 150, 165, 180A, 180B, 180G, 180K.

Sociology. All courses except 46A, 46B, 46C, 106.

TEACHING DEPARTMENTS IN COLLEGE OF LETTERS AND SCIENCE

| | | |
|--------------------------------|--------------------|----------------------|
| Animal Physiology | Education | Philosophy |
| Anthropology | English | Physical Education |
| Art | French and Italian | Physics |
| Bacteriology | Genetics | Political Science |
| Biochemistry and Biophysics | Geography | Psychology |
| Botany | Geology | Rhetoric |
| Chemistry | German and Russian | Sociology |
| Dramatic Art | History | Spanish and Classics |
| Economics | Mathematics | Zoology |
| | Music | |

A minimum of 54 upper division units (courses numbered 100-199) must be completed in courses offered by departments listed above. Courses in American Studies, Biology, and Integrated Studies are included in all College requirements involving Letters and Science teaching departments. Military science units are acceptable only in the 30-unit limitation (see page 142).

COLLEGE ENTRANCE EXAMINATION BOARD ADVANCED PLACEMENT EXAMINATION CREDIT

Students earn 10 units credit toward their bachelor's degree for each CEEB Advanced Placement Examination satisfactorily passed during the junior year or senior year in high school. See chart below for details regarding course equivalences and breadth credit allowed toward graduation.

| EXAMINATION | SCORE | UCD COURSE EQUIVALENCES* | CONTINUING COURSE | BREADTH CREDIT ALLOWED | REMARKS |
|-------------------|--------------------------|--|--|------------------------|--|
| English | | | | Humanities | |
| English | 5, 4, 3 | English 1 and 3 | | 4 units | No exemption from English Composition Examination. |
| Foreign Languages | | | | Humanities | |
| French | 5, 4, 3 | French 6 | French 30A or 46A or concurrent enrollment. | 4 units | |
| German | 5, 4, 3 | German 6A, 6B or 7 | Any upper division course; German 101 strongly recommended. | 4 units | The Foreign Language Requirement for the College of Letters and Science is satisfied by a score of 5, 4 or 3 on any language examination. |
| Latin 4 | 5, 4, 3 | Latin 103 | Determined by consultation with Classics adviser. | 4 units | |
| Latin 5 | 5, 4, 3 | Latin 102A or 102B | Determined by consultation with Classics adviser. | 8 units | |
| Spanish | 5, 4, 3 | Spanish 6 | Spanish 27A; 101A may be taken concurrently. | 4 units | |
| Humanities | | | | Humanities | |
| American History | 5, 4, 3 | History 17A, 17B | | 8 units | Satisfies American History and Institutions Requirement. |
| European History | 5, 4, 3 | History 4B, 4C | | 8 units | |
| Natural Sciences | | | | Natural Sciences | |
| Biology | 5, 4 | Biology 1, Botany 2, Bacteriology 2, Zoology 2 | Any upper division course or, by option, any Biological Sciences "2" course. | 10 units | Student has option of taking Bacteriology 2, Botany 2 and Zoology 2 for full unit credit. |
| | 3 | Biology 1 | Any Biological Sciences course except "10" series. | 10 units | |
| Chemistry | 5, 4, 3 | Chemistry 1A, 1B | See "Remarks" | 10 units | Credit for Chemistry 1A and 1B equivalence may serve as prerequisite to 1C with instructor's consent; 1A and/or 1B may, however, be taken for full credit. |
| Mathematics | AB 5, 4, 3 BC 5, 4, 3 | Mathematics 11, 21A 11, 21A, 21B | Mathematics 21B Mathematics 21C | 10 units 10 units | |
| Physics | 5 | Physics 10 or 2A, 2B | Determined by consultation with Physics adviser. | 10 units | For score of 5 or 4, credit may equate with Physics 4A, 4B or 4A, respectively. Credit for Physics "4" courses given only with consent of Physics adviser. |
| | 4 | Physics 10 or 2A | Determined by consultation with Physics adviser. | 10 units | |
| | 3 | Physics 10 | | 10 units | |

* Credit may not be earned in the University for courses which duplicate credit already allowed for advanced placement examinations as listed under UCD COURSE EQUIVALENCES. See exception for biology and chemistry under REMARKS.

Summary Check List of Requirements

A.B. and B.S. Degrees

Read carefully details of requirements in all sections of the General Catalog

University Requirements

- Subject A American History American Institutions

College Breadth Requirements

Bachelor of Arts Degree

- English Composition Examination.
 Foreign Language: level of 12 units in one language.
 Natural Sciences, Social Sciences, Humanities: 12 units in one area; 20 in each of the other two areas.

Bachelor of Science Degree

- English Composition Examination.
 Natural Sciences: 90 units.
 Social Sciences, Humanities: 22 units in either area or in combination.

Unit Requirements

| | | | |
|--|--|---|---|
| 180 units (Must include 75 in a four-year institution.) | Must include at least 150 units in L & S Teaching Depts. | Must include at least 54 units in upper division courses. | For A.B.: Must include 12 upper division units outside major department. |
| | May include a maximum of 5 units of special study courses in any one quarter (98, 99, 198, 199). | May include a maximum of 9 units in courses numbered 300-499. | |
| | May include 30 units in courses outside L & S Teaching Depts. | May include P.E. 5 and maximum of 6 units of P.E. 1. | |
| | | | |

Major Requirements

Consult major adviser and appropriate departmental section of the *Catalog*.

Scholarship Requirements

An average of at least 2.0 for all units undertaken in the University of California and for:

- All courses required for the four-year major program.
 All upper division courses required for the major program.

Residence Requirement

In the University of California: At least three quarters.

In the College of Letters and Science:

1. 35 of the final 45 units.
2. 27 upper division units in courses offered in Letters and Science teaching departments, including 18 units in the major program.

SUMMARY OF STUDENT SERVICES

OFFICE OF THE DEAN OF THE COLLEGE, 150 MRAK HALL

The staff in this office assists students with questions concerning College requirements, scholarship (probation and disqualification), and other academic matters. Problems which cannot be resolved by clerical assistants are referred to academic deans who are regularly available to students by appointment.

The staff also performs a number of regular functions:

1. It maintains a file of each student's academic record.
2. When a student transfers to Letters and Science from another institution, the Admissions Office determines the unit credit to be allowed for previous work; the College determines how the credit applies toward completion of breadth and unit credit for the bachelor's degree. A Status Card outlining this information is sent to each transfer student immediately prior to his enrollment.
3. It prepares a statement of remaining College requirements, on request, for senior students. (A student inquires about completion of major requirements with his faculty adviser or major department.)
4. It acts on petitions requiring Dean's approval; e.g., petitions for Declaration or Change of Major, Individual Majors, Change of Study List (after established deadlines), Withdrawal, Readmission (on probation).
5. At the end of each quarter the deans review the records of all students who are subject to disqualification and recommend a student's dismissal from the College or continuation on probation.

SCHOOL OF LAW

The School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor.

The program of the school is designed to combine the best features of traditional legal education with the development of new interests and approaches necessary for training lawyers to meet the demands of the coming decades. The three-year curriculum includes not only instruction to develop proficient legal practitioners, but also courses that reflect the general interests of the Davis campus in natural resources, agriculture, urban problems, and state government.

At this early stage in the School's history, it is possible to discern the directions of future endeavor. In general, the School plans to offer students opportunities for in-depth study of an area of law in an individualized program of classroom work, research and writing, and experience in the community. The School also seeks to promote critical evaluation of law and legal institutions in a broad perspective that requires the integration of nonlegal disciplines with professional legal education.

The School is accredited by the American Bar Association and has been admitted to membership in the Association of American Law Schools.

Preparation for the Study of Law

No specific college major is required for admission to the School of Law, and there is no prescribed prelegal program. Degrees from the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science are all acceptable. The individual student's college record and Law School Admission Test score must, of course, demonstrate that he is highly qualified for law study.

Prelegal students should plan a course of study that will give them a broad cultural background and include intensive work for a substantial period of time in a selected field of study. Prelegal students should develop the ability to communicate easily, persuasively, and accurately, to understand people and institutions, to gather and weigh facts, and to solve problems and think creatively. It is most important that prelegal students obtain mastery of the English language. They should be able to read rapidly and with comprehension and to express themselves clearly, completely, and concisely, both orally and in writing.

Requirements for Admission to the School of Law

Applicants for admission to the professional curriculum of the School of Law, leading to the degree of Juris Doctor, must have received a bachelor's degree or an equivalent degree from a college or university of approved standing prior to the time at which they begin their work in the School of Law. The applicant's college record must be of sufficient high caliber to demonstrate that he is qualified for the study of law. The work of the last two college years will be considered more heavily than that of earlier years. Usually, the applicant's academic average will have to be substantially higher than a B (3.0) for him to be seriously considered for admission. In addition, the applicant will be measured by his score on the Law School Admission Test and by his past accomplishments and potential for leadership.

All applications are reviewed by the Law School Admission Committee. Students are admitted only on a full-time basis and *only in September*.

Law School Admission Test

All applicants are required to take the Law School Admission Test administered by the Educational Testing Service. Testing centers have been established for the convenience of applicants in all parts of the United States and in many foreign countries. Applicants are urged to take the test as early as possible, and in any event not later than December in the academic year prior to that in which they seek admission to the School.

Applicants should write to: Law School Admission Test, Educational Testing Service, Princeton, New Jersey 08540, to obtain application forms and information about the test and the location of testing centers.

Admission Procedures

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 which will be supplied by the School and should be

addressed to: Office of the Dean, School of Law, University of California, Davis, California 95616. *The application must be accompanied by a \$10 (\$20 effective winter quarter 1972) nonrefundable application fee* in the form of a check or money order made payable to The Regents of the University of California. The other schools of law affiliated with the University of California may waive the application fee if notified, at the time of application, that the fee has been paid at Davis. The last date for filing completed application forms is March 1 of the year in which admission is sought (March 1, 1971, for admission in Fall 1971), but earlier filing is strongly recommended. No application will be considered if received in the Office of the Dean after March 1 of the year in which admission is sought.

2. The applicant must register with the Law School Data Assembly Service (LSDAS) by completing and mailing the registration form supplied with each application. A transcript from each college or university attended should then be sent not to the School of Law but directly to: LSDAS, Educational Testing Service, Box 944, Princeton, New Jersey 08540.

The LSDAS will analyze the transcript and send a copy to the School of Law and others you designate on the registration form. As soon as they are available, the applicant should submit to the School of Law (not to LSDAS) supplementary transcripts covering any work completed *after* the initial registration with LSDAS. With rare exceptions, *no action will be taken* on any application until college grades are submitted through the first semester or quarter of the applicant's senior year. In some instances, no action will be taken until second quarter senior year grades are submitted. Successful applicants will be required to submit directly to the School of Law a final transcript, showing the award of a bachelor's degree.

3. The applicant must also provide three letters of recommendation from disinterested and responsible persons with whom the applicant recently studied while in college. These letters of recommendation should be sent directly to the School of Law and must be received by the Office of the Dean before the Law School Admission Committee can seriously consider the application.

4. The applicant should take the Law School Admission Test and request that his score be reported to the School of Law. Applicants are urged to take the LSAT as early as possible and in no event later than December of the academic year prior to that in which admission is sought.

5. Applicants accepted by the School of Law are simultaneously admitted to the Graduate Division of the University for the program leading to the degree of Juris Doctor. Applicants intending to pursue studies leading to other graduate degrees must make separate application to the Graduate Division of the University prior to commencing such studies.

Admission to Advanced Standing

Applicants who have completed at least one year of work in another approved law school may in exceptional cases be admitted to advanced standing with credit for not more than one year of such work. Transfer applicants are accepted, however, only to the extent that vacancies exist in the relevant second

year class. No application for advanced standing will be considered until the Law School Admission Committee has received transcripts for all prior law school work.

Students who have been disqualified at another law school will not be admitted to this School of Law.

Professional Curriculum and Degree

The course of study in the professional curriculum requires nine quarters 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 quarter.

Students who have been admitted to the School as candidates for the professional degree and who have completed satisfactorily the professional curriculum (126 quarter units are required) and the required period of resident study will be recommended for the degree of Juris Doctor.

The work of the first year is prescribed. This work provides the essential foundation for subsequent legal study and the satisfactory completion of the first-year courses is, in all cases, a prerequisite to courses of the second and third years.

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 in other accredited law schools may, with prior permission, be credited toward the units required for the professional degree but may not be counted as part of the required period of residence.

The courses of the professional curricula are listed on page 327.

SCHOOL OF MEDICINE

The School of Medicine will admit its fourth class to a course of professional instruction commencing fall quarter 1971.

The degree of Doctor of Medicine requires the satisfactory completion of a four-year course of study comprised of 15 quarters. Course work is conducted on the Davis campus and in nearby affiliated hospitals. The 650-bed Sacramento Medical Center is the major affiliated teaching hospital for the medical school.

The School is currently housed in interim facilities on the Davis campus. Planning for permanent facilities has reached an advanced stage and the permanent buildings will be constructed on the Davis campus on a 150-acre site dedicated to the Health Sciences.

Admission Policies

The class entering in the fall of 1971 will be limited to 100 students selected on the basis of academic achievement and promise as well as personal characteristics which lead the Admissions Committee to feel the candidates will not only be able to complete satisfactorily the requirements of the medical cur-

riculum, but will also become excellent practitioners of the profession of medicine. Factors taken into consideration include an applicant's scholastic record to date, his Medical College Admission Test performance, and reports of teachers, advisers, and interviewers with regard to his intellectual capacity, motivation, emotional stability, and personal dedication.

The majority of openings in each entering class will be awarded to students who are legal residents of the State of California; however, a few out-of-state students will be accepted. The Medical School also participates in the program of the Western Interstate Commission for Higher Education. In this program there are a number of states which do not offer professional graduate medical education within the state. Applicants from such states found eligible by both the School of Medicine and their own states are charged resident rather than non-resident tuition. Further information may be obtained by communicating with this Commission, whose address is University East Campus, 30th Street, Boulder, Colorado 80300.

Students from foreign universities will be considered on an individual basis by the Admissions Committee. In general, an applicant will be expected to have completed at least two years of his premedical work at an accredited college in the United States or Canada. Certain additional requirements apply to such applicants. Detailed information is available from the Admissions Office, School of Medicine.

The School of Medicine is fully cognizant of the need for increased opportunities in medical education for students from disadvantaged cultural and socioeconomic backgrounds. A Task Force comprised of faculty and students has been appointed to identify and advise students from educationally deprived backgrounds, to review all applications of disadvantaged students, and to select applicants for personal interviews by members of the Task Force Committee. Educationally disadvantaged applicants should follow the regular School of Medicine application procedures.

Transfer with Advanced Standing

A few places will be available for students who wish to transfer into the third year of the curriculum. Students are not considered for transfer into the second or fourth year of the curriculum. Students who wish to apply for transfer should write directly to the Secretary of the Admissions Committee for applications. The deadline for receipt of these applications is December 31 of the year for which transfer is requested. The third-year class commences early in July.

Students applying from foreign medical schools are required to submit the results of part one of the examination given by the National Board of Medical Examiners.

Application Procedures

Application forms will be available from the Medical School Admissions Office after July 1, 1971. All applications must be completed and submitted with the necessary supporting documentation no later than December 31, 1971, for the fall of 1972. Early return of the completed application will enable early

processing, which is normally advantageous to the applicant. All applications and communications regarding admission should be addressed directly to the Secretary of Admissions, Admissions Office, School of Medicine, University of California, Davis, California 95616.

The application form must be accompanied by a nonreturnable application fee of \$10 (\$20 effective winter quarter 1971), a recent unmounted wallet-size photograph (optional), and a comprehensive report of the official Committee on Premedical Education of the college in which the applicant is presently enrolled (if such a Committee exists in his school) or two letters of recommendation from individuals who are able to give a meaningful appraisal of the applicant's qualifications. It is suggested that one of these be from a science instructor and one from a nonscience instructor. Applicants may be requested to authorize their student health service or personal physician to send pertinent health information to the Admissions Committee.

Applicants may be notified of the status of their application as early as September 15 of the year preceding that for which admission is sought. However, in some cases a decision may not be made until March of the following year. Every effort will be made to reach as early a decision as possible and to notify the applicant promptly.

A personal interview will normally be required before a student is offered a place in the class. Because of the large number of applicants it is not possible to interview each one, and for this reason interviews are at the invitation of the Admissions Committee. It is highly desirable that this interview take place at the Medical School. However, if this is impossible some applicants may be interviewed by special arrangement at some other location. Although it is the policy of the school to accept no student without an interview, the Committee reserves the right to take formal action without an interview on the basis of credentials submitted.

Premedical Requirements

Arrangements for taking the Medical College Admission Test (MCAT) should be made at the institution at which the applicant is presently enrolled, and the Examining Board should be requested to forward the results to the Secretary of Admissions of this Medical School. Information about the MCAT can be obtained at your undergraduate college or directly from the Psychological Corporation, 304 East 45th Street, New York City 10017. It is desirable that the results of the MCAT be available at the time of the review of the applicant's qualifications. The Admissions Committee recommends that, if feasible, tests be taken in the spring prior to application since the results of the fall examination are not received by the Medical School until late November.

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. However, most instances, completion of a four-year course of study leading to a bachelor's degree is recommended. A maximum of two

years (60 semester units; 90 quarter units) of junior college work may be credited toward this requirement.

Although a specific major in science is not necessary, the following course content at college level is required:

English Composition, one year or its equivalent.

General Chemistry, one year or its equivalent. Some experience in quantitative analysis, either as a separate course or as part of General Chemistry is recommended.

Organic Chemistry, one year or its equivalent. If two or more undergraduate Organic Chemistry sequences are offered, it is recommended that the applicant elect the more rigorous option. As a guideline, an undergraduate student at UCD would take Chemistry 112A (includes laboratory) and 112D and 112E.

Physics, one year or its equivalent.

Mathematics, through integral calculus.

Except in exceptional circumstances, applications will be considered by the Admissions Committee only when the applicant's overall grade-point and science grade-point each average 2.5 or higher (on a scale where one credit hour of A = 4 points). In calculating grade-point averages, such courses as physical education and military science, and courses taken for graduate degrees, will be excluded. Grades of D in any of the required courses cannot be accepted.

Applications may be submitted on the basis of work completed plus work in progress which is to be completed before the beginning of the fall quarter. However, all academic requirements must be completed before registration.

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 of the factors which determine success in pursuing a career in medicine are given full weight by the Admissions Committee in reaching its final decision.

PROFESSIONAL SCHOOL REQUIREMENTS AND PREPARATION

Eligibility for admission to one of the University's professional schools or curricula is contingent upon the successful completion of an undergraduate program of preprofessional training of 2 to 4 years duration (depending upon unit requirements for specific schools).

Announcements describing admission and course requirements for a particular school are available upon request by writing to the school of your choice in care of the appropriate University campus (see legend and addresses below). *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)
- School of Engineering (I)
- School of Engineering and Applied Science (LA)
- School of Forestry and Conservation (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)
- School of Public Health (LA, B)
- School of Veterinary Medicine (D)

Professional schools requiring a bachelor's degree in appropriate field of study for admission:

- Graduate Schools of Administration (I, R)
 - School of Architecture and Urban Planning (LA)
 - Graduate Schools of Business Administration (B, LA)
 - Schools (or Departments) of Education (B, D, I, LA, R, SB, SC)
- Preparation for teaching credentials is available as follows:

- Kindergarten-Primary (LA, SB)
- Elementary Teaching (B, D, I, LA, R, SB, SC)
- Secondary Teaching (B, D, I, LA, R, SB, SC)
- Special Education (R)
- Special Secondary (D, SB)
- Junior College Teaching (B, LA, R, SB)
- Pupil Personnel Services (B, SB)
- School Librarianship (B, LA)
- Special Services (LA, SB)
- Supervision (B, LA)
- Administration (B, LA)

Graduate School of Journalism (B)
Schools of Law (B, D, LA)
Hastings College of The Law (SF)
School of Librarianship (B)
School of Library Service (LA)
Graduate School of Public Affairs (B)
School of Public Health (LA, B)
Schools of Social Welfare (B, LA)
Scripps Institution of Oceanography (SD)

Legend and addresses of above schools:

- (B) University of California, Berkeley, California 94720
- (D) University of California, Davis, California 95616
- (I) University of California, Irvine, California 92664
- (LA) University of California, Los Angeles, California 90024
- (R) University of California, Riverside, California 92502
- (SD) University of California, San Diego, La Jolla, California 92037
- (SB) University of California, Santa Barbara, California 93106
- (SC) University of California, Santa Cruz, California 95060
- (SF) University of California, San Francisco, California 94122

Direct inquiries about schools and curricula in San Francisco (except Hastings College of The Law) in care of: Office of Student Admission.

Preprofessional Training

Preprofessional programs do not lead to a bachelor's degree. Since professional schools cannot accommodate all qualified applicants, students should prepare themselves for alternate careers. Hence, students 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, art, etc., can be equally acceptable. Law schools, in particular, do not prescribe any specific major program. Equal consideration is given 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 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 more detailed information is needed. A list of general reference books which may be of interest is presented at the conclusion of this section.

Business Administration

Preparation for study. Consult school announcement and Economics Department Office, Room 380, Academic Office Building III, Davis, phone 752-0741.

Forestry

Preparation for study. Consult this Catalog, pages 89-91 and school announcements.

Preforestry advisers. E. H. Stanford, Department of Agronomy and Range Science, Room 267, Hunt Hall, Davis, phone 752-1702 or 752-1703 and Jack Major, Botany Department, Room 245, Animal Science, phone 752-0621 or 752-0617.

Law

Preparation for study. Consult this Catalog, page 154 and school announcements.

Prelaw adviser for counseling about general law school admission requirements, exclusive of program planning. C. E. Jacobs, Department of Political Science, Room 271, Voorhies Hall, Davis, phone 752-2637 or 752-0966.

School of Law, Davis. Consult this Catalog, pages 153-156, school announcement, and Dean's Office, Room 1011, King Hall, phone 752-0243.

Medicine

School of Medicine, Davis. Consult this Catalog, pages 156-159 school bulletin, and Office of Student Affairs, School of Medicine, Davis, phone 752-3171 or 752-3172. (Consult same for more general premedical information.)

- Shcool of Medicine, Davis.* Consult this Catalog, pages 156-159, school bulletin,
- a. English 1, 3.
 - b. Chemistry 1A, 1B, 1C, 5, 8A, 8B.
 - c. Physics 2A, 2B, 2C, 3A, 3B, 3C.
 - d. Biology, one year with laboratory (15 units).
 - e. Foreign language: 12 units in one language or three years of one language in high school. (Language requirement being reviewed.)
 - f. Humanities and/or social science: 18 units.
 - g. Electives (to complete total of 135 units): recommended are courses satisfying Letters and Science College and departmental major requirements, but not anatomy, physiology or bacteriology, which are part of the Medical School curriculum.

Veterinary Medicine

Preparation for study. Consult this Catalog, pages 89 and 165 and Dean's Office, College of Agricultural and Environmental Sciences, Room 228, Mrak Hall, Davis, phone 752-0107 or 752-0108.

School of Veterinary Medicine, Davis. Consult General Catalog, pages 165-170, school announcement, and Office of the Assistant Dean-Student Services, Room 1024, Haring Hall, Davis, phone 752-1383.

Allied Health Sciences

Consult Mary Fenley (Mrs.), Office of Allied Health Sciences, School of Medicine, Davis, phone 752-2902, regarding the curricula listed below. Since requirements are continually being revised, it is important to contact her for up-dated admission information.

It should be noted that preparatory courses for the following programs may be taken on this Campus; final degree work, however, is not available at Davis at the present time with the exception of 1) Medical Technology and 2) Dietetics and Nutrition.

| | |
|----------------------------|-----------------------------------|
| Dental Hygiene | Dietetics and Nutrition |
| Dentistry | Occupational Therapy |
| Environmental Health | Optometry |
| Health Care Administration | Pharmacy |
| Health Education | Physical Therapy |
| Medical Illustration | Rehabilitation Counseling |
| Medical Librarianship | Social Work |
| Medical Technology | Speech Therapy and Pathology |
| Nursing | (All other health-related fields) |

Admission Requirements

Curriculum in Dental Hygiene, San Francisco. Minimum of 90 quarter units, including:

- a. English 1, 3.
- b. Chemistry 1A, 1B, 8A, 8B.
- c. Biology, one year with laboratory (15 units).
- d. Psychology 1A or 10, and one additional psychology course (8 units).
- e. Social sciences, humanities or foreign language: 30 units must be selected from these fields.

School of Dentistry, San Francisco. Minimum of 135 quarter units, including:

- a. English 1, 3.
- b. Chemistry 1A, 1B, 8A, 8B.
- c. Physics 2A, 2B, 2C, 3A, 3B, 3C.
- d. Biology, one year with laboratory (15 units).
- e. Psychology (8 units).
- f. Humanities, social sciences or foreign language: 20 units must be selected from these fields (including a one-year sequence in one of these). Strongly recommended: embryology, comparative vertebrate anatomy, genetics, advanced mathematics, vertebrate zoology.

Curriculum in Medical Technology, San Francisco. Preparation for graduate training in Medical Technology can be accomplished by completing the regular undergraduate major program in Bacteriology or Biological Sciences, to include at least:

- a. Chemistry: 24 units including 1A, 1B, 1C.
- b. Biological sciences: 24 units including one course in microbiology.
- c. Mathematics: one course.

Students are also strongly advised to fulfill the American Association of Clinical Pathologists' requirements for National Registry: 24 units of non-survey chemistry, including inorganic and organic chemistry. Chemistry 5 is highly recommended.

School of Nursing, San Francisco. Minimum of 90 quarter units, including:

- a. English 1, 3.
- b. Chemistry 1A, 1B.
- c. Human Anatomy 102.
- d. Physiology 2, 2L or 101, 101L.
- e. Psychology 1A or 10.
- f. Sociology 1 or 3.
- g. Humanities: 8 to 10 units (may include ethnic studies or foreign language).

Strongly recommended: Chemistry 8A, 8B, Bacteriology 2, and two additional social sciences courses.

School of Optometry, Berkeley. Minimum of 90 quarter units, including:

- a. English 1, 3.
- b. Mathematics 11 or 16A.
- c. Mathematics 13 or Bacteriology 2.
- d. Physics 2A, 2B, 2C, 3A, 3B, 3C.
- e. Psychology 1A or 10.
- f. Biology or zoology, one year.
- g. Chemistry 1A, 1B, 8A, 8B.

School of Pharmacy, San Francisco. Minimum of 90 quarter units, including:

- a. English 1, 3.
- b. Chemistry 1A, 1B, 1C.
- c. Physics 2A, 2B, 2C, 3A, 3B, 3C.
- d. Mathematics 16A, 16B, 16C.
- e. Biology, one year integrated biological studies including invertebrate and vertebrate zoology.
- f. Humanities, social science or foreign language: three quarter courses (or 12 units, if preferred) must be selected from these fields.

Curriculum in Physical Therapy, San Francisco. Minimum of 135 quarter units, including:

- a. English 1, 3.
- b. Chemistry 1A, 1B.
- c. Physics 10.
- d. Psychology 168.
- e. Foreign language: 15 to 16 units (or through equivalent level in one language or the high school equivalent). High school work may be counted at the rate of 4 quarter units per year in the same foreign language. (Language requirement being reviewed.)
- f. Physiology 2, 2L; Human Anatomy 102.
- g. Humanities: 16 units.
- h. Social sciences: 16 units (may include Psychology 1A and 168).

Strongly recommended: courses in physical education.

Reference Books

The following books are available in the Reference Room of the University Library, and the Health Sciences Library:

American Universities and Colleges, edited by the American Council on Education.

Admission Requirements of American Dental Schools, published by the American Association of Dental Schools.

Medical School Admission Requirements, published by the Association of American Medical Colleges.

Horizons Unlimited, a handbook describing rewarding career opportunities in medicine, published by the American Medical Association.

The following publications are available in the Dean of Men's Office:

Prelaw Handbook, published by Bobbs-Merrill Company, Inc., prepared by The Association of American Law Schools and The Law School Admission Test Council.

Planning a Career in Law, a pamphlet prepared by The State Bar of California.

SCHOOL OF VETERINARY MEDICINE*†

The degree Doctor of Veterinary Medicine may be obtained by pursuing a course of study requiring a minimum of six years. The final four years must be spent in the professional veterinary medical curriculum.

Students planning a career in veterinary medicine should consider broadening their educational experience by completing the baccalaureate degree before applying to the professional school.

Preveterinary Medical Requirements

Students must complete a minimum of 90 quarter units (60 semester units) of college work including the required courses listed in the preveterinary medical curriculum (page 167) before they will be admitted to the School of Veterinary Medicine. Those who have met these requirements with excellent scholastic achievement may be admitted at the end of two years of study. However, all preveterinary medical students, in addition to satisfying the preprofessional course requirements, should plan their program so they can obtain a baccalaureate degree in four years. The School of Veterinary Medicine will accept the passed or no record option (subject to general campus and individual school and college requirements) only in courses taken under the restricted electives in social sciences and humanities and the additional electives in social sciences, humanities, or agriculture (see page 89).

Many students who enter veterinary medical school as freshmen are already strongly motivated toward some highly specialized field of veterinary medicine

* For additional information prospective students should write the Dean, School of Veterinary Medicine, University of California, Davis 95616.

† For course listings for the School of Veterinary Medicine, refer to page 179.

such as food-animal disease control, public health, laboratory animal medicine, exotic animal medicine, or biomedical research. To increase their breadth of preparation for a particular field of endeavor, preveterinary medical students are strongly urged to include in their elective programs courses that will provide additional background for the fields in which they may be interested. In order to obtain more information and guidance as to programs, such students should contact an adviser representing one of these special areas through the Dean's Office in the School of Veterinary Medicine. For example, a veterinarian engaged in food-animal practice will be largely employed as a herd health consultant or manager and will devote more time to improving the health and productivity of animals than to treating the sick. Thus, a preveterinary student interested in this field would be encouraged to include courses that provide an additional background in nutrition, food-animal production, farm management, and agricultural economics. In the area of zoo and wildlife medicine, the preveterinary medical student would be urged to select courses in evolution, genetics, animal ecology, and animal behavior. For the field of space medicine, courses in computer techniques, mathematics, and electronics would be highly desirable.

Application

Students are admitted to the School of Veterinary Medicine in the fall of each year. Application forms may be obtained after August 15 prior to the year in which the student would like to be accepted, from the Admissions Officer, University of California, Davis 95616. (Do not write to the School of Veterinary Medicine to request an application form.) The completed application must be filed with the Admissions Officer by November 1 in order to be considered for the fall of the year in which application is made. Students may apply before completing all the requirements. However, they must submit a detailed list of courses in progress and a list of all courses to be completed by June 15 of the year they wish to be considered. *Applications lacking this information will not be processed.*

Admission to the School of Veterinary Medicine

Enrollment is limited, and applicants are selected primarily on the basis of scholarship with particular emphasis placed on achievement in required science courses. In addition, candidates should have sufficient experience with animals and some aspect of the veterinary medical profession to justify their decision to pursue a lifetime career in veterinary medicine. Men and women are considered on an equal basis.

Personal qualifications also receive consideration. An interview may be required to enable the Committee on Admissions to make the most accurate judgment possible. Applicants will be notified as soon as possible of their admission status.

Scholastic achievement, particularly in the required courses, is a very important criteria for admission to the School of Veterinary Medicine. Preveterinary medical students are, therefore, cautioned to use the passed or no record option as sparingly as possible.

The School of Veterinary Medicine at the University of California participates in the student program administered by the Western Interstate Commission for Higher Education (WICHE). Students residing in western states without a school of veterinary medicine who wish to participate in this program must be certified by their home state. For addresses of state certifying officers, write to the Western Interstate Commission for Higher Education, University East Campus, 30th Street, Boulder, Colorado 80300.

After Admission

After admission to the School of Veterinary Medicine, the student completes a four-year professional curriculum leading to the degree Doctor of Veterinary Medicine. At the end of the first two years of the professional curriculum, students who do not hold a baccalaureate are eligible to receive a Bachelor of Science degree in Veterinary Science.

Preveterinary Medical Curriculum

Applicants for admission to the School of Veterinary Medicine must complete:

1. Mathematics through trigonometry*; Subject A; and American History and Institutions.
2. At least 90 quarter units or 60 semester units of credit in the University of California or other accredited institution, including the prescribed subjects listed below.

3. Subject Requirements:

| | <i>Quarter Units</i> |
|---|----------------------|
| Chemistry (general, qualitative, organic, and quantitative) | 25 |
| Genetics | 3 |
| Physics (general) | 9 |
| Biology, zoology, embryology | 17 |
| English composition and additional English or rhetoric | 8 |
| Restricted electives in social sciences and humanities† | 17‡ |
| Additional electives in social sciences, humanities or agriculture .. | 11‡ |
| | 90 |

Animal science is no longer required but is recommended.

Students completing the preveterinary medical requirements in an institution other than University of California, Davis, are urged to check the catalog of their college carefully to be sure they are taking equivalent courses.

Plan of Study

| <i>Freshman Year</i> | <i>Fall</i> | <i>Winter</i> | <i>Spring</i> |
|--|-------------|---------------|---------------|
| Chemistry 1A, 1B, 1C | 5 | 5 | 5 |
| English 1 and additional English or rhetoric | 4 | 4 | - |
| Biology 1 | - | - | 6 |
| Electives | 6 | 6 | 4 |
| | 15 | 15 | 15 |

* Should be completed in high school.

† Art, anthropology, economics, foreign languages, geography, history, music, philosophy, political science, psychology, sociology, and/or additional English, rhetoric, and mathematics.

‡ See page 150.

| <i>Sophomore Year</i> | <i>Fall</i> | <i>Winter</i> | <i>Spring</i> |
|---|-------------|---------------|---------------|
| Physics 2A, 2B, 2C | 3 | 3 | 3 |
| Chemistry 8A, 8B, 5 | 3 | 3 | 4 |
| Genetics 100A | - | 3 | - |
| Zoology 2 | 6 | - | - |
| Zoology 100 (vertebrate embryology) | - | - | 5 |
| Electives | 3 | 6 | 3 |
| | — | — | — |
| | 15 | 15 | 15 |

Requirements for the Degree Doctor of Veterinary Medicine

1. The candidate for the degree Doctor of Veterinary Medicine must have completed the general University requirements for a baccalaureate degree (pages 30-32).
2. He must possess good moral character.
3. He must have studied veterinary medicine for the equivalent of twelve quarters of twelve weeks each. The last six quarters must have been spent in the University of California School of Veterinary Medicine.
4. He must have completed the required work, satisfactorily fulfilled all special requirements, and received throughout the entire veterinary medical curriculum satisfactory grades as determined by the Faculty of the School and by the Graduate Council.

Plan of Study

| <i>First Year</i> | <i>Fall</i> | <i>Winter</i> | <i>Spring</i> |
|--|-------------|--|---------------|
| Anatomy 140 | 2 | Anatomy 155 | 2 |
| Anatomy 150 | 2 | Anatomy 156 | 2 |
| Anatomy 151 | 4 | Anatomy 157 | 2 |
| Physiological Sciences 101A | 4 | Physiological Sciences 101B | 3 |
| Physiological Sciences 102A | 1 | Physiological Sciences 102B | 2 |
| | | Physiological Sciences 140A | 5 |
| | | Physiological Sciences 141A | 1 |
| | — | — | — |
| | 13 | 17 | 18 |

Second Year

| | | | | | |
|---|----|--|----|----------------------------------|----|
| Pathology 122A | 5 | Epidemiology and Preventive Medicine 140 | 2 | Anatomy 180 | 4 |
| Physiological Sciences 124 | 4 | Pathology 122B | 5 | Clinical Sciences 103 . | 4 |
| Veterinary Microbiology 120 . | 2 | Veterinary Microbiology 122 . | 4 | Pathology 122C | 4 |
| Veterinary Microbiology 121 . | 3 | Veterinary Microbiology 123 . | 3 | Veterinary Microbiology 125 . | 5 |
| Animal Nutrition 109. . | 3 | Veterinary Microbiology 124 . | 2 | | |
| | — | | — | | — |
| | 17 | | 16 | | 17 |

| <i>Third Year</i> | <i>Fall</i> | <i>Winter</i> | <i>Spring</i> |
|-------------------------------------|--------------------------------------|--------------------------------------|---------------|
| Clinical Pathology 201 . 3 | Epidemiology and Preventive Medicine | Clinical Pathology 202 . 3 | |
| Clinical Sciences 204A . 3 | 208 4 | Clinical Sciences 204C . 3 | |
| Clinical Sciences 210A . 1 | Clinical Sciences 204B . 4 | Clinical Sciences 210C . 1 | |
| Clinical Sciences 220 . 4 | Clinical Sciences 210B . 1 | Clinical Sciences 222 . 5 | |
| Clinical Sciences 230 . 6 | Clinical Sciences 221 . 5 | Epidemiology and Preventive Medicine | |
| | Clinical Sciences 260 . 2 | 240 3 | |
| | | Epidemiology and Preventive Medicine | |
| | | 250 2 | |
| | | | |
| | <u>17</u> | <u>16</u> | <u>17</u> |
| <i>Fourth Year</i> | | | |
| Clinical Pathology 295A 1 | Clinical Pathology 295B 1 | Clinical Pathology 295C 1 | |
| Clinical Sciences 204D . 5 | Clinical Sciences 204E . 3 | Clinical Sciences 204F . 3 | |
| Clinical Sciences 250A . 8 | Clinical Sciences 250B . 8 | Clinical Sciences 250C . 7 | |
| Pathology 295A 1 | Clinical Sciences 270 . 1 | Pathology 295C 1 | |
| Veterinary Microbiology 295A . 1 | Pathology 295B 1 | Veterinary Microbiology 295C . 1 | |
| | Veterinary Microbiology 295B . 1 | Electives 5 | |
| | Electives 3 | | |
| | | | |
| | <u>16</u> | <u>18</u> | <u>18</u> |

Requirements for the Degree Bachelor of Science

Upon recommendation of the Faculty of the School of Veterinary Medicine the degree Bachelor of Science with a major in Veterinary Science is granted to students in the School of Veterinary Medicine who do not hold a baccalaureate and who:

1. Satisfy the general University requirements (pages 30-32).
2. Complete in the School of Veterinary Medicine all courses prescribed in the first two years of the professional curriculum. Exceptions may be made to students admitted in advanced standing.

Admission in Advanced Standing

An applicant requesting admission to advanced standing in the School of Veterinary Medicine may be accepted under the following conditions:

1. He must furnish evidence that he was eligible for admission to the first quarter of the School of Veterinary Medicine.
2. He must show that he has satisfactorily completed courses equivalent in kind and amount to those given in the School of Veterinary Medicine in the quarter or quarters preceding that in which admission is desired.
3. He may be required to pass examinations in any or all subjects for which credit is asked.

Graduate Study

The graduate study program of the School of Veterinary Medicine provides varied opportunities for advanced professional training and for launching careers in research.

Master of Preventive Veterinary Medicine Program

Applicants must hold the degree Doctor of Veterinary Medicine or equivalent degree from an accredited school of veterinary medicine and be recommended for admission by the faculty committee in charge of the program. The program, consisting of a group of required core courses and optional electives, is scheduled over one full year from September to August. Specific fields of emphasis are Epidemiology, Medical Statistics, Information Retrieval and Analysis, and Disease Control and Eradication.

Plan of Study*

| | | Fall | Winter | Spring | Summer |
|------------------|--|------|--------|--------|--------|
| Math 13 | Elementary Statistics | 4 | | | |
| EPM 101 | Perspectives in Veterinary Medicine | NC** | | | |
| 102 | Biomedical Information Retrieval | 3 | | | |
| 103A, 103B, 103C | Medical Statistics | 3 | 3 | 3 | |
| 210 | Advanced Epidemiology | 5 | | | |
| 212 | Epidemiology of the Zoonoses | 3 | | | |
| 214 | Comparative Epidemiology of Noninfectious Diseases | | | 3 | |
| 216 | Mass Screening for Diseases in Populations | | 3 | | |
| 218 | Disease Control and Eradication | | | 4 | |
| 290 | Seminar in Epidemiology and Preventive Medicine | 1 | 1 | 1 | |
| 298 | Group Study | 1 | | 1 | |
| 299 | Research | 1 | 1 | 2 | NC** |

Other graduate degrees offered beyond the D.V.M. are Master of Science and Doctor of Philosophy.

General information regarding these degrees will be found in the *Announcement of the Graduate Division* which may be obtained from the Dean of the Graduate Division, Davis.

Additional detailed information may be obtained by writing the chairman of the department in which the candidate wishes to study.

* Substitutions may be permitted under special circumstances to provide specialized training in related fields.

** NC—Non credit.

GRADUATE DIVISION

Graduate study and research are administered by the Graduate Council, a standing committee of the Academic Senate at Davis, and by the Dean of the Graduate Division. A Universitywide Coordinating Committee on Graduate Affairs determines general policies and establishes common procedures.

Advanced Degrees

On the Davis campus the following advanced degrees are offered: Master of Arts, Master of Fine Arts, Master of Science, Master of Education (in Agricultural Education), Master of Engineering, Juris Doctor, Master of Preventive Veterinary Medicine, Candidate in Philosophy, Doctor of Engineering, Doctor of Veterinary Medicine, Doctor of Medicine, and Doctor of Philosophy.

Majors for graduate study and the advanced degrees offered in each are shown below:

| | |
|--|---|
| Agricultural Chemistry (M.S., Ph.D.) | History (M.A., Ph.D.) |
| Agricultural Economics (M.S., Ph.D.) | History of Art (M.A.) |
| Agricultural Education (M.Ed.) | Home Economics (M.S.) |
| Agricultural Science and Management (M.S.) | Horticulture (M.S.) |
| Agronomy (M.S.) | International Agricultural Development (M.S.) |
| Anatomy (M.S., Ph.D.) | Irrigation (M.S.) |
| Animal Science (M.S.) | Law (J.D.) |
| Anthropology (M.A., Ph.D.) | Linguistics (M.A.) |
| Art (M.F.A.) | Mathematics (M.A., Ph.D.) |
| Avian Sciences (M.S.) | Medicine (M.D.) |
| Biochemistry (M.A., Ph.D.) | Microbiology (M.A., Ph.D.) |
| Biophysics (Ph.D.) | Music (M.A.) |
| Botany (M.S., Ph.D.) | Nutrition (M.S., Ph.D.) |
| Chemistry (M.S., Ph.D.) | Philosophy (M.A., Ph.D.) |
| Classics (M.A.) | Physical Education (M.A.) |
| Comparative Pathology (M.S., Ph.D.) | Physics (M.A., Ph.D.) |
| Comparative Pharmacology and Toxicology (M.S., Ph.D.) | Physiology (M.S., Ph.D.) |
| Dramatic Art (M.A., M.F.A., Ph.D.) | Plant Pathology (M.S., Ph.D.) |
| Ecology (M.S., Ph.D.) | Plant Physiology (M.S., Ph.D.) |
| Economics (M.A., Ph.D.) | Political Science (M.A., Ph.D.) |
| Education (M.A.) | Preventive Veterinary Medicine (M.P.V.M.) |
| Endocrinology (M.A., Ph.D.) | Psychology (M.A., Ph.D.) |
| Engineering (M.Eng., D.Eng., M.S., Ph.D.) | Range Management (M.S.) |
| English (M.A., Ph.D.) | Rhetoric (M.A.) |
| Entomology (M.S., Ph.D.) | Russian (M.A.) |
| Food Science (M.S.) | Sociology (M.A., Ph.D.) |
| French (M.A., Ph.D.) | Soil Science (M.S., Ph.D.) |
| Genetics (M.S., Ph.D.) | Spanish (M.A., Ph.D.) |
| Geography (M.A., Ph.D.) | Vegetable Crops (M.S.) |
| Geology (M.S., Ph.D.) | Veterinary Medicine (D.V.M.) |
| German (M.A., Ph.D.) | Zoology (M.A., Ph.D.) |

This list changes frequently as graduate work expands into new areas of study. Prospective students seeking further information should consult the Graduate Division. General requirements for degrees are published in the *Announcement of the Graduate Division*. The specific requirements are available from the office of the department concerned.

Group majors, those which are sponsored by more than one department, are listed below. If a student is interested in one of these he should write to the group chairman for more information.

Agricultural Chemistry—Donald G. Crosby, Ph.D., Chairman, 238A Cruess Hall
Agricultural Science and Management—William J. Flocker, Ph.D., Chairman,

283 Hunt Hall

Anatomy—Antonio Zappala, M.D., Chairman, 101 Temporary Building 171

Avian Sciences—Daniel W. Peterson, Ph.D., Chairman, 209 Poultry Husbandry Building

Biochemistry—Eric E. Conn, Ph.D., Chairman, 578 Hutchison Hall

Biophysics—Richard S. Criddle, Ph.D., Chairman, 555 Hutchison Hall

Botany—Kenneth Wells, Ph.D., Chairman, 280 Robbins Hall

Comparative Pathology—John W. Kendrick, D.V.M., Ph.D., Chairman, 2301 Haring Hall

Comparative Pharmacology and Toxicology—Stuart A. Peoples, M.D., 2147 Haring Hall

Ecology—C. C. Delwiche, Ph.D., Chairman, 273 Hoagland Hall

Endocrinology—Irving I. Geschwind, Ph.D., 220 Animal Science

Engineering—John B. Powers, Ph.D., Chairman, 2006 Bainer Hall

Food Science—William D. Brown, Ph.D., Chairman, Temporary Building 189

Genetics—Robert W. Allard, Ph.D., Chairman, 201B Hutchison Hall

Home Economics—Glenn R. Hawkes, Ph.D., Chairman, 239 Mrak Hall

Horticulture—Dillon S. Brown, Ph.D., Chairman, 1043 Wickson Hall

International Agricultural Development—Lynn D. Whittig, Ph.D., Chairman, 167 Hoagland Hall

Linguistics—Wayne C. Harsh, Ph.D., Chairman, 111 Sproul Hall

Microbiology—Robert E. Hungate, Ph.D., Chairman, 278 Hutchison Hall

Nutrition—Quinton R. Rogers, Ph.D., Chairman, 2166 Haring Hall

Physiology—Loren D. Carlson, Ph.D., Chairman, Temporary Building 139

Plant Physiology—Roger J. Romani, Ph.D., Chairman, 2039 Wickson Hall

Preventive Veterinary Medicine—Calvin W. Schwabe, D.V.M., Chairman, 2086 Haring Hall

Range Management—R. Merton Love, Ph.D., Chairman, 255 Hunt Hall

Soil Science—Duane S. Mikkelsen, Ph.D., Chairman, 109 Hunt Hall

Admission Standards

Students seeking admission to graduate status at the University of California must hold a bachelor's degree or its equivalent from an institution of acceptable standing. The program of preparation should be substantially equivalent in both the distribution of academic subject matter and in scholarship achievement to

the requirements for a comparable degree at the University of California. Applications for admission are evaluated in terms of scholastic qualifications and formal preparation for the graduate field of study.

The Dean of the Graduate Division may deny an applicant admission if his scholastic record or his undergraduate program of study is judged inadequate as a foundation for advanced academic or professional study. This procedure applies to all applicants, whether they come from schools or colleges within the University of California or elsewhere. Departments may have special requirements for admission to graduate status, and some departments and schools require an additional application for admission to their advanced-degree program.

Application for Admission

Students seeking admission to the University of California, Davis, for graduate work may obtain application forms by writing to the Dean of the Graduate Division, University of California, Davis 95616. Applications must be on file no later than *June 1* for the fall quarter, *October 1* for the winter quarter, and *January 1* for the spring quarter, but early filing, preferably six to twelve months prior to the date of registration, is strongly recommended. The application must be accompanied by a money order or a bank draft for \$10 (\$20 effective winter quarter 1972) made payable to The Regents of the University of California. *This fee is not refunded under any circumstances.* In cases where complete records are filed later than the above dates, the student's registration may be delayed, thus making him liable for the late registration fee of \$10, or he may not even be allowed to register. If registration is delayed, the student must obtain a Permit to Attend Classes from the Office of the Registrar.

Official transcripts of record covering all college and university work completed to date, together with official evidence of degrees conferred, should accompany or immediately follow the application. A separate original and official record must be presented from each institution previously attended. Transcripts of students' records and all other official credentials are retained in the files of the **Office of the Dean of the Graduate Division**. In addition to having the records sent to this office, the student must have in his possession an official record for his use in conference with departments and for other purposes here. The Graduate Division office copy may not be borrowed.

Students wishing to apply for the programs leading to the degrees of Juris Doctor, Doctor of Medicine, Doctor of Veterinary Medicine, or Master of Preventive Veterinary Medicine must file applications directly with the appropriate professional schools.

Reentry

Persons formerly registered in a regular session as graduate students who wish to return after an absence must apply for reentry and pay the Reentry Application Fee of \$10 (\$20 effective winter quarter 1972) at least six weeks before the beginning of the quarter in which they wish to enroll. The Application

for Reentry may be obtained from the Graduate Division. Transcripts of records covering all work undertaken since the student was last registered in graduate status at Davis must be presented along with the Reentry Application.

International Students

Applicants for admission to the Graduate Division on credentials from universities and colleges in foreign countries are advised to make their initial inquiry no later than six months before the date of intended enrollment to permit processing of their records.

Students whose undergraduate preparation has been in a language other than English should furnish positive evidence that their command of both spoken and written English will permit them to profit by the instruction offered. Certificates of proficiency in English by individuals (usually professors) and consular testing at the time the Certificate of Eligibility (I-20 form), is processed are helpful. Prospective students are encouraged, however, to submit scores on the Test of English as a Foreign Language (TOEFL) administered by the Educational Testing Service for the College Board. These tests are given at many testing centers abroad three times a year, and full information is available from the Educational Testing Service, Princeton, New Jersey 08540. A number of other tests given by authorized examiners abroad are acceptable. These include the Michigan Test (English Language Institute Test, University of Michigan), the interview reports supervised by the directors of the Institute of International Education overseas office, and the American University Language Center (AULC) Test.

On arrival all international students take the special University examination in English. Those who do not pass are assigned to remedial courses. Even though the student has been admitted, his registration may be deferred until he acquires an adequate command of English.

Admission Without an Advanced Degree Objective

A student who does not wish to become a candidate for a higher degree may be admitted to a specified field of study for course work only. A program, which requires the approval of the Dean, must have a definite scholarly or professional purpose. The scholastic requirements for admission are the same as for those who are candidates for degrees.

Program of Study

When the student reports to his department or group, he will be assigned to the appropriate adviser, who will plan with him his program of study. This will depend to some degree on the undergraduate training, and the student may be assigned to undergraduate courses to remove deficiencies.

Each student must satisfy the degree requirements as published in the *Announcement of the Graduate Division*. The program in an area of study, as established by the department or group and approved by the Graduate Council, often includes a core of required courses, but considerable flexibility

is permitted to suit the individual student's 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

A graduate student registered on any campus of the University may become an Intercampus Exchange Student with the approval of his graduate adviser, the chairman of the department or group in which he wishes to study on the host campus, and the Dean of the Graduate Division on both the home and the host campus. The Intercampus Exchange Student has library, infirmary, and other student privileges on the host campus but is considered as a graduate student in residence on his home campus. The grades obtained in courses on the host campus are transferred to his home campus and entered on his official record. Forms for application for the intercampus exchange may be obtained at the office of the Dean of the Graduate Division. In order to avoid the \$10 late fee penalty, these forms should be filed with the home campus Graduate Division six weeks prior to the beginning of the quarter in which the student wishes to take advantage of this program.

Fellowships, Assistantships, and Loans

Fellowships are awarded by the Fellowship Committee of the Graduate Council on the bases of scholarship and promise of outstanding academic and professional contribution. For information on available awards the student may consult the Fellowship announcement published in October for the following academic year. Applications with all the supporting records must be filed by January 15. Applicants for fellowships or graduate scholarships must file an Application for Admission to the Graduate Division in order to enter the fellowship competition.

Requests for application forms from students in foreign countries will not be honored *after* December 15 and will not be sent by airmail unless the applicant forwards *in advance* international postal coupons equivalent to 60 cents U. S. postage. Requests for application materials from students in the U. S. will not be honored after January 1.

Teaching assistantships and research assistantships are available in many departments, and interested students should inquire at the office of the department in which they wish to study.

Certain departments may be authorized to offer a limited number of traineeships under the National Institute of Health. For these the student may write directly to the department. Information regarding Graduate Fellowships supported by various other federal agencies is available at the Graduate Division.

Application for loan funds for graduate students should be addressed to the Financial Aid section of the Office of the Dean of Students (see page 37).

Teacher Credential Program

Programs leading to a Standard Teaching Credential with specialization in elementary teaching and in secondary teaching are offered under the jurisdiction

of the Graduate Division. Graduate students who are prospective candidates for advanced degrees may take special professional courses and qualify for the junior college teachers credential.

The curricula for teacher education are offered by the Department of Education and the Department of Applied Behavioral Sciences, and interested students should obtain detailed information at either department. The courses in professional education required for the credential are specified in this catalog under the Department's listing of courses of instruction (see pages 187 and 245). Subject-matter requirements for the teaching major and minor are specified with departmental offerings.

Only students who have completed the bachelor's degree are eligible, and they must be admitted to the program by the Graduate Division. Final filing dates and the application forms may be obtained from the Graduate Division. The student must maintain a scholarship record of 2.75 or better in all graduate work undertaken. In addition to the Graduate Division application, an application for the Department of Education is necessary for those who wish to be admitted for the credential program. Application for the 1972-73 program should be made in Room 174, Academic Office Building III, before January 1, 1972. Exceptions to this rule are made only at the discretion of the Head of Teachers Education.

Since the requirements for the credential are set up both by the State Department of Education and by the University, all students who intend to work for the credential are urged to consult the adviser in one of the departments named above early in their undergraduate career (preferably by the end of their freshman year).

Curricula are offered which lead to the Standard Teaching Credential with a specialization in elementary teaching or in secondary teaching and to the secondary credentials required for teaching classes reimbursed under the National Vocation Acts. Two routes for obtaining each type of credential are available: a student-teaching program (the usual route) and an internship program (limited in enrollment). Application for the intern program should be made to the department early in the senior year.

AN INDEX TO COURSE OFFERINGS BY COLLEGE, SCHOOL, AND GROUP

College of Agricultural and Environmental Sciences

| | |
|--|-----|
| AGRICULTURAL ECONOMICS | 184 |
| AGRICULTURAL EDUCATION | 187 |
| AGRICULTURAL ENGINEERING | 188 |
| AGRICULTURAL PRACTICES | 189 |
| AGRICULTURAL SCIENCE AND MANAGEMENT | 190 |
| AGRONOMY AND RANGE SCIENCE | 190 |
| ANIMAL SCIENCE | 195 |
| APPLIED BEHAVIORAL SCIENCES | 202 |
| ASIAN AMERICAN STUDIES | 208 |
| ATMOSPHERIC SCIENCE | 209 |
| AVIAN SCIENCES | 211 |
| BIOCHEMISTRY | 214 |
| CONSUMER ECONOMICS | 234 |
| CONSUMER SCIENCES | 234 |
| DESIGN | 234 |
| ENTOMOLOGY | 281 |
| ENVIRONMENTAL HORTICULTURE | 283 |
| ENVIRONMENTAL PLANNING MANAGEMENT | 284 |
| ENVIRONMENTAL STUDIES | 285 |
| ENVIRONMENTAL TOXICOLOGY | 287 |
| FOOD SCIENCE AND TECHNOLOGY | 290 |
| FOODS | 293 |
| GENETICS | 299 |
| HOME ECONOMICS EDUCATION | 321 |
| HOME MANAGEMENT | 321 |
| HUMAN DEVELOPMENT | 321 |
| INSTITUTION MANAGEMENT | 323 |
| INTERNATIONAL AGRICULTURAL DEVELOPMENT | 323 |
| NATIVE AMERICAN STUDIES | 357 |
| NEMATOLOGY | 358 |
| NUTRITION | 358 |
| PHYSIOLOGY | 378 |
| PLANT PATHOLOGY | 381 |
| PLANT SCIENCE | 382 |
| POMOLOGY | 391 |
| RANGE MANAGEMENT | 395 |
| RESOURCES SCIENCE | 396 |
| SOIL SCIENCE | 408 |
| SOIL AND WATER SCIENCE | 409 |
| TEXTILES AND CLOTHING | 414 |
| VEGETABLE CROPS | 415 |
| VITICULTURE AND ENOLOGY | 418 |

| | |
|--|-----|
| WATER SCIENCE | 419 |
| WILDLIFE AND FISHERIES BIOLOGY | 421 |

College of Engineering

| | |
|---|-----|
| ENGINEERING (<i>Core Courses</i>) | 248 |
| ENGINEERING: AGRICULTURAL | 250 |
| ENGINEERING: APPLIED SCIENCE | 252 |
| ENGINEERING: CHEMICAL | 256 |
| ENGINEERING: CIVIL | 258 |
| ENGINEERING: ELECTRICAL | 264 |
| ENGINEERING: MECHANICAL | 268 |

School of Law

| | |
|---------------|-----|
| LAW | 327 |
|---------------|-----|

School of Medicine

| | |
|--|-----|
| ANESTHESIOLOGY | 343 |
| BEHAVIORAL BIOLOGY | 344 |
| BIOLOGICAL CHEMISTRY | 344 |
| HUMAN ANATOMY | 345 |
| HUMAN PHYSIOLOGY | 346 |
| INTERNAL MEDICINE—HEMATOLOGY | 347 |
| MEDICAL EDUCATION | 347 |
| MEDICAL MICROBIOLOGY | 348 |
| NEUROLOGY | 348 |
| NEURO-SURGERY | 348 |
| PATHOLOGY | 348 |
| PEDIATRICS | 349 |
| PHARMACOLOGY | 350 |
| PHYSICAL MEDICINE AND REHABILITATION | 351 |
| PSYCHIATRY | 351 |

College of Letters and Science

| | |
|--|-----|
| AFRO-AMERICAN (BLACK) STUDIES (<i>a Committee</i>) | 184 |
| AMERICAN STUDIES (<i>a Program</i>) | 192 |
| ANTHROPOLOGY | 197 |
| ART | 203 |
| ASTRONOMY (under PHYSICS) | 372 |
| BACTERIOLOGY | 212 |
| BIOLOGICAL SCIENCES | 216 |
| BIOLOGY | 217 |
| BOTANY | 218 |
| CANTONESE | 361 |
| CHEMISTRY | 222 |
| CHINESE | 361 |
| CLASSICS | 227 |

| | |
|--|----------|
| DRAMATIC ART | 236 |
| ECONOMICS | 240 |
| EDUCATION | 245 |
| ENGLISH | 272 |
| FOREIGN LITERATURE IN TRANSLATION | 294 |
| FRENCH | 295 |
| GEOGRAPHY | 301 |
| GEOLOGY | 304 |
| GERMAN | 308 |
| GREEK | 228 |
| HISTORY | 313 |
| INTEGRATED STUDIES (<i>a Group</i>) | 323 |
| INTERNATIONAL RELATIONS (<i>a Committee</i>) | 324 |
| ITALIAN | 325 |
| JAPANESE | 361 |
| LATIN | 228 |
| LINGUISTICS (<i>a Committee</i>) | 333 |
| MATHEMATICS | 334 |
| MANDARIN | 361 |
| MILITARY SCIENCE | 352 |
| MUSIC | 354 |
| ORIENTAL LANGUAGES | 361 |
| PHILOSOPHY | 364 |
| PHYSICAL EDUCATION | 368 |
| PHYSICAL SCIENCES (<i>a Committee</i>) | 371 |
| PHYSICS | 373 |
| PHYSIOLOGY | 378, 423 |
| POLITICAL SCIENCE | 383 |
| PORTUGUESE | 411 |
| PSYCHOLOGY | 391 |
| RHETORIC | 397 |
| RUSSIAN | 399 |
| RUSSIAN LITERATURE AND HISTORY | 402 |
| SOCIOLOGY | 403 |
| SPANISH | 410 |
| SUBJECT A | 414 |
| ZOOLOGY | 423 |

School of Veterinary Medicine

| | |
|--|-----|
| ANATOMY | 193 |
| CLINICAL PATHOLOGY | 229 |
| CLINICAL SCIENCES | 230 |
| EPIDEMIOLOGY AND PREVENTIVE MEDICINE | 288 |
| PATHOLOGY | 363 |
| PHYSIOLOGICAL SCIENCES | 376 |
| VETERINARY MICROBIOLOGY | 416 |

Graduate Groups

| | |
|--|-----|
| AGRICULTURAL CHEMISTRY | 184 |
| BIOCHEMISTRY | 214 |
| ECOLOGY | 240 |
| INTERNATIONAL AGRICULTURAL DEVELOPMENT | 324 |
| MICROBIOLOGY | 352 |

The course offerings listed in this catalog are subject to change without notice

Courses of Instruction

Explanatory Note

Academic Credit. Academic work at the University is measured by "units of credit," which determine the amount of time a student has formally devoted to a given subject. In conjunction with the letter grade conferred by the instructor, units of credit give the student and those interested in his career a reasonably accurate evaluation of his progress in various subjects. Units of credit make it possible for a student to assemble a course program for a given term that meets the minimum requirements for a course load while reflecting his special interests. Units of credit also make it possible for students to transfer from one campus or university to another without undue difficulty.

Relation of Units of Credit to Course Procedure. The time-honored rule adopted by most colleges and universities is the so-called "Carnegie unit," which assigns one unit of credit for three hours of work by the student per week. The standard distribution of this work is one hour of lecture or discussion presided over 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 assigned for one unit of credit. In most courses at the Davis campus 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 are authorized for increased credit on the stipulation that more demanding assignments are to be laid down by the instructor. Students should inquire of the instructor, at least by the first class meeting, what the course will involve in the

way of outside reading, term papers, problem sets, field trips, and the like, for these are not always spelled out completely in the *Catalog* (this applies to all courses but is particularly urgent in the case of 4 or 5 unit courses). In this way, the student will be able to plan his work more systematically.

Course Designations. Class hours and room numbers are published each quarter in the *Schedule and Directory*.

The quarter in which a course is 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 (June to August), for students in the School of Medicine only.

A course number followed by two or three letters from the first part of the alphabet (for example, Mathematics 131A-131B-131C) is continued through three successive quarters, ordinarily from September to June; occasionally, however, a course of two quarters may begin in the Winter Quarter. The first quarter course listed in this way is 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 100A and Economics 100B), the A course is not prerequisite to B unless it is specifically mentioned in the listing of the B course.

Prerequisites. Prerequisites for courses should be noted carefully: the responsibility for meeting these prerequisites rests mainly on the student. Certain classes are restricted to a limited number of students, and for these classes it is especially important that the student should have the prerequisite courses by the time the course begins. Otherwise he may find himself displaced by a student who does have the necessary prerequisites. If a student can demonstrate that his preparation is equivalent to that given by the prerequisites specified, these prerequisites may be waived for this student by consent of the instructor.

Level of Courses. Freshmen and sophomores are not encouraged to take upper division courses (i.e., those numbered 100-199).

Special Study Courses. The regulations of the Academic Senate limit to 5 the number of units of "Special Study" courses that a student may take in a given quarter. On the Davis campus, courses with the following numbers presently fall into this category: 38, 39, 194H, 198, and 199.

A student who finds that he shares with an instructor an academic interest that cannot be accommodated within the formal course structure may find it possible to arrange one of these independent study courses. A special study form may be obtained from the instructor who agrees to give such a course: these proposals must be approved by the Chairman of his department, and are subject to review by the appropriate committees of the Academic Senate. Courses numbered 38 ("Directed Group Study") and 39 ("Special Study for Undergraduates") are *for lower division students only*. Courses numbered 198 ("Directed Group Study") and 199 ("Special Study for Advanced Undergraduates") are open *only to upper division students who have completed 84 or more units toward the bachelor's degree and who are judged to have an adequate background in the subject proposed for special study* (in Special Study courses, the subject matter proposed must fall within the instructor's professional compe-

tence). It is expected that the amount of effort proposed in Special Study courses will at least equal that required for a regular course of the corresponding unit value.

Some departments offer special Honors courses (194H). Students who are interested in such courses should consult the Chairman of the department concerned.

Independent Study Program. 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 activities carried on by a student during an independent study quarter. Regularly offered formal courses will therefore be acceptable as a part of such a program only if they clearly fit its theme and contribute something essential toward the realization of its objectives. Under no circumstances is the program to be considered merely a device to raise existing ceilings on variable-unit courses.

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 with whose help and approval a detailed plan is developed; 3) complete a project proposal form, obtained from the dean of each college, and submit it to the Independent Studies Board either directly or through the dean's office. Deadlines will be two weeks prior to the final preenrollment date in the quarter preceding the proposed independent study quarter (see page 5); 4) completion or other termination of the project is to be reported to the Independent Studies Board, which may request such documentation as was provided for in the project proposal.

For further information contact a member of the Independent Studies Board. Membership list may be obtained through the deans of the colleges.

Tutorials. There are some opportunities for students to tutor in their major subject while currently enrolled as undergraduates. Information concerning these tutorial courses (numbered 197T or 197TC) may be obtained from the office of Departments that offer them.

"*Faculty 48*" courses offer an opportunity for a professor or lecturer to lead the exploration of a subject with a group of interested students. The subject matter may be broad in scope or relatively narrow and specialized: in either case it need not fall within the instructor's official field. These courses are authorized by the Davis Division Committee on Courses of Instruction for one quarter only; announcements of 48 courses do not, therefore, appear in the Catalog but are given in the *Schedule and Directory* for each term.

Graduate courses. Graduate courses (numbered 200-299) are open only to students who have adequate preparation; admission is subject to the approval of the instructor in charge.

Professional teacher-training courses in the Department of Education and

courses in other departments that are specially intended for teachers or prospective teachers are numbered 300-399.

Professional courses in departments other than the Department of Education are numbered 400-499.

Extra-session courses. Extra-session courses (laboratory, field, or other individual work done out of session 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.

University Extension courses. Simultaneous enrollment in resident courses and in extension courses is permitted only upon approval by the appropriate dean or study-list authority.

Concurrent Courses. Where classroom space and the instructor's permission is available, enrollment may be granted to University Extension students in courses offered on the Davis campus for regularly admitted and registered students. Such work may be used for admission consideration and for degree recognition.

Summer Session courses. Regularly enrolled students or students planning to enroll for the fall quarter can receive credit toward their degrees in Summer Session courses.

Credit for summer session work at other schools. 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. However, assurance that such credit will be accepted can be given only after the courses have been completed. Students should arrange to have the transcripts of their summer session grades sent to the Registrar for evaluation.

Flexibility. Opportunities for interdisciplinary programs tailored to the individual student's educational objectives are offered by the individual major in the College of Letters and Science (p. 145) and in the College of Agricultural and Environmental Sciences (p. 53).

SYMBOLS

The following numerical footnotes and their accompanying symbols are used throughout the course section:

¹ Absent on leave, 1971-72.

² Absent on leave, fall quarter 1971.

³ Absent on leave, winter quarter 1972.

⁴ Absent on leave, spring quarter 1972.

^{*} Not to be given, 1971-72.

[†] Not to be given, fall quarter 1971.

[‡] Not to be given, winter quarter 1972.

[§] Not to be given, spring quarter, 1972.

[#] To be given if a sufficient number of students enroll.

AFRO-AMERICAN (BLACK) STUDIES

Edward D. Turner, Ph.D., *Chairman of the Committee*
Committee Office, 105 TB-115

Committee in Charge:

Professors:

Bruce Glassburner, Ph.D. (*Economics*)
Willard Lotter, Ph.D. (*Physical Education*)

Associate Professor:

Edward D. Turner, Ph.D. (*Psychology*)

Student Representatives:

Clarence Caesar (*Black Students Union*)
Deitra Moore (*Black Students Union*)
Emi Knowles, (*Black Students Union*)

The Afro-American (Black) Studies Program was initiated in 1969 to provide the opportunity for interested students to pursue a thorough study of Black people. The Program is interdisciplinary and cuts across various departments, especially Anthropology, History, Political Science, and Sociology. However, courses relevant to the Program are also offered in Applied Behavioral Sciences, Dramatic Arts, Economics, Music, Rhetoric, and Psychology. The Program allows and encourages flexibility in order to cater to the interests of the individual student. Each student, however, is required to select *an area of emphasis* to satisfy the requirements for a major

leading to a Bachelor of Arts Degree in Black Studies.

The Major Program

Lower Division Courses.—Required: Anthropology 1, 2; History 4A, 4B, 4C; Political Science 1A, 1B; Sociology 1, 2, 30A-30B-30C. Recommended: Applied Behavioral Sciences 47; Geography 11.

Upper Division Courses.—Required: 36 units of upper division courses to be approved by the Committee. At least 12 of these units must be from the student's area of emphasis. Upper division courses may be selected in consultation with the Committee, although the following courses may be recommended: Anthropology 102, 103B, 139, 140, 148, 152, 153; Applied Behavioral Sciences 151A-151B-151C, 160; Economics 125; History 21A, 21B, 160; Political Science 103B, 146A-146B, 151, 152, 174, 178; Psychology 145, 147A, 198; Sociology 118, 130, 140, 143, 185.

Teaching Major.—Students planning to teach are advised to check with the Education Department regarding credential requirements.

Subject Representative: Mr. Turner.

AGRICULTURAL CHEMISTRY (A Graduate Group)

Donald G. Crosby, Ph.D., *Chairman of the Group*
Group Office, 109 Environmental Toxicology

Graduate Courses

290. Seminar (1) I, II.

Seminar—1 hour. Prerequisite: consent of instructor. The Staff (Chairman in charge)

299. Research. (1-12) I, II, III, (Summer).

Arrangements should be made well in advance with a member of the Group in Agricultural Chemistry. The Staff (Chairman in charge)

AGRICULTURAL ECONOMICS—See Also Consumer Economics

AGRICULTURAL ECONOMICS

Major Advisers.—See *Schedule and Directory* listing.

Major Program and Graduate Study.—See pages 61, 68, and 171. Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses

1. Economic Basis of the Agricultural Industry. (4) II.

Lecture—4 hours. Agriculture and man; the agricultural industry in U.S. and world economies; production and supply, marketing and

demand; agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy emphasizing California. Mr. Snyder.

18. Business Law. (4) I.

Lecture—4 hours. Prerequisite: sophomore standing. Introduction to law; contracts, sales, and agency. Mrs. Taylor.

49. Field Practice. (1) I.

Field trip during fall Orientation Week to observe aspects of the production, processing, handling, and distribution of agricultural products. Mr. French.

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.
The Staff (Mr. Carter in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor.
The Staff (Mr. Carter in charge)

Upper Division Courses**100A. Economic Analysis in Agriculture. (3) I.**

Lecture—3 hours. Prerequisite: Economics 1A, 1B; Mathematics 16A (may be taken concurrently). 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.

Mr. Dean

100B. Economic Analysis in Agriculture. (3) II.

Lecture—3 hours. Prerequisite: course 100A. Pricing, output determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition.

Mr. Logan

100C. Economic Analysis in Agriculture. (3) III.

Lecture—3 hours. Prerequisite: course 100B. Theory of regional specialization, location, and trade for agricultural products; general economic equilibrium.

Mr. Lianos

106A. Quantitative Methods in Agricultural Economics. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 13 or equivalent. Statistical methods for analyzing quantitative agricultural economics data: descriptive statistics, probability, hypothesis testing, statistical inference, and sampling.

Mr. Lianos

106B. Quantitative Methods in Agricultural Economics. (3) III.

Lecture—3 hours. Prerequisite: course 106A or equivalent. Statistical methods for analyzing quantitative agricultural economics data: linear and multiple correlation and regression analysis.

Mr. King

112. Fundamentals of Business Organization. (4) I.

Lecture—4 hours. Principles and practices of business organization; goals; financial and personnel requirements; selection of form of organization—single ownership, partnership, corporation, and cooperative—to facilitate attainment of goals; taxation, industry structure; legal, political, and social problems.

113. Fundamentals of Business Management. (4) II.

Lecture—4 hours. Recommended: course 112. Management principles and their application to all forms of business including cooperatives; the planning function; procurement, sales, finance, and personnel; case studies of agriculturally related businesses.

Mr. Carman

114. Production Management. (4) III.

Lecture—4 hours. Recommended: course 113. Principles and procedures for the efficient use of resources in processing and handling of agricultural products; plant layout; work scheduling; inventory control; coordination of production and sales; location.

Mr. Carman

117. Managerial Accounting. (4) III.

Lecture—4 hours. Prerequisite: Economics 11B; course 112 recommended. Basic concepts of accounting as a managerial tool; procedures for financial reporting; systems and internal control; cost accounting; budgeting; interpretation of administrative reports.

Mr. Carter

120. Agricultural Policy. (3) I.

Lecture—3 hours. Analytical treatment of recent and current economic problems and governmental policies and programs affecting American agriculture.

Mr. Hansen

125. Comparative Agriculture. (4) II.

Lecture—4 hours. The agriculture of the principal countries of the world, with special reference to the influence of food supply upon the development of man.

Mr. Hedges

130. Agricultural Marketing. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or equivalent. The nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing.

Mr. French

140. Farm Management. (5) III.

Lecture—4 hours; laboratory—2 hours. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business.

145. Farm and Rural Resources Appraisal. (3) I.

Lecture—3 hours; one field trip. Principles of farm and ranch appraisal; land utilization in relation to problems of development and valuation.

Mr. Johnston

147. Natural Resource Economics. (3) I.

Lecture—3 hours. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public policy issues.

Mr. Johnston

148. Economic Planning for Regional and Resource Development. (3) II.

Lecture—3 hours. Relation of resources to economic growth, including regional problems;

planning economic development with particular emphasis on resource use in agriculture; selected resource development programs in the United States and certain foreign countries, including land reform experiences. Mr. Dean

150. Agricultural Labor. (3) I.

Lecture—2 hours; discussion—1 hour. Problems, attitudes, and characteristics of agricultural employers, employees, and labor contractors. Impact of mechanization; determinants of productivity; wage levels and structures; evolution and efficiency of the labor market; placement and supervision; off season and in season unemployment; organization and conflict; relevant legislation.

Mr. Sosnick

155. Quantitative Analysis for Business Decisions. (3) I.

Lecture—3 hours. Prerequisite: course 106A; Mathematics 16A. Introduction to selected topics in operations research, including mathematical programming, applied decision theory, game theory, and inventory models.

Mr. Rausser

160. Advanced Agricultural Marketing. (3) III.

Lecture—3 hours. Recommended: course 155. The marketing firm in its economic context: market structures; pricing and price policies; empirical demand analysis; marketing cost and efficiency; public policies toward marketing.

Mr. Carman

170. Advanced Farm Management. (3) III.

Lecture—3 hours. Prerequisite: course 155 or equivalent. The farm firm in its economic context: resource and enterprise combinations; size of firm; uncertainty considerations; replacement policies; demand for inputs; nonfarm influences.

Mr. Paris

176. Economic Analysis in Resource Use. (3) III.

Lecture—3 hours. An analytical treatment of resource use problems, including public policy issues; economic productivity and natural resources; determinants, principles, and patterns of natural resource use; resource conservation; land tenure problems and policies.

Mr. Hansen

190A–190B. Senior Research Project. (2–2)

I–II, II–III.

Supervised individual research. The research report begun in 190A will be revised and completed in 190B. (Deferred grading only, pending completion of the sequence.)

A: I. Miss Parker, II. Mr. Hedges;
B: II. Miss Parker, III. Mr. Hedges

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Carter in charge)

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

Prerequisite: junior or senior standing and

consent of instructor. Limited to students with adequate preparation in Agricultural Economics.

The Staff (Mr. Carter in charge)

Graduate Courses

200A–200B–200C. Economics of Agricultural Production, Consumption, and Trade.

(3–3–3) I–II–III.

Lecture—3 hours. Theory of the firm and industry, with particular reference to production; market structures, single and multiple products, uncertainty; theory of demand and consumption; and location theory and interregional trade.

I. Mr. Dean; II. Mr. King; III. Mr. Lianos

210. Econometric Methods. (4) III.

Lecture—4 hours. Prerequisite: Mathematics 130B. Statistical models and their use in estimation of economic relationships; single and multiple equation systems.

Mr. Rausser

211. Advanced Econometric Methods. (3) I.

Lecture—3 hours. Prerequisite: course 210. Econometric models and their use in estimation of static and dynamic structural relationships. Special problems in the theory and application of econometrics.

Mr. Rausser

221. Agricultural Policy in Developed Countries.

(3) II.

Lecture—3 hours. Economic policy, its nature, formation and analysis; characteristics of agricultural sectors in developed countries; comparative analysis of policies relating to production, marketing, price, income, rural poverty, and resource adjustment; international trade policies for temperate zone agricultural commodities.

Mr. Hoover

222. Agricultural Policy and Planning in Developing Countries. (3) III.

Lecture—3 hours. Agriculture in the structure of developing nations; its role in economic development; historical experience and theoretical models; agriculture and national planning; sectoral policies relating to prices, inputs, productivity, and marketing; international inputs into agricultural development; case studies.

250. Institutional Setting for Agricultural Business. (3) II.

Lecture—3 hours. Study of economic and social influences of the institutional environment on agriculture-related industries; historical development and present structure of the American economy; governmental activities; financial aspects; labor problems.

253. Linear Programming Analysis of Operational Problems. (3) I.

Lecture—3 hours. Linear programming methods with application to production, con-

sumption, transportation, transshipment, and assignment problems; recursive and multiperiod programming, problems of aggregation and planning with limited information. Mr. Carter

254. Quantitative Analysis of Operational Problems. (3) II.

Lecture—3 hours. Selected topics in operation research including nonlinear and dynamic programming, decision theory, inventory, waiting line, and replacement models; simulation of business operations; statistical quality control. Mr. Paris

257. Production Planning and Market

Analysis. (3) III.

Lecture—3 hours. Quantitative analysis of production systems by statistical, economic, and engineering methods; sales analysis for the individual firm; problems of investment, location, scale of operations. Mr. Carman

260. Administrative Organization and Policy Formation. (3) III.

Lecture—3 hours. Concepts and techniques of administration in the business firm; formulation and implementation of management goals; planning, procuring, organizing, and controlling physical factors and personnel. Mr. Logan

280. Analysis of Research in Production Economics. (3) I.

Lecture—3 hours. Current problems and

AGRICULTURAL EDUCATION

Major Advisers.—See *Schedule and Directory* listing.

Secondary Credentials—Agriculture: Mr. Juergenson, 204E Walker Hall.

Secondary Credentials—Homemaking: Mrs. Adams, 204D Walker Hall.

Junior College Credentials—Agriculture: Mr. Juergenson, 204E Walker Hall.

Major Program and Graduate Study.—See pages 61, 69, and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Upper Division Courses

160. Vocational Education. (3) III.

Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture, commerce, home economics, and industry. Mr. Thompson

***188. Technical Journalism. (4) I.**

Lecture—4 hours. Style structure, organization, and presentation of technical information.

methods of analysis in agricultural production economics research. Emphasizes both firm and industry.

Mr. Carter

281. Economic Analysis of Demand and Trade. (3) II.

Lecture—3 hours. Models and methods of analysis of demand, interregional trade, and location in the agricultural economy. Mr. Logan

282. Dynamic Economic Models. (3) III.

Lecture—3 hours. Formulation and appraisal of models which simulate dynamic behavior of individual firms, groups of firms, and other economic systems. Mr. French

283. Analysis of Research in Natural Resource Economics. (3) III.

Lecture—3 hours. Scope and disciplinary context of natural resource economics. Recent problems affecting policy and use planning including efficiency and welfare criteria, technological externalities, public goods, extramarket goods, indivisibilities, and intertemporal problems; benefit cost analysis and public and private investment criteria. Mr. Johnston

299. Individual Study. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)
The Staff (Mr. Carter in charge)

299D. Special Study for Doctoral Dissertation.

(1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)
The Staff (Mr. Carter in charge)

Includes mass communication theory, mass media analysis, and audience analysis.

Miss Regan

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Thompson in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Thompson in charge)

Graduate Courses

290. Seminar. (2) I, II, III.

Discussion—2 hours. Reports and discussions of topics of interest in the fields of agricultural education, home economics education, agricultural extension, and adult education. (Satisfactory/Unsatisfactory grading only.)

Mr. Thompson, Miss Regan

299. Research. (1-6) I, II, III.

Research in agricultural education, home economics education, vocational education, agricultural extension, or adult education.

The Staff (Mr. Thompson in charge)

^a Not to be given, 1971-72.

Supervised Teaching Courses**320A. Introduction to Teaching. (1) I, II, III.**

Lecture—1 hour. Observations and participation in some form of public school work.

Mr. Juergenson

320B. Instructional Materials and Procedures. (3) III.

Lecture—2 hours; laboratory—3 hours. Introduction to the materials and procedures used in teaching. Use of audio-visual, radio and other teaching aids. Preparation of teaching materials; collecting, organizing, processing, and evaluating community resources.

Mr. Juergenson

320C. Supervised Teaching: Sec. 1, Agriculture. (12) I, II, III.

Field work—student teaching—36 hours. Prerequisite: course 320A; course 320E must be taken concurrently. Directed teaching for candidates for the credential in agriculture.

Mr. Juergenson

**AGRICULTURAL ENGINEERING—See also Engineering: Agricultural
AGRICULTURAL ENGINEERING**

Courses listed here are in the College of Agricultural and Environmental Sciences and are intended primarily for students not majoring in Engineering. For course offerings in the College of Engineering, see page 248. For *Bachelor of Science Major Program and Graduate Study* (College of Engineering), see pages 121 and 139.

Lower Division Courses**10. Machines, Systems and Man in Agriculture. (3) II.**

Lecture—2 hours; laboratory, tutorial laboratory and field trips—3 hours. The role of engineering in agriculture, with emphasis on current problems in food production and processing such as residue management, new machinery developments, and effects of mechanization on agricultural labor. Intended for students not majoring in engineering.

Mr. Burkhardt, Mr. Dobie

98. Directed Group Study for Lower Division Students. (1-5) I, II, III.

The Staff (Mr. Goss in charge)

99. Special Study for Lower Division Students. (1-5) I, II, III.

The Staff (Mr. Goss in charge)

Upper Division Courses**100. Social Implications of Mechanization in Agriculture. (3) II.**

Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. The roles

320C. Supervised Teaching: Sec. 2, Home Economics. (12) I, II, III.

Field work—student teaching—36 hours. Prerequisite: course 320A; course 320E must be taken concurrently. Directed teaching for candidates for the credential in home economics.

Mrs. Adams

320E. Curriculum and Instruction Procedures: Sec. 1, Agriculture. (3) I, II, III.

Discussion—3 hours. Prerequisite: all students enrolled in 320E must enroll in 320C concurrently. Planning and organizing an effective curriculum. Selection, organization, evaluation, and use of resource material for teaching.

Mr. Juergenson

320E. Curriculum and Instruction Procedures: Sec. 2, Home Economics. (3) I, II, III.

Discussion—3 hours. Prerequisite: all students enrolled in 320E must enroll in 320C concurrently. Planning and organizing an effective curriculum. Selection, organization, evaluation, and use of resource material for teaching.

Mrs. Adams

of rural manpower and mechanization in the production of food and fiber. Pressures for mechanization and social implications of the resulting developments. Technological considerations in developing machines. Human benefits and stresses resulting from increased levels of mechanization.

Mr. O'Brien

101. Machinery Systems in Food Production. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: upper division standing or consent of instructor. Planning and operating economic machinery systems for the application of energy to the tasks of agricultural production and processing. Emphasis on overall systems coordination and evaluation, machinery-labor-economics relationships, and energy resource utilization.

Mr. Chancellor, Mr. Burkhardt

103. Engines for Automotive, Agricultural, Residential and Recreational Use. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing or consent of instructor. Principles of engine construction, operation, performance, and utilization. Engine fuel resources and properties of fuel, lubricants, and engine exhaust. Fuel combustion, carburetion, and electrical systems. Intended for students not majoring in engineering.

Mr. Burkhardt

***104. Agricultural Machinery. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 2A or 4A. Principles of con-

* Not to be given, 1971-72.

struction, operation, selection, and utilization of equipment for tillage, planting, harvesting, and the application of agricultural chemicals.

105. Farm Structures. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 2A or 4A. Functional and structural design of unified physical plants for livestock production and other enterprises; principles of feed mills, materials conveying, water and electrical systems, feed storage; labor-efficiency studies; materials for and design of beams, columns, trusses, and tanks.

Mr. Neubauer

107. Agricultural Meteorology. (3) I.

Lecture—3 hours. Prerequisite: Geography 1 or 3 or consent of instructor. Daytime radiation intensities, nocturnal heat losses, climatic elements over different ground cover and terrain. Modification of microclimate by sheltering, frost-protection devices, and windbreaks. Probabilities of temperatures, rainfall, and climatic hazards to agriculture (risk figures). Mr. Schultz

110. Physical Aspects of Insect, Fungus and Weed Control. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing. Use and effectiveness of chemicals and biological materials in plant protection systems; hazards to health, crops, and wildlife. Atomization, transport and deposit; aerial and ground application: liquid and dry formulation; regulations and economics.

Mr. Akesson

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Goss in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III. The Staff (Mr. Goss in charge)

Graduate Courses

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Goss in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Goss in charge)

Professional Courses

***314A. Agricultural Engineering Problems and Techniques for Teachers. (3) II.**

Laboratory—9 hours. Prerequisite: Agricultural Education major or consent of instructor. The application of engineering and mechanical principles to the construction, maintenance, and repair of agricultural structures, machinery, and utilities. Offered in even-numbered years.

Mr. Gentry

314B. Agricultural Engineering Problems and Techniques for Teaching. (3) II.

Laboratory—9 hours. Prerequisite: Agricultural Education major or consent of instructor. The application of engineering and mechanical principles to the construction, maintenance, and repair of agricultural structures, machinery, and utilities. Offered in odd-numbered years.

Mr. Garrett

317. Problems in Teaching Farm Mechanics. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: 12 units in Agricultural Engineering, including courses 314A, 314B; Physics 2B or 4B. Demonstrations of and practice in the methods of teaching farm mechanics in secondary schools. School-shop planning including the selection, arrangement, and management of equipment. Curriculum planning, including the relation of teaching materials, references, and visual aids.

Mr. O'Brien

AGRICULTURAL GENETICS—See Genetics, page 299

AGRICULTURAL PRACTICES

Harry O. Walker, Ed.D., *Chairman of the Department*

Department Office, 105 TB-10

The Department of Agricultural Practices administers the College of Agricultural and Environmental Sciences work-experience and internship programs. Students who would like to enrich their educational programs through supervised work-experience should visit the Agricultural Practices office. Opportunities are available in all of the career possibilities (see section on the Majors) for which the College prepares its students.

Lower Division Courses

49A. Field Equipment Operation. (1) I, III.

Laboratory—3 hours. Prerequisite: consent of instructor. Theory and operation of the major types of field equipment, wheel and track-type tractors used in agriculture, forestry, and natural resource management. Essentials of safe equipment operation, the fundamentals of preventive maintenance, field adjustments and trouble shooting are presented. (Passed/Not Passed grading only.)

Mr. Hanna

* Not to be given, 1971-72.

49B. Field Equipment Maintenance. (1) II.

Laboratory—3 hours. Prerequisite: consent of instructor. Theory of operation and maintenance principles for internal combustion engines, power trains, hydraulic and pneumatic controls. Introduction to arc and acetylene welding, the care and use of basic hand and shop tools. (Passed/Not Passed grading only.)

Mr. Hanna

AGRICULTURAL SCIENCE AND MANAGEMENT

Major Advisers.—See *Schedule and Directory Listing*.

Major Program and Graduate Study.—See pages 61, 71, and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agriculture and Environmental Sciences, 228 Mrak Hall.

Lower Division Course**49. A Field Study in Agricultural Management. (2) I, III.**

Lecture—1 hour; laboratory—3 hours. A weekly field trip to 12–14 different farms within Yolo County to observe and discuss with growers their operations and problems. Designed especially for students not acquainted with modern agriculture and its role in society. (Passed/Not Passed grading only.)

Mr. Flocker

Upper Division Courses**190. Proseminar in Agricultural Science and Management. (1) I, II, III.**

Seminar—1 hour. Prerequisite: senior stand-

AGRICULTURAL TOXICOLOGY—See Environmental Toxicology**AGRONOMY AND RANGE SCIENCE**

Related Undergraduate Majors and Graduate Study.—See pages 63, 71, 88, 90, and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Course***2. Forage Crops. (3) III.**

Lecture—2 hours; laboratory—3 hours. Adaptation, establishment, management, and utilization of forage plants as irrigated pasture, range, hay, and silage; aspects of forage quality which affect feeding value to livestock. Field trips will be arranged to observe developments in irrigated pasture management and range improvement.

Mr. Jones, Mr. Love

Upper Division Courses**100. Science and Technology of Field Crop Production. (3) I.**

Lecture—3 hours. Prerequisite: six units of
• Not to be given, 1971–72.

99. Special Study for Undergraduates. (1–3) I, II, III.

Laboratory—3–9 hours. Prerequisite: consent of instructor. Directed study concurrent with selected work-experience opportunities in the technical and/or professional phases of agriculture production, business and research, natural resource management, applied social and behavioral sciences.

The Staff (Mr. Walker in charge)

ing in Agricultural Science and Management or consent of instructor. Reports and discussion of current developments in the agricultural industry. (Passed/Not Passed grading only.)

The Staff (Mr. Carroll in charge)

198. Directed Group Study. (1–5) I, II, III.

Discussion—1–5 hours. Prerequisite: senior standing. Selected topics relating to application of science and management techniques to problems of the agricultural industry.

The Staff (Mr. Carroll in charge)

Graduate Courses**290. Seminar. (1) I.**

Seminar—1 hour.

The Staff (Mr. Carroll in charge)

298. Group Study. (1–5) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Carroll in charge)

299. Research. (1–6) I, II, III.

The Staff (Mr. Carroll in charge)

plant science, botany, and/or biology, or consent of instructor. Fundamentals of field crop production and solving agronomic problems using ecological, physiological, and genetic principles. Recommended for non-majors in agronomy.

Mr. Peterson

111. Cereal Crops of the World. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: 6 units of plant science, botany, and/or biology, or consent of instructor. Contribution of cereal crops to man's development; adaptation, production, utilization, and factors determining quality of wheat, oats, barley, rice, corn, and sorghum. Emphasis is on recent developments and scientific improvements.

Mr. Schaller

112. Forage Crop Ecology. (3) III.

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 which affect feeding value to livestock.

Mr. Raguse

112L. Forage Crops Ecology Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 112. Laboratory work in forage crop ecology to supplement course 112.

Mr. Raguse

113. Fiber, Oil, and Sugar Crops in a Changing World. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: 6 units of plant science, botany and/or biology, or consent of instructor. Industrial crops as world resources of food, feed, 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.

Mr. Mikkelsen

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study, research and/or reading on selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Knowles in charge)

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Knowles in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: 6 upper division units of agronomy.

The Staff (Mr. Knowles in charge)

Graduate Courses

205. Design, Analysis, and Interpretation of Experiments. (3) II, III.

Lecture—2 hours; discussion—3 hours. Prerequisite: Mathematics 105A. The planning and analysis of field and laboratory experiments with emphasis on the biological interpretation of results.

Mr. Williams, Mr. Qualset

221. Advanced Plant Breeding. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Science 113. Advanced topics in plant breeding. Genetic diversity and centers of origin of cultivated plants, mating systems in plants, polyploidy, host-pathogen relationships, role of mutagens in plant breeding, and other topics of current interest.

Mr. Stanford

222. Quantitative Genetics and Plant Improvement. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Science 113; Genetics 105; or

* Not to be given, 1971-72.

consent of instructor. The genetic forces affecting populations. Formulation of breeding plans based on principles of population and quantitative genetics. Offered in even-numbered years.

Mr. Allard

223. Selection Theory in Plant Breeding. (3) II.

Lecture—2 hours; discussion—3 hours. Prerequisite: course 222 or consent of instructors. Theory and application of selection to plant populations for improvement of quantitative characters. Statistical genetic analysis of quantitative character expression and methods for obtaining maximum efficiency in plant breeding schemes. Offered in odd-numbered years.

Mr. Jain, Mr. Qualset

***230. Advanced Population Biology. (3) II.**

Lecture—2 hours; discussion—1 hour. Prerequisite: Genetics 103; recommended—a basic course in ecology (Botany 117, Zoology 125, etc.). The dynamics of growth and evolution of populations. Genetic and ecological aspects of population regulation and integration. Natural selection within and among populations. Intra- and interspecific competition. Community structure and diversity.

Mr. Jain

231. Advanced Topics in the Ecology of Crop Plant Communities. (3) I.

Lecture—3 hours. Prerequisite: Plant Science 101 or consent of instructor. Analytical models and quantitative description of the structure and dynamics of field crop communities in relation to interplant competition, population functions and environmental adaptation.

Mr. Laude

232. Advanced Topics in the Physiology of Crop Plants. (3) I.

Lecture—3 hours. Prerequisite: Plant Science 102 or consent of instructor. Physiological aspects of vegetative and reproductive growth of field crop plants in relation to their field behavior.

Mr. Huffaker

290. Seminar. (1) I.

Seminar—1 hour.

The Staff (Mr. Knowles in charge)

298. Group Study. (1-3) I, II, III.

Directed study in the areas of plant physiology, plant genetics, plant biochemistry, agricultural chemistry, or soil-plant relationships of field crops or range and pasture plants.

The Staff (Mr. Knowles in charge)

299. Research. (1-9) I, II, III.

Original research involving plant physiology, plant genetics, plant biochemistry, agricultural chemistry, or soil-plant relationships of field crops or range and pasture plants.

The Staff (Mr. Knowles in charge)

AMERICAN STUDIES

Robert Merideth, Ph.D., *Chairman of the Program*
Program Office, 822 Sproul Hall

Committee in Charge:

Professors:

- Daniel Calhoun, Ph.D. (*History*)
- Theodore J. Shank, Ph.D. (*Dramatic Art*)
- Brom Weber, Ph.D. (*American Studies and English*)
- Robert A. Wiggins, Ph.D. (*English*)

Associate Professor:

- Robert Merideth, Ph.D. (*American Studies*)

Faculty:

Professor:

- Brom Weber, Ph.D. (*American Studies and English*)

Associate Professors:

- Robert Merideth, Ph.D.
- David S. Wilson, Ph.D.



Assistant Professor:

- Jay E. Mechling, M.A. (*Acting*)

Lecturer:

- René Viargues, M.A.

Major Adviser.—Mr. Merideth.

American Studies involves the interdisciplinary study of American culture past and present, with attention to foreign culture so as to provide a basis for comparative analysis and evaluation. The major consists of a core of interdisciplinary courses which, taken in conjunction with the equivalent of a major ("disciplinary emphasis") in any department of the College of Letters and Science, as well as additional courses in the humanities and arts, the social sciences, and the natural and applied sciences, will enable students to obtain a coherent understanding of American culture's heritage and problems. The program bridges disciplinary, departmental, and other specialized boundaries of inquiry and knowledge in order to develop an ecological view of the American and the complex sociocultural-biophysical environment to which he must adapt as an individual. The major prepares students for professional careers requiring a knowledge of American culture in teaching, industry, business, and government, as well as for graduate study in American Studies or the disciplines in which the students have completed the equivalents of departmental majors. Since each student's program is individually designed for him in accordance with the "disciplinary emphasis" selected in addition to the American Studies core, early consultation with the Chairman of American Studies is required of potential majors with regular advising conferences thereafter.

The Major Program

Lower Division Courses.—Required: American Studies 1A, 1B, 1C; up to 24 units in the department of "disciplinary emphasis"; 8 units in fine arts. Recommended: Anthropology 2; Biology 10; English 30A-30B-30C (not recommended for those choosing English as "disciplinary emphasis"); Geography 2; History 4A-4B-4C; Mathematics 13, 29; Philosophy 6; Physics 10; Psychology 10.

Upper Division Courses.—Required: American Studies 100, 140A, 140B, 140C, 190A, 190B, 190C; 24 units in the department of "disciplinary emphasis"; 16 units in courses dealing with cultures other than that of the United States; 24 units in relevant courses to be chosen in consultation with the Chairman of American Studies.

Teaching Major.—The major in American Studies provides a basis for obtaining teaching credentials in elementary and secondary schools; the student's program must be arranged for the purpose in consultation with the Chairman of American Studies.

Lower Division Courses

1A. American Culture and Technology. (4) II.

Lecture—2 hours; discussion—2 hours. A critical examination of industrial and agricultural technology's role in American culture by exploring its ramifications in past and contemporary America, using written and other materials drawn from many fields and synthesizing the disparate cultural elements of the problem.

Mr. Mechling

1B. Religion in American Culture. (4) I.

Lecture—2 hours; discussion—2 hours. A critical examination of religion's role in American culture by exploring its ramifications in past and contemporary America, using written and other materials drawn from many fields and synthesizing the disparate cultural elements of the problem.

Mr. Wilson

1C. Race and Nationality in American Culture. (4)

III.

Lecture—2 hours; discussion—2 hours. A critical examination of the role of race and nationality in American culture by exploring their ramifications in past and contemporary America, using written and other materials drawn from many fields and synthesizing the disparate cultural elements of the problem.

Mr. Wilson

98. Directed Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

99. Individual Study for Undergraduates. (1-5)
I, II, III. The Staff (Chairman in charge)

Upper Division Courses

100. Introduction to American Studies. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: courses 1A, 1B, 1C, or consent of Chairman of American Studies. The elements of American Studies, including (1) the background and general nature of American Studies, (2) the methods and philosophies of the academic disciplines which deal with the United States, (3) the problems which face students in interdisciplinary study. Mr. Merideth

140A. Events and Institutions in the 1920s. (4) I.

Lecture—3 hours; evaluation of written reports and conferences with individual students. Prerequisite: course 100, or consent of Chairman of American Studies. A study in range of American culture in the 1920s, focused around diverse events and institutions of the decade as reflected in multidisciplinary areas and integrated for the purpose of comprehending the decade's character and meaning. Mr. Mechling

140B. Value and Meaning in the 1920s. (4) II.

Lecture—3 hours; evaluation of written reports and conferences with individual students. Prerequisite: course 100, or consent of Chairman of American Studies. A study of American culture approached thematically in depth by means of scrutiny and integration of multidisciplinary materials relating to the theme of the search for value and meaning in the 1920s. Mr. Weber

140C. Frank Lloyd Wright and the 1920s. (4) III.

Lecture—3 hours; evaluation of written reports and conferences with individual students. Prerequisite: course 100, or consent of Chairman of American Studies. A scrutiny in depth of American culture structured around the life, thought, and practice of Frank Lloyd Wright, a focal cultural figure of the 1920s whose career

embraces multidisciplinary aspects of the decade. Mr. Weber

190A. Senior Proseminar. (4) I.

Seminar—3 hours; individual conferences and written report evaluations. Prerequisite: consent of Chairman of American Studies. Individual research on American Studies topics. (Deferred grading only, pending completion of sequence.) The Staff (Mr. Merideth in charge)

190B. Senior Proseminar. (4) II.

Seminar—3 hours; individual conferences and written report evaluations. Prerequisite: consent of Chairman of American Studies. Individual research on American Studies topics. (Deferred grading only, pending completion of sequence.) The Staff (Mr. Merideth in charge)

190C. Senior Proseminar. (4) III.

Seminar—3 hours; individual conferences and written report evaluations. Prerequisite: consent of Chairman of American Studies. Individual research on American Studies topics. (Deferred grading only, pending completion of sequence.) The Staff (Mr. Merideth in charge)

197T. Tutoring in American Studies. (1-5) I, II, III.

Tutorial—1-5 hours. Prerequisite: consent of Chairman of American Studies. Tutoring in lower division American Studies courses, usually in small discussion groups. Periodic meetings with the instructor in charge; reports and readings. May be repeated for credit when the tutoring is for a different course. (Passed/Not Passed grading only.)

198. Directed Group Study. (1-4) I, II, III.

Prerequisite: consent of instructor.
The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates.

(1-4) I, II, III.

Prerequisite: consent of instructor and Chairman of American Studies.

The Staff (Chairman in charge)

ANATOMY

Larry Z. McFarland, D.V.M., Ph.D., *Chairman of the Department*
Department Office, 1091 Haring Hall

Professors:

Logan M. Julian, D.V.M., Ph.D.
Larry Z. McFarland, D.V.M., Ph.D.
Walter S. Tyler, D.V.M., Ph.D.

Associate Professors:

Leslie J. Faulkin, Jr., Ph.D.
Benjamin L. Hart, DVM., Ph.D.

Assistant Professor:

Raymond D. Barnes, Ph.D.



Lecturer:

Dale L. Brooks, D.V.M.

Upper Division Courses

100. Systematic Anatomy. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Zoology 2. Lectures and dissections emphasizing the typical structure of the anatom-

² Absent on leave, fall quarter, 1971.

cal systems of the dog, rat and monkey. Offered in odd-numbered years.

Mr. McFarland, Mr. Barnes

140. Neuroanatomy of Domestic Animals. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: freshman standing in School of Veterinary Medicine or one of the following: course 100; Anthropology 155; Physiology 110A–110B, 120A; Psychology 108; Zoology 106A, 106B, 107 or the equivalent. A functional, comparative consideration of gross, subgross and microscopic anatomy of the central nervous system and special senses of common domestic animals.

150. Functional Comparative Anatomy of the Locomotor System of Domestic Animals. (2) I.

Lecture—2 hours. Prerequisite: freshman standing in School of Veterinary Medicine, or Zoology 100 and consent of instructor. Gross, subgross, light microscopic and electron microscopic anatomy of the locomotor systems of domesticated mammals. Mr. Julian, Mr. Barnes

151. Functional Comparative Anatomy of the Locomotor System of Domestic Animals. (4) I.

Laboratory—12 hours. Prerequisite: course 150 (should be taken concurrently). Dissection of the locomotor system. Microscopic anatomy of the basic tissue types as represented in the locomotor system. Mr. Julian, Mr. Barnes

155. Functional Comparative Anatomy of Internal Organ Systems: Lecture. (2) II.

Lecture—2 hours. Prerequisite: freshman standing in School of Veterinary Medicine, or embryology and consent of instructors. Functional comparative gross, subgross, light microscopic, and electron microscopic anatomy of the organs in the abdomen and thorax.

Mr. Tyler, Mr. Faulkin

156. Functional Comparative Anatomy of Internal Organ Systems: Gross Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 155 (to be taken concurrently). Dissection and demonstration of organ systems in abdomen and thorax.

Mr. Tyler, Mr. Faulkin

157. Functional Comparative Anatomy of Internal Organ Systems: Microscopic Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 155 (to be taken concurrently). Laboratory study and demonstration of microscopic and submicroscopic structure of organs of abdomen and thorax.

Mr. Faulkin, Mr. Tyler

160. Functional Comparative Anatomy of Poultry and Experimental Animals. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: freshman standing in School of Veterinary Medicine or consent of instructor. Gross

and microscopic anatomy of poultry and conventional laboratory mammals.

Mr. Barnes, Mr. Julian

170. Principles of Normal and Abnormal Animal Behavior. (3) III.

Lecture—3 hours. Prerequisite: course 150 and Physiological Sciences 140B or consent of instructor. An examination of normal behavioral patterns of domestic animals with emphasis on the historical, environmental, and organismic determinants of behavior. An analysis of factors contributing to abnormal behavior in domestic animals.

Mr. Hart

180. Surgical Anatomy. (4) III.

Laboratory—12 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Topographical, radiological, and regional anatomy as applied to the clinical sciences.

Mr. McFarland

198. Directed Group Study. (2–5) I, II, III.

Laboratory—6–15 hours. Prerequisite: consent of instructor.

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates. (1–5) I, II, III.

Laboratory—3–15 hours. Prerequisite: consent of instructor.

The Staff (Chairman in charge)

Graduate Courses

200. Comparative Neuroanatomy. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 140 or equivalent in human or veterinary neuroanatomy. A comparative-quantitative study of the central nervous systems of vertebrates, particularly mammals, with emphasis on function.

Mr. Hart

201. Regional Anatomy. (4) II.

Laboratory—12 hours. Prerequisite: course 100 or equivalent. Detailed dissections comparing the regional anatomy of the sheep, cat, rabbit, chicken and man. Offered in even-numbered years.

Mr. McFarland, Mr. Barnes

202. Organology. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 157, and consent of instructor. The comparative development, growth patterns, and composition of selected animal organs: liver, kidney, lung, brain, a viscera and a skeletal muscle. Offered in odd-numbered years.

The Staff (Mr. Julian in charge)

204. Functional Comparative Anatomy of the Reproductive Systems. (3) I.

Lecture—3 hours. Gross, microscopic, and ultramicroscopic structure of the male and female reproductive systems in birds and mammals. Offered in odd-numbered years.

Mr. Barnes, Mr. McFarland

205. Ultramicroscopic Anatomy. (3) I.

Lecture—3 hours. Prerequisite: Zoology 107 or equivalent. The electron microscopic appearance of cells, tissues, and organs of animals emphasizing the structural basis for their physiological functions. Offered in even-numbered years.

Messrs. Tyler, McFarland, Faulkin

210. Principles of Histochemistry. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Zoology 107, Biochemistry 101A. Principles of enzyme histochemistry of animal tissues applicable to light and electron microscopy. Offered in odd-numbered years.

Mr. Tyler

217. Experimental Endocrinology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Physiology (Animal) 130. Gross, microscopic, and ultramicroscopic structure of the endocrine organs, and the applications of basic techniques used to demonstrate the physiological effects of these organs. Offered in even-numbered years.

ANESTHESIOLOGY—See Medicine**ANIMAL BIOCHEMISTRY—See Biochemistry****ANIMAL GENETICS—See Genetics****ANIMAL HUSBANDRY—See Animal Science****ANIMAL SCIENCE**

Major Advisers.—See Schedule and Directory listing.

Major Program and Graduate Study.—See pages 62, 71 and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses**1. Domestic Animals and Man. (3) I.**

Lecture—2 hours; laboratory—2 hours. Animal domestication and factors affecting their characteristics and distribution. Animal use by man for food, work, fiber, drugs, research and recreation; projected effects of population expansion and urbanization. Demonstrations of beef and dairy cattle, poultry, sheep, swine and horses.

The Staff (Mr. Ronning in charge)

2. Introductory Animal Science. (3) III.

Lecture—2 hours; laboratory—2 hours. Recommended: course 1; Biology 1. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals; the application of sciences to animal production.

The Staff (Mr. Heitman in charge)

290. Seminar. (1) I, II, III.

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

297. Advanced Group Study in Surgical Anatomy. (2-4) I, II, III.

Laboratory—6-12 hours. Prerequisite: course 180. Selected topics in topographical, radiological, or regional anatomy as they apply to the clinical sciences.

Mr. McFarland

298. Group Study. (2-5) I, II, III.

Laboratory—6-15 hours. Prerequisite: consent of instructor.

The Staff (Chairman in charge)

299. Research. (2-12) I, II, III.

Laboratory—6-36 hours. Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grading only.) The Staff (Chairman in charge)

21. Livestock and Dairy Cattle Judging. (2) III.

Laboratory—6 hours. Prerequisite: courses 1 and 2. Conformation, finish and quality in relation to ideal type. Relationship of form to function. Change in body proportions with growth and maturity. Correlation between types in live meat animals and carcass quality.

Mr. Mendel

31. Current Topics in Animal Science. (1) II.

Lecture-discussion—1 hour. A presentation and discussion of topics of current concern to the animal industry. Topics such as animal waste disposal, land utilization, livestock improvement programs, disease control programs, and importation problems will be considered. (Passed/Not Passed grading only.) Mr. Ronning

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Selected topics relating to the animal sciences.

The Staff (Mr. Ronning in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor. Problems in animal biology; nutrition, breeding, and physiology of livestock.

The Staff (Mr. Ronning in charge)

Upper Division Courses**111. Type Evaluation in Livestock and Dairy Cattle. (2) I.**

Laboratory—6 hours. Prerequisite: course 21. Studies of recognized type evaluation in livestock and dairy cattle. Critical evaluation of the bases for the criteria used in establishing these standards. Mr. Carroll

114. Advanced Dairy Cattle Production. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 110 and course 124, or their equivalent recommended. Scientific principles from genetics, nutrition, physiology and related fields applied to conversion of animal feed to human food through dairy animals. Genetic, environmental, and managerial sources of variation in milk composition and yield; economic and energetic efficiency of milk production. Mr. Laben

115. Horse Production. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 100B; Nutrition 103 or 110; Physiology 110B. Feeding, breeding, and management of horses; application of the principles of basic animal sciences to problems of production of all classes of horses. Mr. Evans

116. Meat Animal Production. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 103 or 110; Physiology 110B. Application of the sciences of nutrition, physiology and genetics to the development of efficient management programs for beef, sheep and swine production. Similarities and differences among these species affecting management practices. Methods of improving carcass and meat quality. Mr. Bradford, Mr. Garrett

***117. Physiological Aspects of Animal Production from Tropical and Arid Areas. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Nutrition 110, Physiology 110B. Comparative aspects of animal production from domesticated and wild species in tropical and arid environments, with emphasis upon the effects of the climatic and nutritional environment on basic physiological mechanisms as they relate to the efficiency of animal production. Mr. Robinson

118A. Range Livestock Production. (3) II.

Lecture—3 hours. Prerequisite: Nutrition 103 or 110; courses 1 and 2. Genetics 100B recommended. Not open for credit to Animal Science majors. The application of scientific knowledge to the improvement and production of beef cattle and sheep. Reproduction including artificial insemination; breeding plans; management; supplementary feeding; marketing. Mr. Carroll

* Not to be given, 1971-72.

118B. Intensive Livestock Production. (3) III

Lecture—3 hours. Prerequisite: Nutrition 103 or 110. Recommended: courses 1, 2 and 118A; Genetics 100B. Not open for credit to Animal Science majors. Principles and practices involved in feedlot, dairy and swine operations. Growth and fattening; lactation; feeding practices; methods of evaluating body composition of meat animals; housing and equipment; waste disposal. Mr. Carroll, Mr. Heitman

123. Animal Growth. (4) II.

Lecture—2 hours; special reports and discussions—2 hours. Prerequisite: upper division course in physiology and Nutrition 110, or equivalent background knowledge. Basic and practical aspects of prenatal, postnatal and adult growth of animals focusing on nutritional, physiological and genetic effects and interrelationships. An unconventional approach will integrate knowledge from the several disciplines on the major factors regulating and influencing growth. Mr. Garrett, Mr. Ashmore

124. Lactation. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physiology 110B and Nutrition 110, or equivalent background knowledge. Consideration of the biochemical, genetic, physiological, nutritional and structural factors relating to mammary gland development, the initiation of lactation, the composition of milk and lactational performance. Mr. Baldwin, Mr. Laben

190. Proseminar in Animal Science. (1) I, II, III.

Seminar—1 hour. Prerequisite: senior standing in Animal Science or consent of instructor. Reports and discussions of recent advances in animal science. Mr. Heitman

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to animal science majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. The Staff (Mr. Ronning in charge)

197T. Tutoring in Animal Science. (1-2) I, II, III.

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. (Passed/Not Passed grading only.) Mr. Ronning

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Selected topics relating to the animal sciences.

The Staff (Mr. Ronning in charge)

199. Special Study for Advanced Undergraduates.
(1-5) I, II, III.

Prerequisite: consent of instructor. Problems in animal biology related to nutrition, breeding, and physiology of large domestic livestock.

The Staff (Mr. Ronning in charge)

Graduate Courses

219. Muscle Growth and Development. (3) I.

Lecture—2 hours—seminar—1 hour. Prerequisite: Biochemistry 101B, Zoology 100, 121A; or consent of instructor. Integration of growth and development of skeletal muscle: morphology, biochemistry, neural control mechanisms, circulatory and nutritional factors. Prenatal and neonatal differentiation of fiber types. Experimental and hereditary myopathies. Mr. Ashmore

240. Statistical Inference in Animal Experimentation. (4) III.

Lecture—3 hours; laboratory—2 hours. Pre-

requisite: Mathematics 13; a knowledge of Fortran recommended. A development of hypothesis-testing techniques for specific application to problems involving large animal research and related areas. Particular emphasis on principles of inference and prediction. Laboratory exercises in statistical analysis utilizing computer techniques.

Mr. Gall

290A. Seminar. (1) I, II, III.

Seminar—1 hour. Reports and discussions of topics of interest in genetics, nutrition, and physiology as they apply to animal science.

The Staff (Mr. Ronning in charge)

298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Lectures and discussions of advanced topics in the animal sciences. The Staff (Mr. Ronning in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Ronning in charge)

ANTHROPOLOGY

Delbert L. True, Ph.D., *Chairman of the Department*

Department Office, 331 Voorhies Hall

Professors:

Martin A. Baumhoff, Ph.D.

Daniel J. Crowley, Ph.D. (*Anthropology and Art*)

Jack D. Forbes, Ph.D. (*Anthropology and Applied Behavioral Sciences*)

David L. Olmsted, Ph.D.

Assistant Professors:

Kenne H-K Chang, Ph.D.

Richard T. Curley, Ph.D.

William G. Davis, Ph.D.

Gustavo Gonzalez, Ph.D.

Donald G. Lindburg, Ph.D.

Melvin K. Neville, Ph.D.

Delbert L. True, Ph.D.

◇

Assistant Professors:

Henry McHenry, M.A. (*Acting*)

Jerry A. Moles, M.A. (*Acting*)

Henry J. Rutz, M.A. (*Acting*)

Lecturer:

Kenneth R. Martin, B.A.

Departmental Major Advisers for Bachelor of Arts Degree.—Mr. Curley.

Departmental Major Adviser for Bachelor of Science Degree.—Mr. Lindburg.

Bachelor of Arts Major Program

Lower Division Courses.—Required: Anthropology 1, 2, 3, 13, and Geography 1.

Upper Division Courses.—Required: courses

102, 103A, 109, 110; 111 or 112 or 120, 128A; 4 units of physical anthropology; 4 units of ethnography; one additional archaeology course; and 8 additional units of courses selected from the following: any upper division anthropology course, Art 150, 151, Genetics 100A, 100B, 115.

Language Requirement.—18 units or the equivalent in one language.

Bachelor of Science Major Program

Lower Division Courses.—Required: courses 1, 2, 3; Biology 1; Chemistry 1A-1B; Mathematics 13; Zoology 2; and either Chemistry 8A-8B or Mathematics 16A-16B. Recommended: Physics 2A-2B-2C; Psychology 1A-1B; Geology 1, 1L, 3, 3L.

Upper Division Courses.—A minimum of 44 units including three courses in physical anthropology and three additional courses in anthropology chosen in consultation with the adviser. Twenty additional units shall be chosen in consultation with the adviser from a list provided by the department and shall include Genetics 103, and either 115 or 100A-100B, and not less than one laboratory course in human or vertebrate anatomy.

Language Requirement.—18 units or the equivalent in one language.

Bachelor of Science List of Courses

Physical Anthropology: courses 150, 151, 152, 153, 154A, 154B, 155, 156.

Upper Division Courses outside the Department: Anatomy 100; Biochemistry 101A, 101B;

Epidemiology 103A, 103B, 103C; Genetics 100A, 100B, 103, 105, 115; Geology 106, 107, 140; Human Anatomy 102; Physiology 110A, 110B, 111A, 111B; Psychology 108, 112, 150, 180; Zoology 100, 106A, 106B, 107, 125, 136, 147, 148, 155, 156.

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.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Required: 30 quarter units of anthropology.

Subject Representative: Mr. Davis.

Lower Division Courses

1. Physical Anthropology. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Human biology and physical anthropology; the relation of man and the animals; the origin and antiquity of man; fossil man; anthropometry, the criteria of race and racial classification; current racial theories; race problems.

Mr. Neville, Mr. McHenry

2. Cultural Anthropology. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Diversity of cultures considered from the aspects of language, economics, kinship, art, magic, and religion; culture change.

Mr. Davis, Mr. Moles, Mr. Curley

3. Introduction to Archaeology. (4) I, III.

Lecture—3 hours; discussion—1 hour. Development of archaeology as an anthropological study; objectives and methods of modern archaeology; prehistory and growth of culture, the origins and early development of civilization in the Old and New World.

Mr. True

5. The Relevance of Human Biology. (4) II.

Lecture—2 hours; discussion—2 hours. Prerequisite: consent of instructor. The interrelation between biological and cultural adaptations to man's environment. (Passed/Not Passed grading only.)

Mr. Neville

13. Quantitative Method in Anthropology. (4) III.

Lecture—3 hours; discussion—1 hour.

Mr. Baumhoff

20. The Native American Experience. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Native American Studies 1 or consent of instructor. An introduction to American Indian historical and socio-cultural development with emphasis upon the United States area and upon those processes, such as relations

with non-Indians, which have contributed to the current condition of Indian people. (Same course as Native American Studies 20.)

Mr. Martin

Upper Division Courses

102. Ethnology. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Major theories of culture; survey of principal culture types and their distribution; discussion of ethnological problems.

Mr. Rutz

103A. Archaeological Theory and Method. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1, 3, and 13. Theory and method of prehistoric archaeology.

Mr. True

103B. Old World Archaeology. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A. Comparative prehistory and archaeology of the Eastern Hemisphere.

Mr. Baumhoff

103C. New World Archaeology. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A. Comparative prehistory and archaeology of the Western Hemisphere.

Mr. True

104. Race and Sex: Race Mixture and Mixed Populations. (4) I.

Lecture—3 hours; discussion—1 hour. A study of the phenomena of race mixture (miscegenation), interracial marriage, and mixed (hybrid) human populations. Emphasis will be placed upon the social and cultural effects of race mixture and of the interaction of racism and sexual behavior.

Mr. Forbes

105A. Indians of North America. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An introductory survey of the Indians of North America: origins, languages, civilizations, and history.

Mr. Forbes

105B. Indians of South America. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An introductory survey of the Indians of South America: origins, languages, civilizations, and history.

Mr. Moles

*106. Native Peoples of California and the Great Basin. (4) II.

Lecture—3 hours; discussion—1 hour. An introduction to the traditional and recent cultures of the American Indian peoples of the California-Great Basin area. Considerable emphasis will be placed upon the changes in those cultures taking place during the past 400 years.

* Not to be given, 1971-72.

108. Native Americans in Contemporary Society.

(4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. An introduction to the socio-cultural development of American Indian populations in modern times with emphasis upon North America. Attention will be given to contemporary Indian affairs and problems as well as to the background for present-day conditions.

109. Phonetics. (4) I, II.

Lecture—2 hours; laboratory—4 hours. Thorough grounding in articulatory phonetics with some attention to the fundamentals of acoustic phonetics.

Mr. Gonzalez

110. Elementary Linguistic Analysis. (4) II, III.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 109. Phonemic theory and exercises on phonemic analysis.

Mr. Olmsted

111. Intermediate Linguistic Analysis. (4) II.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 110 (may be taken concurrently). Morphophonemics, morphemics and tactics.

Mr. Olmsted

112. Comparative Linguistics. (4) I.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 109. Linguistic prehistory, historical linguistics and reconstruction; dialect geography.

Mr. Olmsted

***119A. Culture and Personality. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Methods and theories in the study of the relationships among culture, society, and personality. The development of culture and personality as a subdiscipline in anthropology.

***119B. Culture and Personality. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 119A. An examination of empirical investigations of preliterate and contemporary societies in relation to the techniques of culture and personality studies.

120. Language and Culture. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Language and thought; classification of languages; linguistic aspects of culture; language, nation, and state.

Mr. Moles

121. Folklore. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or literary preparation acceptable to instructor. Theory and method in the study of folktales, myths, legends, proverbs, riddles, songs, and other forms of verbal tradition.

Mr. Crowley

* Not to be given, 1971-72.

122. Economic Anthropology. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Economic behavior in nonindustrial societies; its social and cultural setting, and its modern changes.

Mr. Davis

124. Comparative Religion. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An anthropological analysis of the origins, elements, forms, and symbolism of religion; functional interpretation with stress on ethnographic materials.

Mr. Curley

128A. Kinship and Social Organization. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Theoretical: discussion of theories of social organization with primary emphasis on typology and classification of family and kinship systems.

Mr. Davis

128B. Kinship and Social Organization. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 128A. Methodological: demonstration of field methods and discussion of analytic models. Primary emphasis will be placed on componential and transformational analysis.

Mr. Moles

139. Peoples of Africa. (4) II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Peoples and cultures of Africa: survey and comparative analysis of representative societies and cultures in the area.

Mr. Curley

***140. Peoples of Afroamerica. (4) II.**

Lecture—3 hours; discussion—1 hour. A study of the cultural implications of slavery and the contribution of Africans to the national cultures of the Americas.

Mr. Crowley

143. Peoples of India. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Development of Indian cultural traditions; social organization and social trends.

147A. Peoples of the Pacific. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. The aboriginal cultures of Australia and Melanesia in prehistoric and modern times; changes arising from European contact and colonization.

Mr. Rutz

147B. Peoples of the Pacific. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. The aboriginal cultures of Polynesia and Micronesia in prehistoric and modern times; changes arising from European contact and civilization.

Mr. Rutz

148. Ecological Anthropology. (4) III.

Lecture—3 hours; discussion—1 hour. Pre-

requisite: course 2 or consent of instructor. Survey of theories, methods, and applications of the ecological perspective to cultural and physical attributes of human populations.

Mr. Chang

***150. Primate Evolution Laboratory. (3) III.**

Lecture—1 hour; laboratory—5 hours. Prerequisite: course 155 or 151 (may be taken concurrently). Osteological, dental, and neuro-anatomical studies of living and fossil primates.

***151. Primate Evolution. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; Zoology 2 recommended. The origin and relationships of the prosimians, monkeys, and apes.

Mr. Neville

152. Human Evolution and Fossil Man. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Nature and results of the evolutionary processes involved in the formation and differentiation of mankind.

Mr. Neville

153. Living Races of Man. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1; and either course 13, Mathematics 13 or equivalent. Physical characters, distribution, and relationships.

Mr. McHenry

154A. Primate Behavior and Ecology. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. The social behavior and ecology of the prosimians, monkeys, and apes, and their relevance to the evolution of human behavior and social groupings.

Mr. Lindburg

154B. Primate Behavior and Ecology. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 154A, Mathematics 13 or equivalent knowledge of statistics, and consent of instructor. The intensive study of theoretical problems arising in connection with primate behavior and ecology. Certain primate species will be discussed in depth, and laboratory work will involve individual projects on primate groups or special problems.

Mr. Lindburg

155. Comparative Primate Anatomy. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Zoology 2. The functional anatomy of the locomotor, digestive, reproductive, and nervous systems of monkeys and apes. Emphasis on the anatomical evidence for their interrelationships.

Mr. McHenry

156. Human Osteology. (4) I.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or equivalent. Introductory study of the human skeleton, including bone growth, pathology, radiology, microscopy, dentition, and variations in race, sex, and age.

Mr. McHenry

162. Peasant Society and Culture. (4) II.

Lecture—3 hours; discussion—1 hour. Pre-

requisite: consent of instructor. Comparative study of peasant communities, utilizing historical and ethnographic sources; analysis of urban-rural relations; problems of economic development and culture change.

Mr. Chang

165. Culture Change. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Introduction to the analysis of socio-cultural stability and change; theories of innovation, diffusion, acculturation, and cultural evolution; problems of social planning.

Mr. Chang

***190. Cultures of China and Korea. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Ethnological and comparative treatments of two cultures with emphasis on the village level.

Mr. Chang

191. Culture of Japan. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Development of Japanese cultural traditions; social structure and social trends.

Mr. Chang

192. Peoples and Cultures of Southeast Asia. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or equivalent or consent of instructor. The development of major cultural traditions, the patterns of ecological relationships, and comparative social organization of ethnic and regional groups in Southeast Asia.

Mr. Davis

194H. Special Study for Honors Students. (1-5) I, II, III.

Prerequisite: open only to majors of senior standing who qualify for honors program. Independent study of an anthropological problem involving the writing of an honors thesis. (Passed/Not Passed grading only.)

The Staff (Mr. Baumhoff in charge)

195. Field Course in Archaeological Method. (3) I.

Laboratory—8 hours. Prerequisite: course 3. Lectures, museum preparation, and weekend excavations. May be repeated for credit with consent of instructor.

Mr. Baumhoff

196. Archeological Method. (3) II.

Laboratory—6 hours. Prerequisite: course 195 and 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.

Mr. Baumhoff

197T. Tutoring in Anthropology. (1-5) I, II, III.

Tutorial—1-5 hours. Prerequisite: upper di-

* Not to be given, 1971-72.

vision standing with major in anthropology and consent of Department Chairman. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit.

The Staff (Mr. True in charge)

198. Directed Group Study. (1-5) I, II, III.

Discussion—3 hours. Prerequisite: consent of instructor. Directed reading and group discussion of selected anthropological problems.

The Staff (Mr. True in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. True in charge)

Graduate Courses

201. History of Anthropological Theory. (4) I.

Lecture—2 hours; discussion—1 hour. The historical development of the various fields of anthropology with emphasis upon their interrelationships. Required of all first-year graduate students in anthropology. Mr. Curley

209. Objectives and Methods for College Teaching of Anthropology. (2) I.

Discussion—2 hours; assignments and reports. Prerequisite: normally limited to teaching assistants in anthropology. Analysis of the elements of effective teaching, drawing upon the students' experience in the classroom situation. Mr. Olmsted

***210. Aspects of Culture Structure. (4) I, II, III.**

Seminar—3 hours. Analysis of various phases of culture, such as religion, economics, law, and folklore. The Staff

216. Problems in Archaeological Method. (4) III.

Seminar—3 hours. Techniques for analyzing archaeological data; application to various prehistoric cultures. Mr. Baumhoff

217. Andean Prehistory—Theory and Method.

(4) II.

Seminar—3 hours. Prerequisite: consent of instructor. Discussion and evaluation of prehistoric occupations in the Andean Region of South America. Emphasis upon Preceramic and early farming peoples. Discussion will be directed toward the use of the resources of this region to test archaeological theory and to propose problem oriented studies that will work in this direction. Mr. True

***219. Culture and Personality. (4) II.**

Seminar—3 hours.

220. Field Course in Linguistics. (4) III.

Seminar—2 hours; laboratory—2 hours. Prerequisite: courses 110, 111. Techniques of eliciting, recording, and analyzing; work with a native speaker. Mr. Olmsted

***222. Ethnemics. (4) III.**

Seminar—3 hours. Prerequisite: course 120 or consent of instructor. Application of linguistic, cognitive psychological, and related analytical models to folk taxa.

223. Economic Anthropology. (4) III.

Seminar—3 hours. Prerequisite: course 122, or consent of instructor. Selected current methodological and theoretical problems in the analysis of nonindustrial economic systems.

Mr. Davis

***224. Problems in Comparative Religion. (4) III.**

Seminar—3 hours. Advanced study of current problems in the anthropological study of religion.

Mr. Curley

***225. Kinship and Social Structure. (4) II.**

Seminar—3 hours. Componential analysis of kinship systems and discussion of descent group and alliance theories.

Mr. Curley

***226. Evolution of Social Organization. (4) II.**

Seminar—3 hours. Diachronic and synchronic analyses of social organization.

***239. Problems in African Society and Culture. (4) I.**

Seminar—3 hours. Diachronic analyses of traditional institutions in sub-Saharan Africa.

Mr. Curley

***242. Problems in African Prehistory. (4) I.**

Seminar—3 hours. Mr. Baumhoff

245. Ethnology of Northern and Central Asia. (4) III.

Seminar—3 hours. Prerequisite: a reading knowledge of German, Russian, Chinese, or Japanese. Lectures on the culture aboriginally found north of the Caucasus-Korea line. Supervised study of the primary and secondary sources. Work with informants when available. Mr. Olmsted

***247. Peoples and Cultures of Oceania. (4) III.**

Seminar—3 hours.

***248. Concepts and Problems in Ecological Anthropology. (4) I.**

Seminar—3 hours. Prerequisite: course 148 or equivalent or consent of instructor. Advanced study of theories, methods, and applications of the ecological perspective to cultural and physical attributes of human population. Mr. Chang

250. Theory and Method of Anthropology. (4) II.

Seminar—3 hours. Mr. Moles

253. Concepts and Problems in Physical Anthropology. (4) I, II.

Seminar—3 hours. Mr. Lindburg, Mr. Neville

254. Primate Social Behavior. (4) III.

Seminar—3 hours. Prerequisite: course 154B

* Not to be given, 1971-72.

or equivalent. Analysis of primate social behavior, with particular emphasis on field studies.

Mr. Neville

265. Concepts and Problems in Applied Anthropology. (4) I.

Seminar—3 hours. Prerequisite: course 165 or equivalent or consent of instructor. Advanced study in culture change; case studies of directed culture change; problems of planning and evaluation; uses of anthropological theory and data in professional fields such as agriculture, public health, administration, and international technical assistance.

Mr. Chang

APPLIED BEHAVIORAL SCIENCES

Major Advisers.—See *Schedule and Directory* listing.

Major Program.—See pages 62 and 72.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses

17. Population Problems. (2) I, II.

Lecture—2 hours. An assessment of relevant aspects of overpopulation to determine man's chance of survival. Mr. Howard, Mr. Conzelman

18. Scientific Bias and Social Myth. (3) II, III.

Lecture—2 hours; discussion—1 hour. Assumptions and biases in different fields of knowledge, taboo topics, and the nature of evidence in the public and academic communities; fit between University education and issues of society.

II. Mr. Fujimoto, III. Miss Regan

47. Orientation to Community Resources. (1) II, III.

Field trip—3 days; Seminar—two 2 hour sessions. (Given between quarters.) Field trip to educational, social, and welfare agencies in California. Observation and discussion with staff members of different agencies which serve the needs of families and children. (Advance reservation required.)

Mr. Hawkes

98. Directed Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

The Staff (Chairman in charge)

Upper Division Courses

140. Research Methods in Applied Behavioral Sciences. (4) I.

Lecture—4 hours. Prerequisite: Psychology 1A. Application of social sciences research methodology to multidisciplinary problems.

Miss Regan, Mr. Thompson

* Not to be given, 1971-72.

280. Ethnohistorical Theory and Method. (4) III.

Seminar—3 hours. A discussion of the ethnohistorical method; the utilization of diverse types of data, especially documentary sources, to reconstruct socio-cultural history. Particular attention devoted to the applied uses of ethnohistory in the solution of contemporary social problems.

Mr. Forbes

*292. Seminar in Anthropological Linguistics. (4) III.

Seminar—3 hours.

299. Research. (3-8) I, II, III.

The Staff (Mr. Olmsted in charge)

150. Housing. (4) III.

Lecture—4 hours. Exploration of the shelter aspects of the family environment. Study of technological, social, economic and aesthetic factors affecting the nature and organization of family and community housing.

Mr. Cotelli

151A. Community Research and Analysis. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Theories on the emergence and structure of contemporary communities. Ethnographic, power structure and comparative approaches to community studies. Ways to incorporate research into programs for community change and development. Lecture and field work.

Mr. Fujimoto

151B. Community Development. (4) II.

Discussion—1 hour; seminar—3 hours. Prerequisite: course 151A or consent of instructor. Principles and strategies of building institutions so community people can effect change. Examination of styles of citizen participation and control and the various roles of change agents in working with communities for their own self-development. Seminar and field work.

Mr. Forbes

151C. Field Experience in Community Development. (3) III.

Field experience. Prerequisite: course 151A and 151B or consent of instructor. Field assignment-internship with community and grass roots groups, analysis of resources and alternatives for resolution of community development needs as defined by citizen groups.

Mr. Fujimoto, Mr. Forbes

160. The Disadvantaged: Issues and Innovations. (3) I, II.

Seminar—3 hours. Prerequisite: 10 units of psychology, sociology, and/or anthropology. Identification and characteristics of the "invisible" segments of society with emphasis on the socially and culturally disadvantaged. Barriers

encountered by these individuals and avenues for change are explored.

I. Mr. Forbes, II. Mr. Lynn

161. The Continuing Learner. (3) II.

Lecture—3 hours. Prerequisite: Education 110 (may be taken concurrently). Principles of adult education emphasizing barriers to learning, the role of non-verbal communication, the importance of self-concept in teaching adults, and the educator's role in working with non-school populations.

162. Man, Work and Technology. (3) III.

Lecture—3 hours. Critical issues created for man by technology. Employment-unemployment and its effect upon man. Social responsibility of persons and institutions which implement changes in the labor market. Significance of quality in employer-employee relationships.

191. Research Design and Analysis. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 13, course 140 or consent of instructor. Survey of major types of research design in the behavioral sciences. Tests

of statistical significance, analysis of variance, and related topics. Use of computer in data processing.

Miss Regan

197T. Tutoring in Applied Behavioral Sciences.

(1-5) I, II, III.

Prerequisite: consent of major committee; upper division standing with major in Design or Child Development. Leading of small voluntary discussion groups.

The Staff (Mr. Thompson in charge)

197TC. Community Tutoring in Applied Behavioral Sciences. (1-5) I, II, III.

Prerequisite: consent of major committee; upper division standing with major in Design or Child Development. Supervised tutoring in the community.

The Staff (Mr. Thompson in charge)

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Thompson in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Thompson in charge)

ART

Richard D. Cramer, M.F.A., *Chairman of the Department*
Department Office, 101 Art

Professors:

Richard D. Cramer, M.F.A. (*Acting Director, Laboratory for Research in the Fine Arts and Museology*)

Daniel J. Crowley, Ph.D., (*Art and Anthropology*)

Seymour Howard, Ph.D.

Ralph M. Johnson, M.A.

Richard L. Nelson, M.A. (*Emeritus*)

Daniel Shapiro

Wayne Thiebaud, M.A.

Associate Professors:

Robert C. Arneson, M.F.A.

Roy R. DeForest, M.A.

Tio L. Giambruni, M.A.

Ruth J. Horsting, M.A.

Roland C. Petersen, M.A.

William T. Wiley, M.F.A.

Assistant Professors:

Sherwood A. Fehm, Jr., Ph.D.

Manuel J. Neri



Assistant Professor:

Craig Harbison, M.F.A. (*Acting*)

Lecturers:

Joseph A. Baird, Ph.D.

Jane B. Garritson, M.A.

Departmental Major Advisers.—See the Schedule and Directory.

Preparation for the Major:

Practice of Art: ¹ 3 courses from the following list: Art 2, 3, 4, 14, 16 (see prerequisites for upper division courses); 8 units chosen from courses 1A, 1B, 1C, 1D. Entering freshmen who have studied art in high school should apply for advanced standing by submitting examples of their work for faculty review.

History of Art: Courses 1A, 1B, 1C, 1D; one course in drawing, graphics, or painting; and one course in sculpture or ceramics.

The Major Program:

Practice of Art: ² 4 courses from Group A courses under three different artists; 1 course from Group B; 2 courses from Group C; and 2 courses chosen from Group A, B, or C.

¹ Absent on leave, 1971-72.

² Students interested in drawing and painting should take courses 2, 3, 4; course 14 is recommended.

Students interested in sculpture, should take courses 2, 3, 14; course 4 is recommended.

Students preparing for graduate work in any of the environmental design professions should take courses 2, 14, 16, 121A, 121B, 121C, 149, 168, 184.

History of Art: Two Group C courses within each of two periods (e.g., 154A, 154B, and 178B, 178C); 5 courses chosen from Group C. Students planning to do advanced work in the History of Art should develop their knowledge of foreign languages (especially German) as early as possible.

Transfer Students.—Before enrolling in Art courses at Davis, ask your faculty adviser to evaluate transfer courses in art.

Graduate Study.—The Department of Art offers programs of study and research leading to the M.F.A. degree in the practice of art and the M.A. degree in the history of art. Detailed information regarding graduate study may be obtained from the *Announcement of the Graduate Division*.

Teaching Major.—The A.B. degree with a major in the practice of art or in the history of art. Depending on the credential, certain other courses are required. For information see the subject representative.

Teaching Minor.—30 units in Art. These must be selected in consultation with the subject representative.

Subject Representative: See *Schedule and Directory*.

Lower Division Courses

1A. History of Art: Prehistoric through Early Christian. (4) I.

Lecture—4 hours. Art from 1500 B.C. to 500 A.D.: Lascaux, Jericho, Ur, Thebes, Knossos, Troy, Mycenae, Corinth, Athens, Pergamum, Cerveteri, Rome, and Ravenna; Imhotep, Phidias, Polyclitus, Praxiteles, Scopus, Lysippus, Agesander, and Apollodorus. Mr. Howard

1B. History of Art: Byzantine through Renaissance. (4) II.

Lecture—4 hours. European art from the seventh through the sixteenth centuries: Sutton-Hoo, Constantinople, Aachen, Hildesheim, Chartres, Salisbury, Florence, Siena, Rome, Venice; Giotto, the van Eycks, Brunelleschi, Donatello, Piero della Francesca, Botticelli, Leonardo, Michelangelo, Titian, Dürer, and El Greco. Mr. Harbison

1C. History of Art: Post-Renaissance to the Present. (4) III.

Lecture—4 hours. Development of art in Europe after the Reformation. In addition to a consideration of the works of the major masters—Caravaggio, Rembrandt, Bernini, Goya, Blake, Gericault, Monet, Seurat, etc., consideration will be given to the ways in which the various masters have contributed to the development of visual perception.

1D. History of Art: Oriental Art. (4) III.

Lecture—4 hours. The art of India, China, and Japan. Mr. Crowley

2. Elementary Form and Color. (4) I, II, III.

Laboratory—12 hours. Form in composition using black and white media. Introduction to color in composition. The Staff

3. Intermediate Form and Color. (4) I, II, III.

Laboratory—12 hours. Prerequisite: course 2. Color and form in composition. The Staff

4. Introductory Figure Painting. (4) I, II, III.

Laboratory—12 hours. Prerequisite: course 2. Form in composition, with the human figure as subject. The Staff

10. Introduction to Art: History and Appreciation.

(3) II.

Lecture—3 hours. The understanding and appreciation of painting, sculpture, architecture, and industrial art. Illustrated lectures. Intended for students not specializing in art.

11. Introduction to Art: Practice. (3) I, II, III.

Lecture—1 hour; laboratory—4 hours; 2 hours to be arranged. Individual explorations in various media. Intended for students not specializing in Art. Not open for credit to students who have had Art 2, 14, or 16. The Staff

14. Elementary Sculpture. (4) I, II, III.

Laboratory—12 hours. Form in space using clay and plaster. The Staff

16. Descriptive Drawing and Rendering. (4) I, II.

Lecture—1 hour; laboratory—6 hours. Methods of objective drawing and of space description; rendering in various media.

Upper Division Courses

Group A: Practice of Art

101. Painting: Materials and Carriers. (4) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 3. Experimentation in media and their supports.

102. Advanced Drawing and Painting. (4) I, II, III.

Laboratory—8 hours, 1 hour to be arranged. Prerequisite: courses 3, 4. Drawing and painting in various media including oil and polymers. May be repeated for credit. The Staff

104. Advanced Form and Figure Composition.

(4) I, II, III.

Laboratory—8 hours, 1 hour to be arranged. Prerequisite: course 4. Problems of light, color and space that involve the human figure and its environment. May be repeated for credit.

The Staff

110. Photography. (4) II.

Laboratory—9 hours. Prerequisite: course 3 or 128A. Photography as a creative medium using the view camera and the miniature camera.

112A. Ceramics. (4) I, II, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 2 or 14. Ceramics; introduction to ceramic forms and processes.

Mr. Arneson

112B. Ceramics. (4) II, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 112A. Ceramics; introduction to ceramic color and glaze.

Mr. Arneson

121A. Architectural Design. (4) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: two quarters in art practice or design; or consent of instructor. Studio projects in architectural design.

Mr. Cramer

121B. Architectural Design. (4) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 121A. Studio projects in architectural design.

Mr. Cramer

***121C. Architectural Design. (4) III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 121B. Studio projects in architectural design.

Mr. Cramer

128A. Graphic Arts. (4) I, II, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: 2 courses in art practice. Beginning practice and theory of printmaking; practice in traditional and experimental methods in relief and silk-screen printmaking, related to discussion of aesthetics of graphic form. Mr. Shapiro

128B. Graphic Arts. (4) II, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 128A. Practice and theory of traditional and experimental methods of intaglio printmaking; etching, engraving, aquatint, and innovative techniques and materials.

Mr. Shapiro

128C. Graphic Arts. (4) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 128A. Practice and theory of traditional and experimental methods of lithographic printmaking.

Mr. Shapiro

141. Sculpture: Materials and Methods. (4) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 14. Influences of material and technique on sculptural forms; clay, wood, metal, plastics.

Mrs. Horsting

142. Figure Sculpture. (4) III.

Lecture—1 hour; laboratory—6 hours; 1 hour to be arranged. Prerequisite: course 141; course 4 recommended. The human figure in sculpture. May be repeated for credit. The Staff

143. Casting Techniques and Theories of Cast Sculpture. (4) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 14. Sculpture in various casting techniques and media. May be repeated for credit.

Mr. Giambruni, Mrs. Horsting

144. Advanced Sculpture. (4) III.

Laboratory—8 hours; 1 hour to be arranged. Prerequisite: course 141. Advanced sculptural projects in various media.

The Staff

146. Ceramic Sculpture. (4) III.

Laboratory—8 hours; 1 hour to be arranged. Prerequisite: course 112B. Clay as material for sculpture in round and relief. May be repeated for credit.

Mr. Arneson

*Group B: Theory and Criticism****147. Visual Symbols. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 1C, 1D. Nature and function of visual symbols. Origin, development and use in various artistic forms: mandalas, sand-paintings, religious architecture, computer design, etc. Emphasis on transformation of traditional symbols in contemporary usage.

148. Theory and Criticism: Painting and Sculpture. (4) II.

Lecture—3 hours; term paper required. Prerequisite: course 2 or 14, and one art lecture course. Study of forms and symbols in historic and contemporary masterpieces. Mr. Thiebaud

149. Theory and Criticism: Architecture. (4) III.

Lecture—3 hours; seminar paper. Prerequisite: course 2 or 14; one art lecture course. Aesthetic theories of design styles, historic and contemporary.

Mr. Cramer

*Group C: History of Art***150. The Arts of Africa, Oceania, and Prehistoric Europe. (4) I.**

Lecture—3 hours. The traditional arts of Africa and Oceania and of the prehistoric and folk populations of Europe and Asia in their cultural contexts.

Mr. Crowley

151. The Arts of the Indians of the Americas. (4) II.

Lecture—3 hours. Arts of the extinct societies of Mexico, Peru, and related regions, and contemporary Indian arts and crafts.

Mr. Crowley

154A. Greek Art: The Helladic through Archaic Periods. (4) I.

Lecture—3 hours. The art of Classical Greece to the Persian invasions. The Geometric, Ori-

* Not to be given, 1971-72.

talizing, and Archaic styles: the Doric temple, black- and red-figure vase painting, the *Kore* and *Kouros*. Corinth, Selinus, Paestum, Polymedes, Kleitias, Exekias, Epictetus, Euthymides, Kritios, and Kalamis.

Mr. Howard

154B. Greek Art: The Gold and Silver Ages. (4) II.

Lecture—3 hours. Greek art from the time of Pericles to that of Alexander: Olympia, the Athenian Acropolis, Bassae, Epidaurus, Halicarnassus; Myron, Phidias, Polykleitos, the Achilles Painter, Praxiteles, and Scopas.

Mr. Howard

154C. Greek Art: The Hellenistic Age. (4) III.

Lecture—3 hours. Art in the Greek world from 322 B.C. until the time of Imperial Rome: Pergamum, Alexandria, Priene, and Delos—Lysippos, Polyeuctus, Boethus, Agesander, Philoxenus, and Nikeratus.

Mr. Howard

155. Roman Art. (4) I.

Lecture—3 hours. The art of Republican and Imperial Rome, its buildings, portraiture, historic reliefs, and murals: Pompeii, Nimes, Praeneste, Ostia, Baalbeck, Palmyra, Petra, Spoleto, Trier; Forum Romanum, Ara Pacis, Pont du Gard, Colosseum, Pantheon, Baths of Caracalla, and the Arch of Constantine.

Mr. Howard

***160. History of Minor Art. (4) I.**

Lecture—3 hours. Great periods, masters, and masterworks of minor art, such as Tutankhamen's throne, harp of Ur, Tanagra figurines, Portland vase, Bayeux tapestry, Suger's chalice, Majolica; Pisanello, Cellini, Chippendale, Adam, Wedgwood, Morris, Tiffany, Eames, and others.

162. History of Graphic Media. (4) III.

Lecture—3 hours. The development of multiple copy image processes from the late Medieval Period to the present: book illustration, popular prints, graphics as "High Art," photography, advertising. Emphasis will be placed on understanding the relation between technique and perceptual effect.

Mr. Harbison

168. The History of Urban Form. (4) III.

Lecture—3 hours. An historical investigation of the evolution of great cities; physical forms of town planning in the past as a guide to modern urban developments. Consideration of Rome, Constantinople, Venice, Paris, London, and New York. The relation of European and American planning concepts. Field trips.

Mr. Baird

176A. Art of the Middle Ages: Early Christian to Romanesque. (4) I.

Lecture—3 hours. The art of Christian Europe from the founding of Constantinople to the tenth century; the early Christian, Byzantine, Carolingian, and Ottonian periods; the

* Not to be given, 1971-72.

Basilica of St. Peter's, St. Mark's in Venice, Hagia Sophia, St. Gall, Sutton-Hoo, and the Lindisfarne Gospels.

Mr. Fehm

176B. Art of the Middle Ages: Romanesque through Gothic. (4) II.

Lecture—3 hours. The arts in Christian Europe from the eleventh to the fifteenth centuries: St. Sernin, Gislebertus, Poitiers, Caen, St. Ambrose, St. Denis, Chartres, Rheims, Salisbury, Cologne, Santa Croce, Strasbourg, Naumburg, Claus Sluter, and Villard de Honnecourt.

Mr. Fehm

177A. Northern Renaissance Art. (4) I.

Lecture—3 hours. Art of the Lowlands in the fifteenth and sixteenth centuries. The van Eycks, Master of Flemalle, Roger van der Weyden, Bouts, Geertgen, Bosch, and Bruegel.

Mr. Harbison

177B. Northern Renaissance Art. (4) III.

Lecture—3 hours. Art between the Rhine and the Danube in the fifteenth and sixteenth centuries: Multscher, Riemenschneider, Witz, Schongauer, Dürer, Grunwald, Cranach, Alt dorfer, and Holbein.

Mr. Harbison

178A. Italian Renaissance Art. (4) I.

Lecture—3 hours. Art of the Trecento: Nicola and Giovanni Pisano, Cimabue, Giotto, Duccio, the Lorenzetti, Simone Martini. Emphasis on Assisi, Florence, and Siena.

Mr. Fehm

178B. Italian Renaissance Art. (4) II.

Lecture—3 hours. Art of the fifteenth century: Ghiberti, Brunelleschi. Masaccio, Donatello, Fra Angelico, Piero della Francesca, Botticelli, Mantegna, and the Bellini. Emphasis on Florence, Northern Italy, and Venice.

178C. Italian Renaissance Art. (4) III.

Lecture—3 hours. Art of the sixteenth century: Leonardo, Michelangelo, Raphael, Bramante, Giorgione, Titian, Correggio, Pontormo, and Tintoretto. Emphasis on Rome, Florence, and Venice.

178D. Italian Architecture: Late Medieval through Renaissance. (4) I.

Lecture—3 hours; term paper. Architecture in Italy from the thirteenth through sixteenth centuries: the development of mendicant churches, cathedrals, civic buildings, private dwellings and fortifications, with emphasis on Florence, Pisa, Rome, and Venice. Included will be Giotto, Brunelleschi, Bramante, Michaelangelo and Palladio.

Mr. Fehm

179A. Baroque Art. (4) I.

Lecture—3 hours. Architecture, sculpture, and art of the garden, from formative stages of the Baroque in the sixteenth century to creation of the Rococo. Emphasis on western Europe; prototypes and developments. Bernini, Mansart, and other major artistic personalities.

Mr. Baird

179B. Baroque Art. (4) I.

Lecture—3 hours. Painting from 1590 to 1720. Such Italian, Spanish, Flemish, French, and English masters as Caravaggio, Velasquez, Rubens, Van Dyck, Claude, and Poussin will receive particular attention. Some attention to painting and drawing for the theater and other spectacles.

Mr. Harbison

183A. Developmental History of Media and Visual Perception: the Industrial Age. (4) I.

Lecture—3 hours. A historical consideration of interrelationships in the development of visual media—painting, photography, and graphics—as they reflect the development of visual perception from the late eighteenth to the mid-nineteenth centuries. The influence of media technics on visual experience. (Passed/Not Passed grading only.)

183B. Developmental History of Media and Visual Perception: the Age of Materialism. (4) II.

Lecture—3 hours. Visual media from the Impressionist painters to the First World War: painting, photography, graphics, and advertising art. The influence on art of its mutual development with science in altering the nature of art in the twentieth century. (Passed/Not Passed grading only.)

183C. Developmental History of Media and Visual Perception: into the Space Age. (4) III.

Lecture—3 hours. Visual media from World War I to the present. The continuing development of interrelationships among the various media and an examination of the changing concept/function of art in terms of perceptual immediacy.

***183D. Modern Sculpture. (4) I.**

Lecture—3 hours; gallery projects; examination. Masters, modes, and styles of perception, representation, and construction in "sculptural" media since ca. 1750. (Passed/Not Passed grading only.)

Mr. Howard

184. Architecture in the Twentieth Century. (4) II.

Lecture—3 hours. The forms and substyles of modern architecture, with emphasis on the development of organicism in the works of Frank Lloyd Wright and of the international style in the work of Le Corbusier and Mies van der Rohe.

Mr. Cramer

188A. The Art of Latin America. (4) I.

Lecture—3 hours. Emphasis on architecture, sculpture, and paintings of Mexico from colonial times to the present; the American Southwest, colonial art in Peru, and eighteenth century to modern architecture in Brazil. European backgrounds and creative originality in the New World.

Mr. Baird

188B. The Art of the United States. (4) I.

Lecture—3 hours. A survey of three centuries of American building arts, with emphasis on colonial, Georgian, nineteenth and twentieth century architecture. Particular attention to California (especially northern California). Field trips.

Mr. Baird

188C. The Art of the United States. (4) II.

Lecture—3 hours. Emphasis on painting and sculpture. The great eras from colonial to contemporary; notable masters and schools. Special attention to pictorial art since 1850; some attention to the leading figures in California of the later nineteenth and early twentieth centuries. Field trips.

Special Study Courses**198. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Cramer in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Cramer in charge)

Graduate Courses**201. Experiments in Art and Visual Communication.**

(4) I, II, III.

Lecture—3 hours. Original work produced for class discussion and criticism. May be repeated for credit.

The Staff

202. Sculpture in Selected Media. (4) I, II, III.

Lecture—3 hours. Original work produced for class discussion and criticism. May be repeated for credit.

The Staff

250. Principles of Art Historical Research. (3) I.

Seminar—3 hours. Major historic bibliographical sources and reference materials. Use of national and international facilities for research, including intercampus potential of U.C. and other libraries of California. Techniques of research in specialized fields; language problems. Methods of illustration for published papers and books; forms of printing. Required for M.A. candidates in History of Art.

The Staff

251. Seminar in Primitive Art. (3) I.

Seminar—3 hours. Selected areas of special study in the arts of Africa, Oceania, and Prehistoric Europe; in certain years, study of the Indians of the Americas, pre-Conquest to contemporary.

Mr. Crowley

***254. Seminar in Ancient Art: Greece. (3) I.**

Seminar—3 hours. Selected areas of special study in Greek art from Helladic to later Hellenistic.

Mr. Howard

* Not to be given, 1971-72.

***255. Seminar in Ancient Art: Rome. (3) II.**

Seminar—3 hours. Selected areas of special study in Roman art from Republican to late Imperial.
Mr. Howard

***276. Seminar in Medieval Art. (3) II.**

Seminar—3 hours. Selected areas of special study in medieval art from Early Christian to late Gothic.
Mr. Fehm

***277. Seminar in Northern Renaissance Art. (3) II.**

Seminar—3 hours. Selected areas of special study in Netherlandish and German art of the fifteenth and sixteenth centuries. Mr. Harbison

***278. Seminar in Italian Renaissance Art. (3) II.**

Seminar—3 hours. Selected areas of special study in Italian art from trecento to cinquecento.

***279. Seminar in Baroque Art. (3) III.**

Seminar—3 hours. Selected areas of special study in Baroque art from late sixteenth to late eighteenth centuries.
Mr. Baird

***283. Seminar in Modern European Art. (3) III.**

Seminar—3 hours. Selected areas of special study in art since 1800 in Europe.

***288. Seminar in American Art. (3) III.**

Seminar—3 hours. Selected areas of special study in art in the United States from colonial times to the present.
Mr. Baird

290. Seminar. (4) I, II, III.

Seminar—3 hours. Original works produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit.

The Staff (Graduate Adviser in charge)

291. Seminar: Critical Evaluation. (1) I, II, III.

Seminar—1 hour. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.)

The Staff (Graduate Adviser in charge)

292. Seminar: Comprehensive Qualifying.**(1) I, II, III.**

Seminar—1 hour. A further critical evaluation of the student's work to determine his eligibility to begin the Comprehensive Project. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.)

The Staff (Graduate Adviser in charge)

299. Individual Study. (1-6) I, II, III.

The Staff (Graduate Adviser in charge)

299D. Comprehensive Project. (9) I, II, III.

An original body of work accompanied by a catalog summarizing the student's aesthetic position. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.)

The Staff (Graduate Adviser in charge)

Professional Courses**300. Practice and Principles of Art Education.****(3) I, II, III.**

Lecture—2 hours; laboratory—4 hours. Prerequisite: senior or graduate standing; or consent of instructor. Art education and practice of techniques used in elementary and secondary schools.

Mrs. Garritson

401. Museum Training: Curatorial Principles. (3) I.

Seminar—3 hours. Study of private and public collections. Museum personalities. Appraisal of works of art; ethics of appraisal. Auction and sales: methods and catalogues. Registration. Technical problems of the museum. Connoisseurship. Collateral reading. Visits to museums. Seminar with assigned papers.

Mr. Baird

***402. Museum Training: Exhibition Methods. (3) II.**

Seminar—3 hours. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms. Seminar and exhibition.

Mr. Baird

***403. Museum Training: Historic Materials and Techniques. (3) III.**

Seminar—3 hours. Examination of works of art with emphasis on materials and methods of construction: wall paintings, panel paintings, paintings on cloth, drawings, ceramics, metals, etc. Experimentation in constructing works of art from historical writings. Collateral reading. Visits to museums.

***404. Museum Training: Problems of Conservation. (3) I.**

Seminar—3 hours. Examination of works of art with emphasis on physical condition. Typical problems in preservation and restoration. Ethics and aesthetics of museum conservation. Demonstrations of scientific methods. Collateral reading. Visits to museums. Seminar and assigned papers.

ASIAN AMERICAN STUDIES

Related Undergraduate Major.—See page 63. Questions pertaining to the following courses

* Not to be given, 1971-72.

should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses**1C-2C-3C. Elementary Standard Cantonese.**

(4-4-4) I, II, III.

Lecture—3 hours; laboratory—2 hours.
(Same course as Oriental Languages 1C-2C-3C.)

Mr. Leung

33. The Asian Experience in America. (3) I.

Lecture—2 hours; discussion—1 hour. A general consideration of Asians in America, past and present. The Staff (Mr. Kagiwada in charge)

Upper Division Courses**100. Ecology of Asian American Communities. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 33 or consent of instructor. Political and social status, occupation, income, education, health, housing, and civic culture of various Asian American communities in the United States; segregation in interrelations between geographical groups, relations between rich and poor, patronism, exploitation; mobility within each ethnic group.

Mr. Kagiwada

ASTRONOMY—See Physics**ATMOSPHERIC SCIENCE**

Major Advisers.—See *Schedule and Directory listing.*

Major Program.—See pages 62 and 73.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses**20. Introduction to Meteorology. (3) III.**

Lecture—3 hours. Prerequisite: Mathematics 21B or equivalent. Basic concepts of modern meteorology: weather and weather elements, atmospheric circulations, clouds, precipitation, radiation, instruments and observations, meteorological satellites.

Mr. Morgan

20L. Introduction to Meteorology Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 20 (preferably taken concurrently). Introduction to meteorological instruments and observations; weather station visits; weather maps and charts; special films on weather modification, air pollution, and atmospheric circulation; physical experiments illustrating atmospheric phenomena.

Mr. Morgan

Upper Division Courses**110A. Weather Analysis and Forecasting. (3) II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 121A (may be taken concurrently). Theory and practice of three-dimensional scalar and vector analysis as applied to

110. Asian Americans: A Case Study in Inter-Ethnic Relations. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 33 or consent of instructor. A study of prejudices, intermarriages, economical and political interaction between Asian American ethnic groups, of Asian Americans with other non-Asian ethnic groups, and with the larger society.

Mr. Kagiwada

111. Alienation and the Asian American. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 33 or consent of instructor. An examination of self-awareness, alienation, and life perspective of Asians in America. Emphasis will be placed on the problems of identity formation of Asian Americans.

Mr. Kagiwada

140. Speech Patterns of Asian Americans. (4) II, I.

Lecture—4 hours. A general introduction to bilingualism as a social issue; survey of bilingual communities, problems of bilingual speakers, linguistic effects of bilingualism, particularly the effects of Asian languages in the speech patterns of Asian Americans.

Mr. Kagiwada

atmospheric circulations. Physics, structure, and evolution of large-scale weather systems. Techniques of drawing weather maps.

Mr. Carroll, Mr. Morgan

110B. Weather Analysis and Forecasting. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 110A. Application of dynamic theory to atmospheric weather systems. Graphical integration techniques applied to weather maps. Beginning of numerical forecasting techniques.

Mr. Myrup

110C. Weather Analysis and Forecasting. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 110B. Numerical forecasting techniques applied to the general circulation of the atmosphere. The World Weather Watch and its requirements. Use and limitations of satellite data. Long-range forecasting.

Mr. Carroll

120. Atmospheric Thermodynamics and Statics. (3) I.

Lecture—3 hours. Prerequisite: Mathematics 22C, Physics 4B. The atmosphere at rest: atmospheric composition and structure, thermodynamics of atmospheric gases, thermal properties of dry and moist air, hydrostatic equilibrium and stability criteria, and thermodynamic diagrams in meteorology.

Mr. Myrup

121A. Atmospheric Dynamics. (3) II.

Lecture—3 hours. Prerequisite: course 120. The atmosphere in motion: the equations of

motion for rotating atmospheres; pressure and density fields and their relations to atmospheric circulations; wave motion in the atmosphere; vorticity. The physical basis of modern numerical methods in meteorology. Mr. Myrup

121B. Atmospheric Dynamics. (3) III.

Lecture—3 hours. Prerequisite: course 121A. The dynamics of fluid motion in geophysical and laboratory systems: Rossby waves; Helmholtz waves; the effect of turbulence; boundary layers; the Ekman layer. The dynamics of convective motion: the Rayleigh problem; penetrative convection; convective plumes; cumulus models. Mr. Myrup

***122. Atmospheric Radiation. (3) I.**

Lecture—3 hours. Prerequisite: Mathematics 22C, Physics 4C. Basic laws of radiation; properties of solar radiation; absorption, reflection and scattering in atmosphere; planetary albedo; absorption and emission by atmospheric gases and aerosols; atmospheric energy budget. Mr. Coulson

123. Micrometeorology. (3) III.

Lecture—3 hours. Prerequisite: Mathematics 16B or equivalent. Properties of the atmosphere near the earth's surface: frictional effects, mass and energy transfers across the surface-atmosphere interface, and the effect of these in modifying the localized environment. Mr. Coulson

124. Meteorological Instruments and Observations. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 20 or equivalent. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included.

131. Airborne Particulates. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 13; course 20 or Agricultural Engineering 107 recommended. Atmospheric sampling techniques and instrumentation, statistical evaluation of data. Sources of particulates—natural, agricultural, municipal, industrial. Interaction of particles with their atmospheric environment and their importance to health, agriculture, etc. Control of particulates: technology, economics, legislation. Mr. Akesson

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: three upper division units in Atmospheric Science.

The Staff (Mr. Carroll in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Prerequisite: three upper division units in Atmospheric Science and at least an overall B

average. The Staff (Mr. Carroll in charge)

Graduate Courses

***215. Atmospheric Processes. (3) III.**

Lecture—3 hours. Prerequisite: graduate standing in atmospheric science or consent of instructor. Dynamics of the general circulation of the atmosphere, structure of weather systems, atmospheric energy budgets, mass momentum and radiative transfers, observational network and methods of measurement. Mr. Coulson

***221. Advanced Atmospheric Dynamics. (3) I.**

Lecture—3 hours. Prerequisite: course 110C, Mathematics 22B. Dynamics of sub-synoptic scale atmospheric flows with emphasis on: the effect of vertical density gradients on shear flow stability, wake generation and gravity waves; circulations in response to local horizontal density gradients; cumulus cloud dynamics and local severe weather. Mr. Carroll

***222. Radiation in Planetary Atmospheres. (3) II.**

Lecture—3 hours. Prerequisite: course 122 or equivalent. Theory and observations of radiation in planetary atmospheres. Absorption, transmission, scattering by atmospheric gases, aerosols, and clouds; gaseous emission; effects of surface reflection; radiative energy budget of the atmosphere and of the planet as a whole; methods of measurement. Mr. Coulson

***223. Advanced Micrometeorology. (3) I.**

Lecture—3 hours. Prerequisite: course 123 and 121B or equivalent. Turbulent transfer of momentum, heat and moisture in the atmospheric boundary layer. Stability parameters. Air/sea interaction. Numerical boundary layer models. Micrometeorology of plant canopies and cities. Microclimate modification. Turbulent diffusion in the atmospheric boundary layer. Mr. Myrup

***230. Atmospheric Turbulence. (3) II.**

Lecture—3 hours. Prerequisite: course 223 or equivalent. Dynamics and energetics of turbulent motion: transition to turbulence, energy dissipation, kinetic energy and thermal variance equations, convective and mechanical turbulence, integral methods. Statistical methods: probability density function, moments, spectral analysis. The Kolmogoroff theory: spectrum, structure function and diffusion predictions. Mr. Myrup

240. Physical Climatology. (3) I.

Lecture—3 hours. Prerequisite: course 123 or equivalent. Causes of climatic phenomena including the heat and water balance of the earth-atmosphere system and application of the physical principles involved to general climatology, agrometeorology and hydrology. Offered in odd-numbered years. Mr. Morgan

* Not to be given, 1971-72.

AVIAN MEDICINE—See Epidemiology and Preventive Medicine

AVIAN SCIENCES

Major Advisers.—See *Schedule and Directory* listing.

Major Program and Graduate Study.—See pages 62, 65 and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses

10. Poultry Production. (4) II.

Lecture—4 hours. A survey of principles and practices involved in poultry production. Designed for students not specializing in avian sciences. Mr. Ogasawara

11. Laboratory in Poultry Production. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 10 (may be taken concurrently) or consent of instructor. Laboratory studies in poultry biology; techniques and economics of poultry production. Mr. Ogasawara

12. Survey of Poultry and Allied Industries. (3) III.

Lecture—2 hours; conference—1 hour. A survey of industries concerned with poultry products in the U.S.A. and various regions of the world: hatchery industry, feed industry, egg and meat production, poultry products, specialized enterprises. Mr. Peterson

13. Birds, Man, and the Environment. (2) III.

Lecture—2 hours. Birds in the world of man: folklore, art, literature, uniqueness, domestication, recreation, game birds, zoos, falconry, endangered species, public health, in research, as food sources. The Staff (Mr. Grau in charge)

13L. Birds, Man, and the Environment: Laboratory. (1) III.

Laboratory—3 hours. Demonstrations and field trips for students enrolled concurrently in course 13. The Staff (Mr. Grau in charge)

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Grau in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor. Problems in avian biology; nutrition, breeding, and physiology of poultry and their products. The Staff (Mr. Grau in charge)

Upper Division Courses

102. Fertility and Hatchability in Birds. (3) III.

Lecture—2 hours; two field trips. Prerequisite: Biology 1, Chemistry 8A. Reproduction in domestic and wild bird species. The influences of

genetic, environmental and behavioral factors on embryonic development; special emphasis on the effects of diet, drugs, and pesticides.

Mrs. Abbott

121. Birds and Their Eggs as Food. (3) I.

Lecture—3 hours; demonstrations. Prerequisite: consent of instructor. Recommended: Biochemistry 101B. Avian products as food considered from the physical, chemical and nutritional aspects. Factors affecting processing, preservation and quality.

Mr. Peterson, Mr. Brant

149. Environmental Management of Poultry. (1) III.

Lecture—1 hour. Prerequisite: Physiology 149 (may be taken concurrently). Application of physiological principles to environmental management of poultry.

Mr. W. O. Wilson

150. Comparative Nutrition of Avian Species. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biology 1 and Chemistry 8A or consent of instructor. Comparison of digestive tracts, food habits, effects of nutrients on growth, sexual maturity, egg production, fertility and hatchability of eggs of wild and domestic species of birds. Effects of pesticides and other non-nutrient substances on their life cycles.

Mr. Vohra

190. Proseminar in Avian Science. (1) I, II, III.

Seminar—1 hour. Prerequisite: senior standing in avian sciences or consent of instructor.

Mr. Grau

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Grau in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

(1-5) I, II, III.

Prerequisite: consent of instructor. Problems in avian biology related to nutrition, breeding, and physiology of poultry and their products.

The Staff (Mr. Grau in charge)

Graduate Courses

202L. Laboratory in Avian Experimental Embryology and Teratology. (3) II.

Laboratory—9 hours. Prerequisite: consent of instructor. The 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 odd-numbered years.

Mrs. Abbott

290. Seminar. (1) I, II, III.

Seminar—1 hour. Reports and discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology.

The Staff (Mr. Grau in charge)

298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Grau in charge)

BACTERIOLOGYHerman J. Phaff, Ph.D., *Chairman of the Department*

Department Office, 156 Hutchison Hall

Professors:

Robert E. Hungate, Ph.D.

John L. Ingraham, Ph.D.

Allen G. Marr, Ph.D.

Herman J. Phaff, Ph.D. (*Bacteriology and Food Science and Technology*)

Mortimer P. Starr, Ph.D.

Associate Professors:

David Pratt, Ph.D.

Donald M. Reynolds, Ph.D.

Assistant Professors:

Donald P. Kessler, Ph.D.

Mark L. Wheelis, Ph.D.

**Professor:**Martin W. Miller, Ph.D. (*Food Science and Technology*)**Lecturer:**

Wiltraud P. Segel, Ph.D.

Major Advisers.—Mr. Hungate, Mr. Kessler.**The Major Program**

The undergraduate major programs provide a balance of studies in the biology of bacteria and other microorganisms together with appropriate courses in mathematics and physical science. The Bachelor of Science program offers greater emphasis in mathematics and physical science. Both the Bachelor of Arts program and the Bachelor of Science program are suitable for students who plan to do graduate work in a biological science or who wish a professional career in bacteriology.

Either major is appropriate for students contemplating a career in Medical Technology. Such students are advised to take Veterinary Microbiology 127 and 128 and a year laboratory course in physics in addition to the courses required for a major in bacteriology.

Bachelor of Arts Major Program

Lower Division Courses.—Biology 1; Botany 2 or Zoology 2; Chemistry 1A-1B-1C, 5, 8A-8B; Mathematics 16A-16B and either 13, 16C, or 36A-36B; Physics 2A-2B-2C.

Upper Division Courses.—Bacteriology 105, 105L, 106, 130A-130B, and either 106L or 130L; Biochemistry and Biophysics 101A-101B-101L; Genetics 100A-100B; and one course from the following group: Bacteriology

299. Research. (1-12) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Grau in charge)

150; Biology 162; Botany 114, 118, 119; Zoology 110; and two additional units in bacteriology which may include Veterinary Microbiology 127.

Bachelor of Science Major Program

Lower Division Courses.—Biology 1; Chemistry 1A-1B-1C, 5; Mathematics 13, 21A-21B-21C; Physics 4A-4C-4D. Recommended: elementary course in French or German.

Upper Division Courses.—Bacteriology 105, 105L, 106, 130A-130B, and either 106L or 130L; Biochemistry and Biophysics 101A-101B-101L; three quarters of physical chemistry; Chemistry 112A-112D-112E; Genetics 100A-100B; Genetics 102 or Biology 162.

***Honors and Honors Program* (see page 149).**

Graduate Study (see page 171).—The Graduate Group in Microbiology offers programs of study and research leading to the M.A. and Ph.D. degrees in general microbiology, including bacteriology. The offerings of the Department of Bacteriology are augmented by courses and faculty of the Departments of Biochemistry and Biophysics, Botany, Food Science and Technology, Genetics, Viticulture and Enology, and the Schools of Veterinary Medicine and of Medicine. For detailed information regarding graduate study in microbiology, address the Chairman, Graduate Group in Microbiology, Department of Bacteriology.

Teaching Major.—Requirements for the principal teaching major are the same as those for the departmental major.

Teaching Minor.—30 units selected from the A.B. or B.S. Bacteriology major programs, as approved by the Department Subject Representative.

Subject Representative: Mr. Phaff

Lower Division Courses**2. Introduction to Bacteriology. (4) I, II, III.**

Lecture—3 hours; demonstration/discussion—1 hour. Prerequisite: Biology 1. A general introduction to the biology of bacteria. This course is designed primarily as a terminal course.

I. Mrs. Segel; II. Mr. Kessler; III. Mr. Wheelis

3. Bacteriological Laboratory Techniques.

(1) I, II, III.

Laboratory—3 hours. Prerequisite: course 2 (may be taken concurrently). Designed to acquaint the student with the general techniques

of bacteriology, with the major responsibility for organizing and accomplishing the work resting on the student. (Passed/Not passed grading only.)
Mrs. Segel

98. Directed Group Study. (1-5) I, II, III.

Lecture—1-5 hours. Prerequisite: consent of instructor. The Staff (Mr. Phaff in charge)

Upper Division Courses

101. Microbiology and Society. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; introductory courses in biology and chemistry recommended. Microbes and microbiology, with particular attention to human welfare and experience. Nature and classification of microbes. Ways in which microbes aid, harm, and otherwise affect man, including environmental, literary, historical, intellectual, aesthetic, ethical, legal, economic, and political aspects. Mr. Starr

105. Bacterial Diversity. (2) I.

Lecture—2 hours. Prerequisite: Biology 1, Chemistry 8B or 112A; concurrent enrollment in course 105L; course 106 is recommended. Bacterial diversity, with emphasis on morphology, systematics, and ecology. Survey of the major groups of bacteria. Mr. Starr

105L. Bacterial Diversity Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: concurrent enrollment in course 105; course 106 is recommended. Microscopy. Pure culture and enrichment techniques. Selected topics in morphology, systematics, ecology, and metabolism of bacteria, with emphasis on aerobes.

Mr. Starr, Mr. Hungate

106. Bacterial Metabolism. (2) I.

Lecture—2 hours. Prerequisite: Biology 1, Chemistry 8B or 112A; concurrent enrollment in courses 105 and 105L. Bacterial diversity, with emphasis on comparative metabolism.

Mr. Hungate

106L. Bacterial Metabolism Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: courses 105, 105L, and 106. Isolation of anaerobic bacteria and quantitative identification of their fermentation products. Mr. Hungate, Mr. Starr

130A. Bacterial Physiology. (3) II.

Lecture—3 hours. Prerequisite: a bacteriology course including laboratory, Mathematics 16A or 21A, Genetics 100A, Biochemistry 101B (may be taken concurrently). Growth and structure of bacteria, isolation of mutants and genetic analysis, effects of the physical and chemical environment, regulation of enzyme activity.

Messrs. Ingraham, Kessler, Wheelis

130B. Bacterial Physiology. (3) III.

Lecture—3 hours. Prerequisite: course 130A. Regulation of gene expression, control of macromolecular synthesis, episomes, comparative genetics of bacteria.

Messrs. Kessler, Ingraham, Wheelis

130L. Bacterial Physiology Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 130A. Physiology and genetics of bacteria and bacterial viruses.

Messrs. Kessler,

Ingraham, Marr, Pratt, Wheelis

150. Protistology. (3) II.

Lecture—3 hours. Prerequisite, a bacteriology course including laboratory and Botany 2 or Zoology 2. A survey of protozoa and yeasts, including selected physiological topics.

Mr. Hungate, Mr. Phaff

151. Protistology Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 150 (may be taken concurrently). Experiments on the taxonomy, physiology, and ecology of selected yeasts and protozoa.

Mr. Hungate, Mr. Phaff

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Phaff in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Phaff in charge)

Graduate Courses

205. Bacterial Diversity and Ecology. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: courses 105 and 105L (preferably taken concurrently). Intensive study of selected microorganisms and habitats in relation to diversification factors.

Mr. Starr

206. Bacterial Taxonomy. (2) I.

Lecture—2 hours. Prerequisite: courses 105, 105L, and 205 are recommended. Principles and procedures of bacterial taxonomy. Mr. Starr

207. Microbial Ecology. (2) II.

Lecture and discussion—2 hours. Prerequisite: courses 105 and 106 or equivalent. Analysis of microbial participation in various ecosystems with a view toward formulation of quantitatively descriptive models. Mr. Hungate

230. Bacterial Physiology. (2) III.

Lecture—2 hours. Prerequisite: course 130B; Biochemistry 101B; course 170 recommended. Economics of bacterial growth; biochemical and genetic regulation of metabolism.

Mr. Ingraham, Mr. Marr

250. Yeasts and Related Organisms. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: a laboratory course in bacteriology, botany, biochemistry, and consent of instructor. Recommended: a course in cryptogamic botany. Morphology, development, classification, and distribution of yeasts; relation to other fungi; growth requirements; physiological activities.

Mr. Phaff, Mr. Miller

291. Seminar in General Microbiology. (1) III.

Seminar—1 hour. A review and discussion of the current literature and developments in the field of microbiology with presentations by individual students. (Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Phaff in charge)

292. Seminar in Bacterial Physiology. (1) I, II, III.

Seminar—1 hour. A review and discussion of the current literature and developments in bacterial physiology with presentations by individual students. (Satisfactory/Unsatisfactory grading only.)

Mr. Marr, Mr. Ingraham

293. Seminar in Bacterial Genetics. (1) I, II, III.

Seminar—1 hour. A review and discussion of the current literature and developments in bacterial genetics with presentations by individual students. (Satisfactory/Unsatisfactory grading only.)

Mr. Kessler

294. Seminar in Bacterial Virology. (1) I, II, III.

Seminar—1 hour. Prerequisite: consent of instructor. An examination of current topics in the structure, replication, and genetics of bacterial viruses. (Satisfactory/Unsatisfactory grading only.)

Mr. Pratt

295. Seminar in Microbial Ecology. (1) I, III.

Seminar—1 hour. Prerequisite: consent of instructor. A review and discussion of the current literature in the ecology of protists and bacteria with presentations by individual students. (Satisfactory/Unsatisfactory grading only.)

Mr. Hungate

298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Phaff in charge)

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Phaff in charge)

For other courses related to Bacteriology see the course offerings in the Departments of Food Science and Technology, Veterinary Microbiology, Medical Microbiology, Epidemiology and Preventive Medicine, Botany, Plant Pathology, and Biology.

BEHAVIORAL BIOLOGY—See Medicine

BIOCHEMISTRY (A Graduate Group)

Eric E. Conn, Ph.D., *Chairman of the Group*

Group Office, 5206 Storer Hall

Graduate Study.—The Graduate Group in Biochemistry offers programs of study and research leading to the M.A. and Ph.D. degrees. For detailed information regarding graduate study in biochemistry address the chairman of the group.

Graduate Courses

290. Seminar. (1) I, II, III.

Seminar—1 hour. Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Conn in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Conn in charge)

BIOCHEMISTRY AND BIOPHYSICS

Major Advisers.—See *Schedule and Directory* listing.

Major Program and Graduate Study.—See pages 62, 74 and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Upper Division Courses**101A. General Biochemistry. (3) I, II.**

Lecture—3 hours. Prerequisite: Chemistry 8B or 112B. Recommended: introductory course in bacteriology, botany, or zoology. Introduction to the chemistry and metabolism of biologically important compounds; dynamic aspects of biochemistry with examples from animals, plants, and microorganisms.

Mr. Conn, Miss Etzler, Mr. Segel

101B. General Biochemistry. (3) II, III.

Lecture—3 hours. Prerequisite: course 101A. A continuation of 101A.

Mr. Conn, Miss Etzler, Mr. Segel

101L. General Biochemistry Laboratory. (5) I, III.

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 101B (may be taken concurrently); Chemistry 5. Introduction to laboratory methods and procedures employed in studying biochemical processes. Designed for students who require limited experience in the use of biochemical techniques as laboratory tools.

Messrs. Criddle, Preiss, Toliver

102. Animal Biochemistry Laboratory. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biochemistry 101B (may be taken concurrently). Laboratory procedures employed in the study of physiological and biochemical processes.

Mr. Baldwin

Mr. Dahmus, Mr. Toliver

122. Plant Biochemistry. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 101B. The chemistry of important plant constituents and processes such as photosynthesis and respiration; carbohydrate, fat, and nitrogen metabolism.

Mr. Conn, Mr. Stumpf

190. Proseminar in Biochemistry. (1) I, II, III.

Seminar—1 hour. Prerequisite: consent of instructor. Discussion of the historical developments of modern biochemistry.

The Staff (Mr. Segel in charge)

194H. Special Study for Honors Students. (1-5)

I, II, III.

Prerequisite: open only to majors of senior standing on honors list. Independent study of selected topics under the direction of a member of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Segel in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Stumpf in charge)

Graduate Courses**201A-201B-201C. Advanced General Biochemistry.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 101B or consent of instructor; Chemistry 109B or 110C, 112C. Physical and chemical properties of amino acids, proteins, lipids, carbohydrates and nucleic acids; methods of isolating proteins; enzymes, including kinetics, cofactors, and type reactions; and the study of organized cell structures. The Staff (Mr. Bruening in charge)

202A-202B. Advanced Biochemistry Laboratory.

(6-6) I-II.

Lecture—1 hour; laboratory—15 hours. Prerequisite: course 201A; Chemistry 5. Laboratory methods and procedures used in biochemical research. Critical evaluation of experimental design and data is stressed.

The Staff (Mr. Bruening in charge)

203. Carbohydrates. (3) III.

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. The chemistry, metabolism, and biological functions of the various classes of carbohydrates and their polymers. Biosynthesis of simple and complex sugars and polysaccharides. Offered in odd-numbered years.

Mr. Preiss

204. Nucleic Acids. (3) I.

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. The physical and biological properties of nucleic acids; biosynthetic pathways; metabolism and structure of bases, nucleotides and their occurrence and distribution. The relation of structure and function of RNA and DNA to heredity, coding, and protein synthesis. Offered in odd-numbered years.

Messrs. Bruening, Dahmus

205. Biochemical Mechanisms. (3) II.

Lecture—3 hours. Prerequisite: course 101B or consent of instructor; Chemistry 110C, 131. Bond structures of biochemical interest. Application of modern organic and inorganic chemical principles to a study of the mechanisms of biochemical reactions.

Mr. Ingraham

206. Physical Biochemistry of Macromolecules.

(3) I.

Lecture—3 hours. Prerequisite: course 201C or consent of instructor; Chemistry 110C. Application of modern physical concepts and experimental methods to the problems of large molecules of biological interest. Offered in even-numbered years.

Mr. Criddle

207. Lipids. (3) III.

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. A discussion of the chemistry, metabolism and experimental methodology unique to fatty acids, triglycerides, phospholipids, plasmalogens, sphingolipids, carotenoids and steroids. Offered in even-numbered years.

Mr. Stumpf

210. Protein Biochemistry. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 201C. Chemical, physical, and biological properties of amino acids, peptides, and proteins. The biological aspects include protein function, biosynthetic and biodegradative pathways, and nutritional requirements for amino acids.

Mr. Geschwind

215. Kinetics of Biological Systems. (2) III.

Lecture—2 hours. Prerequisite: course 201B; Fortran IV (may be taken concurrently). The kinetic behavior of multivariable biological systems; mathematical methods and analysis of typical 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. Mr. Ingraham

***225. Science, the Scientist, and Society. (2) II.**

Discussion—2 hours. Prerequisite: two years of graduate work and consent of instructor. Readings and discussions on the attitudes and values of scientists toward themselves, science, and society. Scientists and ethics, responsibilities, prejudices; the organization, teaching, and publication of science; basic versus applied research; science and art creativity, societal control of science; antiscience. Mr. Hedrick

230. Biochemical Aspects of Endocrinology. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101B; Physiology 110B. The chemistry and

BIOLOGICAL SCIENCES

S. R. Snow, Ph.D., Associate Dean of Biological Sciences

Division Office, 150 Mrak Hall

Major advisers.—See Schedule and Directory.

The Major Program

The major programs in biological sciences provide the opportunity to study a broader area of biology than is possible with most departmental programs. The programs prepare for a career in professions such as teacher, laboratory technician, medical technologist, etc. Both Plan I and Plan II serve as a basis for training in professional schools (Medicine, Dentistry, Pharmacy, etc.) and for graduate study leading to advanced degrees and careers in research. Plan II should be selected by those interested in the study of the chemical and molecular aspects of life. Students who follow Plan I and

* Not to be given, 1971-1972.

function of animal hormones, with special reference to the isolation and structure of those of vertebrate origin. Assay, mechanism of action, biosynthesis, and metabolism of hormones. Biochemical lesions in congenital and other endocrinopathies. Offered in odd-numbered years.

Mr. Geschwind

240. Selected Topics in Biochemistry. (2) I.

Lecture—2 hours. Prerequisite: course 201C or consent of instructor. (Satisfactory/Unsatisfactory grading only.)

Mr. Stumpf

250. Biochemical Literature. (1) I, II, III.

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Critical reading and evaluation of the current biochemical literature. Selected papers will be presented and discussed in detail. (Satisfactory/Unsatisfactory grading only.)

Mr. Dahmus

270. Advanced Research Conference. (1) I, II, III.

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Presentation and critical discussions of the research activities of various members of the local biochemical community; primarily designed for graduate students. (Satisfactory/Unsatisfactory grading only.)

Mr. Stumpf

291. Current Progress in Biochemistry. (1) I, II, III.

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Seminars presented by guest lecturers on the subject of their own research activities. (Satisfactory/Unsatisfactory grading only.)

Mr. Cridle

299. Research. (1-12) I, II, III.

The Staff (Mr. Stumpf in charge)

are interested in a career as laboratory technician, admission to professional schools or graduate work in physiology or chemical biology should consider taking Chemistry 5 and a year laboratory course in physics. For those contemplating medical technology, Veterinary Microbiology 127 and courses such as medical microbiology and parasitology are recommended in addition to the above.

Bachelor of Arts Major Program

Lower Division Courses.—Required: Bacteriology 2; Biology 1; Botany 2; Chemistry 1A-1B, 8A-8B; Zoology 2; 6 units of mathematics. Recommended: Chemistry 1C; Geology 3; Physics 2A-2B-2C or equivalent.

Upper Division Courses.—Required: A total

of 36 units in biological sciences including Genetics 100A–100B; and at least one course or course sequence from each of the following groups including one course each in plant biology, and animal biology and one in animal science:

a) Organismal Biology.—Bacteriology 105, 105L, 150, 151; Botany 105, 108, 114, 118, 119; Entomology 101, 103; Zoology 100, 106A, 106B, 110, 112, 133A, 133B, 135, 136, 137.

b) Population Biology and Ecology.—Botany 117, 141; Entomology 104; Genetics 105; Zoology 116, 125, 147.

c) Evolutionary Biology.—Botany 116, 140 (same as Geology 140); Genetics 103; Geology 107; Zoology 148.

d) Physiology.—Physiology 101, 101L; 110A–110B; Bacteriology 106, 106L, 130A, 130B, 130L; Botany 111; Entomology 102; Physiological Sciences 140A–140B; Zoology 142.

e) Cell Biology.—Physiology 100A–100B, 103; Botany 130A (same as Zoology 130A); Zoology 120, 121A, 121B.

Bachelor of Science Major Program, Plan I

Lower Division Courses.—Required: Bacteriology 2; Biology 1; Botany 2; Chemistry 1A–1B–1C or 4A–4B–4C, and 8A–8B or 112A–112B–112C or 112A–112D–112E; Mathematics 16A–16B–16C, and 13 or 131A; Physics 2A–2B–2C; Zoology 2. Recommended: Chemistry 5; Geology 3; Physics 3A–3B–3C.

Upper Division Courses.—Required: A total of 45 units in biological sciences including Biochemistry 101A–101B or Physiological Sciences 101A–101B, and Genetics 100A–100B; and one course or course sequence from each of the following groups including one course each in animal biology, microbiology, and plant biology:

(Same as *a* through *e* under Bachelor of Arts major program above.)

Bachelor of Science Major Program, Plan II

Lower Division Courses.—Required: Bacteriology 2; Biology 1; Botany 2; Chemistry 1A–1B–1C and 5, or 4A–4B–4C; Mathematics 21A–21B–21C and 13 or 131A; Physics 4A–4B–4C–4D–4E; Zoology 2. Recommended: Geology 3; Mathematics 22A, 22B, 22C.

Upper Division Courses.—Required: A total of 45 units in biological sciences including Bio-

chemistry 101A–101B–101L or Physiological Sciences 101A–101B–102A; Chemistry 109A–109B or 110A–110B–110C and 112A–112B–112C or 112A–112D–112E; Genetics 100A–100B; and one course from groups *a*, *b*, and *c* and one course from group *d* or *e*.

(Same as *a* through *e* under Bachelor of Arts major program above.)

The Honors Program.—Students on the honor list may enroll in an Honors Program of courses leading to honors with the bachelor's degree (see page 149).

A special study course (194H) involving either independent research or reading on an appropriate topic, followed by preparation of an honors thesis (course 195H) based primarily on the work done in the prerequisite course, must be completed.

Teaching Major.—A degree in Biological Sciences satisfies the requirement for a teaching major in the life sciences for both elementary and secondary teaching credentials, except that for the elementary credential Entomology 1 or 10 must be included.

Teaching Minor.—A minimum of 30 units of biology, including the undergraduate core: Biology 1, Botany 2, Zoology 2, and Bacteriology 2.

Subject Representative: Mr. Murphy (Botany)

Upper Division Courses

189. Integration of Biological Concepts. (3–6)

Lecture—2 hours; discussion—1 hour. Prerequisite: twenty upper division units in biology. A detailed examination in depth of the coherence of biology through a study of several unifying themes, for example, evolution. Mr. Stebbins

194H. Special Study for Honors Students. (3–6) I, II, III.

Prerequisite: enrollment limited to honors students. Independent research and/or reading on selected topics.

The Staff (Mr. Snow in charge)

195H. Honors Thesis. (2) I, II, III.

Prerequisite: course 194H. Preparation of comprehensive thesis incorporating studies undertaken in course 194H.

The Staff (Mr. Snow in charge)

BIOLOGICAL CHEMISTRY—See Medicine

BIOLOGY (Interdepartmental Courses)

Biology courses offered jointly by two or more departments or groups are listed below.

Lower Division Courses

1. Principles of Biology. (6) I, II, III.

Lecture—4 hours; laboratory—6 hours. Prerequisite: Chemistry 1B. An interdisciplinary

course designed for majors in the biological sciences. Emphasis on the unity of basic biological principles as related to cell structure and function, reproduction, genetics, growth and differentiation, evolution, ecology, and taxonomy.

- I. Mr. Thornton, Mr. Murphy (Botany)
- II. Mr. Pratt (Bacteriology)
- III. ——— (Zoology)

10. General Biology. (4) I, III.

Lecture—3 hours; discussion—1 hour. Not open for credit to those who have had course 1. Consideration of the main features and principles of biology, with emphasis on biological processes and special reference to evolution,

heredity, and the bearing of biology on human life. Designed for students not specializing in biology.

- I. Mr. Ketellapper (Botany)
- III. Mr. Spieth (Zoology)

Upper Division Course

162. General Virology. (3) II.

Lecture—3 hours. Prerequisite: course 1; Genetics 100A and Biochemistry 101B recommended. An integrated presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication and genetics.

- Mr. Bruening (Biochemistry),
- Mr. Shalla (Plant Pathology),
- Mr. Pratt (Bacteriology)

BOTANY

C. Ralph Stocking, Ph.D., *Chairman of the Department*

Department Office, 143 Robbins Hall

Professors:

- Floyd M. Ashton, Ph.D.
- Daniel I. Axelrod, Ph.D.
- Paul A. Castelfranco, Ph.D.
- Alden S. Crafts, Ph.D., LL.D. (*Emeritus*)
- Herbert B. Currier, Ph.D.
- Elizabeth G. Cutter, Ph.D., D.Sc.
- E-nest M. Gifford, Jr., Ph.D.
- Hendrik J. Ketellapper, Ph.D.
- C. Ralph Stocking, Ph.D.
- ¹John M. Tucker, Ph.D.
- Grady L. Webster, Ph.D.
- T. Elliot Weier, Ph.D. (*Emeritus*)

Associate Professors:

- Bruce A. Bonner, Ph.D.
- ²Donald W. Kyhos, Ph.D.
- Norma J. Lang, Ph.D.
- Jack Major, Ph.D.
- ³Kenneth Wells, Ph.D.

Assistant Professors:

- ²⁴Michael G. Barbour, Ph.D.
- Richard H. Falk, Ph.D.
- Terence M. Murphy, Ph.D.
- Robert F. Norris, Ph.D.
- Thomas E. Ragland, Ph.D.
- Robert M. Thornton, Ph.D.

◇ ◇ ◇

Lecturers:

- David E. Bayer, Ph.D.
- Oliver A. Leonard, Ph.D.

Departmental Major Adviser.—Mr. Wells

The Major Programs

The Bachelor of Science major program should be elected by those students who plan advanced study in botany, who wish to obtain general

secondary teaching credentials, or who wish training for a position requiring a detailed knowledge of plants. Students who wish a less intensive program in botany, but one that acquaints the students with plant life and its importance, should elect the Bachelor of Arts major program.

Bachelor of Science Major Program

Lower Division Courses.—Required: Bacteriology 2; Biology 1; Botany 2; Zoology 2; Chemistry 1A, 1B, 1C, 8A, 8B; Physics 2A, 2B, 2C; Mathematics 13. German, French or Russian is the recommended language. Recommended: Chemistry 5; Mathematics 16A, 16B, 16C, especially for those students whose major interests are ecological, biochemical or physiological.

Upper Division Courses.—Required: Biochemistry 101A, 101B; Botany 105, 108, 111, 116; Genetics 100A, 100B; in addition, students whose interests are morphological or taxonomic are required to take Botany 118 and 119, students whose interests are ecological are required to take Botany 114 and 117, students whose interests are biochemical or physiological are required to take Botany 114 and 5 additional upper division units in botany or related natural science courses.

Bachelor of Arts Major Program

Lower Division Courses.—Required: Biology 1; Botany 2; Chemistry 1A, 1B, 8A, 8B; Zoology 2. Recommended: Bacteriology 2; Chemistry 1C; Mathematics 13.

Upper Division Courses.—Required: Botany 105, 108, 111, 116; Genetics 100A, 100B; 10 additional units in botany or related natural science courses. Recommended: Botany 114 or 118, 119.

¹ Absent on leave, 1971-72.

² Absent on leave, winter quarter 1972.

⁴ Absent on leave, spring quarter 1972.

Honors and Honors Program (see page 149).—Students on the honors list may elect to substitute a maximum 5 units of 194H for 5 upper division units of the regular major; however, recommendations for high honors and highest honors at graduation are not dependent on the completion of 194H.

Teaching Major.—The requirements for the teaching major are the same as for the departmental major for degree (A.B. or B.S.).

Teaching Minor.—Botany 2; and a minimum of 23 units in botany or closely related subjects. Students must consult with subject representative.

Subject Representative: Mr. Wells

Graduate Study.—Graduate programs leading to M.S., and Ph.D. degrees are offered in cytology, plant physiology, anatomy, morphology, taxonomy, ecology, mycology, phycology, and allied areas. The resources of the department are augmented by appropriate courses in related departments.

Lower Division Courses

2. General Botany. (5) I, II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biology 1. Structure, physiology, and taxonomy of plants, with special emphasis on seed plants.

I. Mr. Kyhos
II. Mr. Bonner, III. Mr. Ketellapper

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Stocking in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Stocking in charge)

Upper Division Courses

101. Survey of Biotic Communities of California. (3) III.

Lecture—2 hours; weekend field trips—8 to 10 days. Prerequisite: upper division standing, consent of instructor; course 2 recommended. The structure of selected plant communities and the relationship of their component species to the environment.

The Staff (Mr. Webster in charge)

105. Plant Anatomy. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Structure and growth of meristems; development and structure of cells, tissues and tissue systems; comparative anatomy of stem, root, and leaf.

Miss Cutter

107. Weed Control. (4) III.

Lecture—2 hours; laboratory—6 hours; 2 field trips. Prerequisite: course 2; Chemistry 8B. Introduction to the physiological and chemical principles underlying control of weeds; prin-

ciples of preventive, cultural, and biological weed control; identification of common weeds.

Mr. Norris

108. Systematic Botany of Flowering Plants. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Laboratory and field studies of the characters and relationships of the principal families and orders of flowering plants. Principles of taxonomy. Practice in identification of species by means of keys.

111. Introduction to Plant Physiology. (5) I.

Lecture—5 hours. Prerequisite: course 2; Chemistry 8B (may be taken concurrently). The fundamental activities of plants such as absorption, transpiration, synthesis of foods, respiration, growth, and reproduction.

Mr. Stocking

*111L. Introductory Plant Physiology Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 111. Experiments designed to illustrate basic principles considered in course 111. The Staff

114. Biology of Fungi and Algae. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Not open for credit to students having received credit for courses 118, 119A, or 119B. An introduction to the morphology, taxonomy, evolution, and physiology of the fungi and the algae.

Miss Lang

*115. Mosses and Liverworts. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 2. Morphology, taxonomy, and ecology of mosses and liverworts. Field trips.

116. Organization and Phylogeny of Vascular Plants. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2; course 105 recommended. Structure, reproduction, and phylogeny of the major groups of living and extinct vascular plants; special emphasis given to seed plants.

Mr. Gifford

117. Plant Ecology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 111. Study of individual plants, species, and vegetation in relation to environment and of modification of the environment by vegetation.

Mr. Major

118. Phycology. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Morphology, physiology, genetics, evolution, distribution, cultivation, and economic importance of algae; field trip.

Miss Lang

* Not to be given, 1971-72.

119. Introductory Mycology. (5) I.

Lecture—3 hours; laboratory—6 hours; field trip. Prerequisite: course 2 or Bacteriology 2. Introduction to structure, ontogeny, and taxonomy of selected species of the major taxa of *Myxomycota* and *Eumycota*.

130A. General Cytology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2 or Zoology 2; Genetics 100B or Biochemistry 101A. An analysis of the structure and ultrastructure of cells; the relationship between structure and function at cellular and subcellular levels. Consideration of cell particulates, membranes, endoplasmic reticulum, mitochondria, plastids, the golgi zone and their relationship to the metabolic nucleus. (Same course as Zoology 130A.) Mr. Falk, Mr. Wolfe

130B. General Cytology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 130A. An analysis of the structure and function of cells during mitosis, meiosis, gametogenesis and fertilization at cellular and subcellular levels. (Same course as Zoology 130B.) Mr. Falk, Mr. Wolfe

140. Paleobotany. (5) III.

Lecture—2 hours; laboratory—6 hours; two all-day field trips, one 3-day field trip. Prerequisite: senior standing. Guiding principles underlying an analysis of successive floral assemblages in Cenozoic and Cretaceous rocks. Development of modern vegetation with emphasis on centers of origin and radiation, rates of evolution, and community evolution. (Same course as Geology 140.) Mr. Axelrod

141. Plant Geography. (3) II.

Lecture—3 hours. Prerequisite: course 108 or 116, course 117 recommended; or consent of instructor. Analysis of the distribution patterns of the vascular plant groups, and consideration of the factors which account for the present diversity of flora and vegetation. Mr. Webster

155. Plant Microtechnique. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 116 or course 105. Introduction to practical laboratory methods in preparing plant materials for microscopic examination; special emphasis on paraffin and chromosome smear techniques; introduction to techniques of tissue culture and photomicrography.

Mr. Gifford, Mr. Falk

180. Biological Evaluation of Herbicides. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 107 and 111 (may be taken concurrently). Principles dealing with the physical, chemical, and physiological aspects of herbicides. Laboratory, greenhouse and field studies illustrating these principles in herbicide evaluation; emphasis upon biological assays and upon the interpretation of biological data. Mr. Bayer

194H. Special Study for Honors Students. (1-5)

I, II, III.

Prerequisite: open only to majors of senior standing on honors list. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Stocking in charge)

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Stocking in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Stocking in charge)

Graduate Courses

201A. Ecological Theory. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: a course in ecology. The course will focus on the ecologic community as a unit. The major generalizations concerning the structure and functioning of the community will be examined together with the generalizations relating both structure and function to the abiotic environment and its fluctuations. (Same course as Ecology, Geology, and Zoology 201A.)

The Staff (Mr. Salt and Mr. Major in charge)

201B. Analysis of a Selected Ecosystem. (3) II.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 201A or consent of instructor. Application of basic ecological principles to the interpretation of biotic and abiotic interrelationships of a particular ecosystem. Recent advances in theory, technique, and basic information are emphasized. Lectures will be given by specialists from several fields. May be repeated for credit. (Same course as Ecology, Geology, and Zoology 201B)

The Staff (Chairman in charge)

201C. The Changing Biosphere. (3) III.

Lecture—2 hours; 1 assigned problem. Prerequisite: courses 201A, 201B; or consent of instructor. Course deals with changing gas balance and weather in the biosphere and effects on plants and animals, the effects of structural, chemical and physical changes of living systems, changes in species diversity, effects on human population increase, and related topics. (Same course as Ecology, Geology, and Zoology 201C.)

The Staff (Chairman in charge)

205A. Advanced Plant Physiology. (3) I.

Lecture—3 hours. Prerequisite: course 111, Biochemistry 101A (may be taken concurrently). Cellular physiology, plant water relations, and translocation.

Mr. Currier

205B. Advanced Plant Physiology. (3) II.

Lecture—3 hours. Prerequisite: course 111, Biochemistry 101B (may be taken concurrently). Mineral nutrition, photosynthesis, respiration, and general plant metabolism.

Mr. Ragland, Mr. Murphy

205C. Advanced Plant Physiology. (3) III.

Lecture—3 hours. Prerequisite: course 111, Biochemistry 101A; courses 205A and 205B, Biochemistry 101B recommended. Internal and environmental regulation of plant growth and development.

Mr. Bonner

206A. Advanced Plant Physiology Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: course 205A (may be taken concurrently). Laboratory procedures in advanced plant physiology. Experiments designed to follow subject-matter sequence of course 205A.

Mr. Currier

206B. Advanced Plant Physiology Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 205B (may be taken concurrently), Chemistry 5. Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205B.

Mr. Ragland

206C. Advanced Plant Physiology Laboratory. (2)

III.

Laboratory—6 hours. Prerequisite: course 205C (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205C.

Mr. Bonner

***210. Cell Physiology-Plasmatics. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Selected plant physiological topics treated on the cellular level: water relations, plasmolytic phenomena, cytoplasmic movements, transport mechanisms, vital staining, responses of cells to high and low temperatures, wound reactions, effects of poisons. Microscopic techniques are stressed.

Mr. Currier

211. Plant Cell Metabolism. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: consent of instructor. Plant cell physiology, dealing particularly with the roles of plastids, mitochondria, microsomes, and nuclei in cellular metabolism. Isolation and study of these particulates, using centrifugation, gasometric, chromatographic, and spectroscopic methods. Detailed consideration of photosynthesis and respiration.

Mr. Castelfranco

212. Physiology of Herbicidal Action. (3) I.

Lecture—3 hours. Prerequisite: courses 107, 205A, 205B, 205C. A study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants and soils.

Mr. Ashton

215. Light and Plant Growth. (3) II.

Lecture—3 hours. Prerequisite: courses 205A, 205B, 205C; Physics 2B. Mechanisms and phenomena involved in the control of plant growth by light. Photoperiodism, photomorphogenesis, phototropism, and certain aspects of photosynthesis.

Mr. Bonner

216. Advanced Morphology of Vascular Plants.

(3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 116. Evolution of form, structure, and reproduction of fossil and extant types through Cycadophytes.

Mr. Gifford

217. Concept and Measurement of the Plant Community. (3) I.

Seminar-discussion—3 hours; term paper involving the application of some sampling and analytical methods. Prerequisite: course 117 and a course in statistics. Major subject areas are: 1) historical concepts of the plant community and of hierarchical groupings of communities, and 2) a review of sampling and analytical methods employed in the description or measurement of plant communities.

Mr. Barbour

218. Experimental Phycology. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 118. Special problems in development, physiology, and genetics using algae as experimental organisms. Topics to be investigated will be selected according to the interests of individual students.

Miss Lang

220. Plant Morphogenesis. (3) III.

Lecture—3 hours. Prerequisite: course 105 or 116; course 155 recommended. A survey of recent advances in the study of growth and the development of form, with special reference to higher plants, and some emphasis on experimental approaches.

Miss Cutter

220L. Plant Morphogenesis Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 220 (may be taken concurrently) and consent of instructor. Procedures, principally experimental, used to study the development of plant form.

Miss Cutter

221. Selected Topics in Plant Physiology. (2) I, II, III.

Lecture—2 hours. Evaluation of the most recent research in plant physiology. Coverage of the entire field in a three-year period. Lectures and discussions by specialists in the areas of their research interests. May be repeated for credit. (Satisfactory / Unsatisfactory grading only.)

I. Mr. Castelfranco;

II. Mr. Murphy; III. Mr. Currier

* Not to be given, 1971-72.

231. Biological Electron Microscopy. (3) II.

Lecture—1 hour; laboratory—8 hours. Prerequisite: consent of instructor. An introduction to biological electron microscopy. Areas to be covered are: electron optics, electron-specimen interactions, vacuum systems, specimen preparation, and microscope operation. Mr. Falk

***255. Principles of Plant Taxonomy. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 108; Genetics 103 recommended. Principles of plant taxonomy; phylogenetic vs. phenetic classification; examples of the way in which various disciplines—anatomy, embryology, biochemistry, etc.—elucidate problems of taxonomic relationship, mainly of genera and higher categories. Mr. Tucker

***256A. Experimental Plant Taxonomy. (2) II.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 108. Recommended: course 117; Genetics 103. The application of experimental techniques to the elucidation of taxonomic problems and evolutionary relationships in higher plants. Mr. Kyhos

***256B. Experimental Plant Taxonomy. (2) III.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 256A. A continuation of course 256A. The study of variation in natural populations in relation to taxonomy; the application of population sample analysis, cytogenetics, transplant studies, etc., to the solution of taxonomic problems and the clarification of relationships. Mr. Kyhos

***257. Plant Autecology. (3) I.**

Lecture—3 hours. Prerequisite: course 117, Mathematics 13. Evaluation of biotic and abiotic environmental factors in the distribution of plant species. Mr. Major

CANTONESE—See Oriental Languages**CHEMISTRY**

Raymond M. Keefer, Ph.D., *Chairman of the Department*

Department Office, 108 Chemistry Building

Professors:

Thomas L. Allen, Ph.D.
Lawrence J. Andrews, Ph.D.
Albert T. Bottini, Ph.D.
¹Robert K. Brinton, Ph.D.
Raymond M. Keefer, Ph.D.
Richard E. Kepner, Ph.D.
Charles P. Nash, Ph.D.
Edgar P. Painter, Ph.D.

^{*} Not to be given, 1971–1972.

¹ Absent on leave, 1971–72.

³ Absent on leave, winter quarter 1972.

⁴ Absent on leave, spring quarter 1972.

258. Plant Syncology. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 108, 117; Soil Science 120A recommended. Theories and techniques involved in the study of structure, composition, boundaries, ecology, and classification of vegetation, with particular emphasis on California plant communities. Mr. Major

***290. Seminar. (1) I, II, III.**

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

291. Seminar in Plant Morphology. (1) I, II.

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.) I. Miss Lang; II. Miss Cutter

292. Seminar in Plant Physiology. (1) I, III.

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

I. Mr. Ragland; III. Mr. Thornton

293. Seminar in Weed Science. (1) II.

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.) Mr. Leonard

294. Seminar in Cytology and Cytobiochemistry.

(1) III.

Seminar—1 hour. Survey of current research developments in the fields of cytology and biochemistry with special reference to plants. Discussion of the fine structure of cells in relation to biochemical function. (Satisfactory/Unsatisfactory grading only.) Mr. Falk

298. Group Study. (1–5) I, II, III.

The Staff (Chairman in charge)

299. Research. (1–9) I, II, III.

The Staff (Chairman in charge)

Harold G. Reiber, Ph.D. (*Emeritus*)

^{3,4}Leo H. Sommer, Ph.D.

David H. Volman, Ph.D.

George S. Zweifel, Sc.D.

Associate Professors:

^{3,4}Edwin C. Friedrich, Ph.D.

Rodney E. Harrington, Ph.D.

¹Hakon Hope, Cand. real

W. Kenneth Musker, Ph.D.

Peter A. Rock, Ph.D.

John W. Root, Ph.D.

James H. Swinehart, Ph.D.

Assistant Professors:

Alan L. Balch, Ph.D.
 William H. Fink, Ph.D.
 Kenneth G. Hancock, Ph.D.
 Joel E. Keizer, Ph.D.
 R. Bryan Miller, Ph.D.
 Dino S. Tinti, Ph.D.
 James S. Vincent, Ph.D.

Major Subject Advisers.—Mr. Fink, Mr. Hancock, Mr. Harrington, Mr. Kepner, Mr. Painter, Mr. Vincent.

The Major Programs

Students who are interested in chemistry as a profession should elect the program leading to the Bachelor of Science degree. Certification of the degree by the American Chemical Society requires that in addition the student acquire a reading knowledge of German or Russian. Students desiring a less intensive program in chemistry should elect the program leading to the Bachelor of Arts degree. 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 degree is simplified if their high school programs include chemistry and four years of mathematics.

Candidates for the bachelors' degree in chemistry will receive upper division credit for those lower division chemistry courses accepted in lieu of upper division courses required for the major.

Bachelor of Science Major Program

Lower Division Courses.—Required: Chemistry 1A, 1B, 1C, 5 or 4A-4B-4C; Physics 4A, 4B, 4C, 4D, 4E; Mathematics 11, 21A, 21B, 21C, 22B, and either 22A or 22C.

Upper Division Courses.—Required: Chemistry 110A, 110B, 110C, 111A, 111B, 112A, 112B, 112C, 124, and 8 units of any additional courses in chemistry (one of which must include laboratory work) except Chemistry 109A or 109B.

Bachelor of Arts Major Program

Lower Division Courses.—Required: Chemistry 1A, 1B, 1C, 5 or 4A-4B-4C; Physics 2A, 2B, 2C, 3A, 3B, 3C; Mathematics 11, 21A, 21B, 21C, or 16A, 16B, 16C.

Upper Division Courses.—Required: 36 units in chemistry, biochemistry, or physics, including Chemistry 110A, 110B, 110C, 112A, 112B, and 112C or 112E.

Honors and Honors Program (see page 149).—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.

Teaching Major.—The teaching major is satisfied by either the A.B. or B.S. major in chemistry.

Teaching Minor.—Chemistry 1A, 1B, 1C, 5, 8A, 8B, 109A, 109B. With the approval of the representative some substitution may be permitted.

Subject Representative: Mr. Nash

Lower Division Courses**1A. General Chemistry. (5) I, II.**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: high school chemistry; or high school physics and three years of high school mathematics (with an average grade of B or higher); or second-quarter standing. Fundamental principles of chemistry. Stoichiometry, properties and theory of gases, first law of thermodynamics, atomic and molecular structure, colligative properties of solutions.

The Staff

(I. Mr. Keefer and
Mr. Allen in charge;
II. Mr. Tinti in charge)

1B. General Chemistry. (5) II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1A. Continuation of course 1A. Chemical equilibria, oxidation-reduction processes, electrochemistry, introduction to qualitative analysis.

The Staff (II. Mr. Musker and Mr. Swinehart in charge; III. Mr. Allen in charge)

1C. General Chemistry. (5) I, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1B. Continuation of course 1B. Chemical kinetics, structures and reactions of complex ions and molecules, application of principles of chemistry to problems of qualitative analysis. The Staff (I. Mr. Musker in charge; III. _____ in charge)

4A. General Chemistry. (5) I.

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Mathematics 21A or 16A (may be taken concurrently); high school chemistry or consent of instructor. An introduction to atomic and molecular structure and binding, states of matter, thermochemistry and chemical equilibria. Courses 4A-4B-4C are equivalent to course sequence 1A-1B-1C-5. The sequence 4A-4B-4C is accelerated for students majoring in the physical sciences or in engineering.

Mr. Tinti

4B. General Chemistry. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 4A. Continuation of course 4A. A quantitative treatment of chemical equilibria with applications to precipitation reac-

tions, acid-base reactions, complexation reactions, and oxidation-reduction reactions. Elementary electrochemistry and chemical kinetics. The laboratory will emphasize quantitative techniques.

Mr. Rock

4C. General Chemistry. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 4B. Continuation of course 4B. Topics in systematic inorganic chemistry, nuclear chemistry, introduction to organic chemistry and the functional group concept biological applications. The laboratory will emphasize qualitative analysis and preparative techniques.

Mr. Balch

5. Quantitative Analysis. (4) I, III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1C with grade of C or higher. Not open to students who have credit for Chemistry 4B. An introduction to the principles and methods of quantitative chemical analysis, with emphasis on the application of equilibrium theory to analytical problems.

I. Mr. Nash;
III. ———**8A. Organic Chemistry, Brief Course. (3) I, II, III.**

Lecture—3 hours. Prerequisite: course 1B with a grade of C or higher. With course 8B an introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for students majoring in areas other than chemistry.

I. Mr. Sommer, II. ———; III. ———

8B. Organic Chemistry, Brief Course. (3) II, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 8A. Continuation of course 8A. The laboratory is concerned primarily with the study of the properties and chemistry of the common classes of organic compounds.

II. Mr. Hancock, III. Mr. Reiber

10. Concepts of Chemistry. (4) I.

Lecture—3 hours; discussion—1 hour. Designed for the nonscience major. A survey of the important basic concepts and modern applications of chemistry. Not open to students who have credit for course 1A; students with credit for course 10 may take course 1A for full credit.

Mr. Friedrich

Upper Division Courses***109A. Physical Chemistry, Brief Course. (2) I.**

Lecture—2 hours. Prerequisite: course 5 or consent of instructor; Mathematics 21C and 11 or equivalent, or 16C; one year of college physics. Special topics in physical chemistry, with emphasis on spectroscopy, molecular structure, and principles of chemical thermodynamics. Intended for students majoring in areas other than chemistry.

Mr. Harrington

***109B. Physical Chemistry, Brief Course. (3) II.**

Lecture—3 hours. Prerequisite: course 109A or 110A. Continuation of course 109A, with emphasis on equilibrium, electrochemistry, and chemical kinetics.

Mr. Harrington

110A. Physical Chemistry. (3) I, III.

Lecture—3 hours. Prerequisite: course 5; Mathematics 21C and 11 or equivalent, or 16C; one year of college physics. A development of the principles of classical thermodynamics; emphasis on criteria for the existence and maintenance of equilibrium.

I. Mr. Rock, III. Mr. Volman

110B. Physical Chemistry. (3) I, II.

Lecture—3 hours. Prerequisite: course 110A. Continuation of course 110A. Atomic and molecular structure and spectra; the relation between molecular and thermodynamic properties.

I. Mr. Root; II. Mr. Allen, Mr. Fink

110C. Physical Chemistry. (3) II, III.

Lecture—3 hours. Prerequisite: course 110B. Continuation of course 110B with emphasis on solution thermodynamics, kinetic theory, and chemical kinetics.

II. Mr. Keefer; III. Mr. Nash

111A. Physical Chemistry: Methods and Applications. (4) I, II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 109B or 110C (may be taken concurrently). Lecture topics include statistical analysis and data processing, basic electronics, diffraction methods, and optical systems. Laboratory exercises will involve computer practice, thermodynamic measurements on nonelectrolyte systems, and structural properties of molecules.

I. Mr. Fink, II. Mr. Nash

111B. Physical Chemistry: Methods and Applications. (4) II, III.

Lecture—1 hour; laboratory—9 hours. Prerequisite: course 111A or consent of instructor. Lecture topics will include distribution equilibria and electroanalytical methods. Laboratory exercises will involve kinetics and mechanism, electrochemistry, distribution equilibria, chromatography, and elective projects.

II. Mr. Keizer, III. Mr. Tinti

112A. Organic Chemistry. (5) I, II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1C with a grade of C or higher. Introduction to the basic concepts of organic chemistry; the chemistry of hydrocarbons. Designed primarily for majors in chemistry.

I. Mr. Bottini, II. Mr. Reiber, III. Mr. Painter

112B. Organic Chemistry. (5) I, II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112A or 8B and 10. Continuation of course 112A 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.

I. Mr. Kepner, II. Mr. Miller, III. Mr. Bottini

^o Not to be given, 1971-1972.

112C. Organic Chemistry. (5) I, II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112B. Continuation of course 112B with emphasis on enolate condensations and the chemistry of amines and phenols; selected biologically important compounds.

I. Mr. Zweifel, II. Mr. Kepner, III. Mr. Hancock

112D. Organic Chemistry. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 112A or 8B and 10; and consent of instructor. Equivalent to the lecture part of 112B. Intended primarily for students in fields other than chemistry.

I. Mr. Kepner, II. Mr. Miller,
III. Mr. Bottini

112E. Organic Chemistry. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 112B or 112D; and consent of instructor. Equivalent to the lecture part of 112C. Intended primarily for students in fields other than chemistry.

I. Mr. Zweifel, II. Mr. Kepner,
III. Mr. Hancock

121. Introduction to Molecular Structure and Spectra. (4) III.

Lecture—4 hours. Prerequisite: course 110C. Modern theoretical and experimental methods used to study problems of molecular structure and binding; emphasis on spectroscopic techniques.

Mr. Vincent

124. Advanced Inorganic Chemistry. (4) I.

Lecture—4 hours. Prerequisite: course 109B or 110C; 112C or 112E. Modern interpretations of bonding, structure, and reactivity of inorganic compounds; emphasis on the chemistry of the first- and second-row elements and transition metals.

Mr. Balch

124L. Advanced Inorganic Chemistry Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 124. Synthesis and characterization of inorganic compounds.

126. Nuclear Chemistry. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110B (may be taken concurrently with consent of instructor). Introduction to experimental and theoretical nuclear chemistry including nuclear properties, nuclear spectroscopy, radiation effects, radioactive decay, and nuclear reactions. Both the lectures and the laboratory stress applications of nuclear phenomena in chemistry.

Mr. Root

130. Qualitative Organic Analysis. (4) III.

Lecture—1 hour; laboratory—9 hours. Prerequisite: course 5; 112C or 112E. The application of physical and chemical techniques to the qualitative identification of organic compounds.

Mr. Kepner

131. Advanced Organic Chemistry. (4) II.

Lecture—4 hours. Prerequisite: course 109B or 110B; 112C or 112E. Application of current knowledge of reaction mechanisms and molecular structure to problems of organic synthesis.

Mr. Zweifel

150A. Chemistry of Natural Products. (3) I.

Lecture—3 hours. Prerequisite: courses 109B and 112C or 112E, or consent of instructor. Chemistry of carbohydrates and lipids: structure proof, stereochemistry, conformation, substitutions, and rearrangements of model systems.

Mr. Painter

150B. Chemistry of Natural Products. (3) II.

Lecture—3 hours. Prerequisite: courses 109B and 112C or 112E, or consent of instructor. Structure, reactions, and physical properties of proteins, amino acids, nucleic acids, and related nitrogen compounds.

Mr. Painter

194H. Undergraduate Research. (2-5) I, II, III.

Prerequisite: course 110C (may be taken concurrently) and honors status. Original research and a written report of the investigation. Unit value to be determined by instructor supervising the research.

The Staff (Mr. Keefer in charge)

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics.

The Staff (Mr. Keefer in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. The Staff (Mr. Keefer in charge)

Graduate Courses**204. Chemical Kinetics. (3) III.**

Lecture—3 hours. Basic theories describing rate processes, with special emphasis on the interpretation of activation parameters. An intensive study of the relationship between rate law and mechanisms.

Mr. Swinehart

205. Quantum Chemistry I. (3) III.

Lecture—3 hours. Introduction to quantum chemistry, with emphasis on molecular electronic structure.

Mr. Vincent

206. Quantum Chemistry II. (3) III.

Lecture—3 hours. Prerequisite: course 205. A quantum mechanical description of the fundamental nature of the interaction between electromagnetic radiation and matter, emphasizing molecular spectroscopy; consideration of vibrational, rotational, electronic, and magnetic aspects. Offered in even-numbered years.

Mr. Fink

207. Quantum Chemistry III. (3) III.

Lecture—3 hours. Prerequisite: course 205. An advanced course in the quantum theory of molecular electronic structure. Offered in odd-numbered years. Mr. Fink

214. Chemical Thermodynamics. (4) I.

Lecture—4 hours. Development of thermodynamic relations; applications to chemical systems. Mr. Volman

215. Advanced Physical Chemistry—Statistical Methods. (3) III.

Lecture—3 hours. Prerequisite: course 214. Probability and statistical methods; introduction to partition functions and statistical thermodynamics; heat capacities; chemical equilibrium; statistical theory of reaction rates; liquids and solutions; matter in fields. Mr. Keizer

216. Statistical Thermodynamics. (3) I.

Lecture—3 hours. Prerequisite: course 215. Development of the laws of molecular assemblies; ensemble theory; fluctuations; imperfect gases; quantum effects; cooperative phenomena. Offered in even-numbered years. Mr. Keizer

219. Spectroscopy of Organic Compounds. (3) I.

Lecture—3 hours. Use of spectroscopy in organic chemistry for the identification of compounds and the investigation of stereochemical and reaction mechanism phenomena. Mr. Miller

220. Organic Chemistry. (3) III.

Lecture—3 hours. Selected topics of current interest concerning the structures and syntheses of naturally occurring organic compounds, including both carbocyclic and heterocyclic systems. Offered in odd-numbered years.

221A-H. Organic Chemistry. (3) II.

Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. The Staff

223. Organometallic Compounds. (3) III.

Lecture—3 hours. Selected topics of current interest concerning the preparation of organometallic compounds and their utilization in organic synthesis. Offered in even-numbered years. Mr. Zweifel

224. Inorganic Chemistry. (3) III.

Lecture—3 hours. Prerequisite: course 124. A development of the modern theories related to the structural, optical, and magnetic properties of inorganic compounds and complexes. Offered in odd-numbered years. Mr. Swinehart

225. Inorganic Chemistry. (3) III.

Lecture—3 hours. Prerequisite: course 124. Application of kinetic and thermodynamic principles to the interpretation of inorganic systems. Offered in even-numbered years. Mr. Musker

226. Advanced Nuclear Chemistry. (3) III.

Lecture—3 hours. Prerequisite: courses 126 and 205 or consent of instructor. Detailed discussion of nuclear models, decay processes, nuclear reactions, and interaction of radiations with matter with emphasis on chemical applications. Offered in odd-numbered years. Mr. Root

223. Physical Organic Chemistry. (3) I.

Lecture—3 hours. Modern concepts of substitution, elimination, and addition reactions, rearrangements, and stereochemistry.

Mr. Andrews

290. Seminar. (1) I, II, III.

Seminar—1 hour. Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grading only.)

Mr. Miller, Mr. Volman

298. Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

299. Research. (1-12) I, II, III.

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.

The Staff (Chairman in charge)

CHINESE—See Oriental Languages**CLASSICS**

Department Office, 615 Sproul Hall

Associate Professors:

Richard E. Grimm, Ph.D.
Wesley E. Thompson, Ph.D.

Assistant Professor:

Frederick H. van Doorninck, Jr., Ph.D.

**Assistant Professor:**

David H. Traill, M.A. (*Acting*)

The Major Program—Greek

Lower Division Courses.—Required: Greek 1, 2, and 3 or their equivalents. Recommended: Latin 1, 2, and 3.

Upper Division Courses.—Required: 36 units

of upper division courses of which two may be chosen from department-approved courses in other fields. Students majoring in Greek must maintain at least a C average in upper division courses.

The Major Program—Latin

Lower Division Courses.—Required: Latin 1, 2, 3, and 4 or their equivalents.

Upper Division Courses.—Required: at least 36 units of upper division courses, including 121A–121B.

Graduate Study.—M.A. degree.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Requirements for the teaching minor in Latin: Latin 1, 2, 3, 4 or their equivalents; at least 18 units of upper division work, including Latin 121A–121B. Recommended: History 111C.

Subject Representative: Mr. Grimm

Classics

Lower Division Courses

*10. Greek and Roman Mythology. (3) I.

Lecture—3 hours. Origin and development of myths and legends, their place in the religion, literature, and art of Greece and Rome.

Mr. Thompson

17A. Greek Archaeology. (3) I.

Lecture—3 hours. Greece, Crete, and the Aegean world during the Bronze Age with emphasis on the Minoan and Mycenaean civilizations. Consideration of certain aspects of Homeric civilization in light of the archaeological remains.

Mr. van Doorninck

17B. Greek Archaeology. (3) II.

Lecture—3 hours. The archaeological monuments of Archaic and Classical Greece. Selections from Greek literature are related to the archaeological remains.

Mr. van Doorninck

*17C. Roman Archaeology. (3) III.

Lecture—3 hours. The development of Rome and its Empire as illustrated by the monuments.

Mr. van Doorninck

40. Homer and the Tradition of Ancient Epic. (3) I.

Lecture—3 hours. Reading in translation of the *Iliad* and *Odyssey*. Homer's influence on Vergil. Lectures on the development of ancient epic. Offered in odd-numbered years. Mr. Grimm

41. Greek Tragedy. (3) III.

Lecture—3 hours. Reading in translation of selected plays of Aeschylus, Sophocles, and Euripides. Lectures on the development and influence of Athenian tragedy.

Mr. Grimm

* Not to be given, 1971–72.

Upper Division Courses

*139B. Greek Literature in Translation. (3) II.

Lecture—3 hours. The development of historical writing in Greece: Herodotus, Thucydides, and selections from the minor historians. Offered in even-numbered years. Mr. Thompson

*141. Greek and Roman Comedy. (4) II.

Lecture—3 hours. Readings in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. Offered in odd-numbered years.

Mr. Grimm

*150. Athenian Political and Social Institutions. (3) II.

Lecture—2 hours; discussion—1 hour. Politics and government, marriage and kinship, religious societies, and the demographic and economic basis of Athenian democracy. Offered in odd-numbered years.

Mr. Thompson

*174. Ancient Greek Sanctuaries. (4) III.

Lecture-discussion—4 hours. Prerequisite: course 17B or consent of instructor. The history, cults, and monuments of Olympia, Delphi, and other sanctuaries. Student reports on major monuments. Offered in even-numbered years.

Mr. van Doorninck

*175. Topography and Monuments of Ancient Athens. (4) III.

Lecture-discussion—4 hours. Prerequisite: course 17A–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 excavational evidence. Offered in odd-numbered years.

Mr. van Doorninck

Graduate Courses

201. Introduction to Classical Philology. (4) I.

Seminar—3 hours. A survey of major contemporary areas of classical scholarship with special attention devoted to current problems in literary and textual criticism. Mr. Thompson

202. Homer. (4) III.

Seminar—3 hours. Readings in the *Iliad* and *Odyssey*; the origins and transmission of the poems.

Mr. van Doorninck

203. Vergil. (4) II.

Seminar—3 hours. Reading of selected books of the *Bucolics*, *Georgics*, and *Aeneid*. Emphasis will be placed on the study of Vergilian poetic language.

Mr. Grimm

*204. Greek and Roman Comedy. (4) I.

Seminar—3 hours. Historical and critical problems in Aristophanes or New Comedy. May be repeated for credit.

Mr. Thompson

***205. Latin Lyric and Elegy. (4) II.**

Seminar—3 hours. A critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit. Mr. Traill

***206. Greek Historiography. (4) III.**

Seminar—3 hours. The development of historical writing in Greece. May be repeated for credit. Mr. Thompson

***207. Greek Drama. (4) II.**

Seminar—3 hours. Literary and philological analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit. Mr. Grimm

Greek

Departmental Major Adviser.—Mr. Thompson.

Lower Division Courses**1. Elementary Greek. (5) I.**

Lecture—4 hours.

The Staff

2. Elementary Greek. (5) II.

Lecture—4 hours. Prerequisite: course 1. A continuation of course 1. The Staff

3. Elementary Greek. (5) III.

Lecture—4 hours. Prerequisite: course 2. A continuation of course 2. The Staff

Upper Division Courses***100. Attic Orators. (4) I.**

Lecture—3 hours. Prerequisite: course 3.

Mr. Thompson

101. Plato. (4) I.

Lecture—3 hours. Prerequisite: course 3.

Mr. Grimm

***102. Euripides. (4) II.**

Lecture—3 hours. Prerequisite: course 101.

***103A. Homer: Iliad. (4) II.**

Recitation—3 hours; term paper. Prerequisite: course 3. Mr. van Doorninck

***103B. Homer: Odyssey. (4) II.**

Recitation—3 hours; term paper. Prerequisite: course 3. Mr. van Doorninck

***104. Menander. (4) I.**

Lecture—3 hours; one contact hour in form of term paper to be graded by instructor. Prerequisite: course 3. Mr. Thompson

105. Demosthenes. (4) II.

Lecture—3 hours; term paper. Prerequisite: course 3. Mr. Thompson

***111. Sophocles. (4) III.**

Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years. Mr. Grimm

***112. Aristophanes. (4) III.**

Lecture—3 hours. Prerequisite: course 103. Offered in even-numbered years. Mr. Grimm

***113. Thucydides. (4) I.**

Lecture—3 hours. Prerequisite: course 103. Offered in even-numbered years. Mr. Thompson

114. Lyric Poetry. (4) III.

Lecture—3 hours. Prerequisite: course 103. Offered in even-numbered years. Mr. Thompson

***115. Aeschylus. (4) II.**

Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years. Mr. Grimm

***116. Herodotus. (4) II.**

Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years.

Mr. van Doorninck

***120A-120B. Greek Composition. (2-2) II-III.**

Lecture—2 hours. Prerequisite: course 103. Mr. Thompson

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Thompson in charge)

Latin

Departmental Major Adviser.—Mr. Grimm.

Lower Division Courses**1. Elementary Latin (4) I.**

Lecture—4 hours.

The Staff

2. Elementary Latin. (4) II.

Lecture—4 hours. Prerequisite: course 1. A continuation of course 1. The Staff

3. Elementary Latin. (4) III.

Lecture—4 hours. Prerequisite: course 2. A continuation of course 2. The Staff

***4. Intermediate Latin. (3) I.**

Lecture—3 hours. Prerequisite: course 3 or equivalent.

The Staff

***10. The Structure of Latin. (4) III.**

Lecture—4 hours. Prerequisite: not open to students who have received credit for any other course in Latin. A survey of the Latin language, with special emphasis on the morphology and syntactical relationships of classical Latin.

Mr. Thompson

Upper Division Courses***101. Livy. (4) I.**

Lecture—3 hours. Prerequisite: course 3. Offered in odd-numbered years. Mr. Thompson

* Not to be given, 1971-72.

***102. Roman Comedy. (5) I.**

Lecture—4 hours; term paper. Offered in even-numbered years. Mr. Thompson

***103. Vergil: Aeneid. (4) III.**

Lecture—3 hours. Prerequisite: course 3. Offered in even-numbered years.

***104. Sallust. (4) I.**

Lecture—3 hours. Prerequisite: course 3. Offered in even-numbered years. Mr. Thompson

***105. Catullus. (4) II.**

Lecture—3 hours. Prerequisite: course 3. Offered in odd-numbered years. Mr. Grimm

***106. Horace: Odes and Epodes. (4) I.**

Lecture—3 hours. Prerequisite: course 3. Offered in odd-numbered years. Mr. Grimm

***108. Horace: Satires and Epistles. (4) II.**

Lecture—3 hours. Prerequisite: course 3. Offered in odd-numbered years. Mr. Grimm

***109. Roman Elegy. (4) III.**

Lecture—3 hours. Prerequisite: course 3. Offered in odd-numbered years. Mr. Grimm

111A-111B-111C. Silver Age Latin. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 3. Selections from Tacitus, Pliny, Petronius, Juvenal,

Martial, and other writers of the Silver Age. Offered in odd-numbered years. Mr. Traill

***112. Cicero: Political Writings. (4) I.**

Recitation—3 hours; term paper. Prerequisite: course 3. Mr. Thompson

***114. Cicero: Philosophical Works. (4) I.**

Lecture—3 hours. Prerequisite: course 3. Offered in odd-numbered years.

***115. Lucretius. (4) II.**

Lecture—3 hours. Prerequisite: course 3. Offered in even-numbered years.

***116. Vergil: Eclogues and Georgics. (4) III.**

Lecture—3 hours. Prerequisite: course 3. Offered in even-numbered years.

***121A-121B. Latin Composition. (3-3) II, III.**

Lecture—3 hours. Prerequisite: junior standing. Offered in odd-numbered years. Mr. Grimm

199. Special Study for Advanced Undergraduates.

(2-5) I, II, III.

The Staff (Mr. Grimm in charge)

Graduate Courses**299. Research. (2-5) I, II, III.**

The Staff (Chairman in charge)

CLINICAL PATHOLOGY

Jiro J. Kaneko, D.V.M., Ph.D., *Chairman of the Department*

Department Office, 1165 Haring Hall

Professors:

Donald E. Jasper, D.V.M., Ph.D.
Jiro J. Kaneko, D.V.M., Ph.D.
Oscar W. Schalm, D.V.M., Ph.D.

Associate Professor:

Nemi C. Jain, M.V.Sc., Ph.D.

◇ ◇ ◇

Assistant Professor:

Kerry S. Keeton, D.V.M. (*Acting*)

Lecturers:

Edward J. Carroll, Ph.D.
Jerry P. Lewis, M.D. (*Clinical Pathology*
and *Professor of Internal Medicine*)

Upper Division Courses**101. Comparative Hematology. (3) III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: Physiology 110B (Animal Science), Chemistry 5, introductory biochemistry or consent of instructors. Principles, methods and procedures of clinical hematology; comparative blood cellular morphology and function. Offered in even-numbered years.

Messrs. Schalm, Jain, Kaneko

199. Special Study for Undergraduates. (1-4)

I, II, III.

The Staff (Mr. Kaneko in charge)

Graduate Courses**201. Clinical Hematology. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Hematological techniques and interpretation as applied to the study of disease in animals.

Mr. Schalm, Mr. Jain

202. Clinical Biochemistry. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Biochemical methods in the diagnosis of disease. Special emphasis on electrolyte balance, liver function, kidney function, urinalysis, osteological diseases, thyroid function, and disorders of carbohydrate, protein, and lipid metabolism.

Mr. Kaneko, Mr. Keeton

* Not to be given, 1971-72.

203. Biochemistry of Metabolic Diseases. (3) II.

Lecture—3 hours. Prerequisite: biochemistry and physiology or consent of instructor. The biochemistry of inborn and acquired errors of metabolism in animals and man. Offered in even-numbered years.
Mr. Kaneko

204. Morphological Hematology. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. Morphological and interpretive clinical hematology for graduate students. Offered in odd-numbered years.
Mr. Schalm

205. Physiology and Pathology of Leukocytes. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 201 or 204, Biochemistry 101A–101B or Physiological Sciences 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; cytochemical reactions, spectrophotometry, fluorescence microscopy, column chromatography, and electron microscopy. Offered in even-numbered years.
Mr. Jain

206. Immunohematology. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 201, Veterinary Microbiology 111 or 121, or consent of instructor. Immunologic aspects of hematology; blood cell antigens and antibodies; autoimmune hematologic dis-

eases; reactions to blood transfusion; transplantation mechanisms. Offered in odd-numbered years. Messrs. Jain, Carroll, Lewis, MacKenzie

261. The Bovine Mammary Glands in Health and Disease. (2) II.

Lecture—2 hours; two 2-hour laboratory sessions. Prerequisite: consent of instructor. Ontogeny, embryology, anatomy and physiology of the mammary glands; relationship of mastitis and milk quality; infectious causes and the influence of environment, milking machines and management on mastitis; pathogenesis of mastitis; cellular and humoral defense mechanisms; mastitis diagnosis and control.

Mr. Jasper, Mr. Carroll

290. Seminar in Clinical Pathology. (1) I, II, III.

Seminar—1 hour.

The Staff (Mr. Kaneko in charge)

295A–295B–295C. Clinical Pathology Laboratory.

(1–1–1) I–II–III.

Discussion—7 hours total; laboratory—16 hours total. Prerequisite: fourth-year standing in School of Veterinary Medicine. Application of laboratory methods to the diagnosis of animal disease. (Satisfactory/Unsatisfactory grading only.)

The Staff

298. Directed Group Study. (1–3) I, II, III. The Staff**299. Research in Clinical Pathology. (1–12) I, II, III.** The Staff**CLINICAL SCIENCES**

Edward A. Rhode, Jr., D.V.M., *Chairman of the Department*

Department Office, 1315 Haring Hall

Professors:

- Robert M. Cello, D.V.M.
- John F. Christensen, D.V.M., Ph.D.
(Emeritus)
- Alfred G. Edward, D.V.M.
- Jack A. Howarth, D.V.M., Ph.D.
- John P. Hughes, D.V.M.
- John W. Kendrick, D.V.M., Ph.D.
- Robert L. Leighton, V.M.D.
- Blaine McGowan, Jr., D.V.M.
- Joe P. Morgan, D.V.M., Vet. Med. Dr.
- William R. Pritchard, D.V.M., Ph.D., J.D.
- Edward A. Rhode, Jr., D.V.M.
- Gordon H. Theilen, D.V.M.
- John D. Wheat, D.V.M.

Associate Professors:

- Murray E. Fowler, D.V.M.
- Jerry R. Gillespie, D.V.M., Ph.D. (*Clinical Sciences and Human Physiology*)
- I. Gary Gourley, D.V.M., Ph.D.

Charles A. Hjerpe, D.V.M.

Terrell A. Holliday, D.V.M., Ph.D.

George H. Stabenfeldt, D.V.M., Ph.D.

Peter F. Suter, D.V.M., Ph.D.

Bud C. Tennant, D.V.M.

Assistant Professors:

- Alexander A. Ardans, D.V.M.
- Maarten Drost, D.V.M.
- Gary O. Ewing, D.V.M.
- Humphrey D. Knight, D.V.M.
- Gerald V. Ling, D.V.M.
- Dennis M. Meagher, D.V.M., Ph.D.
- Timothy R. O'Brien, D.V.M., Ph.D.
- Ronald D. Schechter, V.M.D.

**Assistant Professors:**

- Andreco J. Gabor, M.D., Ph.D.
- Anthony A. Stannard, D.V.M. (*Acting*)

Lecturers:

John C. Bartley, D.V.M., Ph.D.
 Wyland S. Cripe, D.V.M.
 Laurence R. Enos, Pharm.D.
 Charles E. Grayson, M.D. (*Radiology*)
 Andrew G. Hendrickx, Ph.D.
 Thomas G. Kawakami, Ph.D.
 Vicki A. Nelson, D.V.M.
 Sigmund T. Rich, D.V.M.
 Alida P. Wind, M.V.D.
 Floyd W. Wilcox, M.S. (*Radiology*)

Upper Division Courses**102. Recognition and Identification of Poisonous Plants. (1) III.**

Lecture-discussion—1 hour. Prerequisite: sophomore standing in School of Veterinary Medicine or consent of instructor. General introduction to plant nomenclature and principles of taxonomy. Poisonous plant species will be discussed systematically according to families. The use of keys and other devices will be used to teach recognition of these species. Mr. Fowler

103. Introductory Medicine. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Pathology 122B and Physiological Sciences 140B. Lectures on the principles of clinical diagnosis of animal diseases, with special emphasis on history taking and identification and interpretation of symptoms. The laboratory will provide practice in physical examination of normal and abnormal animals.

Mr. Ling

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

The Staff (Mr. Rhode in charge)

Graduate Courses**202. Laboratory Animal Preventive Medicine. (2) III.**

Lecture—2 hours; discussion—optional. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Lectures and discussion of the principles of animal facility design, husbandry, and legal aspects of laboratory animal care.

Messrs. Edward, Rich, Bustad

204A. Medicine (3) I.

Lecture—3 hours. Prerequisite: course 103. A study of the medical diseases of domestic animals. The Staff (Mr. Ewing in charge)

204B. Medicine. (4) II.

Lecture—4 hours. Prerequisite: course 204A. A study of the medical diseases of domestic animals. The Staff (Mr. Howarth in charge)

204C. Medicine. (3) III.

Lecture—3 hours. Prerequisite: course 204B. A study of the medical diseases of domestic animals. The Staff (Mr. Tennant in charge)

204D. Medicine. (5) I.

Lecture—5 hours. Prerequisite: course 204C. A study of the medical diseases of domestic animals. The Staff (Mr. Stannard in charge)

204E. Medicine. (3) II.

Lecture—3 hours. Prerequisite: course 204D. A study of the medical diseases of domestic animals. The Staff (Mr. Holliday in charge)

204F. Medicine. (3) III.

Lecture—3 hours. Prerequisite: course 204E. A study of the medical diseases of domestic animals. The Staff (Mr. Schechter in charge)

205. Advanced Veterinary Clinical Neurology. (1) III.

Laboratory—2 hours. Prerequisite: senior standing in the School of Veterinary Medicine or consent of instructor. Extension of neurology portions of courses 204 and 250. Some special techniques of neurological examination, electroencephalography, electromyography, and neuroradiography. Discussions emphasizing the anatomical, physiological, and pathological basis of the techniques and interpretation of the results.

Mr. Holliday

206. Clinical Oncology. (3) II.

Lecture—2 hours; laboratory—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. A study of neoplastic diseases of animals.

Mr. Theilen, Mr. Ling

207. Ecological Factors of Animal Disease. (2) III.

Lecture—1 hour; discussion—1 hour. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Relationship of animal environment to control and prevention of disease. Application of nutrition, genetics, husbandry, and management to disease control.

Mr. McGowan

208. Advanced Small Animal Surgery. (2) III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. A comprehensive review of the surgical diseases encountered with particular attention to those of the cat. Illustrated by slides, demonstrations, and current cases from the Veterinary Medical Teaching Hospital.

Mr. Leighton

209. Reproduction in the Equine. (1) II.

Lecture—1 hour. Prerequisite: senior standing in the School of Veterinary Medicine or consent of instructor. A discussion of special problems of equine reproduction with emphasis on methods of diagnosis and the interpretation of clinical and laboratory findings. Mr. Hughes

210A. Medical Rounds. (1) I.

Laboratory—2 hours. Prerequisite: course 103. Discussion of selected cases from the clinic. The Staff (Mr. Holliday in charge)

210B. Medical Rounds. (1) II.

Laboratory—2 hours. Prerequisite: course 204A. Discussion of selected cases from the clinic. The Staff (Mr. Holliday in charge)

210C. Medical Rounds. (1) III.

Laboratory—2 hours. Prerequisite: course 204B. Discussion of selected cases from the clinic. The Staff (Mr. Holliday in charge)

211A. Medical Rounds in Laboratory Animal Medicine. (1) I.

Laboratory—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Cases from the campus Experimental Animal Resource Facility as well as the Primate Center and Radiobiology Laboratory will be selected for discussion of history, interpretation of symptoms, treatment and disposition. The Staff (Mr. Edward in charge)

211B. Medical Rounds in Laboratory Animal Medicine. (1) II.

Laboratory—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Cases from the campus Experimental Animal Resource Facility as well as the Primate Center and Radiobiology Laboratory will be selected for discussion of history, interpretation of symptoms, treatment and disposition. The Staff (Mr. Edward in charge)

211C. Medical Rounds in Laboratory Animal Medicine. (1) III.

Laboratory—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Cases from the campus Experimental Animal Resource Facility as well as the Primate Center and Radiobiology Laboratory will be selected for discussion of history, interpretation of symptoms, treatment and disposition. The Staff (Mr. Edward in charge)

212. Special Problems in Bovine Medicine. (2) II.

Lecture—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Economics and husbandry practices of the California cattle-feeding industry are outlined. Potential contributions by the practicing veterinarian to the success of the individual cattlefeeder are explored, with emphasis on the "herd approach" and disease prevention. Mr. Hjerpe

213. Veterinary Ophthalmology. (2) III.

Lecture—2 hours. Prerequisite: course 204E or consent of instructor. Selected topics relating to the eye and its diseases. Mr. Cello

214. Ophthalmic Surgery. (1) III.

Laboratory—2 hours. Prerequisite: consent of instructor. Technics of eye surgery in domestic animals. Mr. Cello

215. Selected Topics in Zoo Medicine. (2) III.

Lecture—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Lectures or selected topics related to the health of zoo animals. These will include nutritional requirements, housing, sanitation, restraint, anesthesia, surgery, and specific disease problems. Mr. Fowler

216. Primate Medicine. (2) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: senior standing in School of Veterinary Medicine, or consent of instructor. An introduction to primate medicine and primatology with emphasis on practical aspects of handling, husbandry, nutrition, reproduction, diseases, and anesthesia in nonhuman primates. Appropriate demonstrations at the National Center for Primate Biology will be included.

The Staff (Mrs. Giles in charge)

217. Caged Bird Medicine and Surgery. (1) I.

Lecture—1 hour. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Medical and surgical problems of caged birds: handling and restraint, feeding, nutritional and infectious diseases, anesthesia and surgery, plus problems of organ systems.

Mr. Fowler

218. Diseases of Free-Living Wild Animals. (2) II.

Lecture—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. The diseases of free-living wild animals. Effects of these diseases on the wild population itself, domestic animals and man. Infectious, nutritional, toxic (pollution) and parasitic diseases will be considered.

Mr. Fowler

220. Introductory Surgery. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Pathology 122C, Physiological Sciences 140B. Principles of surgery and surgical technique. Mr. Leighton, Miss Wind

221. Large Animal Surgery. (5) II.

Lecture—5 hours. Prerequisite: course 220. Surgical diseases of large animals. Mr. Wheat

222. Small Animal Surgery. (5) III.

Lecture—5 hours. Prerequisite: course 220. Surgical diseases of small animals. Miss Wind, Mr. Gourley

223. Experimental Surgery. (3) II.

Lecture—1 hour; laboratory—2 hours and two 3-hour laboratories. Prerequisite: graduate standing or consent of instructor. A basic course in experimental surgery with emphasis on the principles of surgical technique, experimental animal care, and anesthesia. Mr. Gourley

230. Reproduction, Genital Diseases and Obstetrics. (6) I.

Lecture—5 hours; laboratory—3 hours. Prerequisite: Pathology 122C, Physiological Sciences 140B. A course in the diagnosis, treatment, and control of diseases affecting the reproductive organs; the normal and disturbed physiology of reproduction; and obstetrics.

Messrs. Drost, Hughes, Kendrick, Stabenfeldt

231. Pathophysiology of Mammalian Reproductive Processes. (3) III.

Lecture—3 hours. Prerequisite: senior standing in the School of Veterinary Medicine or consent of instructor. Physiological and pathological aspects of reproductive failure in mammals concerning gonadal function, fertilization, implantation, prenatal mortality, neonatal mortality, environmental factors, anatomical and hereditary defects, intersexuality and behavior.

Mr. Stabenfeldt

232. Teratologic Aspects of Development. (3) II.

Lecture—3 hours. Prerequisite: Anatomy 100, and Zoology 100 or the equivalent, or consent of instructor. Embryological and pharmacological principles of teratogenesis; design and interpretation of teratogenic tests; consideration of congenital malformations and abnormalities induced by environmental and genetic factors.

Mr. Hendrickx

249. Clinics. (2-8) (Summer).

Diagnosis and treatment of animal diseases. Students are responsible for case records, care of patients, physical examinations, and participation in surgery. Laboratory exercises in restraint, diagnostic and therapeutic procedures and surgical techniques.

The Staff (Mr. Rhode in charge)

250A. Clinics. (8) I.

Laboratory—24 hours. Prerequisite: courses 204C, 220, 230, 260.

The Staff (Mr. Rhode in charge)

250B. Clinics. (8) II.

Laboratory—24 hours. Prerequisite: courses 204C, 220, 230, 260.

The Staff (Mr. Rhode in charge)

250C. Clinics. (7) III.

Laboratory—21 hours. Prerequisite: courses 204C, 220, 230, 260.

The Staff (Mr. Rhode in charge)

260. Radiology. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: courses 103, 220. The physics and practical operation of x-ray and fluoroscopic equipment; the development and interpretation of radiographs, radiation therapy, and radiobiology.

Mr. Morgan

261. Special Radiographic Procedures. (3) I, II, III.

Discussion—1 hour; laboratory—6 hours. Prerequisite: course 260 or consent of instructor. The theory of selected radiographic techniques, contrast media, and special radiographic equipment.

Messrs. Morgan, O'Brien, Suter

262A. Advanced Radiographic Interpretation. (1-3) I.

Discussion—1-3 hours. Prerequisite: course 260 or consent of instructor. Principles of radiographic interpretation in the diagnosis of disease of small and large animals. Current clinic cases will be utilized when possible.

Messrs. Morgan, O'Brien, Suter

262B. Advanced Radiographic Interpretation.

(1-3) II.

Discussion—1-3 hours. Prerequisite: course 260 or consent of instructor. Principles of radiographic interpretation in the diagnosis of disease of small and large animals. Current clinic cases will be utilized when possible.

Messrs. Morgan, O'Brien, Suter

262C. Advanced Radiographic Interpretation.

(1-3) III.

Discussion—1-3 hours. Prerequisite: course 260 or consent of instructor. Principles of radiographic interpretation in the diagnosis of disease of small and large animals. Current clinic cases will be utilized when possible.

Messrs. Morgan, O'Brien, Suter

263. Advanced Radiation Therapy. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 260 or consent of instructor. Principles of radiation therapy. The application of X-, beta-, and gamma-radiation on selected clinic cases.

O'Brien

270. Jurisprudence and Law for the Veterinarian.

(1) II.

Lecture—1 hour. Prerequisite: senior standing in the School of Veterinary Medicine or consent of instructor. The student is introduced to the principles of veterinary medical jurisprudence and the legal concepts pertinent to professional activities.

Mr. Pritchard

280. Advanced Pulmonary Physiology. (3) II.

Lecture—3 hours. Prerequisite: Comparative Physiology 120B, Physiology 210B or Physiological Sciences 141B. Advanced study of physiology of mammalian respiration with emphasis on mechanisms of ventilation, gas distribution, diffusion and blood perfusion.

Mr. Gillespie, Mr. Cross

280L. Advanced Pulmonary Physiology. (1) II.

Laboratory—4 hours. Prerequisite: Comparative Physiology 120B, Physiology 210B or Physiological Sciences 141B. Advanced study of physiology of mammalian respiration with emphasis on mechanisms of ventilation, gas

distribution, diffusion and blood perfusion. Laboratory exercises illustrate modern functional concepts and procedures.

Mr. Gillespie, Mr. Cross

285. Acid-Base Relationships in Mammals. (2) III.

Lecture—2 hours. Prerequisite: Physiological Sciences 101B, 102B; or consent of instructor. An examination of the buffer systems in the mammalian body. Effects on the buffer systems and organ functions of adding endogenous or exogenous acid or basic products to the body fluids. Control mechanisms and body fluid relationships to the buffer systems.

Mr. Gillespie, Mr. Cross

290. Seminar in Veterinary Medicine. (1) I, II, III.

The Staff (Mr. Rhode in charge)

CONSUMER ECONOMICS

Related Undergraduate Major.—See page 64.

Graduate Study.—See page 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Upper Division Courses

141. Consumers and the Market. (4) II, III.

Lecture—4 hours. Prerequisite: Economics 1A; Mathematics 13. Social and economic factors affecting consumer expenditures. The structure of the retail market and the effects of its performance on consumers. Agencies aiding and protecting consumers, sources of information available to consumers. Miss Parker

142. Social and Economic Problems of Families. (4) II, III.

Lecture—4 hours. Prerequisite: Economics 1A; Mathematics 13. The management of income and expenditures by the family. The use

CONSUMER SCIENCES

Major Advisers.—See *Schedule and Directory* listing.

Major Program and Graduate Study.—See pages 64 and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

DESIGN

Major Advisers.—See *Schedule and Directory* listing.

Major Program.—See pages 62 and 79.

Questions pertaining to the following courses

291. Radiology Seminar. (1) I, II, III.

Seminar—1 hour. Prerequisite: course 260. Presentation by faculty, radiology graduate students, and visiting faculty of current research undertaken in clinical radiology both at this and other institutions. Mr. Morgan

292. Current Topics in Reproduction. (1) I, II, III.

Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current scientific literature in reproduction, as well as presentation of research findings by graduate students and faculty. The Staff (Mr. Stabenfeldt in charge)

298. Group Study. (1-2) I, II, III.

The Staff (Mr. Rhode in charge)

299. Research. (1-9) I, II, III.

The Staff (Mr. Rhode in charge)

of consumer credit, savings, investments, and insurance by families. Mrs. Lane

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Carter in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

The Staff (Mr. Carter in charge)

Graduate Courses

247. Consumption and Standards of Living. (4) III.

Lecture—4 hours. Prerequisite: course 141. An analytical treatment of household consumption behavior. The effects of income, prices, and household characteristics on expenditures. Standards of income and consumption adequacy. Mrs. Lane

290. Seminar. (1) I, II, III.

Seminar—1 hour. Mrs. Lane

299. Research. (1-12) I, II, III.

The Staff (Mr. Carter in charge)

Upper Division Course

100. Consumer Behavior. (3) I.

Lecture—3 hours. Recommended: introductory course in economics and/or psychology. Influence of psychological, sociological, and product attribute factors on consumer behavior. Description of consumer decision processes and methods of studying consumer behavior. Utilization of consumer behavior information by individual, marketers, and social organizations. Mr. Schutz

should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses**6. Introduction to Design. (4) I, II, III.**

Lecture—4 hours. Introduction to various fields of design. Consideration of the social, cultural, and physical needs of man influencing the design of objects.

I. Mr. Olsen;

II. Mrs. Rossbach; III. Mrs. Butler

30A. Graphic Presentation. (4) I.

Lecture—1 hour; laboratory—9 hours. Experience in design through the exploration of visual presentation areas such as drafting and perspective, calligraphy and figure drawing. May be repeated for credit with a change in section.

Mrs. Rossbach

30B. Structure in Materials. (4) II.

Lecture—1 hour; laboratory—9 hours. Workshop experience in design through the experimental exploration of visual communication areas such as two-dimensional and three-dimensional design. May be repeated for credit with a change in section.

Mr. Olsen

30C. New Materials and Processes. (4) III.

Lecture—1 hour; laboratory—9 hours. Workshop experience in design through the experimental exploration of construction in materials areas such as personal adornment, non-loom textiles and model construction. May be repeated for credit with a change in section.

Mrs. Stabb

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.
The Staff (Mr. Thompson in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor.
The Staff (Mr. Thompson in charge)

Upper Division Courses**120A. Principles of Design. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: Art 2, Psychology 1A. Principles of organization and composition in design. An exploration of the subjective process of awareness.

Mr. Olsen, Mrs. Rossbach

120B. Principles of Design. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A. Exploration of the principles of structure; development of approaches to the solution of problems involving multi-dimensional space and movement.

Mr. Olsen

120C. Principles of Design. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A. Visual perception and organization in the interaction of color phenomena; design problems dealing with the effects and functions of color as sensation, as light and as form.

Mr. Gotelli

140A. History of Design. (3) I.

Lecture—3 hours. Prerequisite: Art 1A (may be taken concurrently). The history of Western design from Ancient Egypt and the Middle East through the Aegean and Classical civilizations to the waning of the Middle Ages.

Mrs. Giambruni

140B. History of Design. (3) II.

Lecture—3 hours. Prerequisite: Art 1B or consent of instructor. The history of Western design from the Renaissance through the Baroque, the Rococo and Neoclassicism of the eighteenth century, nineteenth century, industrialization to the emergence of modernism.

Mrs. Giambruni

142A. World Textiles: Far East and Pacific. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Art 1A. An exploration through lectures and visual material of the textile arts of Japan, China, Korea, India, Indonesia and the Pacific Islands with emphasis on the aesthetic and stylistic qualities of these cultures.

Mrs. Giambruni

142B. World Textiles: Middle East, Europe, and United States. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Art 1A. An exploration through lectures and visual material of the textile arts of the Middle East, Europe, and the United States with emphasis on aesthetic and stylistic qualities. The influences of Eastern textiles on textiles of Europe and the United States.

143. History of Costume Design. (3) II.

Lecture—3 hours. Prerequisite: Art 1A. The history of costume design from the earliest times to the present with emphasis on both aesthetic and functional aspects.

Mrs. Stabb

144. History of Interior Design. (3) I.

Lecture—3 hours. Prerequisite: one course in art history. The history of Western interior design from its beginnings in Ancient Egypt through the Classical, Medieval, and Renaissance worlds to modern times.

Mrs. Giambruni

160A-160B-160C. Textile Design. (3-3-3) I-II-III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A or consent of instructor. An exploration of the design and appreciation of hand printed textiles; emphasizes the unique qualities of the individual as producer.

Mrs. Rossbach

170A-170B-170C. Costume Design. (3-3-3) II-III-I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A or consent of instructor. Studio projects in costume design; consideration of functional and aesthetic factors influencing the historic, contemporary and projected image of man as expressed through costume.

Mrs. Stabb

180A-180B-180C. Interior Design. (3-3-3) I-II-III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A or consent of instructor. Analysis, organization and solution of interior design problems involving the social, cultural, economic and aesthetic needs of man. Consideration of the interrelationship of interior design, architectural and landscape design.

I-III. Mr. Olsen, II. Mr. Gotelli

196. Individual Problems in Design. (3) III.

Seminar—1 hour; laboratory—6 hours. Prerequisite: design major of senior standing. A

proseminar in relationship to a senior thesis, a comprehensive design problem pursued under the direction of a member of the faculty.

The Staff (Mrs. Rossbach in charge)

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: upper division standing and consent of instructor.

The Staff (Mr. Thompson in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Thompson in charge)

DRAMATIC ART

Alan A. Stambusky, Ph.D., *Chairman of the Department*

Department Office, 222 Dramatic Art Building

Professors:

Theodore J. Shank, Ph.D.

Daniel E. Snyder

Associate Professors:

Everard d'Harnoncourt, Ph. D.

*Robert K. Sarlos, Ph.D.

*Alan A. Stambusky, Ph.D.

Assistant Professors:

Gene A. Chesley, M.A.

Robert A. Fahrner, Ph.D.

Alfred Rossi, Ph.D.

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Assistant Professor:

David Copelin, M.A. (*Acting*)

Lecturers:

Phyllis J. Kress, M.F.A.

David P. Wyatt, B.A.

Major Adviser.—Mr. Shank.

Lower Division Courses.—Twenty-two quarter units in Dramatic Art consisting of the following: 10A, 10B, 10C (*Principles of Acting*); 20 (*Introduction to Dramatic Art*); 24 (*Visual Aspects of Dramatic Art*); and 25 (*Technical Aspects of Dramatic Art*).

Upper Division Courses.—Thirty-eight quarter units in Dramatic Art including the following: 124A, 124B (*Principles of Theatrical Design*); 127A (*Principles of Directing*); 158A, 158B (*World Drama*); 159 (*Contemporary Drama*); 160A (*Principles of Playwriting*); either 127B (*Principles of Directing*) or 160B (*Principles of Playwriting*); 190 (*Proseminar in Dramatic Art*).

In exceptional cases, with the adviser's consent, the student may petition to substitute up to 8 units from other Dramatic Art courses for any of the above courses.

In addition each major student is required to participate in departmental dramatic productions.

Teaching Major.—The requirements for the teaching major are the same as for the undergraduate major.

Teaching Minor.—At least 30 quarter units, including Dramatic Art 10A, 10B, 20, and 24; and 127A-127B and two courses from the sequence 158A, 158B, 159. Participation in departmental dramatic productions is recommended.

Subject Representative: Mr. Shank

Graduate Study.—The Department of Dramatic Art offers programs of study and research leading to the M.A., M.F.A. and Ph.D. (Theatre Research) degrees. Detailed information may be obtained from the Graduate Adviser.

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.

Professional Resident Theatre Program

The Department of Dramatic Art regularly engages professional artists-in-residence, particularly actors, to work with students in productions and in acting workshops. Davis is the only University of California campus to offer this innovative training opportunity to students.

Lower Division Courses

10A. Principles of Acting. (4) I.

Lecture—2 hours; laboratory—4 hours. The physical and psychological resources for acting; fundamentals of creative mime, improvisation, stage speech and movement. Reading and analysis of selective plays to illustrate principles involved. Field trips included.

Mr. Rossi

² Absent on leave, fall quarter 1971.

10B. Principles of Acting. (4) II.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 10A. Methods of characterization in the realistic style. Reading and analysis of contemporary plays; theory and practice of acting with emphasis on realistic and naturalistic character analysis and interpretation. Field trips included.

Mr. Rossi

10C. Principles of Acting. (4) III.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 10B or consent of instructor. Methods of characterization in non-realistic styles. Reading and analysis of plays of different types and forms selected from various periods; theory and practice of acting with emphasis on period styles. Field trips included.

Mr. Rossi

15. The Art of the Cinema. (4) I, III.

Lecture—3 hours; laboratory—2 hours. The cinema as an art form; its relation to other arts; its evolution with emphasis on the significant modern contributions.

Mr. d'Harnoncourt

20. Introduction to Dramatic Art. (4) I, III.

Lecture—3 hours; discussion—1 hour. Understanding and appreciation of plays in their cultural contexts. The plays will be selected from the major periods of dramatic art.

Mr. Copelin, Mr. Fahrner

24. Visual Aspects of Dramatic Art. (4) III.

Lecture—3 hours; laboratory—2 hours. Understanding and appreciation of the visual aspects of dramatic art: theatre architecture, scenery, lighting, costume, and makeup.

Mr. Snyder

25. Technical Aspects of Dramatic Art. (2) I, II, III.

Lecture—1 hour; laboratory—2 hours. Understanding and appreciation of the technical principles of dramatic production: basic tools and materials, principles of scene construction, scene painting, costume construction, stage rigging, lighting and sound equipment and control systems.

Mr. Wyatt

27. Creative Principles of Dramatic Art. (4) II.

Lecture—4 hours. Understanding and appreciation of both the distinctive and collaborative contributions of playwright, actor, director, and designer to the total work of dramatic art.

Mr. Copelin

30. Theatre Laboratory. (1-5) I, II, III.

Prerequisite: course 25 or consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to a total of 8 units.

The Staff

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

Upper Division Courses**110. Advanced Acting. (4) I.**

Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 10A, 10B and 10C, and consent of instructor. Advanced theory and practice of acting with emphasis on special problems. Detailed study of the Stanislavski system of acting and other acting theories. Field trips included.

111. Voice and Speech for the Actor. (1) I, II, III.

Laboratory—2 hours. Fundamentals of voice production and speech through exercises in relaxation, diaphragmatic breathing, breath control and phrasing, articulation, resonation, and tone placement.

The Staff

112. Stage Movement. (1) I, II, III.

Laboratory—2 hours. Fundamental work in developing physical aspects of acting techniques used in stage movements.

The Staff

115. Advanced Study of Major Film Makers. (4) II.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 15. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and their application to selected films.

Mr. d'Harnoncourt, Mr. Baker

124A. Principles of Theatrical Design. (3) I.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24 or consent of instructor. Scene design: drafting methods, working drawings, rendering techniques, scale models, methods and materials of scenery construction.

Mr. Chesley

124B. Principles of Theatrical Design. (4) II.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 124A. Analysis of plays in terms of scene design, elements of design, execution of designs for modern and period plays.

Mr. Snyder

124C. Principles of Theatrical Design. (3) III.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24 or consent of instructor. Theories of lighting the stage, equipment and control systems, execution of lighting plots.

Mr. Chesley

124D. Principles of Theatrical Design. (3) III.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24 or consent of instructor. Source materials for theatrical costuming, selecting fabrics, elements of design, analysis of plays in terms of costume design, execution of designs for modern and period plays.

Miss Kress

125. History of Scene Design and Staging Methods. (4) II.

Lecture—4 hours. Study of scenic developments from the Renaissance to the present.

Mr. Sarlos

127A. Principles of Directing. (5) I.

Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: courses 10A and 10B. The director's creative approach to the play and to its staging. Mr. Rossi

127B. Principles of Directing. (3) II.

Lecture—1 hour; laboratory—2 hours; rehearsal. Prerequisite: course 127A. The director's creative approach to the actor. Mr. Rossi

150. American Drama. (4) III.

Lecture—4 hours. Selected plays and the history of the theatre from Colonial times to the present. Mr. Sarlos

158A. World Drama. (5) I.

Lecture—4 hours; papers and conferences. Selected plays and the history of the theatre from ancient Greece to Neoclassicism. Mr. Fahrner

158B. World Drama. (5) II.

Lecture—4 hours; papers and conferences. Selected plays and the history of the theatre from Neoclassicism to Naturalism. Mr. Fahrner

159. Contemporary Drama. (5) III.

Lecture—4 hours; papers and conferences. Selected plays and the history of the theatre from Naturalism to the present. Mr. Fahrner

160A-160B. Principles of Playwriting. (4-4) I-II.

Lecture-Seminar—4 hours. Prerequisite: two courses in Dramatic Art or related courses in other departments. Analysis of dramatic structure; preparation of scenarios; the composition of plays. Mr. Shank

***165. Dramatic Theory and Criticism. (4) III.**

Lecture—Seminar—4 hours. Changing concepts of drama from Aristotle to the present.

180. Theatre Laboratory. (1-5) I, II, III.

Prerequisite: upper division standing and course 25, or consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit. The Staff

190. Proseminar in Dramatic Art. (4) III.

Seminar—3 hours; individual research. Prerequisite: senior status in dramatic art. Comprehensive study of dramatic art. (Passed/Not Passed grading only.) The Staff

198. Directed Group Study. (1-4) I, II, III.

Lecture—1-4 hours. Prerequisite: consent of instructor. The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor. The Staff (Chairman in charge)

Graduate Courses**200. Methods and Materials in Theatre Research. (4) I.**

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. Mr. Fahrner

***210A. Special Problems in Advanced Acting. (4) I.**

Seminar—2 hours; laboratory—4 hours. Advanced acting problems arising from differences in the type and style of plays selected from Greece to the Renaissance.

210B. Special Problems in Advanced Acting. (4) II.

Seminar—2 hours; laboratory—4 hours. Advanced acting problems relating to plays selected from the Renaissance to Romanticism. The Staff

***210C. Special Problems in Advanced Acting. (4) III.**

Seminar—2 hours; laboratory—4 hours. Advanced acting problems in plays drawn from Romanticism to the present.

211. Advanced Voice and Speech. (1) I, II, III.

Laboratory—2 hours. Voice production and speech related to specific acting problems in classical plays, particularly in verse. The Staff

212. Advanced Stage Movement. (1) I, II, III.

Laboratory—2 hours. Rhythmic movement patterns relating to acting problems in classic and modern plays. The Staff

224A. Advanced Principles and Theories of Theatrical Design. (4) I.

Seminar—3 hours. Selected problems in the visual and auditory aspects of theatrical production. Mr. Snyder

224B. Advanced Principles and Theories of Theatrical Design. (4) II.

Seminar—3 hours. Selected problems in the design of stage scenery and costumes; practice in design. Mr. Chesley

224C. Advanced Principles and Theories of Theatrical Design. (4) III.

Seminar—3 hours. Design of a production for three different types of theatres: open stage, arena, and proscenium. Mr. Snyder

***226. History of Directing. (4) II.**

Seminar—3 hours. Survey of the theories and practice of internationally recognized stage directors from 1874 to the present. The Staff

* Not to be given, 1971-72.

227. Advanced Directing. (4) III.

Seminar—2 hours; laboratory—2 hours. Advanced directing techniques; specialized procedures in styles of drama. Projects in directing scenes from dramas of different types and periods. Mr. Stambusky

***228A. Seminar in Directing. (4) I.**

Seminar—3 hours. Development of directorial conceptions for contemporary productions of selected plays from the Greek to the Renaissance. ———

***228B. Seminar in Directing. (4) II.**

Seminar—3 hours. Directorial conceptions for contemporary productions of selected plays from the Renaissance to Romanticism. ———

228C. Seminar in Directing. (4) I.

Seminar—3 hours. Directorial conceptions for contemporary productions of selected plays from Romanticism to the present. Mr. Copelin

***229A. Special Problems in Directing. (4) II.**

Seminar—2 hours; laboratory—2 hours. Specialized directorial procedures in styles of drama. Projects in directing scenes selected from plays of the Greek to Renaissance periods. ———

***229B. Special Problems in Directing. (4) II.**

Seminar—2 hours; laboratory—2 hours. Projects in directing scenes from plays of the Renaissance to Romanticism. ———

229C. Special Problems in Directing. (4) II.

Seminar—2 hours; laboratory—2 hours. The direction of a full-length play from a classical period. Mr. Stambusky

***230A–230B. Classic and Medieval Theatre.**

(4–4) II, III.

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 includes readings and discussion and may be taken separately; 230B emphasizes research culminating in a substantial scholarly paper. Mr. Sarlos, Mr. Stambusky

235A–235B. Renaissance and Baroque Theatre.

(4–4) II, III.

Seminar—3 hours. The theatre of Italy, Spain, England, and France 1500–1660; emphasis on relationship of dramas of the period to physical circumstances of production. Course 235A includes readings and discussion and may be taken separately; 235B emphasizes research culminating in a substantial scholarly paper. Mr. Copelin, Mr. Sarlos

***240A–240B. Neoclassic and Romantic Theatre.**

(4–4) II, III.

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 includes readings and discussion and may be taken separately; 240B emphasizes research culminating in a substantial scholarly paper. ———, Mr. Sarlos

250. Modern Theatre. (4) I.

Seminar—3 hours. The theatre of Europe and America 1860–1940, with emphasis on the relationship of the dramas of the period to the physical circumstances under which they were produced. Mr. d'Harononcourt

259. Contemporary Theatre. (4) II.

Seminar—3 hours. World theatre since 1940, with emphasis on the relationship of the dramas of our period to the physical circumstances under which they are produced. Mr. d'Harononcourt

260. Advanced Playwriting. (4) I, II, III.

Seminar—3 hours. Dramatic structure, character, and dialogue. Advanced projects in playwriting. Mr. Shank

265. Theory of Dramatic Art. (4) I.

Seminar—3 hours. Theory and aesthetic principles of dramatic art as a fine art. Mr. Fahrner

280. Theatre Laboratory. (1–12) I, II, III.

Advanced practice in acting, designing, directing, playwriting, and technical theatre. The Staff

292. Contemporary Theatre Practice. (2) III.

Seminar—2 hours. Seminar in the techniques and requirements for pursuit of a career as a theatre professional. Includes survey of Broadway, Off-Broadway, Regional, University, and Community theatres. The Staff

298. Group Study. (1–4) I, II, III.

Seminar—1–3 hours. Prerequisite: consent of instructor. The Staff (Chairman in charge)

299. Individual Study. (1–12) I, II, III.

The Staff (Chairman in charge)

Professional Courses**413. Stage Make-Up. (1) I.**

Lecture-laboratory—2 hours. Lectures, demonstrations, and practical work in aspects of theatrical make-up. The Staff

414. Swordplay for the Theatre. (1) II.

Laboratory—2 hours. The techniques of the stage use of historical weapons; the choreography of stage duels with emphasis on safety and theatrical effectiveness. The Staff

* Not to be given, 1971–72.

ECOLOGY (A Graduate Group)

C. C. Delwiche, Ph.D., *Chairman of the Group*

Group Office, Institute of Ecology,
460 Academic Office Building III

Graduate Courses

201A. Ecological Theory. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: a course in ecology. The course will focus on the ecological community as a unit. The major generalizations concerning the structure and functioning of the community will be examined together with the generalizations relating both structure and function to the abiotic environment and its fluctuations. (Same course as Botany, Geology and Zoology 201A.)

The Staff (Mr. Salt and Mr. Major in charge)

201B. Analysis of A Selected Ecosystem. (3) II.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 201A or consent of instructor. Application of basic ecological principles to the interpretation of biotic and abiotic interrelationships of a particular ecosystem. Recent advances in theory, technique, and basic information are emphasized. Lectures will be given by specialists

from several fields. May be repeated for credit. (Same course as Botany, Geology and Zoology 201B.) The Staff (Chairman in charge)

201C. The Changing Biosphere. (3) III.

Lecture—2 hours; 1 assigned problem. Prerequisite: courses 201A, 201B; or consent of instructor. Course deals with changing gas balance and weather in the biosphere and effects on plants and animals, the effects of structural, chemical and physical changes on living systems, changes in species diversity, effects on human population increase, and related topics. (Same course as Botany, Geology and Zoology 201C.) The Staff (Chairman in charge)

290. Seminar in Ecology. (1) I, II.

Seminar—1 hour. Topics in ecology and resource management.

The Staff (Chairman in charge)

ECONOMICS

Frank C. Child, Ph.D., *Chairman of the Department*

Department Office, 380 Academic Office Building III

Professors:

Frank C. Child, Ph.D.
Bruce Glassburner, Ph.D.
Thomas Mayer, Ph.D.
Tsung-yuen Shen, Ph.D.

Departmental Major Advisers.—Mr. Brzeski, Mr. Glassburner, Mr. Goldberg, Mr. Goldin, Mr. Gustafson, Mr. Lenard, Mr. Olmstead, Mr. Shen, Mr. Vencill.

Graduate Advisers.—Mr. Kaneda, Mr. Mayer, Mr. Oettinger, Mr. Tuma, Mr. Wegge.

The American History and Institutions requirement may be satisfied in part by Economics 111. (See also page 30.)

The Major Program

Lower Division Courses.—Required: Economics 1A, 1B, or the sequence, Economics 2A–2B–2C; Economics 12; and at least a C average in these courses. Students planning to major in economics should normally complete these courses by the end of the sophomore year.

Students considering graduate study in economics or business are strongly urged to take Mathematics 15, 16A, and 16B.

Upper Division Courses.—Required: A total of 36 units of economics including (1) Economics 100 and 101; (2) either Economics 110A or 110B or 111; and (3) one of the following sequences of courses: 102A–102B; 110A–110B, 110A–111, or 110B–111; 115A–115B; 116–117; 121A–121B; 130A–130B; 135A–135B–135C; 150–151, or 150–152; 160–161. Economics 100 may be taken before, concur-



Assistant Professor:

Thomas M. Lenard, B.A. (*Acting*)

Lecturers:

Arthur Packenham, M.B.A.
C. Daniel Vencill, M.A.

rently with, or after Economics 101. The Department recommends that these courses be taken as soon as possible after the introductory course. Except under extraordinary circumstances, not more than three economics courses may be taken in any one quarter. In special cases, the department will accept a limited number of related upper division courses from other departments in satisfaction of the economics upper division course requirements. Approval from a departmental adviser is required in all such cases.

Economics is an appropriate major for undergraduates contemplating graduate study in business administration, law, regional planning or public affairs. For further information consult with a departmental adviser.

Teaching Major and Minor.—Economics is acceptable for the secondary credential.

Teaching Major.—Same as for the undergraduate major for the A.B. degree.

Teaching Minor.—Thirty units in economics including Economics 1A, 1B; or 2A, 2B, 2C; and 12. The student should consult with the subject representative.

Subject Representative: Mr. Brzeski.

Graduate Study.—Students who meet the admission requirements of the Graduate Division and the Department of Economics may pursue studies leading to the M.A. and Ph.D. degrees. Fields of emphasis for graduate study include: Economic Theory, Monetary Economics, Economic Development, Economic History, International Economics, Labor Economics, Industrial Organization, Economic Systems, Public Finance, Mathematical Economics, and Quantitative Methods (Econometrics).

For information about admission to graduate study, degree requirements, and financial aid, students should consult the *Announcement of the Graduate Division* and contact the chairman of the departmental graduate committee.

Lower Division Courses

1A. Principles of Economics. (5) I, III.

Lecture—3 hours; discussion—2 hours. Courses 1A and 1B may be taken in either order. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems.

Mr. Glassburner, Mr. Child

1B. Principles of Economics. (5) II, III.

Lecture—3 hours; discussion—2 hours. Courses 1A and 1B may be taken in either order. Analysis of the economy as a whole: determinants of the level of income, employment, and prices; money and banking, economic fluctuations, international trade, economic development; the role of public policy. Mr. Vencill

2A-2B-2C. Principles of Economics. (4-3-3)

I-II-III.

Lecture—3-2-2 hours; discussion—1-1-1 hour. Same as Economics 1A and 1B. Students enrolling for a full year of Principles of Economics must complete either 1A-1B or 2A-2B-2C.

Mr. Gustafson

11A. Elementary Accounting. (4) I.

Lecture—3 hours; laboratory—2 hours. The history and basic concepts of accounting; the ledger, journals, income statement, and the balance sheet; inventory valuation; depreciation; introduction to cost accounting; analysis of financial statements; social accounting.

Mr. Oettinger

11B. Elementary Accounting. (3) II.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 11A. Continuation of course 11A.

Mr. Oettinger

12. Introduction to Quantitative Methods in Economics. (5) I, III.

Lecture—4 hours; laboratory—2 hours. Prerequisite: two years of high school algebra. Not open to students having credit for Mathematics 13 or Psychology 3. Methods of analyzing quantitative economic data including descriptive statistics; sampling and statistical inference index numbers, correlation, and time series. Emphasis on the logic of procedures, interpretation, and application.

Mr. Brzeski, Mr. Gustafson

49. Lower Division Seminar. (1-3) III.

Seminar—1-3 hours. Prerequisite: lower division standing; consent of instructor.

The Staff (Chairman in charge)

98. Group Study for Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Child in charge)

99. Individual Study for Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Child in charge)

Upper Division Courses

100. Intermediate Micro Theory. (5) I, II.

Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C or consent of instructor. Price and distribution theory under condition of perfect and imperfect competition. Welfare economics.

The Staff

101. Intermediate Macro Theory. (5) II, III.

Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C or consent of instructor. Theory of income, employment and prices under static and dynamic conditions.

The Staff

102A. Advanced Micro Theory. (4) II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 12, 100, Mathematics 16A–16B; or consent of instructor. Selected topics in micro-economic theory. Mr. Wegge

102B. Advanced Macro Theory. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 12, 101, Mathematics 16A–16B; or consent of instructor. Selected topics in macro-economic theory. Mr. Lenard

103. Theory of Economic Optimization and Dynamic Processes. (4) I.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 100, 101; Mathematics 16A, 16B (may be taken concurrently); or consent of instructor. Study of the analytical concepts used in characterizing optimal decision for consumers and firms. Elements of activity analysis. Theory of dynamic systems used in business cycle theory, inflation and economic growth. Mr. Shen

105. History of Economic Thought. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A–1B or 2A–2B–2C, or consent of instructor. Historical survey of economic doctrine: the Classical School and its antecedents. Neoclassical thought, criticism of classical thought, emergence of modern economic thought. Mr. Shen

110A. Economic History. (4) I.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A–1B or 2A–2B–2C, or consent of instructor. Survey of economic change in Europe prior to the year 1700; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development. Mr. Olmstead

110B. Economic History. (4) II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A–1B or 2A–2B–2C, or consent of instructor. Survey of economic change in Europe from the year 1700 to the present; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development. Mr. Olmstead

111. Economic History. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A–1B or 2A–2B–2C, or consent of instructor. Survey of economic change in the United States beginning with the Colonial Period; reference to other regions of the Western Hemisphere; implications for contemporary economic problems. Mr. Olmstead

115A–115B. Economic Development. (4–4) I–II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A–1B or 2A–2B–2C, or consent of instructor. Theories of economic de-

velopment and underdevelopment, economic policy for growth and development. Contemporary and historical case studies.

Mr. Kaneda, Mr. Gustafson

116. Economic Systems. (4) I.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A–1B or 2A–2B–2C, or consent of instructor. Critical examination of major economic systems, their goals and institutions; capitalism, fascism, and varieties of socialism; problems of economic planning in USSR, India, China, and other industrializing economies. Mr. Brzeski

117. The Soviet Economy. (4) II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A–1B or 2A–2B–2C, or consent of instructor. Survey of Soviet economic development: economic organization, methods of planning, and performance. Mr. Brzeski

121A. Industrial Organization. (4) II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A–1B or 2A–2B–2C, or consent of instructor. An appraisal of the role of competition and monopoly in the American economy; market structure, conduct, and economic performance of a variety of industries. Mr. Goldberg

121B. Industrial Organization. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 121A. Public policy in a private enterprise economy; antitrust and other policies toward industry; economies of regulated industries. Mr. Goldberg

123. Ecology and Economics. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A–1B, 2A–2B–2C; or consent of instructor. Economics and populations as self-regulating systems; economic regulation of man's interaction with his environment. Topics: population growth and its economic determinants; optimal rates of use of exhaustible and renewable resources; implications of common property in resources; prospects for agricultural growth. Mr. Gustafson

125. Urban Economics. (4) II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A–1B or 2A–2B–2C, or consent of instructor. The structure of the metropolitan economy. The process of urban economic growth. Major problems such as: urban poverty and decay, housing, transportation, land-use planning and financing public services.

The Staff

130A–130B. Economics of the Public Sector. (4–4)

I–II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A–1B or 2A–2B–2C, or consent of instructor. Impact of the public sector

on income, employment, prices, allocation of resources, and distribution of income; related topics such as the budgetary process, public debt, revenue and expenditure problems, fiscal institutions.

Mr. Goldin

134. Corporation Finance. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. The corporation as a form of business organization; promotion, organization, operation, expansion, consolidation, failure, and reorganization; the capital market, financial instruments, and institutions; security markets.

135A. Money, Income, and Monetary Policy. (3) I.

Lecture—3 hours. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. Monetary institutions, the banking system, money creation, the Federal Reserve System, the tools of monetary policy.

Mr. Vencill

135B. Money, Income, and Monetary Policy. (4) II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 101 and 135A. Monetary theory; the impact of changes in the quantity of money and of liquid assets on money income.

Mr. Vencill

135C. Money, Income, and Monetary Policy. (3) III.

Lecture—3 hours. Prerequisite: course 135B. Evaluation of monetary policy, its impact on the economy and past performance, the problem of inflation.

Mr. Mayer

150. Trade Unions and the Labor Market. (4) II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. Theory and philosophy of labor movements in America, Western Europe and the developing world. The structure and government of labor unions. Current labor market issues.

Mr. Oettinger

*151. Wage Determination. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 100 and 101; or consent of instructor. The theory and practice of wage determination on the micro and macro level. The impact of legal minimum wages. Wage-price and wage-employment relationships. Offered in odd-numbered years.

Mr. Oettinger

152. Labor and Public Policy. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 150; or consent of instructor. The economic impact of labor legislation. Collective bargaining, strikes, dispute settlement and government intervention. Manpower and welfare programs. Offered in even-numbered years.

Mr. Oettinger

160. International Trade. (4) I.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. International trade theory; impact of trade on the domestic and the world economies; public policy toward external trade.

Mr. Child

161. International Finance. (4) II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. International money and capital markets and their impact on the domestic and world economies; international financial institutions and policies.

Mr. Child

190. Senior Seminar. (5) I.

Seminar—4 hours. Prerequisite: open only to economics majors with senior standing; consent of instructor. Selected topics in economic analysis and public policy.

Mr. Oettinger

197T. Tutoring in Economics. (1-5) I, II, III.

Undergraduate tutors will lead small voluntary discussion groups affiliated with one of the department's regular courses, under the supervision of, and at the option of the instructor in charge of the course.

The Staff (Mr. Child in charge)

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor; upper division standing.

The Staff (Mr. Child in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor; upper division standing.

The Staff (Mr. Child in charge)

Graduate Courses

200A. Economic Theory. (4) II.

Lecture—3 hours; laboratory—2 hours. Prerequisite: Mathematics 16A or consent of instructor. Price and value theory; behavior of firms and households under competitive conditions; price determination, resource allocation, and income distribution; fundamentals of welfare economics.

Mr. Kaneda

200B. Economic Theory. (4) III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: courses 103 and 200A; Mathematics 16A, 16B; or consent of instructor. A continuation of course 200A with reference to non-competitive conditions.

Mr. Wegge

200C. Economic Theory. (4) I.

Lecture—3 hours; laboratory—2 hours. Microstatic theory of income, employment, and prices.

Mr. Mayer

* Not to be given, 1971-72.

200D. Economic Theory. (4) III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: courses 103 and 200C; Mathematics 16A, 16B; or consent of instructor. Macrodynastic theory of income, employment, and prices.

Mr. Shen

201. History of Economic Thought. (4) III.

Lecture—3 hours; to be arranged—1 hour. Development of economic thought from classical Greece to modern times.

Mr. Glassburner

202. Topics in Economic Theory. (4) I.

Seminar—4 hours. Prerequisite: courses 200A, 200B, 200C, 200D; or consent of instructor. Recent developments in economic theory.

Mr. Child

203A. Advanced Economic Theory. (4) II.

Seminar—4 hours. Prerequisite: course 200B. Advanced topics in the theory of the firm; distribution theory; welfare economics.

203B. Advanced Economic Theory. (4) III.

Seminar—4 hours. Prerequisite: courses 200B and 200C. General equilibrium theory; capital theory; growth theory.

207. Special Topics in Mathematical Economics.

(4) III.

Seminar—3 hours. Prerequisite: courses 203A and 203B or consent of instructor. Advanced topics in mathematical economics. Contents may vary from one year to another.

210A. Economic History. (4) III.

Seminar—3 hours. Method and theory of economic history. Critical analysis of the methodology of economic history and theories of economic change as illustrated by major economic phenomena drawn from the history of different countries.

Mr. Tuma

210B. Economic History. (3) I.

Lecture-discussion—3 hours. Problems in economic history of the eastern hemisphere from the beginning of the Middle Ages up to the end of the eighteenth century; emphasis on Europe.

Mr. Tuma

210C. Economic History. (3) II.

Lecture-discussion—3 hours. Problems in economic history of the eastern hemisphere since the eighteenth century; emphasis on England, France, and Germany.

Mr. Tuma

210D. Economic History. (3) III.

Lecture-discussion—3 hours. Problems in economic history of the western hemisphere since the eighteenth century; emphasis on United States.

215A–215B. Economic Development. (4–4) I–II.

Lecture—3 hours; to be arranged—1 hour. Theories of economic development, policies for growth, problems from selected areas.

Mr. Kaneda

216. Economic Systems. (4) II.

Lecture—4 hours. Comparative study of economic systems, with reference to their organization and institutions, their values and goals, and their economic performance. Mr. Brzeski

217. Economics of Planning. (4) III.

Lecture—4 hours. Theories and principles of economic planning under various economic systems.

Mr. Brzeski

218. Development Programming. (4) I.

Seminar—3 hours. Prerequisite: courses 215B and 217; Mathematics 15 and 16B. Analytical formulation of growth and development goals including the optimal growth models; problems and practices in implementing such development policies.

Mr. Shen

221A. Industrial Organization. (4) II.

Lecture—3 hours; to be arranged—1 hour. Analysis of market structure, business behavior, and economic performance under conditions of limited governmental interference. Mr. Goldberg

221B. Industrial Organization. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 221A. Social standards and public policies toward the business sector of the economy.

Mr. Goldberg

230. Public Finance. (4) I.

Lecture—3 hours; to be arranged—1 hour. Role of the public sector; tax and expenditure theories; related topics.

Mr. Goldin

231. Problems of the Public Sector. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 230. Public sector institutions, problems, and policies.

Mr. Goldin

235A–235B–235C. Monetary Economics. (3–3–3)

I–II–III.

Lecture—3 hours. Monetary theory, policy, and problems.

Mr. Mayer

240A. Econometrics: Principles. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 103; Mathematics 130B or 131C (Mathematics 131C may be taken concurrently). General linear model, auto-correlation, multicollinearity, heteroscedasticity. Simultaneous equation problems.

Mr. Wegge

240B. Econometrics: Advanced Topics. (4) I.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 240A and Mathematics 131C, or consent of instructor. Special problems in the theory and the applications of econometrics.

Mr. Wegge

250A. Labor Economics. (4) II.

Lecture—3 hours; to be arranged—1 hour.
 Prerequisite: courses 150 and 151. Philosophy and theory of the labor movement; union structure and organization under changing labor market conditions; labor market issues.

Mr. Oettinger

250B. Labor Economics. (4) III.

Lecture—3 hours; to be arranged—1 hour.
 Prerequisite: courses 150 and 151. Theory of the labor market; analysis of wage-employment, wage-investment, and wage-price relationships.

Mr. Oettinger

260A. International Economics. (4) I.

Lecture—3 hours; to be arranged—1 hour.
 Economic structure and factors that underlie international trade; policies for regulating external trade.

Mr. Wegge

EDUCATION

Julius M. Sassenrath, Ph.D., *Chairman of the Department*

Douglas L. Minnis, Ed.D., *Head of Teacher Education*

Department Office, 174 Academic Office Building III

Professors:

Donald G. Arnstine, Ph.D.
 Hugh C. Black, Ph.D.
 Julius M. Sassenrath, Ph.D.

Associate Professors:

Leroy F. Troutner, Ph.D.
 George D. Yonge, Ph.D.

Assistant Professors:

Vincent A. Crockenberg, Ph.D.
 Linnea C. Ehri, Ph.D.
 D. Steven Lynch, Ph.D.
 Carlton J. Spring, Jr., Ph.D.

◇ ◇ ◇

Lecturers in and Supervisors of Teacher Education:

W. Augustus Davis, M.Ed.
 Larry D. Estes, M.A.
 Maryann E. Gatheral, B.A.
 Robert E. Hapworth, M.A.
 Burt Liebert, M.F.A.
 Jack E. Lowry, M.A.T.
 Walter T. Mara, M.S.
 Douglas L. Minnis, Ed.D.
 Victor A. Perkes, Ed.D.
 Shirley J. Skinner, M.A.
 David R. Wampler, Ph.D.

Credentials Counselors:

Elementary.—Mrs. Gatheral, Mr. Hapworth, Mrs. Skinner, Mr. Wampler.
Secondary.—Mr. Davis, Mr. Estes, Mr. Liebert, Mr. Lowry, Mr. Mara, Mr. Perkes.

260B. International Economics. (4) II.

Lecture—3 hours; to be arranged—1 hour.
 Significance of international transactions for the national income; international monetary mechanisms.

Mr. Kaneda

298. Group Study. (1-5) I, II, III.

Discussion—1-5 hours. Prerequisite: graduate standing and consent of instructor. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

299. Individual Study. (1-6) I, II, III.

Prerequisite: consent of instructor and graduate standing. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

299D. Dissertation Research. (1-6) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff

Junior College.—Mr. Mara.

Curricula for Teacher Education.—(See page 175). For a statement of complete requirements and appointments with credential counselors, apply to the departmental office. Applicants for the credential program should consult the department early in the fall quarter of the senior year.

Required courses in the "Professional Preparation" part of the requirements:

For Secondary Teaching: courses 320A, 110, 120, 320C, and 320E.

For Elementary Teaching: courses 110, 120, 300, 302, 303, 330A, 330C, and 330E.

Lower Division Course**98. Directed Group Study. (1-5) I, II, III.**

Lecture—2 hours; discussion—2 hours.

The Staff (Mr. Sassenrath in charge)

Upper Division Courses**110. Introduction to Educational Psychology. (4) I, II, III.**

Lecture—4 hours. Prerequisite: upper division or graduate standing; Psychology 1A, 1C, or 10. The learning process; physical, mental, and social development; individual differences and their measurement; mental hygiene; the role of the teacher in guidance and counseling.

Mrs. Ehri, Messrs. Lynch, Sassenrath, Spring, Yonge

114. Quantitative Methods in Educational Research. (4) I.

Lecture—2 hours; discussion—2 hours. Pre-

requisite: two years of high school algebra. Problems and methods in data analysis. Design of research projects. Emphasis will be on procedures suited to digital computers. Mr. Yonge

117. The Psychology of Reading Disability. (3) III.

Lecture—1 hour; discussion—2 hours. Prerequisite: Psychology 1A or equivalent; upper division or graduate standing. Cognitive and motivational processes involved in the acquisition of reading ability. Processes which may be impaired in the slow reader will be identified.

Mr. Spring

119. Tests and Measurements. (4) II.

Lecture—4 hours. Prerequisite: course 110 (may be taken concurrently). A critical survey of teacher-made and standardized tests; principles and functions of measurement in education, current practices in school marks; supervised work in test administration, scoring and interpretation.

Mr. Yonge

120. Philosophical and Social Foundations of Education. (4) I, II, III.

Lecture—4 hours. Prerequisite: upper division or graduate standing. Philosophical, historical, and sociological study of education and the school in our society.

Messrs. Arnstine, Black, Crockenberg,
Troutner

121. The Romantic Critics of Education. (4) I.

Lecture—2 hours; discussion—2 hours. A critical philosophic examination of the concept of the free school and of the assumptions about the educative process and prescriptions for educational reform of such writers as Rousseau, Tolstoy, Dewey, Neill, Goodman, Holt, Kohl, Denison, Leonard and others. Mr. Crockenberg

150A. Educating and Tutoring Minority Children and Youth. (2) I.

Lecture—1 hour; laboratory—3 hours. Poverty as it affects a person's performance in the school with emphasis on how to deal with it in the school and community.

Mr. Davis, Mr. Liebert

150B. Educating and Tutoring Minority Children and Youth. (2) II.

Lecture—1 hour; laboratory—3 hours. Racism as it affects a person's performance in the school with emphasis on how to deal with it in the school and community. Mr. Davis, Mr. Liebert

150C. Educating and Tutoring Minority Children and Youth. (2) III.

Lecture—1 hour; laboratory—3 hours. Youth cultures as they affect a person's performance in the school with emphasis on how to deal with them in the school and community.

Mr. Davis, Mr. Liebert

163. Guidance and Counseling. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 110 (may be taken concurrently). Nature and scope of pupil personnel services; basic tools and techniques of guidance; theory and practice of counseling psychology, with emphasis on educational and vocational adjustment. Mr. Lynch

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Sassenrath in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Sassenrath in charge)

Graduate Courses

201. History and Philosophy of Education: Ancient Period. (4) I.

Lecture—2 hours; seminar—2 hours. The scope, influence, and significance of the major educational ideas from selected ancient societies and cultures with emphasis upon the historical and philosophical contexts.

Mr. Black

202. History and Philosophy of Education: Middle Period. (4) II.

Lecture—2 hours; seminar—2 hours. The scope, influence, and significance of the major educational ideas from selected societies and cultures of the middle period (through the eighteenth century) with emphasis upon the historical and philosophical contexts.

Mr. Black

204. Existential Thought and Education. (4) II.

Lecture—1 hour; discussion—1 hour; seminar—2 hours. A study and critical analysis of the implications of existential thought for education.

Mr. Troutner

205. The Concept of Mind in Teaching. (4) III.

Seminar—4 hours. A philosophical analysis of the problems of educational practice which are created, aggravated, and sometimes solved by varying conceptualizations of mind and thinking.

Mr. Arnstine

210. Learning and Instruction. (3) I.

Seminar—3 hours. Prerequisite: course 110 or equivalent and consent of instructor. Critical readings and seminar reports of selected problems and procedures in the experimental study of learning and instruction.

Mr. Sassenrath

211. Thinking and Problem Solving. (3) II.

Seminar—3 hours. Prerequisite: course 110 or equivalent and consent of instructor. Critical consideration of thinking with special reference to concept development, problem-solving, home, school, and personality influences.

Mr. Yonge

212. Intellectual Development. (3) II.

Seminar—4 hours. Prerequisite: course 110 or equivalent and consent of instructor. Theory

and research on the development of language and thought in children: emergence of grammatical, semantic systems, and operational thought; implications for education. Mrs. Ehri

tures, conferences, and laboratory work; observation of and participation in classroom activities in the public elementary schools and University experimental classroom.

The Staff

219. Advanced Educational Measurement. (3) III.

Seminar—3 hours. Prerequisite: course 119 or equivalent and consent of instructor. Critical study and evaluation at an advanced level of measurement procedures used in educational research, including such topics as test theory, item analysis, and factor analysis. Mr. Sassenrath

***†320C. Supervised Teaching in Secondary Schools. (4-12) I, II, III.**

Laboratory—4-12 hours. Prerequisite: course 320A; course 320E (must be taken concurrently). Directed teaching for candidates for the secondary credential. (Satisfactory/Unsatisfactory grading only.)

The Staff

290. Seminar. (3) I, II, III.

Seminar—3 hours.

The Staff (Chairman in charge)

299. Research. (1-6) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

Professional Courses

300. Reading and Language Arts in the Elementary School. (4) I, III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: consent of instructor. Principles, procedures and curriculum materials for the teaching of reading and the oral and written language arts. Includes phonics and other developmental reading skills.

Mrs. Gatheral, Mrs. Skinner

302. Elementary School Curriculum: Social Studies. (2) I, II, III.

Lecture—2 hours. Current conceptions of the elementary school curriculum, with emphasis on the contributions from the social sciences and on effective teaching methods.

Mr. Minnis, Mr. Wampler

303. Elementary School Curriculum: Science. (2) I, II, III.

Lecture—2 hours. Current conceptions of the elementary school curriculum with emphasis on the role of science and on effective teaching methods.

Mr. Hapworth

309. Early Childhood and Kindergarten Education. (2) II.

Lecture—2 hours. Prerequisite: consent of instructor. Methods, materials, and history of nursery school and kindergarten education.

Mrs. Skinner

313. Middle Grade School Curriculum: Science and Social Science. (3) I.

Lecture—3 hours. Prerequisite: consent of instructor. Current conception of middle grade school curriculum and effective teaching in science and social science. Mr. Perkes, Mr. Estes

323. Secondary School Curriculum: Science. (2) I.

Lecture—2 hours. Current conceptions of secondary school curriculum and effective teaching in the biological and physical sciences.

Mr. Perkes

***330A. Introduction to Teaching in Elementary Schools. (3) I, II, III.**

Lecture—2 hours; laboratory—3 hours. Lectures, conferences, and laboratory work; observation of and participation in classroom activities in the public elementary schools and the University experimental classroom.

The Staff

***†330C. Supervised Teaching in Elementary Schools. (2-12) I, II, III.**

Prerequisite: course 330E (must be taken concurrently). Directed teaching for candidates for the elementary credential. May only be taken for credit for a total of 12 units. (Satisfactory/Unsatisfactory grading only.)

The Staff

***†330E. Methods of Teaching in Elementary Schools. (1-3) I, II, III.**

Lecture—1-3 hours. Prerequisite: course 330C (must be taken concurrently). Selection, organization, and evaluation of teaching materials including audio-visual aids. May be repeated for credit up to a total of 6 units.

The Staff

^a Students must make their own transportation arrangements for observations and student teaching.

^{††} Open only to interns and student teachers. These 300 series courses are scheduled as extra-session courses, to begin with the opening of the public schools and to end with the closing of the second semester in the public schools. Thus teaching assignments in the fall quarter, 1971, will begin on or about September 2. For the spring quarter, they will end on or about June 2. Students should make arrangements accordingly.

***320A. Introduction to Teaching in Secondary Schools. (3) I, II, III.**

Lecture—2 hours; laboratory—3 hours. Lec-

††340. Supervised Teaching in Junior Colleges. (5)

I, II, III.

Discussion—1 hour; supervised teaching—minimum 45 clock hours. Prerequisite: consent of instructor. Directed teaching for candidates for the standard teaching credential with specialization in junior college teaching. (Satisfactory/Unsatisfactory grading only.) Mr. Mara

341. Teaching in the Junior College. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. The junior college: organization and functions, role in higher education, characteristics of students, trends and issues in curricula, instructional procedures and materials. Mr. Mara

ENGINEERINGJohn D. Kemper, Ph.D., *Dean of the College*Roy Bainer, M.S., LL.D., *Dean of the College, Emeritus*Don O. Brush, Ph.D., *Associate Dean of the College*John B. Powers, Ph.D., *Associate Dean of the College*

College Office, 2132 Bainer Hall

**Associate Professors:**John R. Beljan, M.D. (*School of Medicine*)G. Worden Waring, Ph.D. (*School of Medicine*)

Mr. Mara

Assistant Professor:Phillip R. Yarnell, M.D. (*School of Medicine*)**Lower Division Courses****1. 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 angles, elevations and leveling, including stadia methods. Field problems, including mapping with special reference to agricultural and landscaping applications. Mr. Goss

3. Introduction to Engineering Systems. (3) I, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 21A recommended (may be taken concurrently). An introduction to the profession of engineering and to the role of the engineer as a responsible agent for the planning and shaping of the human environment. (Passed/Not Passed grading only.)

Mr. Schröder

4. Engineering Graphics in Design. (3) I, II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: mechanical drawing. Principles of descriptive geometry and of mechanical and free-hand drawing; their application in the representation, visualization and solution of engineer-

⁹ Students must make their own transportation arrangements for observations and student teaching.

[†] Open only to interns and student teachers.

These 300 series courses are scheduled as extra-session courses, to begin with the opening of the public schools and to end with the closing of the second semester in the public schools. Thus teaching assignments in the fall quarter, 1971, will begin on or about September 2. For the spring quarter, they will end on or about June 2. Students should make arrangements accordingly.

ing problems. Introduction to engineering design. Mr. J. M. Henderson

5A. Engineering Applications of Computers. (3) II, III.

Lecture—2 hours; discussion—1 hour. Prerequisite: Mathematics 21B (may be taken concurrently); Physics 4A (may be taken concurrently); not open for credit to students who have completed Mathematics 29. Introduction to digital computer structure, computer languages, and time sharing systems; programming digital computers with applications to engineering problems of both numerical and non-numerical natures. Mr. Loomis, Mr. Kozdrowicki

10. Technology and Society. (3) II.

Lecture—2 hours; discussion—1 hour. Types of technology: communication, computation, defense technology, information development, and transportation. World energy resources and society's energy needs. Effects of technology on society: population control, personality development, technology and the economy. (Passed/Not Passed grading only.)

Mr. DeGroot, Mr. Schroeder

17. Circuits. (3) I, II, III.

Lecture—3 hours. Prerequisite: Mathematics 22B (may be taken concurrently); Physics 4C. Basic circuit analysis techniques; transient and steady-state solutions using differential equations. Mr. LaPatra, Mr. Owen

35. Statics. (3) I, II, III.

Lecture—3 hours. Prerequisite: Mathematics 21C; Physics 4A. Force systems and equilibrium conditions with emphasis on engineering problems. The Staff

45. Properties of Materials. (4) I, III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: sophomore standing in engineering. An introductory course on the properties of engineering materials and their relation to the internal structure of the materials.

Mr. Mukherjee, Mr. Moon

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor; lower division standing. Group study of selected topics. The Staff (Mr. Brush in charge)

Upper Division Courses**100. Electronic Circuits and Systems. (4) I, II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 17. An introduction to the theory and application of analog and digital circuits and systems. Mr. Mitra, Mr. Owen

102A. Dynamics. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 35; Mathematics 22B, 22C. Kinematics and kinetics of particles, of systems of particles, and of rigid bodies applied to engineering problems.

Mr. J. M. Henderson

102B. Dynamics. (3) II, III.

Lecture—3 hours. Prerequisite: course 102A. Topics in rigid body dynamics; elementary dynamics of vibrating systems; introduction to energy methods.

Mr. J. M. Henderson

103A. Elementary Fluid Mechanics. (3) I, II.

Lecture—3 hours. Prerequisite: course 102A (may be taken concurrently). Fluid properties; fluid statics; continuity and linear momentum equations for control volumes; flow of incompressible fluids in pipes; dimensional analysis; laminar, transition, and turbulent flow regimes.

Mr. Dwyer

103B. Elementary Fluid Mechanics. (3) II, III.

Lecture—3 hours. Prerequisite: course 103A. Potential flow; open channel flow; boundary layer flow; one dimensional compressible flow.

Mr. Dwyer

104A. Mechanics of Materials. (3) I, II.

Lecture—3 hours. Prerequisite: course 35; Mathematics 22B, 22C (may be taken concurrently). Concepts of stress, strain, elasticity; stress and deformation analysis for axially loaded members, torsion of round shafts, bending and shear of beams; combined stresses.

The Staff

104B. Mechanics of Materials. (3) II, III.

Lecture—3 hours. Prerequisite: course 104A. Beams: unsymmetrical loading, shear center, indeterminate problems, inelastic bending, buckling and lateral instability. Energy methods; failure theories; torsion of thin-walled sections.

The Staff

105A. Thermodynamics. (3) I, II.

Lecture—3 hours. Prerequisite: Mathematics 22B, 22C. Equations of state and thermodynamics of one-component systems; first and second laws; phase equilibria.

Mr. Giedt

105B. Thermodynamics. (3) II.

Lecture—3 hours. Prerequisite: course 105A. Gas mixtures; work-producing and work-absorbing cycles (vapor and gas); measures of performance. Recent developments.

Mr. Giedt

106. Engineering Economics. (3) II.

Lecture—3 hours. Prerequisite: senior standing in engineering. The analysis of problems in engineering economy; the selection of alternatives; replacement decisions. Compounding, tax, origins and cost of capital, economic life, and risk and uncertainty are applied to methods of selecting most economic alternatives.

Mr. Garrett

110. Introduction to Engineering Principles. (3) I.

Lecture—3 hours. Prerequisite: open to all students not enrolled in the College of Engineering. Introduction to engineering principles and techniques for nonengineering students.

Mr. J. M. Henderson

115. Systems Diagnosis and Modeling. (3) I.

Lecture—3 hours. Prerequisite: upper division standing. The systems approach to complex problem definition. Analysis optimization and simulation techniques. Implementation of results. Micro and macro modeling. Application areas studied as projects may include social processes, economics, urban problems, justice systems and others.

Mr. LaPatra

122. Introduction to Mechanical Vibrations. (3) I.

Lecture—3 hours. Prerequisite: course 102B. Free and forced vibrations in lumped-parameter systems with and without damping; vibrations in coupled systems; electromechanical analogs; use of energy conservation principles.

Mr. Beadle

130. Solid-State Thermodynamics. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: senior standing in Engineering, or consent of instructor. The thermodynamics of the solid state, relation between thermodynamic and physical properties, free energy of heterogeneous reactions, quasicontinuum approach to solutions, free energy of binary systems and thermodynamics of interfaces.

Mr. Mukherjee

140. Materials in Engineering Design. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: senior standing in Engineering, or consent of instructor. Descriptive treatment of common engineering materials. Mechanical properties of typical materials including metals, woods, cements, polymers and glasses. Principles of heat treatment and fabrication as they affect design parameters, and applications in engineering will be emphasized.

Mr. Moon

142. Crystal Structure and X-Ray Diffraction. (3) I.

Lecture—3 hours. Prerequisite: course 45 or consent of instructor. Crystallography, including crystal structure and symmetry operations. Stereographic projection. Reciprocal lattice. Physics of X-rays. Theory of diffraction for X-rays, electrons and neutrons.

Mr. Moon

180. Engineering Analysis. (3) III.

Lecture—3 hours. The 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.

Mr. McKillop

183. Intermediate Mechanics of Materials. (3) II.

Lecture—3 hours. Prerequisite: course 104B; Mathematics 24. Stresses and deformations of curved beams; beams on elastic foundations; torsion of non-circular bars; introduction to plates and shells; thick-walled cylinders.

Mr. Romstad

184. Experimental Stress Analysis. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 104B. Experimental methods for the analysis of stress and strain, including photoelasticity, brittle lacquers, mechanical and electrical strain gages and instrumentation.

Mr. Beadle

187. Introduction to Theory of Elasticity. (3) I.

Lecture—3 hours. Prerequisite: course 104B. Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexure and torsion of bars of various shapes.

Mr. Hutchinson

ENGINEERING: AGRICULTURAL—See also Agricultural Engineering

ENGINEERING: AGRICULTURAL†

John R. Goss, M.S., *Chairman of the Department*

Department Office, 2030 Bainer Hall

Professors:

Roy Bainer, M.S., LL.D.
(*Engineering and Agricultural
Engineering, Emeritus*)
William J. Chancellor, Ph.D.
Robert B. Fridley, M.S.
John R. Goss, M.S.
S. Milton Henderson, M.S.
Robert A. Kepner, B.S.
Loren W. Neubauer, Ph.D., (*Engineering
and Agricultural Engineering, Emeritus*)

Professors: ◊ ◊ ◊

Norman B. Akesson, M.S. (*Agricultural
Engineering*)
Coby Lorenzen, Jr., M.S. (*Agricultural
Engineering, Emeritus*)
Michael O'Brien, Ph.D., (*Agricultural
Engineering*)
Wesley E. Yates, M.S. (*Agricultural
Engineering*)

Associate Professors:

Roger E. Garrett, Ph.D.
(*Agricultural Engineering*)

† Courses listed here are in the College of Engineering. For further course offerings, see Agricultural Engineering, page 188.

188. Physical Metallurgy Principles. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 45, 105A or consent of instructor. The physical principles in metallurgy are outlined. The elementary theory of metals, rate of approach to equilibrium, thermal behavior of metals, structure and free energy of alloy phases, diffusion phenomenon and strengthening mechanisms in solids are discussed.

Mr. Mukherjee

190. Professional Responsibilities of Engineers.

(3) II, III.

Lecture—2 hours; discussion—1 hour. Organization of the engineering profession; engineering and management; introduction to contracts, specifications, and business law; oral presentations by class members on the interaction between engineering and society.

Mr. Beadle

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor, upper division standing. The Staff (Mr. Brush in charge)

Stanton R. Morrison, Ph.D. (*Agricultural
Engineering*)

Assistant Professor:

Thomas H. Burkhardt, M.S. (*Acting,
Agricultural Engineering*)

Lecturers:

Pictiaw (Paul) Chen, Ph.D.
Joe P. Gentry, Ph.D.
Henry E. Studer, M.S.

Lower Division Courses

**1. The Agricultural Engineer in Tomorrow's
World. (1) II.**

Lecture—1 hour. Exploration of opportunities in Agricultural Engineering as they relate to society, environment, and biological systems, including interdisciplinary approaches. Discussion of agricultural engineering projects illustrating design, development, testing, and evaluation methods. (Passed/Not Passed grading only.)

The Staff (Mr. Goss in charge)

**98. Directed Group Study for Lower Division
Students. (1-5) I, II, III.**

The Staff (Mr. Goss in charge)

**99. Special Study for Lower Division Students.
(1-5) I, II, III.**

The Staff (Mr. Goss in charge)

Upper Division Courses**114. Principles of Farm Machinery. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 102B. Functional requirements, basic principles, and performance characteristics of field machines; cost analysis; general design considerations; laboratory studies and tests with specific machines. Mr. Yates

116. Agricultural Power. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 105A. Sources and systems for supplying energy to agricultural operations: internal combustion engines; fuels; electric power; solar energy; power transmission systems; muscle physiology; traction and vehicle mechanics; implement control systems.

Mr. Burkhardt

117. Developing and Evaluating Farm Machines.

(3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 114; Mechanical Engineering 118. Design procedures; effects of biological factors, labor requirements, crop values, and annual use upon the design approach; designing a production unit; hydraulic controls and power transmission in farm machines; testing and evaluating machine performance and durability.

Mr. Gentry

118. Development Engineering. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mechanical Engineering 118 (may be taken concurrently). Failure modes: determination of the causes of systems malfunction by analysis of interactions and variations in effects; experiment design; development procedures.

Mr. Studer

125. Agricultural Structures and Sanitation. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 35 and 104A. Functional and material requirements of storage and production structures; lighting, heating, insulating, and ventilating; water supply and sanitation for the farm home and for animal structures; methods and economics of farm waste disposal.

Mr. Neubauer

126. Design of Agricultural Structures. (3) III.

Lecture—3 hours. Prerequisite: course 125; Civil Engineering 131. Agricultural building loads and codes; design with steel, concrete, and timber; glued-laminated and plywood box beams; pole buildings and connections; lumber rigid frames; arches.

Mr. Neubauer

132. Unit Operations in Agricultural Processing.

(4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103A and 105A. Thermodynamics and mass transfer principles applied to

such processes as drying, dehydration, refrigeration, size reduction, separation, and materials handling.

Mr. Henderson

141. Engineering Properties of Agricultural Materials. (3) I.

Lecture—2 hours; laboratory—3 hours. Selected topics, with emphasis on mechanical and rheological properties and design applications. Techniques for measuring and recording static and dynamic properties.

Mr. Chen

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Goss in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Goss in charge)

Graduate Courses**215. Soil-Machine Relations in Tillage and Traction. (3) I.**

Lecture—3 hours. Prerequisite: courses 114 and 116; Civil Engineering 171 and Soil and Water Science 101 recommended. Mechanics of interactions between agricultural soils and tillage and traction devices; determination of relevant physical properties of soil; analyses of stresses and strains in soil due to machine-applied loads; experimental and analytical methods for synthesizing characteristics of overall systems.

Mr. Chancellor

225. Advanced Agricultural Structures Design. (3) II.

Lecture—3 hours. Prerequisite: course 126. Recommended: Civil Engineering 132B and 132C. Critical evaluation of codes as applied to agricultural structures; safe design criteria, load sharing, and statistical reliability concepts; computer analysis of indeterminate wood structures; stressed skin construction; ultimate strength design in reinforced concrete; applications of new materials and methods.

Mr. Neubauer

235. Advanced Unit Operations in Agricultural Processing. (3) III.

Lecture—3 hours. Prerequisite: course 132 or equivalent. Basic engineering procedures applicable to agricultural processing; e.g., size reduction, fluidization of granular particles, heat and mass transfer applications to drying and freezing, respiration of biomaterials.

Mr. Henderson

245. Agricultural Waste Management. (3) III.

Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor. Animal, crop and food processing wastes; pesticides, fertilizers, odors, dust and smoke in relation to environmental pollution. Disposal needs, present and future. Regulation, economics and pub-

lic concern. Coordination with municipal and industrial wastes management. Mr. Akesson

255. Environmental Engineering in Agriculture.
(3) III.

Lecture—3 hours. Prerequisite: Mechanical Engineering 186. The description, methods of measurement and effect on man, animals and plants of physical environmental factors, and the design of systems for their control.

Mr. Morrison

290. Seminar. (1) I, III.

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Gentry in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Henderson in charge)

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Henderson in charge)

ENGINEERING: APPLIED SCIENCE

Harold P. Smith, Jr., Ph.D., *Chairman of the Department*

Carl A. Jensen, Ph.D., *Vice-Chairman of the Department*

Department Office, 228 Walker Hall

Professors:

Stewart D. Bloom, Ph.D.

Richard J. Borg, Ph.D.

John Killeen, Ph.D.

Harold P. Smith, Jr., Ph.D.

Edward Teller, Ph.D. (*Professor at Large*)

Associate Professors:

Carl A. Jensen, Ph.D.

Wilson K. Talley, Ph.D.

Assistant Professors:

John S. DeGroot, Ph.D.

George D. Sauter, Ph.D.

Lowell L. Wood, Ph.D.

◊ ◊ ◊

Professor:

Richard F. Post, Ph.D. (*In Residence*)

Lecturers:

Berni J. Alder, Ph.D.

Frank M. Chilton, Ph.D.

Sidney S. Fernbach, Ph.D.

Joseph A. Fleck, Ph.D.

John G. Fletcher, Ph.D.

John C. Garrison, Ph.D.

Michael W. Guinan, Ph.D.

Laurence Hall, Ph.D.

William C. Hoover, Ph.D.

Tony Huen, Ph.D.

Montgomery H. Johnson, Ph.D.

Roger N. Keeler, Ph.D.

Ray E. Kidder, Ph.D.

Cecil E. Leith, Ph.D.

Gilbert Leppelmeier, Ph.D.

Hans M. Mark, Ph.D.

Kenneth D. Marx, Ph.D.

Kenneth G. Moses, Ph.D.

Jacques B. J. Read, Ph.D.

Harry L. Sahlin, Ph.D.

John J. Walton, Ph.D.

Frederick O. Wooten, Ph.D.

Davis

Upper Division Courses

115. Introduction to the Use of Computers. (3)

I, II, III.

Lecture—3 hours. Prerequisite: Engineering 5A; Mathematics 22B. Lectures and laboratory work on electronic computers and their application to engineering problems.

Mr. Talley, Mr. Jensen

135A. Introductory Nuclear Science and Technology. (3) II.

Lecture—3 hours. Prerequisite: Physics 121 or equivalent. Interaction of gamma rays, electrons, and heavy particles with matter; energy loss and multiple scattering formulae and their application in various media. Introductory aspects of nuclear phenomena: nuclear masses, size, energies, and decay modes. Mr. Sauter

144. Introduction to Nuclear Technology. (3) III.

Lecture—3 hours. Prerequisite: course 135A. Nuclear reactions and their applications: nuclear energy sources, radiation detection; nuclear instrumentation. Nuclear particle accelerators. High vacuum technology. Mr. Sauter

Graduate Courses

217A. Introduction to Computational Physics. (3) I.

Lecture—3 hours. Prerequisite: course 115. Finite difference techniques applied to the solution of problems in sound wave propagation, shock propagation and magnetohydrodynamic stability. Monte Carlo and quadrature techniques applied to problems in linear transport theory. (Courses 217A, 217B, 217C may be taken in any order.) Mr. DeGroot

217B. Introduction to Computational Physics. (3) II.

Lecture—3 hours. Prerequisite: course 115. Numerical transform and finite difference techniques applied to the solution of problems in electromagnetic propagation in random media and plasma dynamical problems such as solutions of the Vlasov equation, the Fokker-Planck equation and plasma stability. Mr. DeGroot

217C. Introduction to Computational Physics.

(3) III.

Lecture—3 hours. Prerequisite: course 115. Direct summation, importance sampling Monte Carlo, variational and special integration techniques for the solution of problems in statistical mechanics such as vibrational states of H_2 and equation of the state with various potentials and of problems in quantum mechanics.

Mr. Jensen

230A-230B-230C. Structure of Matter.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 205C. Classical properties of matter; introduction of quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules and solids; quantum theory of cooperative effects.

Mr. Jensen

240A-240B-240C. Nuclear Reactor Analysis.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 205C. The physical concepts and mathematical techniques used in the analysis of nuclear reactors.

Mr. DeGroot

245A-245B. Nuclear Reactor Systems. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 240A. Those aspects of fluid dynamics, thermodynamics, heat transfer, and thermal stress analysis that apply to the engineering design of nuclear reactors. Radiation shielding, fuel cycles, and isotope separation.

Mr. Sauter

246. Nuclear Explosives: Phenomenology. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 220A. The phenomenology of nuclear explosives; the theoretical and empirical laws for such effects; the scientific uses of such phenomena. Offered in odd-numbered years. Mr. Talley

260A-260B. Statistical Theory of Equilibrium and Transport Phenomena. (3-3) I-II.

Lecture—3 hours. Prerequisite: courses 205A and 120B. Statistical mechanical formulation of thermodynamics with application to the various states of matter. Statistical foundation of irreversible phenomena; evaluation of the transport coefficients in fluids and metals. Mr. Talley

271. Electrodynamics of Continuous Media. (3) I.

Lecture—3 hours. Prerequisite: course 230A; Electrical Engineering 230A; Chemistry 110A. Solutions of Maxwell's equations in continuous media. Stresses and mechanical potentials of matter in constant and time varying fields. Ther-

modynamically based phenomenological description of electromagnetic fields in matter. Quantum mechanical interpretation of the properties of conductive and dispersive media. Mr. Chilton

280A-280B. Plasma Kinetic Theory with Applications. (3-3) II, III.

Lecture—3 hours. Prerequisite: Electrical Engineering 240 or consent of instructor. Plasma kinetic equations; steady state solutions-plasma sheaths; linear plasma waves-Landau damping, plasma echoes, and beam-plasma interactions; nonlinear effects, large amplitude waves, plasma turbulence, shocks, and wave-particle interactions. Stability problems in controlled thermonuclear fusion.

Mr. DeGroot

290. Seminar. (1-2) I, II, III.

Seminar—2 hours. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

298. Group Study. (1-5) I, II, III.

Lecture—1-5 hours. Such topics as neutron physics, nuclear technology, advanced hydrodynamics, plasma physics, or advanced mathematics

The Staff (Chairman in charge)

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

Livermore**Upper Division Courses****105. Special Topics in Applied Science. (2) I.**

Lecture—2 hours. Use of laws and concepts covered in undergraduate curricula in applied science. The variety of subjects covered will include problems of space physics, a discussion of gravity and capillary waves, and some problems in optics such as lasers.

Mr. Teller

***110A. Vectors and Tensors. (4) I.**

Lecture—4 hours. Prerequisite: ordinary differential equations. Algebra and calculus of finite and infinite dimensional vectors; orthonormal functions; introduction to linear equations.

Mr. Marx

***110B. Complex Variables and Calculus of Variations. (4) II.**

Lecture—4 hours. Prerequisite: course 110A. Analytic functions; contour integrals; power series, conformal mapping; Laplace transform; calculus of variations.

Mr. Marx

***110C. Linear Equations. (4) III.**

Lecture—4 hours. Prerequisite: course 110B. Solution of linear algebraic, differential, and integral equations by orthonormal expansion and Green's functions; approximation methods.

Mr. Marx

* Not to be given, 1971-72.

115. Introduction to the Use of Computers. (3) I.

Lecture—3 hours. Prerequisite: Engineering 5A; Mathematics 22B. Lectures and laboratory work on electronic computers and their application to engineering problems. Mr. Wood

120A-120B. Chemistry for Physicists and Engineers. (3-3) I-II.

Lecture—3 hours. Prerequisite: Chemistry 1C; Mathematics 22B. Concepts of chemistry and physical chemistry, including atomic and molecular structure and the properties of liquids and solids. Mr. Borg

123A-123B-123C. Structural Chemistry. (1-1-1) I-II-III.

Lecture—1 hour. Prerequisite: freshman chemistry and modern physics. A factual descriptive course relating chemical and physical properties of substances to their molecular or crystal structure. Selected examples of organic compounds, minerals, refractory oxides and carbides, and complex ions. Generalizing correlations between structure, chemical reactivity, solubility, melting temperatures, etc. Mr. Borg

135A. Introductory Nuclear Science and Technology. (3) I.

Lecture—3 hours. Prerequisite: Physics 121 or equivalent. Interaction of gamma rays, electrons, and heavy particles with matter; energy loss and multiple scattering formulae and their application in various media. Introductory aspects of nuclear phenomena: nuclear masses, size, energies, and decay modes. Mr. Bloom

135B-135C. Introductory Nuclear Science and Technology. (2-2) II-III.

Lecture—2 hours. Prerequisite: course 135A. Radiation detection, charged particle technology, radiation chemistry, neutron technology, magnetic moment and spin measurement, vacuum technology. Mr. Bloom

Graduate Courses**205A. Mathematical Methods. (3) I.**

Lecture—3 hours. Prerequisite: introductory courses in ordinary differential equations, vector analysis, infinite series, and functions of a complex variable. Calculus of finite and infinite dimensional vector spaces; orthonormal functions; linear equations. Applications of these analytical techniques to physical systems. Mr. Marx

205B. Mathematical Methods. (3) II.

Lecture—3 hours. Prerequisite: course 205A or the equivalent. Differential equations in the complex plane; contour integration; conformal mapping; Fourier and Laplace transforms; calculus of variations; applications of these techniques to physical systems. Mr. Marx

205C. Mathematical Methods. (3) III.

Lecture—3 hours. Prerequisite: course 205B or equivalent. Eigenvalue problems; solution of linear differential and integral equations by expansions in orthonormal functions; Green's functions; approximation methods; applications to physical systems. Mr. Marx

210A-210B-210C. Advanced Mathematical Methods. (3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 205C. Classification of partial differential equations, elliptic and hyperbolic equations, initial value problems in two or more independent variables, difference and Monte Carlo methods; applications to problems in hydrodynamics, magnetohydrodynamics, shock waves, transport theory, and plasma physics. Mr. Killeen

211. Computer Mathematics. (3) I.

Lecture—3 hours. Prerequisite: course 205C; course 115 (may be taken concurrently). Review and survey of mathematical fields fundamental to computer science. Theory of sets, Boolean algebra and propositional calculus, predicate calculus, probability and statistics, mathematical programming, general number systems. Mr. Fletcher

212A-212B. Computer Languages. (3-3) II-III.

Lecture—3 hours. Prerequisite: course 211. The basic tools in the use of computers for processing data are covered. These include common subroutines such as sorting and filing, assemblies and relocatable codes, algorithmic notations and construction of algorithms. Considerations evolving from special hardware are discussed. Mr. Fletcher

213A. Switching Theory. (3) II.

Lecture—3 hours. Prerequisite: course 211. This course will cover minimization techniques, switching function realization with electronic circuits, trees, storage devices, and elementary sequential machines. Mr. Fletcher

213B. Computing Machines. (3) III.

Lecture—3 hours. Prerequisite: course 212A. This course will cover computing machine organization, memory systems, arithmetic units and input-output systems. Mr. Fletcher

214. Computing with Symbolic Expressions. (3) I.

Lecture—3 hours. Prerequisite: course 211. Theory and practice of computing with symbolic expressions. The LISP programming language, function composition, conditional expressions, recursive functions. Writing programs to manipulate symbolic expressions. Interpreters, compilers, proving the equivalence of algorithms. Survey of symbol manipulation languages. Mr. Fletcher

215. Artificial Intelligence. (3) II.

Lecture—3 hours. Prerequisite: course 211. An organized description of attempts to get computers to behave intelligently. Programs play games, solve problems, prove theorems, and deduce answers to questions from given facts. Programs that learn to make evaluations and to recognize patterns.

Mr. Fletcher

216. Automata Theory. (3) III.

Lecture—3 hours. Prerequisite: course 212A. This course will cover the elements of finite automata including models, graphical and table representation, equivalence, minimization, identification. Time permitting, infinite automata will be introduced and computability discussed.

Mr. Fletcher

220. Physical Chemistry of Solids. (3) III.

Lecture—3 hours. Prerequisite: courses 120B, 260B. Equations of state—heterogeneous equilibria—phase diagrams—two-body potential functions, the Debye model statistical thermodynamics of solid solutions, phase transformations and order—disorder phenomena—surface thermodynamics.

Mr. Borg

221A-221B-221C. Materials Science. (3-3-3)

(I-II-III).

Lecture—3 hours. Prerequisite: courses 120B, 260B. The facts and theories of crystal defect physics and their application to such problems as the mechanical properties of solids, radiation damage, phase transformations, etc. Covers thermodynamics of point defects, diffusion, elasticity dislocation theory.

Mr. Borg, Mr. Guinan

230A-230B-230C. Structure of Matter.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 205C. Classical properties of matter; introduction of quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules and solids; quantum theory of cooperative effects.

Mr. Sahlin

231A-231B-231C. Theory of the Solid State.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 230C. Structure binding and mechanical properties of crystals; dielectrics, electrons in metals, metals and alloys; magnetism, superconductivity, and semiconductors.

Mr. Leppelmeier

232. Solid-State Electronics. (3) I.

Lecture—3 hours. Prerequisite: course 231C. Theory of semiconductors and semiconductor devices (transport properties, optical properties, p-n junctions, transistor devices, and surface states). An introduction to microwave magnetic devices and superconducting memory devices.

Mr. Wooten

235A-235B. Nuclear Physics. (3-3) II-III.

Lecture—3 hours. Prerequisite: course 230C. Basic properties of nuclei; radioactive decay; nuclear models; low energy nuclear reactions; neutron physics. Interaction of particles and radiation with matter.

Mr. Bloom

237A-237B. Neutron Physics. (3-3) II-III.

Lecture—3 hours. Prerequisite: course 135A. Properties of neutrons, cross-sections and nuclear structure, fast neutrons, neutron resonances, fission process, thermal neutrons, neutron optics, diffraction, applications of neutron diffraction and optics to studies of the structure of matter. Offered in odd-numbered years.

Mr. Sauter

239A-239B. Nuclear Chemistry. (3-3) II-III.

Lecture—3 hours. Prerequisite: course 135A. Radiochemistry as an analytical technique in the study of chemical and nuclear processes: activation analysis, fission, properties of the actinides, current theories of the properties of the transactinides, radiolysis, "hot atom" chemistry, and mechanisms of biological radiation damage. Offered in even-numbered years.

Mr. Read

250A-250B. Continuum Mechanics. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 205C. Tensor notation, algebra, and analysis. Theory of elasticity, stress-strain relation, strain energy, reciprocity laws, elastic waves. Hydrodynamics of incompressible and compressible flows in two and three dimensions.

Mr. Walton

251. Geophysical and Stellar Hydrodynamics. (3) III.

Lecture—3 hours. Prerequisite: course 250B. Hydrodynamics and thermodynamics of fluids in gravitational fields with applications to the atmosphere, the ocean, and stellar models. The role of convection and radiation transport. The use of numerical models. Offered in even-numbered years.

Mr. Wood

252. Turbulence. (3) III.

Lecture—3 hours. Prerequisite: course 250B. Definition, kinematics, and dynamics of turbulent flows. Hydrodynamic instability. Equilibrium theory for isotropic turbulence. Convection, diffusion, and Reynolds stress, magneto-hydrodynamic turbulence of plasmas. Two-dimensional turbulence with geophysical applications. Offered in odd-numbered years.

Mr. Chilton

260A-260B. Statistical Theory of Equilibrium and Transport Phenomena. (3-3) III-I.

Lecture—3 hours. Prerequisite: courses 205A and 120B. Statistical mechanical formulation of thermodynamics with application to the various states of matter. Statistical foundation of irreversible phenomena; evaluation of the transport coefficients in fluids and metals.

Mr. Johnson

262. Advanced Statistical Thermodynamics. (3) II.

Lecture—3 hours. Prerequisite: course 260B.

Formulation of thermodynamics of many-component systems through the grand partition function. Distribution functions. Cluster expansion and condensation. Monte Carlo. Molecular dynamics.

Mr. Hoover

263. Material Properties at High Pressures and Temperatures. (3) III.

Lecture—3 hours. Prerequisite: course 262. Theory of the properties of matter at extremely high pressure and temperatures. Terrestrial and astrophysical applications.

Mr. Keeler

264. Material Properties at Low Temperatures. (3) III.

Lecture—3 hours. Prerequisite: course 262. Properties of liquid helium, theoretical explanations. General properties of superfluids and superconductivity, theories and applications. Cryogenic theory.

Mr. Sahlin

266. Quantum Optics. (4) III.

Lecture—4 hours. Prerequisite: course 230C. Quantum theory of radiation; quantum theory of optical coherence, conditions for laser action; laser types; rate equations, density matrices; laser noise theory; parametric amplifiers, nonlinear optics, stimulated Raman and Brillouin scattering.

Mr. Fleck

270A-270B-270C. Electromagnetic Theory. (3-3-3) II-III-I.

Lecture—3 hours. Prerequisite: Electrical Engineering 131B; ordinary differential equations. Electromagnetic field theory; physical properties of dielectrics and conductors; magnetic properties of materials, steady and quasi-steady currents, propagation of electromagnetic waves in vacuum and through matter.

Mr. Johnson

275A-275B-275C. Plasma Physics. (3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 270C. The basic equations governing the behavior of a fully ionized plasma in a magnetic field; simple plasma configurations in controlled fusion re-

search and space applications. Theory of plasma waves and instabilities. Transport coefficients and radiation phenomena.

Mr. Moses

276. Classical Mechanics. (3) I.

Lecture—3 hours. Prerequisite: consent of instructor. General principles of analytical mechanics. Variational principles. Lagrange's and Hamilton's equations. Kinematics; collisions. Offered in even-numbered years.

Mr. Hall

277. Plasma Kinetic Theory. (3) I.

Lecture—3 hours. Prerequisite: course 275B. The derivation of plasma kinetic equations; turbulence; fluctuations; advanced radiation and transport phenomena.

278A-278B. Waves and Radiations in Plasmas. (3-3) II, III.

Lecture—3 hours. Prerequisite: course 275A. Wave propagation in plasmas; plasma instabilities; radiation processes, including bremsstrahlung, synchrotron radiation, and radiation from partially ionized atoms.

Mr. Hall

279. High-Temperature Plasmas. (3) I.

Lecture—3 hours. Prerequisite: course 275B. Confinement and stability of high temperature plasmas in open and closed magnetic-field structures. Application to controlled-fusion research and space plasmas.

Mr. Hall

290. Seminar. (1-2) I, II, III.

Seminar—1-2 hours. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

298. Group Study. (1-3) I, II, III.

Lecture—1-3 hours. Such topics as neutron physics, nuclear technology, advanced hydrodynamics, plasma physics, or advanced mathematics.

The Staff (Chairman in charge)

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

ENGINEERING: CHEMICAL

J. M. Smith, Sc.D., *Chairman of the Department*
Department Office, 3092 Bainer Hall

Professor:

J. M. Smith, Sc.D.

Associate Professors:

Richard L. Bell, Ph.D.

Stephen Whitaker, Ph.D.

Assistant Professors:

Neil A. Dougherty, Ph.D.

Alan P. Jackman, Ph.D.

Benjamin J. McCoy, Ph.D.

Lower Division Courses

1. The Scope of Chemical Engineering. (1) II.

Lecture—1 hour; discussion—1 hour. Demonstrations and discussions of the opportunities in chemical engineering for professional development, contributions to basic knowledge, and service to society. (Passed/Not Passed grading only.)

The Staff (Chairman in charge)

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Group

study of selected topics. Students may enroll in more than one section.

The Staff (Mr. Smith in charge)

99. Special Study for Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Smith in charge)

Upper Division Courses

150A. Chemical Engineering Fluid Mechanics.

(3) II.

Lecture—3 hours. Prerequisite: Engineering 102A. Fluid statics and one-dimensional laminar flows. Kinematics of point and integral functions. The stress vector-stress tensor relation. Newton's law of viscosity and application of the Navier-Stokes equations to laminar flow and dimensional analysis. Flow of non-Newtonian fluids. Students electing this course may not receive credit for Engineering 103A. Mr. Bell

150B. Chemical Engineering Fluid Mechanics.

(3) III.

Lecture—3 hours. Prerequisite: course 150A. Turbulent flows and time averaging. Application of Bernoulli's equation and the macroscopic mass, momentum, and mechanical energy balances to a variety of practical problems. Introduction to compressible flow. The entropy equation and isotropic processes. Shock waves and choke flow. Students electing this course may not receive credit for Engineering 103B.

Mr. Bell

151. Material and Energy Balances. (3) I.

Lecture—3 hours. Prerequisite: Chemistry 110A (may be taken concurrently). Use of principles of conservation of mass and energy in chemical process calculations. Mr. Whitaker

152A. Chemical Engineering Thermodynamics. (3) II.

Lecture—3 hours. Prerequisite: course 151; Chemistry 110A. Application of principles of thermodynamics to chemical processes. Mr. Bell

152B. Chemical Engineering Thermodynamics.

(3) III.

Lecture—3 hours. Prerequisite: course 152A. Continuation of course 152A. Mr. Smith

153. Chemical Engineering Heat Transfer. (4) III.

Lecture—4 hours. Prerequisite: course 150A. Steady and transient heat conduction. The thermal energy equation, analysis of forced and free convective heat transfer. Turbulence, macroscopic balances, and heat transfer coefficients. The photon transport equation and radiant energy exchange. The design of heat exchangers.

Mr. McCoy

154A. Mass Transfer. (3) I.

Lecture—3 hours. Prerequisite: Mechanical Engineering 186 (may be taken concurrently);

Chemistry 110A. Fundamental concepts of mass transfer in fluids. Problems in pure diffusion and convective mass transfer. Mr. McCoy

154B. Applications of Mass Transfer. (3) II.

Lecture—3 hours. Prerequisite: course 154A. Application of the principles of mass transfer and thermodynamic equilibrium to absorption, extraction, distillation and other separation processes. Mr. Bell

155A. Chemical Engineering Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 154B (may be taken concurrently). Laboratory experiments in heat, mass, and momentum transfer and in chemical kinetics. Mr. Smith

155B. Chemical Engineering Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 155A. Continuation of course 155A. Mr. Smith

156A. Chemical Engineering Kinetics. (3) II.

Lecture—3 hours. Prerequisite: course 152B, 154A; and Chemistry 110C (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reactor design. Mr. Dougherty

156B. Chemical Engineering Kinetics. (3) III.

Lecture—3 hours. Prerequisite: course 156A. Continuation of course 156A. Mr. Dougherty

157. Chemical Engineering Process Dynamics.

(4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 154B and 156A. A study of stability and the transient state of chemical processing systems. Mr. Bell

158. Chemical Engineering Process Design. (3) III.

Lecture—3 hours. Prerequisite: courses 154B and 156A. Chemical Engineering process design; optimization and economics. Mr. McCoy

159. Chemical Engineering Analysis. (3) I.

Lecture—3 hours. Chemical engineering applications of partial differential equations, tensors, systems of linear equations, and operational calculus. Mr. Jackman

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Selected topics. Student groups may be organized in instrumentation and design problems. Students may enroll in one or more separate subjects.

The Staff (Mr. Smith in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Smith in charge)

Graduate Courses**252A. Advanced Thermodynamics. (3) I.**

Lecture—3 hours. Prerequisite: course 152B or Engineering 105B. A general treatment of the first and second laws; applications of thermodynamic relationships to phase and chemical reaction equilibria; introduction to statistical thermodynamics.

Mr. Smith

252B. Advanced Thermodynamics. (3) II.

Lecture—3 hours. Prerequisite: course 252A. Continuation of 252A with an emphasis on statistical thermodynamics.

Mr. Dougharty

253A. Advanced Transport Phenomena. (4) I.

Lecture—4 hours. Prerequisite: Mechanical Engineering 186. Tensor and vector methods in the formulation of equations of mass, momentum, energy, and entropy in continuous media with particular emphasis on fluids. Applications to the formulation of rheological equations of state for viscoelastic fluids and fluid interfaces.

Mr. McCoy

253B. Advanced Transport Phenomena. (4) II.

Lecture—4 hours. Prerequisite: course 253A. Continuation of course 253A, with application to both differential and integral mass, momentum, and energy balances. Radiant energy transport and heat transfer in reacting systems.

Mr. Jackman

253C. Advanced Transport Phenomena. (3) III.

Lecture—3 hours. Prerequisite: course 253B. Continuation of course 253B with special emphasis on multicomponent systems. The laws of molecular diffusion and energy transport, including the effects of concentration, temperature, electric and pressure fields. Convective mass transfer and chemically reacting flows.

Mr. Bell

254. Molecular Theory of Transport Phenomena.

(3) II.

Lecture—3 hours. The transport of mass, momentum, and energy is considered from the molecular point of view. Derivations of the Boltzmann equation are considered, and solutions for special cases are discussed. Methods for calculating transport coefficients are presented.

Mr. McCoy

ENGINEERING: CIVIL

Ray B. Krone, Ph.D., Chairman of the Department
Department Office, 2092 Bainer Hall

Professors:

**Jaime Amoroch, Ph.D. (Civil Engineering
and Water Science and Engineering)**

^aDon O. Brush, Ph.D.

**Robert H. Burgy, M.S. (Civil Engineering
and Water Science and Engineering)**

255A. Equilibrium Stage Processing. (3) I.

Lecture—3 hours. Prerequisite: course 154B; course 252B (may be taken concurrently). The concept of equilibrium stage processing; applications to the design of distillation, absorption, and extraction processes.

Mr. Dougharty

255B. Equilibrium Stage Processing. (3) II.

Lecture—3 hours. Prerequisite: course 255A. Continuation of course 255A.

Mr. Bell

256A. Applied Kinetics and Reactor Design. (3) II.

Lecture—3 hours. Prerequisite: courses 156B and 252A. Application of kinetics and molecular transport rates to the design of chemical reactors, with emphasis on homogeneous systems.

Mr. Dougharty

256B. Applied Kinetics and Reactor Design. (3) III.

Lecture—3 hours. Prerequisite: course 256A. Continuation of course 256A, with emphasis on convective transport and heterogeneous catalytic systems.

Mr. Smith

257. Rheology of Fluids. (3) III.

Lecture—3 hours. Prerequisite: course 253A. Non-Newtonian and viscoelastic behavior of polymer materials, suspensions and emulsions. Continuum theories of stress equations for materials with and without memory. Solution of simple boundary value problems and the evaluation of rheological experiments.

Mr. Whitaker

258. Chemical Process Dynamics. (3) I.

Lecture—3 hours. Prerequisite: courses 154B, 156B. Unsteady-state process analysis, examples of first and second order process systems, coupling of mixed order processes including chemical reaction kinetics, mass and heat transfer and fluid mechanics, simulation of chemical processes.

Mr. Bell

290. Seminar. (1) I, II, III.

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

¹Leonard R. Herrmann, Ph.D.

Ray B. Krone, Ph.D.

James N. Luthin, Ph.D. (Civil Engineering
and Water Science and Engineering)²Absent on leave, 1971-72³Absent on leave, winter quarter 1972.⁴Absent on leave, spring quarter 1972.

Gerald T. Orlob, Ph.D.

Verne H. Scott, Ph.D. (*Civil Engineering and Water Science and Engineering*)

Associate Professors:

Kandiah Arulanandan, Ph.D.

James A. Cheney, Ph.D.

James R. Hutchinson, Ph.D.

Edward D. Schroeder, Ph.D.

Theodor S. Strelkoff, Ph.D., (*Civil Engineering and Water Science and Engineering*)

Assistant Professors:

Bruce E. Larock, Ph.D.

Melvin R. Ramey, Ph.D.

Karl M. Romstad, Ph.D.

Chih-Kang Shen, Ph.D.

Michael A. Taylor, Ph.D.

George Tchobanoglous, Ph.D.

Lower Division Courses

1. The Civil Engineer in Society. (1) II.

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. (Passed/Not Passed grading only.)

The Staff (Mr. Romstad in charge)

10. Introduction to Surveying. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: lower division standing in the College. Theory and practice of measurements for distance, elevations, and angles; the analyses and adjustments for systematic and random measurement errors; line directions, traverse computations, horizontal and vertical curves; astronomical observations and calculations for latitude, longitude, azimuth, and time.

Mr. Tchobanoglous

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor; lower division standing. Group study of selected topics.

The Staff (Mr. Krone in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor; lower division standing. The Staff (Mr. Krone in charge)

Upper Division Courses

131. Structural Analysis. (3) I, III.

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Structural analysis of determinate and indeterminate beams, trusses and frames; influence lines, moving loads, deflection analysis.

Mr. Romstad

132A. Structural Design: Metallic Elements. (3) II, III.

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Metallic

beams, columns, other members; analysis and design of riveted, bolted, and welded joints; design of simple beam connections, moment resistant connections, and column base plates.

Mr. Romstad

132B. Structural Design: Concrete Elements. (3) I, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 132A (may be taken concurrently). Reinforced concrete beams, columns, slabs, and footings; elastic theory and ultimate design. Introduction to prestressed concrete and plastics.

Mr. Taylor

132C. Structural Design: Timber Elements. (2) III.

Lecture—2 hours. Prerequisite: course 132A. Elements of timber structures and laminated structures, including connection design.

Mr. Ramey

133. Matrix Structural Analysis. (3) II.

Lecture—3 hours. Prerequisite: course 131 or 135. General force and displacement methods of structural analysis using matrix methods. Applications to civil and aerospace structures.

Mr. Romstad

134. Analysis and Design of Buildings. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 131, 132B. Vertical dead and live loading; earthquake and wind forces. Building code and structural requirements for the use of timber, steel frame, reinforced concrete, and brick. Supervised classroom design.

Mr. Taylor

135. Aerospace Structures. (3) III.

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Analysis of stiffened and unstiffened shell structures; analysis of statically indeterminate box beams, rings and arches. Buckling of flat plates and shells.

Mr. Cheney

137. Construction Principles. (3) III.

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 practices; economic factors in planning, organizing, and operating a construction force. Field trips and analysis of local construction projects.

Mr. Taylor

138. Dynamic Loads on Stationary Structures. (3) II.

Lecture—3 hours. Prerequisite: course 131; Engineering 102B, 103B. Determination of loads on structures due to base movements (earthquakes), steady and non-steady aerodynamic forces (wind and blast), and impact and vibration forces; comparison of dynamic loads with stationary loads and determination of equivalent load factors.

Mr. Hutchinson

141. Engineering Hydromechanics. (3) I.

Lecture—3 hours. Prerequisite: Engineering

103B. Application of principles of mechanics to flows of heavy, incompressible fluids. Flow visualization, configuration of free surfaces, streamlines, flow nets, separation, cavitation; pressure distribution in non-uniform, unsteady flow; turbulence; surface and form drag; conduit flow. Engineering approximations.

Mr. Strelkoff

142. Water Supply. (3) I, II.

Lecture—3 hours. Prerequisite: Engineering 103B (may be taken concurrently), or consent of instructor. Study of surface and ground water supplies; analysis for prediction of surface and ground water yields; water requirements; water supply and distribution systems including dams, reservoirs, wells, pumping plants, open channels, and pipe lines; water treatment methods and processes.

Mr. Burgy

143. Water Resources Engineering. (3) II.

Lecture—3 hours. Prerequisite: course 142. Basic concepts of water resources planning; water inventories, use, and control; water conservation measures and legislation; multiple-purpose project planning; domestic and foreign water development projects; simulation, optimization, and dynamic programming studies.

Mr. Scott

144. Drainage Engineering. (3) III.

Lecture—3 hours. Prerequisite: Engineering 103B. Elements of seepage through porous media; theory of drainage; depth and spacing of drains; methods of drainage investigation; project planning for drainage; engineering analysis of surface drainage.

Mr. Luthin

145. Hydraulic System Design. (3) III.

Lecture—3 hours. Prerequisite: Engineering 103B. Principles of project planning; methods of analysis and hydraulic design of storage systems, diversion structures, conveyance and regulation systems, and structures for irrigation, power, and flood control projects.

Mr. Amorocho

146. Hydraulic Engineering Laboratory. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: Engineering 103B (may be taken concurrently). Experimental analysis of flow about hydraulic structural elements such as gates, weirs, orifices, spillways and energy dissipators; centrifugal pump; open channel wave motion; measurements and instrumentation.

Mr. Larock

147. Solid and Radioactive Waste Management. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103B. Characteristics and amounts of solid wastes; collection systems; introduction to waste treatment processes and return of treated wastes to the environment. Origin, nature, and management of radioactive wastes.

Mr. Tchobanoglous

148. Waterborne Waste Management. (3) II.

Lecture—3 hours. Prerequisite: Engineering 103B. Introduction to industrial and domestic waterborne waste collection and treatment systems; methods of treated waste release.

Mr. Schroeder

149. Air Pollution Control. (3) III.

Lecture—3 hours. Prerequisite: Engineering 103A. Origins, characteristics, and amounts of air pollutants; atmospheric reactions and behavior of airborne wastes; methods of control.

Mr. Schroeder

160. Highway Engineering. (3) III.

Lecture—3 hours. Prerequisite: course 171; senior standing in engineering. Highway planning, economy, surveys and plans; highway design to include highway capacity, cross section, vertical and horizontal alignment, intersections and drainage. Highway construction, grading and pavements.

Mr. Shen

171. Soil Mechanics. (3) I, III.

Lecture—3 hours. Prerequisite: Engineering 104A (may be taken concurrently). Soil formations, mass-volume relationships, principle of effective stress, soil characteristics (classification and identification), compaction, capillarity and permeability, compressibility and consolidation, strength—state of stress and failure criteria.

Mr. Arulanandan

172. Soil Properties, Soil Behavior and Engineering Applications. (2) I, III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 171 (may be taken concurrently). Detailed study of the physical and mechanical properties of soils, including experimental determination of these properties and their engineering applications. Introduction to physicochemical principles and influence of physicochemical factors on soil behavior.

Mr. Shen

173. Soil Mechanics and Foundation Design. (4) II.

Lecture—4 hours. Prerequisite: courses 132B and 171. Site exploration, bearing capacity, footing design, lateral earth pressures, retaining walls, slope stability, theory of consolidation and application of foundation design, methods of minimizing settlements and effect of settlement on structures.

Mr. Shen

174. Nuclear Civil Engineering Laboratory. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: senior standing in engineering. Phenomenology and potentials of nuclear explosives as a construction tool. Hazards associated with underground detonation. Laboratory experiments on radioisotope transport in groundwater, cratering with explosives, and slope stability. Offered in odd-numbered years.

Mr. Cheney, Mr. Talley

175. Introduction to Geologic Engineering. (3) III.

Lecture—2 hours; laboratory—3 hours. Introduction to the principles of geology, and study of geologic features that affect engineering structures. Discussion of geological aspects of engineering construction problems by means of case history studies.

Mr. Shen

177. Steady Flow in Open Channels. (3) II.

Lecture—3 hours. Prerequisite: course 141; Mathematics 22B, 22C. Recommended: a short course in Fortran programming (may be taken concurrently). Backwater curves; qualitative surface profiles; free surface flow; resistance in uniform flows; gradually and rapidly varied flows; critical depth; supercritical flows. Analytical and digital-computer solutions. Offered in odd-numbered years.

Mr. Strelkoff

181. Plastic Analysis of Structures. (3) III.

Lecture—3 hours. Prerequisite: course 132A. Structural behavior in the plastic range; methods of predicting strength and deformation in the inelastic range; analysis and design of continuous beams and frames; rules of practice for plastic design of structures.

Mr. Romstad

182. Prestressed Concrete. (3) II.

Lecture—3 hours. Prerequisite: course 132B. Analysis and design of prestressed concrete structures; statically determinate and indeterminate structures; principles and applications of ultimate strength; applications to buildings, bridges and tanks.

Mr. Ramey

198. Directed Group Study. (1-5) I, II, III.

Lecture—1-5 hours. Prerequisite: consent of instructor. Selected topics. Students may enroll in one or more separate sections.

The Staff (Mr. Krone in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Lecture—1-5 hours. Prerequisite: senior standing in engineering and at least a B average.

The Staff (Mr. Krone in charge)

Graduate Courses**225. Theory of Elasticity. (3) II.**

Lecture—3 hours. Prerequisite: Engineering 187. Tensor formulation of the elastic field equations. Variational principles. Introduction to nonlinear elasticity. Approximate and exact solutions for plane stress and plane strain problems. Introduction to three-dimensional problems. Offered in even-numbered years.

Mr. Hutchinson

***226A. Theory of Elastic Stability. (3) II.**

Lecture—3 hours. Prerequisite: Engineering 187. Basic concepts of the stability of elastic systems. Adjacent-equilibrium and minimum potential energy theories of stability. Application to bars, frames, and rings. Offered in even-numbered years.

Mr. Brush

***226B. Theory of Elastic Stability. (3) III.**

Lecture—3 hours. Prerequisite: courses 226A, 227. Continuation of course 226A. Application to plates and shells. Offered in even-numbered years.

Mr. Brush

227. Theory of Plates. (3) II.

Lecture—3 hours. Prerequisite: Engineering 187. Stress and deformation analysis of plates bent by transverse loads; applications to circular, rectangular, and other shapes.

Mr. Herrmann

228. Theory of Shells. (3) III.

Lecture—3 hours. Prerequisite: Engineering 187. Direct stresses in shells with axial symmetry. Applications to shell roofs, tanks, cylindrical shells, pipelines; bending stresses in shells. Offered in odd-numbered years.

Mr. Brush

229. Theory of Plasticity. (3) III.

Lecture—3 hours. Prerequisite: Engineering 187. Fundamentals of plasticity, the concept of yield and the associated constitutive equations in the theory of elastic-plastic solids. Variational theorems, the piecewise linear loading functions and related minimum principles. Application to earth structures, torsion and plane problems of plasticity. Offered in odd-numbered years.

Mr. Hutchinson

230. Theory of Viscoelasticity. (3) I.

Lecture—3 hours. Prerequisite: Engineering 187. Fundamentals of viscoelasticity, representation of linear viscoelastic material behavior in integral and differential operator forms. Application to earth structure, buckling, plane and axisymmetric problems. Introduction to nonlinear viscoelasticity. Offered in even-numbered years.

Mr. Hutchinson

231. Advanced Analysis Procedures in Solid Mechanics. (4) I.

Lecture—4 hours. Prerequisite: course 133, Engineering 187 (may be taken concurrently). Fundamentals of the finite element and related procedures. Application to torsion, plane stress, plane strain, axisymmetric, plate and shell bending, thermal stress and soil mechanics problems. Consideration of inelastic and nonlinear problems.

Mr. Herrmann

240. Water Quality. (3) I.

Lecture—3 hours. Prerequisite: course 141, Chemistry 110A (may be taken concurrently). Water quality requirements for domestic, industrial, agricultural, and recreational and wildlife water uses; properties of natural surface and groundwaters; transport and fates of waterborne pollutants; methods of analysis.

Mr. Orlob

241. Land Quality. (2) II.

Lecture—2 hours. Prerequisite: Chemistry 110A. Factors determining land quality for use

* Not to be given, 1971-72.

in man's activities; land modification for temperature control; out-of-doors noise and its control; interrelations of land and vegetation on qualities of air and water. Mr. Krone

242. Air Quality. (3) III.

Lecture—3 hours. Prerequisite: Engineering 105A; Chemistry 110A recommended. Properties of the air and the atmosphere; atmospheric phenomena; factors determining air quality; origins, transport and degradation of atmospheric pollutants; effects of pollutants on men, plants, soil, and water. Mr. Krone

243A. Water and Waste Treatment. (3) I.

Lecture—3 hours. Prerequisite: Engineering 103B; courses 148, 149 recommended. Characteristics of water- and airborne-wastes; treatment processes and process kinetics; treatment system design. Mr. Tchobanoglous

243B. Water and Waste Treatment. (3) II.

Lecture—3 hours. Prerequisite: course 243A. Continuation of course 243A. Mr. Tchobanoglous

243C. Water and Waste Treatment Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 243B. Operation of model treatment units; measurements of waste and process effluent characteristics; evaluation of process parameters. Mr. Tchobanoglous

244. Environment Quality Management. (2) III.

Lecture—2 hours. Prerequisite: courses 240, 241, 242 (may be taken concurrently). Fates of pollutants in the overall environment; requirements for environment quality; monitoring methods; environment quality control methods. Mr. Orlob, Mr. Krone

247. Nuclear Civil Engineering. (3) III.

Lecture—3 hours. Prerequisite: Applied Science 246. The engineering uses of nuclear explosives; earthmoving for canals, harbors, highways and water resource development; mining; petroleum; desalination. Offered in odd-numbered years. Mr. Cheney

251. Advanced Matrix Structural Analysis. (3) I.

Lecture—3 hours. Prerequisite: course 133. Analysis of indeterminate structures by displacement and force methods; development of large-capacity computer program for frameworks; treatment of tapered and curved members and semi-elastic connections; emphasis on efficient digital-computer solutions; introduction to matrix stability analysis and structural optimization. Mr. Romstad

252. Advanced Topics in Metal Structures. (3) II.

Lecture—3 hours. Prerequisite: consent of

instructor. Residual stresses, recent developments in welded structures and high-strength bolt connections, light gage and alloy steels, aluminum and other metals; aerospace structures, three dimensional space frames. Offered in odd-numbered years. Mr. Ramey

253. Advanced Topics in Concrete Structures. (3) I.

Lecture—3 hours. Prerequisite: consent of instructor. Advanced analysis and design of concrete folded plates, thin shells and gravity dams; yield line theory; lift slabs; effects of shrinkage and creep upon stress and deflection. Mr. Ramey

257. Analysis of Structures under Dynamic Loading. (3) I.

Lecture—3 hours. Prerequisite: course 138. Analysis of earthquake and blast resistant structures; method of lateral forces; current research about earthquake and blast loading and structural effects. Offered in even-numbered years. Mr. Hutchinson

271. Advanced Topics in Surface Water Hydrology. (2) III.

Lecture—2 hours. Prerequisite: course 142; Water Science 141; consent of instructor. Analysis of hydrologic processes and procedures in water supply investigations including topics in atmospheric relationships, research methods, water balances, and water yield prediction methods. Offered in odd-numbered years. Mr. Burgy

272. Groundwater Flow and Seepage. (3) II.

Lecture—3 hours. Prerequisite: Engineering 103B. Flow of fluids through porous media. Anisotropy. Solution of steady state problems by: mathematical analysis, models, analogs, graphical methods. Dupuit-Forcheimier assumptions. Method of images. Boussinesq's equation for transient problems, solution by Laplace transform. Seepage under dams. Mr. Luthin

273. Groundwater Hydrology. (3) III.

Lecture—3 hours. Prerequisite: course 272. Analyses and methods of groundwater development; geophysical exploration and analysis; artificial recharge concepts; hydraulics of wells, including analytical treatment of transient flow problems; and problems of well design. Numerical and experimental methods of groundwater flow. Mr. Scott

274. Hydraulics of Pipe Lines. (3) I.

Lecture—3 hours. Prerequisite: course 141 (may be taken concurrently); Engineering 5A or equivalent, or consent of instructor. Mechanics of liquid flow in pipes and pipe network systems. Steady flow, unsteady flow, surge and water-hammer problems. Introduction to stability and resonance phenomena. Offered in even-numbered years. Mr. Larock

275. Stochastic Hydrology. (2) III.

Lecture—2 hours. Prerequisite: course 142 or Water Science 141 or equivalent. Application of modern statistical analysis in hydrology: time series analysis, stochastic models, simulation by Monte Carlo methods, statistical assessment of predictive capacity of models.

Mr. Amorocho

276. Hydrologic Systems Analysis. (3) II.

Lecture—3 hours. Prerequisite: course 142 or Water Science 141 or equivalent; Mathematics 22A, 22B, 22C, 24. Theory and application of the methods of modern systems analysis and mathematical statistics to problems of hydrological prediction. Emphasis on current developments in parametric and stochastic hydrologies.

Mr. Amorocho

277. Unsteady Flow in Open Channels. (3) III.

Lecture—3 hours. Prerequisite: course 177, short course in Fortran programming. Long waves in open-channel systems; Saint-Venant equations; method of characteristics; explicit and implicit finite-difference solutions, stability of numerical schemes, double-sweep method; influence of hydraulic structures; flood routing; bores; dam break; long waves in two-space dimensions. Offered in odd-numbered years.

Mr. Strelkoff

278. Hydrodynamics. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 24, 185A; Mechanical Engineering 185. Recommended: a short course in Fortran programming (may be taken concurrently). General equations of continuity, momentum, and energy. Stream functions; velocity potential; conformal mapping. Direct solutions for irrotational flow around bodies and in conduits; gravitational effects. Offered in even-numbered years.

Mr. Larock

279. Advanced Mechanics of Fluids. (4) I.

Lecture—4 hours. Prerequisite: Mathematics 22B, 22C, 24; Mechanical Engineering 185. Rotational flows. Navier-Stokes equations and solutions for laminar, viscous flows; turbulent flow and Reynolds equations, isotropy simplification, diffusion, phenomenological theories; the boundary layer approximation. Offered in odd-numbered years.

Mr. Larock

281A. Advanced Soil Mechanics. (3) I.

Lecture—3 hours. Prerequisite: course 173. Theories of consolidation, secondary compression, stress distribution, bearing capacity, lateral earth pressures, shear strength, yielding of soils, creep, effect of type of compaction on the behavior of compacted clays.

Mr. Arulanandan

281B. Advanced Soil Mechanics. (3) II.

Lecture—3 hours. Prerequisite: course 281A. Theories of slope stability. Analysis of slope stability problems for static and dynamic loading conditions. Anisotropic stress conditions in soils. Lateral earth pressure theories. Design of anchored bulkheads.

Mr. Arulanandan

282. Advanced Soil Laboratory. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 281A. Subsurface exploration, advanced laboratory techniques including consolidation, shear strength, pore water pressure measurement, electrical properties measurement, pavement design tests, field strength and load bearing tests.

Mr. Shen

283. Physicochemical Properties of Soils and Soil Behavior. (3) I.

Lecture—3 hours. Prerequisite: course 171. Analysis of the mechanical behavior of soils from consideration of clay mineralogy, colloidal phenomena, ion-exchange and soil-water characteristics. Conduction phenomena, deformation mechanisms, strength, swelling, compaction. Microscopic theories to explain yielding of soils.

Mr. Arulanandan

285. Pavement Design and Soil Stabilization. (3) II.

Lecture—3 hours. Prerequisite: course 171 or equivalent. Principles and methods of pavement design for highway and airport pavements; purposes, principles, and methods of soil stabilization and design of stabilized pavement layers. Offered in even-numbered years.

Mr. Arulanandan

286. Seepage and Earth Dams. (3) II.

Lecture—3 hours. Prerequisite: course 171 or equivalent. Groundwater flow around dams; principles of earth dam design, types of failure, and design and construction procedures. Offered in odd-numbered years.

Mr. Arulanandan

290. Seminar. (1) III.

Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study. (Satisfactory/Unsatisfactory grading only.)

Mr. Krone

298. Group Study. (1-5) I, II, III.

Lecture—1-5 hours.

The Staff (Mr. Krone in charge)

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Krone in charge)

ENGINEERING: ELECTRICAL

Herschel H. Loomis, Jr., Ph.D., *Chairman of the Department*
Department Office, 3004 Bainer Hall

Professors:

Herman J. Fink, Ph.D.
John B. Powers, Ph.D.
Ronald F. Soohoo, Ph.D.

Associate Professors:

*Vidal R. Algazi, Ph.D.
¹Tien C. Hsia, Ph.D.
Jack W. LaPatra, Ph.D.
Herschel H. Loomis, Jr., Ph.D.
Sanjit K. Mitra, Ph.D.
Earle W. Owen, D.Sc.

Assistant Professors:

John N. Churchill, Ph. D.
Robert B. Green, Ph.D.
Lansing Hatfield, Ph.D.
Hartley J. Jensen, Ph.D.
Edward W. Kozdrowicki, Ph.D.
Paul J. Stoll, Ph.D.
Myron F. Uman, Ph.D.

Lower Division Courses

1. Introduction to Electrical Engineering. (1) II.

Lecture—1 hour. Electrical Engineering as a professional activity. What Electrical Engineers know and how they use their knowledge. Problems they are concerned with and how they go about solving them. A presentation of basic ideas and their applications. Examination of some case studies. (Passed/Not Passed grading only.) The Staff (Mr. Algazi in charge)

98. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Loomis in charge)

99. Special Study for Lower Division Students. (1-5) I, II, III.

The Staff (Mr. Loomis in charge)

Upper Division Courses

110A. Electronic Circuits. (3) III.

Lecture—3 hours. Prerequisite: Engineering 100. Analysis of linear amplifiers; single stage and multistage amplifiers, tuned amplifiers, oscillators. Mr. Jensen

110B. Electronic Circuits. (3) I.

Lecture—3 hours. Prerequisite: course 110A. Nonlinear electronic circuits; large signal amplifiers, oscillators, and switching circuits. Mr. Jensen

111A. Electronics Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 110A (may be taken concurrently); Engineering 100. Properties of transistors and vacuum tubes. Small-signal analysis of single-stage and multi-

stage resistance-coupled and transformer-coupled class A amplifiers. Mr. Jensen

111B. Electronics Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: courses 110B (may be taken concurrently), 111A. Tuned amplifiers and oscillators. Switching circuits and large signal amplifiers. Mr. Jensen

112A. Linear Systems Analysis. (3) II.

Lecture—3 hours. Prerequisite: Engineering 17. Properties and classification of linear systems. Signal representation by discrete, continuous, and generalized exponentials: Fourier series, Fourier and Laplace transform methods. Convolution integral. State space techniques. Mr. LaPatra

112B. Linear Systems Analysis. (3) III.

Lecture—3 hours. Prerequisite: course 112A or equivalent. Frequency analysis of linear, electrical, mechanical, and electromechanical systems. System function. Natural response and stability concepts. Introduction to feedback systems and to communication systems. Mr. LaPatra

113. Digital and Sampled Data Systems. (3) I.

Lecture—3 hours. Prerequisite: course 112A or equivalent. Introduction to digital and sampled data systems. Difference equations and Z transformation and their applications to linear discrete systems analysis. State variable methods, discrete models of continuous systems. Digital computer simulation and analysis techniques. Mr. Hsia, Mr. Hatfield

***116. Network Analysis. (3) I.**

Lecture—3 hours. Prerequisite: course 112A. Topics in modern network analysis, including two-port networks, matrix methods, graph theory, nonlinear circuits, and computer solutions. Mr. LaPatra

117. Network Synthesis. (3) III.

Lecture—3 hours. Prerequisite: course 112A. An introduction to modern network synthesis techniques. Topics include one- and two-port networks, approximation problems, realization procedures, and filter theory. Mr. LaPatra

130A. Introductory Electromagnetics. (3) I.

Lecture—3 hours. Prerequisite: Mathematics 22B, 22C. Static electric and magnetic fields, properties of materials, time-varying electromagnetic phenomena, Maxwell's equations. Mr. Uman

130B. Introductory Electromagnetics. (3) II.

Lecture—3 hours. Prerequisite: course 130A. Propagation of plane electromagnetic waves, guided waves, transmission lines, antennas. Mr. Uman

¹ Absent on leave, 1971-72.

² Absent on leave, fall quarter 1971.

* Not to be given, 1971-72.

131A. Electromagnetic Fields and Waves. (3) I.

Lecture—3 hours. Prerequisite: course 130B or equivalent. Propagation and reflection of plane waves in isotropic media. Guided electromagnetic waves. Rectangular and circular wave guides.

Mr. Fink, Mr. Churchill

131B. Electromagnetic Fields and Waves. (3) II.

Lecture—3 hours. Prerequisite: course 131A or equivalent. Dielectric guides. Helix and slow-waves structures. Wave propagation in media with anisotropic permittivity and permeability.

Mr. Fink, Mr. Uman

131C. Electromagnetic Fields and Waves. (3) III.

Lecture—3 hours. Prerequisite: course 131B or equivalent. Resonant cavities; microwave network components; antennas; ionospheric propagation.

Mr. Fink, Mr. Green

133. High-Frequency Laboratory. (2) III

Laboratory—6 hours. Prerequisite: course 130B. Steady-state and transient transmission line behavior; wave propagation in linear and nonlinear artificial lines; rudimentary experiments with reflex klystrons and wave guides.

Mr. Green, Mr. Uman

140A. Introduction to Physical Electronics. (3) II.

Lecture—3 hours. Prerequisite: course 130A, Engineering 105A. Introduction to fundamental physics of electronic conduction, developing models to explain operation of modern devices; equilibrium and nonequilibrium statistical mechanics, conductivity, diffusion, gaseous and beam electronics, plasmas, quantum mechanics.

Mr. Uman

140B. Introduction to Physical Electronics. (3) III.

Lecture—3 hours. Prerequisite: course 140A. Electrons in solids, band theory, electrons and holes, semiconductors, junction device physics and models.

Mr. Churchill

145A. Solid-State Electronics. (3) I.

Lecture—3 hours. Prerequisite: Physics 121. Electric and magnetic properties of solids. Topics discussed include electrical conductivity, dielectric constant, and various types of magnetism in solids.

Mr. Churchill, Mr. Soohoo

145B. Solid-State Electronics. (3) II.

Lecture—3 hours. Prerequisite: course 145A. Electrical characteristics of dielectric and semiconducting materials, with application to such solid-state electronics devices as transistors, tunnel diodes, parametric amplifiers, and their associated circuits.

Mr. Churchill, Mr. Soohoo

145C. Solid-State Electronics. (3) III.

Lecture—3 hours. Prerequisite: course 145A. Characteristics of magnetic materials, with application to such magnetic devices as ferrite cores, thin films, and their associated computer memory and logic circuits.

Mr. Churchill, Mr. Soohoo

146. Physical Electronics. (3) I, II.

Lecture—3 hours. Prerequisite: Physical Electronics 121. Motion of charges through vacuum, gases and solids. Topics include discussion of vacuum tubes, gaseous electronic and semiconductor devices, and magnetic materials.

Mr. Soohoo

150. Instrumentation Systems. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 100. Analytical and design methods common to all instrumentation systems; dynamic response; transducers; signal conditioning.

Mr. Owen

155A. Electronic Instrumentation for Biology Majors. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 16A, 16B and a freshman physics course. Mathematical description of instruments, static errors, dynamic errors, the external characteristics of amplifiers. Laboratory projects illustrate the use of electronic instruments and the properties of sensors. Not open to engineering majors.

Mr. Owen

155B. Electronic Instrumentation for Biology Majors. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 155A. Amplifiers, the use of feedback, digital instrumentation. Laboratory projects illustrate the properties of amplifiers and the use of analog and digital computers as a component of an instrumentation system. Not open to engineering majors.

Mr. Owen

157A. Control Systems. (3) II.

Lecture—3 hours. Prerequisite: course 112B. Design and analysis of closed loop automatic control systems. Examples are drawn from all engineering fields. The mathematical representation of systems; frequency, s-plane and state space methods; stability criteria.

Mr. Hsia, Mr. Owen

157B. Control Systems. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 157A. Introduction to nonlinear and sampled data systems. Applications of digital and analog computers.

Mr. Hsia, Mr. Owen

172. Switching Circuit Theory. (3) I.

Lecture—3 hours. Prerequisite: Engineering 100. The analysis and design of switching circuits, considering relay, electronic and magnetic realizations. Introduction to sequential machines.

Mr. Mitra

173. Digital Computer Design. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 174. A study of the logic design and hardware implementation of digital computers; a laboratory project involving the design, simulation and realization of a digital computer subsystem.

Mr. Loomis

174. Computer Organization. (3) II.

Lecture—3 hours. Prerequisite: course 172; Engineering 5A. The structure and operation of a simple stored program digital computer; data representations and algorithms for operating on data; digital computer subsystems including processors, control units, memory units; data channels and input/output units; special structures.

Mr. Hatfield

175. Computer Devices and Systems. (3) III.

Lecture—3 hours. Prerequisite: course 140B. Essential elements of the computer and their interdependence. Characteristics of computer input and output devices, main and auxiliary storage including magnetic cores; films, drums, and discs, and the central processor. Computer integrated circuits and large scale integration (LSI) also discussed.

Mr. Soohoo

176. Programming Languages. (3) I.

Lecture—3 hours. Prerequisite: Engineering 5A. Limits of Fortran; display terminal language; job control language; Formac; Cobol and Snobol. Use of languages for maximum computer performance. Emphasis on applications of various languages. Symbolic differentiation and integration. Treatment of natural language by machine.

Mr. Kozdrowicki

***177. Programming Techniques and File Manipulation. (3) II.**

Lecture—3 hours. Prerequisite: Engineering 5A. Basic programming techniques, scatter tables or hash coding, lists, searching and insertion, sorting, string processing, input-output fundamentals, indexed sequential files, relative files, swapping of files, system programming techniques, multiprocessing software, program utilities. Offered in even-numbered years.

Mr. Kozdrowicki

182. Probabilistic Systems Analysis. (3) I.

Lecture—3 hours. Probabilistic models in engineering. Elements of probability theory and applications to engineering problems.

Mr. Algazi, Mr. Hatfield

184. Principles of Communications. (3) II.

Lecture—3 hours. Prerequisite: course 182. Probabilistic analysis of digital and analog communication systems; elements of information theory.

Mr. Algazi, Mr. Hatfield

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: senior standing in engineering with at least a B average. Group study of selected topics. Students may enroll in one or more separate subjects.

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

The Staff (Chairman in charge)

Graduate Courses***201. Optimization Techniques with Applications. (3) II.**

Lecture—3 hours. Prerequisite: knowledge of Fortran programming and graduate status. The theory of computer oriented optimization techniques with applications in system design. Offered in odd-numbered years.

Mr. Mitra

204. Digital Processing of Signals. (3) III.

Lecture—3 hours. Prerequisite: course 112B or graduate status. The theory of digital signal-processing operations with emphasis on the frequency domain description of digital filtering. Examples of applications to spectrum analysis and to the processing of images.

Mr. Algazi, Mr. Mitra

212A-212B. Systems Analysis. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 112A. Properties of systems and their mathematical characteristics; state space concepts, matrix methods; multivariable systems, time-invariant systems; real time analysis, frequency methods, the identification problem, adaptive systems.

Mr. Hsia, Mr. Owen

***216. Network Theory. (3) II.**

Lecture—3 hours. Prerequisite: course 112B or equivalent. Foundations of network theory. Generalized network analysis, state-variable approach, energy functions, equivalent networks and normal coordinates, scattering matrices, integral theorems and network limitations. Offered in even-numbered years.

Mr. Mitra

217. Passive Network Synthesis. (3) III.

Lecture—3 hours. Prerequisite: course 117 or equivalent. Advanced topics in synthesis of passive networks. Driving-point and transfer function realizations, matching networks, n-port realizations, approximation techniques. Offered in even-numbered years.

Mr. Mitra

***218. Active Network Synthesis. (3) I.**

Lecture—3 hours. Prerequisite: course 117 or equivalent. Advanced topics in synthesis of active networks with lumped R,C and distributed R,C elements. Realization using monolithic integrated operational amplifiers of driving-point and transfer functions. Sensitivity and stability considerations. Offered in even-numbered years.

Mr. Mitra

226A. Fundamentals of Microwave and Quantum Electronics. (3) I.

Lecture—3 hours. Prerequisite: courses 131C, 133, and 145C or equivalent. Density operator. Interaction between electromagnetic fields and the electron charge and spin. Lorentz force law, energy levels in matter, Zeeman splitting, magnetic resonance and relaxation, and the absorption and radiation of electromagnetic energy. Electric dipole transitions.

Mr. Fink, Mr. Soohoo

* Not to be given, 1971-72.

226B. Microwave Electronics. (3) II.

Lecture—3 hours. Prerequisite: course 226A or equivalent. Theory of interaction between electromagnetic fields and the electronic charge, with applications to electron beam and solid state devices. Beam formation, velocity, and density modulation, plasma oscillation, space charge wave propagation in klystrons. Parametric amplifiers tunnel and IMPATT diodes and Gunn oscillators. Offered in even-numbered years.

Mr. Soohoo

***226C. Quantum Electronics. (3) II.**

Lecture—3 hours. Prerequisite: course 226A. Lasers, masers: population inversion, threshold requirement, steady state and transient behavior, Q-switching. Interaction between radiation and phonons. Offered in odd-numbered years.

Mr. Fink

230A. Advanced Electromagnetic Theory. (3) I.

Lecture—3 hours. Prerequisite: course 131C or equivalent. The exact formulation of electromagnetic problems by using vector potentials and Green's functions. Applications of these techniques to radiation and transmission problems.

Mr. Green

230B. Advanced Electromagnetic Theory. (3) II.

Lecture—3 hours. Prerequisite: course 230A. Advanced topics in propagation such as propagation through anisotropic media, duct theory of propagation over the earth, ray tracing through the ionosphere. Offered in even-numbered years.

Mr. Green

230C. Advanced Electromagnetic Theory. (3) III.

Lecture—3 hours. Prerequisite: course 230A. Advanced topics in radiation and scattering such as reception of statistically varying signals, diffracted ray theory, and quasi static solutions.

Mr. Green

240. Engineering Problems in Plasma Physics. (3) III.

Lecture—3 hours. Prerequisite: courses 130B and 140B. Plasma oscillations and sheaths, measurement of plasma parameters, magnetized plasmas, kinetic and fluid descriptions, waves; applications to problems in communications, devices, power generation, propulsion and controlled thermonuclear fusion research. Mr. Uman

Mr. Stoll

245A. Applied Solid-State Physics. (3) I.

Lecture—3 hours. Prerequisite: course 145C or equivalent. The physics of solids relevant to solid-state applications. Topics include classical statistics, band theory of solids, electric polarization, conductivity, and magnetism in solids.

Mr. Soohoo, Mr. Churchill

245B. Applied Solid-State Physics. (3) II.

Lecture—3 hours. Prerequisite: course 245A. The theory of semiconductors with application to transistors. Topics include electrons, holes,

mobility, and transistor circuitry. Brief discussion of superconductivity and superconducting solenoids. Offered in even-numbered years.

Mr. Soohoo, Mr. Churchill

***245C. Applied Solid-State Physics. (3) III.**

Lecture—3 hours. Prerequisite: course 245A. The theory of magnetism in solids, with application to ferromagnetic devices and circuits. Topics include paramagnetism, ferromagnetism, magnetic resonance, and switching properties of individual magnetic elements and magnetic arrays. Offered in odd-numbered years.

Mr. Soohoo, Mr. Churchill

251. Nonlinear Control Systems. (3) III.

Lecture—3 hours. Prerequisite: course 157B and 212B. Techniques for solving nonlinear control problems; state space methods, stability theorems; Lyapunov's methods; sinusoidal describing function and on-off systems. Offered in even-numbered years.

Mr. Owen

***252. Control System Optimization. (3) III.**

Lecture—3 hours. Prerequisite: course 157B and 212B. Optimization of systems by the adjustment of parameters; deterministic inputs, stochastic inputs. Optimization of systems by the calculus of variations; Pontryagin's maximum principle, Bellman's principle of optimality. Offered in odd-numbered years.

Mr. Hsia

261. Biological Signals and Systems. (3) III.

Lecture—3 hours. Prerequisite: Human Physiology 260 or the combination of course 157A and a basic physiology course such as Zoology 2 or Physiology 110B. Measurement and analysis of biological system dynamics by power spectral methods, with application to the cardiorespiratory and other systems. Methods of simulation and identification of linear and nonlinear biological system transfer relationships.

Mr. Stoll

270. Sequential Machines. (3) II.

Lecture—3 hours. Prerequisite: course 172. A study of the algebraic structure theory of sequential machines and the development of sequential machine synthesis techniques.

Mr. Loomis

271. Advanced Digital System Design. (3) III.

Lecture—3 hours. Prerequisite: course 174. Advanced topics in the design of digital systems; high speed and high rate arithmetic; the state assignment problem.

Mr. Loomis

***276. Symbol Manipulation Languages. (3) II.**

Lecture—3 hours. Prerequisite: course 176 or equivalent language experience. The mathematical programming language LISP; recursive programming using LISP and SNOBOL. Use of SNOBOL to write a LISP compiler. ALCOL-68;

* Not to be given, 1971-72.

PL/I; compiler-compilers; algorithms for compilers and interpreters; compilation vs. interpretation; algorithms for automatic differentiation and integration. Offered in odd-numbered years.

Mr. Kozdrowicki

279A-279B. Artificial Intelligence. (3-3) II-III.

Lecture—3 hours. Prerequisite: consent of instructor. The achievement of artificial intelligence through attempted realization of macroscopic descriptions of intelligent behavior; heuristic programming; game playing; mechanical theorem proving; concept formation by machine; perception of geometrical figures; analogical reasoning; natural language processors; the brain-modeling problem. Mr. Kozdrowicki

284A. Noise, Communication and Information Theory. (3) II.

Lecture—3 hours. Prerequisite: course 182 or equivalent. Fundamentals of the theory of random processes pertinent to communications, control and other physical applications. Review of probability theory. Characterization of random processes. Correlation functions and power spectra. Linear and nonlinear operations on random processes.

Mr. Algazi

284B. Noise, Communication and Information Theory. (3) III.

Lecture—3 hours. Prerequisite: course 284A.

ENGINEERING: MECHANICAL

Harry Brandt, Ph.D., *Chairman of the Department*
Department Office, 2020 Bainer Hall

Professors:

Harry Brandt, Ph.D.
Clyne F. Garland, M.S. (*Emeritus*)
Warren H. Giedt, Ph.D.
Myron A. Hoffman, Sc.D.
Dean C. Karnopp, Ph.D.
John D. Kemper, Ph.D.
Allan A. McKillop, Ph.D.
Amiya K. Mukherjee, D.Phil.
An Tzu Yang, D.E.Sc.

Associate Professors:

Charles W. Beadle, Ph.D.
Harry A. Dwyer, Ph.D.
Jerald M. Henderson, D.Engr.
Paul S. Moller, Ph.D.

Assistant Professors:

John W. Brewer, Ph. D.
Dale G. Jones, Ph.D.
Walter V. Loscutoff, Ph.D.
Donald W. Moon, Ph.D.
◇ ◇ ◇

Associate Professor:

Jack L. White, Ph.D. (*Acting*)

Application of statistical techniques to the areas of detection, estimation, and modulation theory. Detection problem and application to radar and digital communication. Estimation theory for signals described by finite parameter sets. Linear and nonlinear modulation and efficient demodulators.

Mr. Algazi

***284C. Noise, Communication and Information Theory. (3) I.**

Lecture—3 hours. Prerequisite: course 182. Information theory and coding. Definition of a measure of information and study of its properties. Introduction to channel capacity and error free communications over noisy channels. Encoding and decoding of data for transmission over noisy channels. Offered in even-numbered years.

Mr. Algazi

290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion of current research. Written and oral reports will be given. (Satisfactory/Unsatisfactory grading only.)
The Staff (Chairman in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)
The Staff (Chairman in charge)

Lower Division Course

1. Mechanical Engineering. (1) II.

Lecture—1 hour. A description of the field of mechanical engineering with examples taken from industrial applications. Discussion of the practice with respect to engineering principles, ethics and responsibilities. (Passed/Not Passed grading only.)

The Staff (Mr. Karnopp in charge)

Upper Division Courses

111. Engineering Principles Laboratory. (4) III.

Discussion—2 hours; laboratory—4 hours. Prerequisite: Engineering 103A, 104A, 105B. Experimental investigation of the steady-state and transient behavior of thermal, mechanical, structural, and fluid systems.

Mr. Brandt

114. Kinematics of Mechanisms. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102B. Classification of kinematic elements and mechanisms; graphical and analytical determination of displacements, velocities, and accelerations within planar mech-

* Not to be given, 1971-1972.

anisms involving turning, sliding, and higher pairs. Kinematic design of cams, gears, and gear trains; intermittent-motion mechanisms.

Mr. Yang

115. Dynamics of Machinery. (3) II.

Lecture—3 hours. Prerequisite: course 114. Analysis of dynamic response of machine elements such as cams, springs, gears, and links, with emphasis on high speed operation; gyroscopic forces in machines; balancing of machinery; introduction to dynamics of feedback control systems.

Mr. Yang

118. Mechanical Design. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 4, 104A; course 121 recommended. Application of the principles of engineering mechanics in the design of mechanical components, with special emphasis on stress concentration, theories of failure, fatigue, and fluctuating stresses.

Mr. Henderson

120. Advanced Mechanical Design. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 118. Continuation of course 118, with special emphasis on advanced design analysis; application of two-dimensional theory of elasticity to stress analysis; contact stresses; thermal stresses; elastic impact; creep; hydrodynamic lubrication and bearing design.

Mr. Yang

121. Manufacturing Methods. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104A. Introduction to the methods employed in modern manufacturing, with particular emphasis on the interrelationships between engineering design and manufacturing methods. Introduction to the theoretical basis of metal forming.

Mr. Henderson

123A–123B. Experimental Engineering.

(2–2) I–II; II–III.

Laboratory—6 hours. Prerequisite: senior standing in engineering. Performance of a two-quarter long project which includes the design, construction, and evaluation of a mechanical engineering system or related experiment intended to give the student experience in theoretical modelling and experimental evaluation.

Mr. Henderson

124. Engineering Systems Design. (3) III.

Lecture—3 hours. Prerequisite: senior standing in engineering. Synthesis of the several fields of engineering, with applications in the design of systems.

Mr. Henderson

125. Fluid and Gas Dynamics. (4) I.

Lecture—4 hours. Prerequisite: Engineering 103B. Development of the basic equations of inviscid fluid flow in control volume and differential form. Extensive applications to gas dynamics: wave propagation, shock waves,

Prandtl-Meyer flow, flow in ducts. Further applications to aerofoils, cavitation, water hammer and geophysical flow.

Mr. Dwyer

126A–126B–126C. Experimental Aeronautical Engineering. (2–2–2) I–II–III.

Laboratory—6 hours. Prerequisite: Engineering 102B, 103B, 105B. Projects are chosen to acquaint students with experimental methods in aeronautical design as they relate to aerodynamics, stability, control, structures and overall vehicle performance.

Mr. Moller

127. Aerodynamics. (3) I.

Lecture—3 hours. Prerequisite: Engineering 103B. Lift and drag; aerodynamic load distributions; thin aerofoil and slender body theory; boundary layer control; compressibility effects; mutual interference; static and elementary dynamic stability; propulsion.

Mr. Moller

128. Aerospace Design. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 127; Engineering 104B. Design of aircraft and missile systems; influence of aerodynamic and inertial loading on structural integrity; guidance and control.

Mr. Moller

135. Gas Turbine Power Plants. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 125, Engineering 105B. Study of gas turbines with principal emphasis on their application to aircraft propulsion. Analysis of both the idealized jet engine performance and the more realistic performance including component losses. Comparison of turbojet, turbofan and ramjet engines for various aircraft applications. Brief look at use of gas turbines for electrical power generation.

Mr. Hoffman

137. Modern Power Generation. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 125, Engineering 105B. Study of new concepts for generating electrical power with higher efficiency and lower pollution of the environment. Emphasis on the fluid mechanics, heat transfer and thermodynamics of high temperature energy converters such as magneto-hydrodynamic (MHD) generators and advanced gas turbines with nuclear reactor heat sources.

Mr. Hoffman

171. Analysis, Simulation, and Design of Dynamic Systems. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: senior standing in engineering. Structural models for dynamic systems. Design of control systems to improve linearity, accuracy and speed of response. Design of feedback systems which maintain quality of performance in spite of parameter variations. Analog and digital computer simulation.

Messrs. Brewer, Karnopp, Loscutoff

172. Analysis, Simulation, and Design of Dynamic Systems. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 171. Phenomenological models for dynamic systems. Control system design using frequency domain methods. Stability of nonlinear control systems. Introduction to state space techniques.

Messrs. Brewer, Karnopp, Loscutoff

175. Introduction to Socio-Technological System Analysis. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: senior standing in engineering. Description of transient and steady-state models of population, pollution and violence. Application of engineering thermodynamics and system theory to the analysis of social and ecological systems. Review of current social criticisms of technology. Interactions of society with technology.

Mr. Brewer

178. Controls Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 172 (to be taken concurrently). Laboratory demonstrations in automatic control. Analog and digital computer experiments in feedback control.

Mr. Loscutoff

185. Real Fluid Flow. (4) III.

Lecture—4 hours. Prerequisite: Engineering 103B. An introduction to the properties of real fluids. Derivation of the Navier-Stokes equations and dynamical similarity. Low Reynolds number flow. Boundary layer concepts. Turbulent flow.

Mr. Dwyer

186. Heat Transfer. (4) III.

Lecture—4 hours. Prerequisite: Engineering 103B (may be taken concurrently). Fundamental concepts of heat transfer: conduction, convection and radiation.

Mr. McKillop

198. Directed Group Study. (1-5) I, II, III.

Lecture—1-5 hours. Prerequisite: senior standing in engineering with at least a B average. Group study of selected topics.

The Staff (Mr. Brandt in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Brandt in charge)

Graduate Courses**204. Heat Conduction. (3) II.**

Lecture—3 hours. Prerequisite: Engineering 180, course 186. Steady-state and transient problems in heat conduction, using both mathematical and numerical methods of solution.

Mr. Giedt

205. Thermal Radiation. (3) I.

Lecture—3 hours. Prerequisite: course 186,

or consent of instructor. The transfer of radiant energy. Geometrical and spectral characteristics of systems involving thermal radiation. Gaseous radiation.

Mr. Brandt

210A. Boundary Layer Theory. (4) I.

Lecture—4 hours. Prerequisite: graduate standing. Derivation of Navier-Stokes and energy equations. Exact solutions of both equations. Low Reynolds number flow. Boundary layers for two-dimensional flow. Similarity solutions of boundary layer equations. Axially symmetric and three-dimensional boundary layers. Heat transfers in boundary layers.

Messrs. Dwyer, Brandt, Giedt, McKillop

210B. Boundary Layer Theory. (4) II.

Lecture—4 hours. Prerequisite: course 210A. Solution to compressible boundary layer problems. Advanced topics in boundary layer theory, including higher order theory, geophysical flows and jets and wakes. Free convection flows. Derivation and analysis of the mean flow equations of turbulent flow and development of transport coefficient analysis.

Messrs. Dwyer, Brandt, Giedt, McKillop

210C. Numerical Methods in Boundary Layer Flows. (3) III.

Lecture—3 hours. Prerequisite: course 210B. Development of the basic finite difference schemes for the Navier-Stokes equations, laminar and turbulent boundary layer equations, and the potential flow equations. Analysis of the stability and convergence of these schemes with practical examples.

Mr. Dwyer, Mr. McKillop

211. Transitional and Turbulent Flows. (3) III.

Lecture—3 hours. Prerequisite: course 210B. Wave motion in fluids; stability of Couette flow, plane Poiseuille flow and boundary layers; description of turbulent flow. Structure of the turbulent energy spectrum; turbulent transport phenomena. Turbulent shear flows and their measurement; new theories in turbulence. Offered in odd-numbered years.

Mr. Dwyer

212A. Gas Dynamics. (3) I.

Lecture—3 hours. Prerequisite: course 125 or equivalent. Derivation and analysis of the basic equations of motion of inviscid gases at subsonic and supersonic speeds. Prandtl-Meyer flow and the method of characteristics. Applications to unsteady transonic and hypersonic flow. Shock theory.

Mr. Dwyer

212B. Gas Dynamics. (3) II.

Lecture—3 hours. Prerequisite: course 212A. Advanced numerical techniques for solving the differential equations of gas dynamics. Introduction to the gas dynamics of non-equilibrium flow. Shock structure. Free molecular and rarefied gas dynamics.

Mr. Dwyer

213. Theory of Jets. (3) III.

Lecture—3 hours. Prerequisite: course 210A or consent of instructor. Turbulent jets of incompressible and compressible fluids; free jets and jets confined to finite spaces; wakes behind bluff bodies; practical applications of turbulent jets. Offered in even-numbered years.

Mr. Brandt

214. Aerodynamics. (3) III.

Lecture—3 hours. Prerequisite: courses 125, 127, 185. Development and examination of the potential and viscous flow concepts useful in evaluating the aerodynamic loads and performance of flight vehicles. Applications of these concepts will be made through complete system analysis and optimization with particular emphasis on V.T.O.L. aircraft.

Mr. Moller

220A-220B. Mechanical Vibrations. (3-3) II-III.

Lecture—3 hours. Prerequisite: Engineering 122. Applications of vibration theory to systems with many degrees of freedom and continuous systems. Oscillations in systems having nonlinear characteristics. Self-excited oscillations. Response curves and stability considerations.

Mr. Karnopp

221. Introduction to Random Vibration. (3) I.

Lecture—3 hours. Prerequisite: Engineering 122 (may be taken concurrently with consent of instructor). Nature and statistical analysis of random vibrations. Response of physical systems to random excitation. Data processing. Mr. Beadle

222. Advanced Dynamics. (3) I.

Lecture—3 hours. Prerequisite: Engineering 102B. Dynamics of particles and of rigid bodies with advanced engineering applications; generalized coordinates; Hamilton's Principles; Lagrange's Equations; Hamilton-Jacobi theory.

Mr. Beadle

223. Advanced Kinematic Analysis. (3) I.

Lecture—3 hours. Prerequisite: course 115. Advanced kinematic analysis of planar mechanism, poles and centrodotes, Euler-Savary equation, inflection circle, curvature theory, Bobillier's construction, Hartmann's construction. Four-bar coupler-point curves. Offered in odd-numbered years.

Mr. Yang

224. Kinematic Synthesis of Mechanisms. (3) II.

Lecture—3 hours. Prerequisite: course 115. Introduction to curve and function synthesis. Chebyshev's theorem. Structure errors. Complex number methods. Geometrical synthesis using poles, pole paths, and center point curves. Burmester's theorem. Offered in odd-numbered years.

Mr. Yang

225. Spatial Mechanisms. (3) III.

Lecture—3 hours. Prerequisite: courses 115, 223. Constraints and pairing in spatial mechanisms. Analysis of spatial mechanisms; application of vector, dual number, dual vector, matrix,

quaternions, and associated computer methods. Synthesis of spatial mechanisms for path and function generation. Offered in even-numbered years.

Mr. Yang

231. High Temperature Gases. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105A. Study of the fundamental processes in high temperature gases including chemical and ionization equilibrium, conduction and diffusion, elastic and inelastic collisions and radiation. Application to energy conversion and propulsion. Offered in even-numbered years.

Mr. Hoffman

232. MHD Energy Conversion. (4) III.

Lecture—4 hours. Prerequisite: Engineering 103B, 105B. Study of the direct conversion of thermal energy to electrical energy utilizing a magnetohydrodynamic (MHD) generator with chemical and nuclear heat sources. Evaluation of complete MHD power systems for both public utility power and space power supplies. Offered in odd-numbered years.

Mr. Hoffman

240. Theory of Crystal Dislocations. (3) I.

Lecture—3 hours. Prerequisite: Engineering 142 or 187, or consent of instructor. Edge, screw and mixed dislocation concepts. The stress field and energy of dislocations. Force on a dislocation. Motion of dislocations and its relation to plastic deformation. Dislocation multiplication and interaction with point, line, and surface defects.

Mr. Moon

241. Applications of Dislocation Theory. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240; Engineering 188 or consent of instructor. Concepts of dislocation theory are applied to explain plasticity of crystalline solids. Glide and climb of dislocations, imperfect dislocations, strain hardening, recrystallization, theories of creep processes and interaction of dislocation with solute atoms, precipitates and impurity clouds are discussed. Offered in even-numbered years.

Mr. Mukherjee

242. Advanced Mechanical Properties of Materials. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 188, 104B or consent of instructor. Strength and structure of engineering materials. The dependence of their mechanical properties on time, stress and temperature. Generalized concepts of dislocation theory in plastic deformation, including fracture, and creep. Influence of microstructure in optimizing the mechanical strength properties.

Mr. Mukherjee

243. Solid-State Phase Transformation. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 188, 105A or consent of instructor. The theory of alloying, kinetics of phase changes, homogeneous and heterogeneous

transformation, transformation by shear, order-disorder reactions and the phase changes during the heat treatment of iron-carbon alloys are discussed. Offered in odd-numbered years.

Mr. Mukherjee

270. Modeling and Simulation of Engineering Systems. (3) I.

Lecture—3 hours. Prerequisite: course 171 or consent of instructor. Multiport models of mechanical, electrical, hydraulic and thermal devices; bond graphs, block diagrams and state space equations; Hamilton's principle for complex systems; formulation for analog and digital simulation; identification; instrumentation; approximate models of distributed systems.

Messrs. Karnopp, Brewer, Loscutoff

271. Analysis and Control of Multivariable Systems. (3) II.

Lecture—3 hours. Prerequisite: course 270 or consent of instructor. Analysis of multi-input, multi-output systems and synthesis of linear control; comparison of transfer functions and state space methods in feedback control design; application to physical systems for hardware realization. Messrs. Karnopp, Brewer, Loscutoff

272. Analysis and Design of Control Systems. (3) III.

Lecture—3 hours. Prerequisite: Electrical Engineering 252 (to be taken concurrently); course 271 recommended. Synthesis of automatic control of mechanical engineering systems; both lumped and distributed parameter systems

and continuous and discrete time control will be considered. Messrs. Karnopp, Brewer, Loscutoff

275. Application of Modern Systems and Control Theory to Environmental Problems. (4) III.

Lecture—2 hours; seminar—1 hour; laboratory—3 hours. Prerequisite: courses 175, 270; or consent of instructor. Analysis, simulation, and planning for social, geophysical, and ecosystem environments. Observability, controllability and optimality in socio-technological systems. Large, dynamic systems theory. General systems theory. Emphasis on interdisciplinary research. Offered in odd-numbered years.

Mr. Brewer

289. Presentation of Thesis Research. (1) III.

Seminar—1 hour. Prerequisite: substantial progress toward completion of master's or doctor's thesis. Presentation of the results obtained in a thesis research project. Critical evaluation of experimental and analytical approaches and critique of presentation.

Mr. Giedt

290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion of current graduate research with particular attention to validity of experimental procedures, and including oral and written presentation of a term paper. (Satisfactory/Unsatisfactory grading only.)

Mr. Giedt

298. Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

ENGLISH

James L. Woodress, Ph.D., *Chairman of the Department*
Department Office, 100 Sproul Hall

Professors:

- ¹Everett Carter, Ph.D.
- Thomas A. Hanzo, Ph.D.
- Gwendolyn B. Needham, Ph.D.
- Karl J. Shapiro
- Linda Van Norden, Ph.D.
- Brom Weber, Ph.D. (*English and American Studies*)

- Robert A. Wiggins, Ph.D.
- James L. Woodress, Ph.D.
- Celeste T. Wright, Ph.D.

Associate Professors:

- ²William E. Baker, Ph.D.
- Wayne C. Harsh, Ph.D. (*English and Linguistics*)

¹John O. Hayden, Ph.D.

Elizabeth R. Homann, Ph.D.

Robert H. Hopkins, Ph.D.

Arthur E. McGuinness, Ph.D.

Daniel S. Silvia, Jr., Ph.D.

Assistant Professors:

- Arthur K. Amos, Jr., Ph.D.
- Elliot L. Gilbert, Ph.D.
- Peter L. Hays, Ph.D.
- Michael J. Hoffman, Ph.D.
- James R. Hurford, Ph.D.
- Diane L. Murray, Ph.D.
- David A. Robertson, Ph.D.
- David S. Wilson, Ph.D. (*English and American Studies*)



¹ Absent on leave, 1971-72.

² Absent on leave, fall quarter 1971.

* Absent on leave, spring quarter 1972.

Assistant Professors:

Caesar B. Adams, B.A. (*Acting*)
 Sydney E. Berger, M.A. (*Acting*)
 Thomas P. Campbell, III, B.A. (*Acting*)
 Walter J. Hicks, Ph.D. (*Acting*)
 Paul D. Johnson, M.A. (*Acting*)
 Robert M. Silvey, M.A.

Lecturers:

Mary A. O'Connor, M.A.
 W. Georg Isaak, M.A.
 Gwendolyn Schwabe, M.A.

Departmental Major Advisers—Mr. Amos, Mr. Baker, Mr. Campbell, Mr. Gilbert, Mr. Hanzo, Mr. Hayden, Mr. Hays, Mr. Hoffman, Mr. Johnson, Mr. Hopkins, Mr. Hurford, Mr. Mann, Mr. McGuinness, Mrs. Murray, Mr. Silvia, Mr. Wilson, Mrs. Wright.

The Major Program

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 advisers, individually, in the spring quarters of their sophomore and junior years.

Lower Division Courses. — Required: one course from 1, 2, 3, 4A. or 4B; course 45; 46A, 46B, 46C (these courses should be taken in order). Recommended: courses in the Freshman offering other than the one chosen to meet the requirements; courses 30A, 30B, 30C; a course in philosophy; and a course in classics.

Upper Division Courses. — Required: Thirty-six units of upper-division courses, which must include at least one in each of the following groups: Period courses, Genre courses, Author courses, Special Subjects.

Majors must also take at least one upper-division course in four of the following five periods of British literature: 1) Medieval; 2) Renaissance; 3) Seventeenth and Eighteenth Century; 4) Romantics and Nineteenth Century; 5) Twentieth Century; and at least one upper-division course in the following two periods of American literature: 1) Beginnings to 1860; 2) 1860 to the present.

In addition, the student must choose one of four areas of emphasis: General English and American Literature; Writing; Language and Linguistics; Preparation for Teaching. The student must consult with his adviser for specific requirements of each area of emphasis.

General Major. — Requires a minimum of 32 units of literature and four units of language.

Teaching Major. — The English teaching major in the teacher-training curriculum requires not only the core requirements but also courses 103, 105A, 105B, and 300 (which counts as 3 units of credit in education). Although these

courses may be postponed to the fifth year, course 105A should be taken before course 300.

Teaching Minor. — The teaching minor consists of 32 units, including courses 45, 46A, 46B, 46C, either 30B or 30C, and at least 12 units of upper-division work including English 103, 117A or 117B, and 155B or 155C. Course 300 (which counts as 3 units of credit in education) must be taken in the senior or postgraduate year. Recommended in addition to the required 32 units, especially in preparation for course 300: course 105A.

Writing Major. — Core requirements of 20 distributed units of English and American literature; English 100A, 100B, 100C and a 198 seminar in writing techniques.

Linguistics Major. — Core requirements of 20 distributed units of English and American literature; four courses in Linguistics.

Foreign Languages. — Students who contemplate advanced study in English at Davis should prepare for foreign-language requirements for higher degrees, and should consult with the graduate adviser.

Honors and Honors Program. — See page 149.

Graduate Study. — The Department of English offers programs of study and research leading to the M.A. and Ph.D. degrees. Detailed information may be obtained from the Graduate Adviser or from the Chairman of the Department.

Subject A. — Students must have passed Subject A before taking any course in English.

Prerequisite: one course from courses 1, 2, 3, 4A, 4B is required for admission to courses 20, 30A, 30B, 30C, 45, 46A, 46B, 46C, 47 and all upper-division courses. Course 45 is recommended as preparation for the 30 and 46 series.

Lower Division Courses**1. Expository Writing. (4) I, II, III.**

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement. Composition, the essay, paragraph structure, dictation, and related topics. Frequent writing assignments will be made.

The Staff (Mr. Isaak in charge)

2. Language and Stylistics. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement. An introduction to modern inquiries into the nature and forms of the English language. Frequent writing assignments will be made.

The Staff (Mr. Harsh in charge)

3. Introduction to Literature. (4) I, II, III.

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. Mr. Isaak in charge

4A, 4B. Backgrounds for English Literature.

(4, 4) A: I, II, III; B: I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement; course 4A is not prerequisite to 4B. This course, designed to introduce English majors to essential background material, will concentrate on such major literary works as *The Iliad*, *The Bible*, *The Aeneid*, and *The Divine Comedy*. Frequent writing assignments will be made.

The Staff (Chairman in charge)

5. Introduction to Creative Writing. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement and consent of instructor. A course in the elementary principles of writing fiction and poetry. Students will be expected to experiment with a variety of forms and will be encouraged to do free and independent work in addition to the restricted assignments of the course.

Mr. Isaak in charge

***20. Intermediate Composition. (4) I, III.**

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Designed primarily for non-majors who wish to improve their skills in expository writing; the content of the course includes basic principles of rhetoric and rules of usage in present-day English.

25. English for Foreign Students. (5) I, II, III.

Lecture—2 hours; discussion—2 hours; laboratory—1 hour. For foreign students only; required of those who do not pass the examination in English. Students who take this course must also take course 26. Mrs. Schwabe in charge

26. English for Foreign Students. (5) I, II, III.

Lecture—2 hours; discussion—2 hours; laboratory—2 hours. Continuation of course 25; required of those who have taken course 25.

Mrs. Schwabe in charge

30A. Survey of American Literature. (4) I.

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. American literature from its seventeenth-century beginnings to 1830. Mr. Wilson

30B. Survey of American Literature. (4) II.

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Nineteenth-century American literature from 1830 to 1900. Mr. Wiggins

30C. Survey of American Literature. (4) III.

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. American literature in the twentieth century. Mr. Wiggins

45. Critical Reading of Poetry. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Pre-

• Not to be given, 1971-72.

requisite: one course from courses 1, 2, 3, 4A, 4B. Close reading of selections from English and American poetry. Frequent written exercises.

The Staff (Mrs. Wright in charge)

46A. Masterpieces of English Literature. (4) I.

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected works of principal writers to 1640. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

The Staff (Chairman in charge)

46B. Masterpieces of English Literature. (4) II.

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected works of principal writers from 1640 to 1800. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

The Staff (Chairman in charge)

46C. Masterpieces of English Literature. (4) III.

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected works of principal writers from 1800 to the present. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

The Staff (Chairman in charge)

47. Introduction to Modern Literature. (4) II.

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Chief twentieth-century writers of England and America.

Mr. Shapiro

98. Directed Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

99. Special Study for Undergraduates. (1-5)

I, II, III. The Staff (Chairman in charge)

Upper Division Courses

Note: Each upper-division course is listed under one of the following groups:

- Period courses
- Genre courses
- Author courses
- Special subjects
- Writing courses
- Language and linguistics
- Senior seminars

Period courses: *studies of the major writers, the literary traditions and forms they worked in, and the influencing events of an age.*

111. Old English and Early Medieval Literature.

(4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Major types, tradi-

tions, and conventions of literature in England from the time of *Beowulf* to the late medieval romances, with special emphasis on the heroic strain, courtly love and its impact, and the development of Arthurian literature. Mostly in translation.

Mr. Campbell

112. The Age of Chaucer. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The literary, religious, and social movements of the later fourteenth century in England as they are reflected in the writings of Chaucer, Langland, the *Gawain* poet, and their contemporaries; the fifteenth-century Chaucerians.

Mr. Berger

*115. The English Renaissance. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected poetry and prose: More, Spenser, Hooker, Bacon, and others. The New Learning; the Reformation; psychological and moral concepts of the age.

*116. The Age of Elizabeth. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Poetry of Marlowe, Shakespeare, Sidney and others; fiction of Gascoigne, Lyly, Lodge; representative plays.

120. Earlier Seventeenth-Century Poetry and Prose.

(4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Major authors, forms, and styles. Donne, Jonson, Marvell, Bacon, Browne, Hobbes. Tradition and revolution.

Mr. Silvey

123. Dryden and His Contemporaries. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The Restoration in English Literature; Neoclassicism, Ancients versus Moderns, Pyrrhonism, the New Philosophy. Drama, criticism, and satire. Emphasis on the work of John Dryden.

Mr. McGuinness

125. The Age of Swift and Pope: Prose and Poetry.

(4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The Augustan Age: reason and imagination. Readings in Swift, Addison, Steele, Defoe, Pope, Gay, Thomson, and others.

Mr. McGuinness

127. Johnson and His Contemporaries. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Sense and Sensibility in poetry, biography, journals, fiction, comedy, and criticism. Readings in Johnson, Boswell, Goldsmith, Fielding, and others.

Mr. Hopkins

128. Prose and Poetry of the Later Eighteenth Century. (4) I.

Lecture—3 hours. Prerequisite: one course

from courses 1, 2, 3, 4A, 4B. Sense and Sensibility in criticism, history, philosophy and the novel. Readings in Hume, Burke, Gibbon, Sterne, Cowper, and others. The mysticism of Blake.

Mr. Hopkins

130. Early Romantic Literature. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Blake, Burns, Wordsworth, Coleridge, Scott; the eighteenth-century background and the development of Romantic concepts of the imagination.

Mr. Baker

*132. Later Romantic Literature. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Byron, Shelley, Keats. Individualism and revolt.

Mr. Baker

133. Early Victorian Literature. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Tennyson, Browning, Arnold, and selected prose writers. The Victorian temper; the individual and society; the search for faith. The impact of scientific thought upon creative thinkers.

Mr. Baker

*134. Later Victorian Literature. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Ruskin, Hardy, Hopkins, and others. The Oxford movement; the Pre-Raphaelites; art and sociology; aestheticism and decadence; pessimism. Tendencies continuing into the Edwardian period.

Mr. Gilbert

136. British Literature from 1880 to 1918. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Yeats, Conrad, Joyce. Aestheticism, naturalism, symbolism, and impressionism. The transition from Victorian to twentieth-century styles and attitudes.

Mr. Gilbert

137. British Literature from 1918 to 1940. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Lawrence, Eliot, Forster, and others. Post-war attitudes. Modern psychology and the awareness of myth.

Mr. Hanzo

138. British Literature from 1940 to the Present.

(4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Literature of England and Ireland from World War II to the present. Major themes in the novel, poetry, and short story.

Mr. Hanzo

139. Modern Anglo-Irish Writers. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. A study of Yeats, Joyce, George Moore, John Synge, James Stephens and others.

Mr. McGuinness

* Not to be given, 1971-72.

140. Origins of American Literature. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Seventeenth-century American literature; special attention to European literary-intellectual traditions, dominant American forms (poems, sermon, history), and major writers (Ann Bradstreet, Edward Taylor, and others). Mr. Weber

141. The American Enlightenment and Its Reaction. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Eighteenth-century American literature; rise of neoclassicism, liberal religion, popular literature, scientific thought, satiric temper; decline of Puritan traditions; major writers, including Franklin, Edwards, Freneau, and Brackenridge. Mr. Wilson

142. Early Nineteenth-Century American Literature. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Beginnings of American romanticism; sentimentalism. Gothic vogue, cultural nationalism, Southwestern humor; prose and poetry of Brown, Bryant, Irving, Cooper, Poe, and Longstreet.

Mr. Johnson

143. Transcendentalism and Its Reaction. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Flowering of American romanticism; the metaphysical tradition, Oriental and European antecedents, philosophical idealism, and literary achievement of Transcendentalism (Emerson, Thoreau, Whitman); the critical tempers of Hawthorne and Melville; Emily Dickinson. Mr. Johnson

144. American Literature from 1865 to 1914. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Religion, local color, social criticism, naturalism, *fin de siècle* aestheticism; Twain, James, Crane, Dreiser, Howells.

146. Modern American Literature: 1914 to 1940. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The Modernist movement, disillusionment, artistic experimentation, classical revival, New Criticism, proletarian literature, romantic nationalism, European currents, Pound, Fitzgerald, Eliot, Frost, Hemingway, Crane, Faulkner, and Stevens.

Mr. Woodress

147. Modern American Literature: 1940 to the Present. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Contemporary

* Not to be given, 1971-72.

fiction, poetry, and drama. The impact of World War II on the younger writers; experimentation and formalism in poetry and the drama.

Mr. Hicks

Genre courses: studies of major literary forms.

150A. English Drama to Marlowe. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The development of the drama from its beginnings to the Renaissance. Miracle and mystery plays; the morality tradition. Early comedy, tragedy, and chronicle plays.

Mr. Campbell

150B. English Drama from Marlowe to 1642. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Shakespeare's contemporaries in the drama, including Webster, Jonson, Beaumont and Fletcher, and others. The revenge play and tragicomedy; post-Shakespearean development of dramatic action and blank verse.

Mr. Berger

150C. English Drama from 1642 to 1890. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Restoration comedy, eighteenth-century sentimental comedy, and nineteenth-century melodrama, with particular attention to plays of Congreve, Sheridan, and Boucicault.

Mrs. Homann

***150D. British Drama from 1890 to the Present. (4) I.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The rise of dramatic realism; the chief reactions against it. Emphasis on Shaw, O'Casey, and Osborne.

152. American Drama from Its Beginnings to the Present. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Critical and historical survey of drama in America from its eighteenth-century origins with emphasis on Boucicault, Rice, O'Neill, Williams, and Miller.

Mr. Hays

155A. The English Novel: 1700-1770. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Realism and the rise of the modern novel. Defoe, Richardson, Fielding, Sterne, and Smollett.

Mrs. Needham

155B. The English Novel: 1770-1850. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Sense and Sensibility in the novel. Walpole, Radcliffe, Austen, Scott, Dickens, Bronte sisters.

Mrs. Murray

155C. The English Novel: 1850-1900. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Major Victorian

novelists: their theory and practice. Dickens, Thackeray, Trollope, Eliot, Meredith, and Hardy.

Mr. Gilbert

***155D. The English Novel: 1900 to the Present.**

(4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Major figures including Conrad, Joyce, and Lawrence. Impressionism, the revolt against naturalism; the experimental novel; the anti-modernist reaction.

Mr. Hoffman

158A. The American Novel to 1900. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The rise and development of the American novel from its eighteenth-century beginnings. Cooper, Hawthorne, Melville, Howells, Twain, James, Crane.

Mr. Hoffman

158B. The American Novel from 1900 to the Present. (4) III.

Prerequisite:

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Major American novelists of the twentieth century. Wharton, Dreiser, Faulkner, Hemingway, Fitzgerald, Bellow.

Mr. Hays

***160. The English Lyric. (4) II.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The history of poetic style from the sixteenth to the twentieth centuries. Major examples of the short poem in relation to intellectual history, to foreign influences, and to the development of poetic forms.

170A. The Epic. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Studies in the development of the epic.

Miss Van Norden

183. Film as Narrative. (4) III.

Lecture—1 hour; discussion—2 hours; laboratory—2 hours; film showings. Prerequisite: Dramatic Art 15 or consent of instructor. A close study of modern cinema (1930–60) as a storytelling medium. Emphasis on the work of American and British artists (Ford, Huston, Hitchcock, Welles).

Mr. Baker, Mr. d'Harnoncourt

Author courses: studies of the works and development of an author or authors.

113. Chaucer. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. *Troilus and Criseyde*, selected *Canterbury Tales*; central ideas in the fourteenth century.

Mr. Silvia

117A. Shakespeare. (4) I, II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected major works.

Mrs. Wright, Mr. Amos, Mr. Adams

117B. Shakespeare. (4) II, III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected major works not included in course 117A.

Mrs. Wright, Mr. Adams, Mr. Silvey

***122. Milton. (4) III.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected major works, including *Paradise Lost*.

189. Study of a Major Writer. (4) I, III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The artistic development of one major writer. May be taken only once.

The Staff (Chairman in charge)

Special subjects: studies in a special problem in literature.

110A. Introduction to Principles of Criticism.

(4) II.

Lecture—3 hours. Prerequisite: course 45 or equivalent. Methods and assumptions of critical theory from Aristotle to the present. Emphasis on major contributions to the history of literary criticism.

Mr. Robertson

110B. Introduction to Principles of Criticism. (4) III.

Lecture—3 hours. Prerequisite: course 45. Continuation of course 110A.

Mr. Robertson

170B. European Influences on the English and American Novel. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Studies in the English and American novel, with special reference to continental influences.

171. English Bible as Literature. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Old Testament poetry and prophecy; the Gospels and certain Epistles.

Miss Van Norden

***175. American Literary Humor. (4) I.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The American humorous vision as expressed in such modes as comedy, satire, irony, and their combinations from the seventeenth century to the present, with attention given to such matters as the nature of humor and the cultural influences affecting its development.

Mr. Weber

180. Literature for the Elementary and Secondary Schools. (4) I.

Lecture—3 hours; papers. Prerequisite: a first-year English course and one of the following: 30A, 30B, 30C, 45, 46A, 46B, 46C. Intensive study of literature used frequently in elementary and secondary English classes, including such works as *Charlotte's Web*, *Tom*

* Not to be given, 1971–72.

Sawyer, Red Badge of Courage, and short stories, drama, poetry; selections from regional, national, and world literature written in English.

Mr. Wiggins

183. Film as Narrative. (4) III.

Lecture—1 hour; discussion—2 hours; laboratory—2 hours; film showings. Prerequisite: Dramatic Art 15 or consent of instructor. A close study of modern cinema (1930–60) as a storytelling medium. Emphasis on the work of American and British artists (Ford, Huston, Hitchcock, Welles).

Mr. Baker, Mr. d'Harnoncourt

***185. Intercultural Literary Colloquium. (4) II.**

Lecture—2 hours; discussion—1 hour; readings in English or the language of the original text; term paper. Prerequisite: consent of instructor. Interdepartmental inquiry into such European and American themes as the anti-hero, guilt and judgment, escape, and utopia. Specific topics to be chosen by instructors. (To be given jointly with German 185 and Russian 185.) The Staff (Chairman in charge)

Writing courses:

100A. Creative Writing. (4) I.

Lecture—3 hours; evaluation of written materials and conferences with individual students—1 hour. Prerequisite: one course from courses 1, 2, 3, 4A, 4B; consent of instructor. Writing of poetry and fiction. May be repeated for credit with consent of instructor. No final examination. The Staff (Mr. Shapiro in charge)

100B. Creative Writing. (4) II.

Lecture—2 hours; evaluation of written materials and individual student conferences. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Sophmores may enroll with consent of instructor. The writing of poetry and fiction. May be repeated for credit with consent of instructor. No final examination.

The Staff (Mr. Shapiro in charge)

100C. Creative Writing. (4) III.

Lecture—2 hours; evaluation of written materials and individual student conferences. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Sophmores may enroll with consent of instructor. The writing of poetry and fiction. May be repeated for credit with consent of instructor. No final examination.

The Staff (Mr. Shapiro in charge)

103. Advanced Composition. (4) I, II, III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Survey of prose styles, the principles of prose rhetoric, and the usage patterns of present-day English grammar. Frequent written composition stressing the principles studied. Required of prospective high school English teachers.

The Staff (Mr. Harsh in charge)

* Not to be given, 1971–72.

Language and linguistics:

105A. Language. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Present-day English grammar and pronunciation according to the perspectives of traditional grammar and contemporary linguistics. Preparation for stylistic analysis and historical study of English language and literature. Required of prospective high-school English teachers. Mr. Hurford

105B. Language. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. History of the English language. Examination of the language as recorded in literary texts from Old English to present-day English. Relationship of English to other languages; development of vocabulary, phonology, and grammatical patterns. Required of prospective high-school English teachers.

***105C. Language Change Reflected in Literature.**

(4) II, III.

Lecture—3 hours; term paper. Prerequisite: courses 105A–105B. Study of literary texts from the various historical periods in the English language, considering, in addition to other stylistic features, those characteristics particularly connected with development and change in the respective linguistic periods.

Mr. Harsh, Mr. Campbell

192. Theory and Methods in Modern Linguistics.

(4) I.

Lecture—3 hours; term paper. Prerequisite: courses 105A–105B. Survey of scholarship in linguistic studies from European backgrounds to present, concentrating primarily but not exclusively on descriptions of the English language. Contrastive analysis with other Germanic languages.

Mr. Hurford

***195. Language, Thought, and Expression. (4) II, III.**

Seminar—3 hours; term paper. Prerequisite: course 192. Investigation of a range of theories on the relationship between language structure and thought, from philosophical, linguistic, and historical points of view. Readings will include Chomsky, Empson, Hayakawa, Ogden, Richards, Vygotsky, Whorf, et al.

Mr. Hurford

***196. Stylistics. (4) II, III.**

Seminar—3 hours; term paper. Prerequisite: course 192. Analysis of linguistic stylistic variations in specific works to be selected from the corpus of writings in English.

Mr. Baker

Senior Seminars:

188. Special Topics in Literary Studies. (4)

I, II, III.

Seminar—3 hours. Prerequisite: senior standing with a major in English, and consent of instructor. Group study of a special topic drawn

from English or American literature. The course will be offered in sections according to the topic studied, and papers will be assigned. May be taken only once. The Staff (Chairman in charge)

189. Study of a Major Writer. (4) I, III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The artistic development of one major writer and his intellectual and literary milieu. May be taken only once. The Staff (Chairman in charge)

194H. Special Study for Honors Students.

(2) I, II, III.

Prerequisite: honors status; one course from courses 1, 2, 3, 4A, 4B. Individual directed study leading to preparation of a long paper. May be repeated once for credit.

The Staff (Chairman in charge)

197T. Tutoring in English. (1-4) I, II, III.

Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit.

The Staff (Chairman in charge)

197TC. Community Tutoring in English. (1-4)

I, II, III.

Prerequisite: upper-division standing and a major in English; consent of instructor. May be repeated for credit.

The Staff (Chairman in charge)

198. Directed Group Study. (4) I, II, III.

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Chairman in charge)

Graduate Courses

200. Techniques of Literary Scholarship. (4) I.

Lecture—3 hours. The elements of bibliography with special attention to literature and discussion of the principal modes of literary investigation—critical, historical, textual, and others.

Mr. Woodress

***201. Literary Criticism. (4) II.**

Lecture—3 hours. Survey of the major critics from Aristotle to the present, with emphasis on the relationship of critical theory to the history of literature.

Mr. Hayden

205. Introduction to Old English (4) II.

Lecture—3 hours; written reports; individual conferences. The language of Anglo-Saxon England; readings in Old English prose and poetry.

Mr. Campbell

***206. Beowulf. (4) II.**

Lecture—3 hours. A study of the poem and the Heroic Age of Germanic literature.

Mr. Silvia

207. Middle and Early Modern English. (4) III.

Lecture—3 hours. Earlier dialects; the new vocabulary; the later sound shifts and changes to the seventeenth century. Readings in illustrative documents.

Mrs. Homann

210. Readings in English and American Literature.

(4) I, II, III.

Discussion—3 hours. Prerequisite: upper division English course in area to be studied. Offered in multiple sections each quarter. Content varies according to specialty of instructor. Course designed for students preparing for their comprehensive examinations. May be repeated for credit.

The Staff (Chairman in charge)

215. Arthurian Romance. (4) I.

Lecture—3 hours. The sources of Arthurian Romantic literature; Continental and English literary treatment; Malory's synthesis; significant changes of attitudes in post-Malory literature.

Mrs. Homann

***225. Topics in Irish Literature. (4) I, II, III.**

Seminar—3 hours. Prerequisite: course 139. Course will vary from quarter to quarter and will include such topics as the nineteenth-century novel, contemporary Irish poetry, rise of the drama, or a study of a major author.

***230A. Studies in Major Writers: Chaucer. (4) III.**

Seminar—3 hours.

Mr. Silvia

***230B. Studies in Major Writers: Milton. (4) II.**

Seminar—3 hours.

Miss Van Norden

***231. American-European Literary Relations. (4) I.**

Lecture—3 hours. The interchange of ideas and forms between America and Europe.

Mr. Carter

***232A. Problems of English Romantic Literature.**

(4) III.

Seminar—3 hours. Selected issues in the current study and critical assessment of Romantic literature.

Mr. Hayden

***232B. Problems of English Victorian Literature.**

(4) II.

Seminar—3 hours. Selected issues in the current study and critical assessment of Victorian literature.

Mr. Gilbert

233. Problems in American Literature. (4) I.

Seminar—3 hours. Selected topics for intensive investigation.

Mr. Hays, Mr. Weber

***234. Dramatic Literature. (4) III.**

Seminar—3 hours. A historical introduction to dramatic theory; the genres of tragedy, comedy, and tragicomedy.

* Not to be given, 1971-72.

***235. Fiction. (4) I.**

Seminar—3 hours. Theories of fiction as reflected in the practice of writers from the eighteenth century to the present. Mrs. Needham

***236. Poetics. (4) II, III.**

Seminar—3 hours. Metaphor, style, and structure in English poetry from the sixteenth century to the present. Mr. Shapiro

237. Modern Critical Theory. (4) III.

Seminar—3 hours. Examination of problems in the theory underlying the practice of literary criticism from I. A. Richards and T. S. Eliot to the present. Mr. Hanzo

***240A-240B-240C. Medieval Literature.**

(4-4-4) I-II-III.

Seminar—3 hours. Mrs. Homann

***242A-242B-242C. Sixteenth-Century Literature.**

(4-4-4) I-II-III.

Seminar—3 hours. —————

***244A-244B-244C. Shakespeare. (4-4-4) I-II-III.**

Seminar—3 hours —————

***246A-246B-246C. Seventeenth-Century Literature.**

(4-4-4) I-II-III.

Seminar—3 hours. Miss Van Norden

***248A-248B-248C. Eighteenth-Century Literature.**

(4-4-4) I-II-III.

Seminar—3 hours. Mrs. Needham

***250A-250B-250C. Romantic Literature.**

(4-4-4) I-II-III.

Seminar—3 hours. Mr. Hayden

***252A-252B-252C. Victorian Literature.**

(4-4-4) I-II-III.

Seminar—3 hours. Mrs. Murray

***254A-254B-254C. Twentieth-Century British**

Literature. (4-4-4) I-II-III.

Seminar—3 hours. —————

***256A-256B-256C. Early American Literature.**

(4-4-4) I-II-III.

Seminar—3 hours. Mr. Weber

258A-258B-258C. American Literature: 1800 to the Civil War. (4-4-4) I-II-III.

Seminar—3 hours. Mr. Hoffman

***260A-260B-260C. American Literature: Civil War to 1914. (4-4-4) I-II-III.**

Seminar—3 hours. Mr. Woodress

***262A-262B-262C. American Literature after 1914. (4-4-4) I-II-III.**

Seminar—3 hours. Mr. Woodress

• Not to be given, 1971-72.

† Not to be given, fall quarter 1971.

§ Not to be given, spring quarter 1972.

***264A-264B-264C. Studies in Modern British and**

American Literature. (4-4-4) I-II-III.

Seminar—3 hours. Mr. Hanzo

289. Study of a Major Writer. (4) I, II, III.

Seminar—3 hours. The artistic development of one major writer and his intellectual and literary milieu. May be repeated for credit when a different writer is studied.

The Staff (Chairman in charge)

298. Directed Group Study. (1-5) III.

(Satisfactory/Unsatisfactory grading only.)
The Staff (Mr. Weber in charge)

299. Individual Study. (1-4) I, II, III.

(Satisfactory/Unsatisfactory grading only.)
The Staff (Chairman in charge)

299D. Special Study for the Doctoral Dissertation.

(1-8) I, II, III.

(Satisfactory/Unsatisfactory grading only.)
The Staff (Chairman in charge)

Professional Courses**300. Problems in Teaching English Language, Literature and Composition in Secondary Schools. (3) II.**

Lecture—2 hours. Prerequisite: senior or graduate standing; an English teaching major or minor. This course should be completed before practice teaching. The course is accepted in partial satisfaction of the requirement in education for the general secondary credential.

Mr. Harsh

***301. The Teaching of English as a Foreign Language. (4) II.**

Lecture—3 hours. Methods for the use of applied linguistics in the teaching of English to nonnative speakers. Mr. Hurford

***302. Application of Language Study to the Teaching of Composition and Literature. (4) II, III.**

Lecture—3 hours. Prerequisite: course 105A-105B. Application of language theory to teaching of English at the elementary, secondary, and college levels. Subject matter in the course will include recently developed language texts, curriculum materials from state and national English curriculum centers, and other pertinent pedagogical materials.

Mr. Harsh

390A. Teaching English at the College Level. (2) I.

Lecture-discussion—2 hours; observation of freshman English courses—2 hours. Prerequisite: graduate standing. A consideration of the problems and techniques of teaching English composition at the college level. (Satisfactory/Unsatisfactory grading only.) The Staff

390B. Teaching English at the College Level. (2) I.

Lecture-discussion—2 hours; observation of freshman English courses—2 hours. Prerequisite:

site: graduate standing. A consideration of the problems and techniques of teaching literature

at the college level. (Satisfactory/Unsatisfactory grading only.) The Staff

ENTOMOLOGY

Major Advisers.—See *Schedule and Directory* listing.

Major Program and Graduate Study. See pages 62, 64, 81 and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses

1. An Introduction to Entomology. (5) III.

Lecture—3 hours; laboratory—6 hours. A basic study of insects: their biology, anatomy, classification and relation to human welfare.

Mr. Strong

10. Natural History of Insects. (3) I, III.

Lecture—3 hours. Designed for students not specializing in entomology. Not open for credit to students who have had course 1 but students who have taken course 10 may take course 1 for credit. Biology, taxonomy and behavior of insects. A cultural and technical course providing an introduction to the insects. Mr. Bacon

Upper Division Courses

101. Introduction to Structure and Function in Insects. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1. General principles of insect morphology with emphasis on the functional approach. Comparative anatomy of selected insect types. Mr. Summers

102. Insect Physiology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1 or equivalent; Chemistry 8B; course 101 recommended. Vital functions of insects and related organisms. Mr. Judson

103. Systematic Entomology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory course in zoology or entomology. The principles of taxonomy in animals; speciation; introduction to classification and nomenclature. Mr. Bohart

104. Insect Ecology. (4) II.

Lecture—4 hours. Prerequisite: upper division standing in one of the biological sciences. Principles of ecology with examples from the insects; analysis of the insect environment; population dynamics. Mr. Cothran

105. Insect Classification. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 1. Principles and methods of

classification of insects to the family level with emphasis on identification.

Messrs. Thorp, Bohart, Grigarick

106. Field Entomology. (2) III.

Laboratory—6 hours. Prerequisite: course 105 or consent of instructor. Collection and comparative analyses of insect faunas from selected ecological zones in California. Offered in odd-numbered years. Mr. Thorp

109. Field Taxonomy and Ecology. (5) (Summer).

Lecture—2 hours; laboratory—24 hours. Prerequisite: an introductory course in entomology or consent of instructor. The study of insects in their natural habitats; their identification and ecology. Offered in even-numbered years.

Mr. Bohart

110. Economic Entomology. (4) III.

Lecture—2 hours; laboratory—6 hours. An introductory course dealing with the identification, biology, and control of economic insects, with emphasis on those attacking agricultural crops.

Mr. Grigarick

112. Principles of Agricultural Entomology. (4) II.

Lecture—4 hours. Prerequisite: an introductory course in entomology or consent of instructor. Principles and problems in the control of insects and mites; integrated control, residues, considerations of application equipment, philosophy of sampling.

Mr. Lange

116. Biology of Aquatic Insects. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: an introductory course in entomology or consent of instructor. A study of the life histories, ecology, and identification of insects associated with streams, ponds, and lakes. Offered in even-numbered years.

Mr. Grigarick

117. Chemistry of Insecticides. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B, or consent of instructor. Chemical composition and reactions of insecticides; their physiological effects on plant and animal tissues.

Mr. Stafford

119. Apiculture. (3) II.

Lecture—3 hours. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities.

Mr. Laidlaw, Mr. Gary

119L. Apiculture Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 119. Biology and behavior of honeybees (especially communicative behavior); fundamentals of colony management necessary for efficient

agricultural use; utilization of bees in research and teaching. Mr. Gary, Mr. Laidlaw

121. Insect Behavior. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. Evolution of behavior, sense organs, specific types and patterns of behavior, comparative behavior, learning, and applied aspects of behavioral phenomena. Analysis of movies on behavior. Mr. Gary

123. Classification of Immature Insects. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory course in entomology. Criteria used to identify the immature forms of the principal orders and families of insects; primary emphasis on economic groups. Offered in even-numbered years. Mr. Lange

125. Insect Vectors of Plant Pathogens. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in entomology or plant pathology, or consent of instructor. The role of insects and mites in the transmission of plant pathogens with emphasis on the biological relationships between insect vectors and plant viruses they transmit. Virus transmission techniques and approaches to control. Mr. McLean

127. Acarology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 103 or 110. The morphology, taxonomy, and ecology of mites, with emphasis on plant and animal parasites. Offered in odd-numbered years. Mr. Summers

130. Biological Control of Insect and Weed Pests. (4) II.

Lecture—4 hours. Prerequisite: introductory course in entomology or consent of instructor. Theories and practices of biological control; population phenomena, and the biology of entomophagous insects. Offered in even-numbered years. Mr. Bacon

153. Medical Entomology. (3) III.

Lecture—3 hours. Prerequisite: one course in entomology or consent of instructor. The worldwide relationships of insects and other arthropods to human health. The biology and basic classification of medically important arthropods with special emphasis on the ecology of arthropod-borne diseases of man and principles of their control. Mr. McClelland

194H. Special Study for Honors Students. (1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. The Staff (Mr. Bacon in charge)

198. Directed Group Study. (1-5) I, II, III. (Summer)

Prerequisite: consent of instructor. The Staff (Mr. Bacon in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III. (Summer).

The Staff (Mr. Bacon in charge)
Graduate Courses

202. Advanced Insect Physiology. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 102 or Zoology 112, or consent of instructor; Biochemistry 101A or 101B recommended. Selected topics of insect physiology. Intensive study of topics of current interest, which will vary from year to year. The course may be repeated for credit. Offered in odd-numbered years. Mr. Judson

203. Principles of Systematic Entomology. (3) II.

Lecture—3 hours. Prerequisite: course 103. Theory and philosophy of taxonomy with emphasis on phylogeny, zoogeography, and nomenclature of insects. Offered in even-numbered years. Mr. Bohart

219. Advanced Apiculture. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 119, or consent of instructor. Advanced topics in bee biology with special consideration of morphology, genetics, caste differentiation, and artificial insemination. Offered in even-numbered years. Mr. Laidlaw

253. Advanced Medical Entomology. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: one upper division course in entomology other than 153 and one course in microbiology; course 153 is recommended. A study in depth of one or more selected arthropod-borne diseases of man with emphasis on the relationship of the physiology, behavior and population dynamics of the vector to the ecology of the disease. Emphasis in the laboratory on epidemiologic techniques relating to vectors and taxonomy of a selected group. Mr. McClelland

275. Principles and Methods of Entomological Research. (4) II.

Lecture—2 hours; laboratory—6 hours. Techniques and purposes of the scientific method as related to the field of entomological research with emphasis on problem selection, methods of attack, and the accompanying collection, evaluation, and presentation of data. Offered in odd-numbered years. Mr. Strong

290. Seminar. (2) I, II, III.

Seminar—2 hours.
The Staff (Mr. Strong in charge)

291. Seminar in Medical Entomology. (2) I.

Seminar—2 hours. Prerequisite: course 153. Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in man and animals. Mr. McClelland

298. Group Study. (1-5) I-II-III.

(Satisfactory/Unsatisfactory grading only.)
The Staff (Mr. Bacon in charge)

ENVIRONMENTAL HORTICULTURE

Related Major Programs and Graduate Study.

—See pages 64 and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses

1. Introduction to Landscape Design. (3) II.

Lecture—3 hours. Recommended for non-majors. Design principles and criteria used in analyzing, evaluating, and developing the visual and functional aspects of landscaped areas.

The Staff

1L. Introduction to Landscape Design Laboratory.

(2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1 (may be taken concurrently); recommended for non-majors. Practice in analysis and design with reference to landscape problems.

The Staff

5. Introduction to Environmental Plants. (2) I, III.

Lecture—1 hour; laboratory—3 hours. Recommended for non-majors. The course introduces plants commonly used in the landscape. The origin, domestication and breeding of cultivated plants is discussed. Students learn to identify the more important environmental plants of California.

Mr. Harding

10. Landscape Horticulture for the Home and Community. (3) III.

Lecture—2 hours; discussion—1 hour. Recommended for non-majors. The influences of climate, soil, and cultural practices on the growing of turf, flowers, and herbaceous and woody plants in the landscape.

Mr. Kofranek, Mr. Hackett

47. Introduction to Environmental Horticulture.

(1) III. §§

Field Study—30 hours. Prerequisite: consent of instructor. An introduction to environmental horticulture including parks and recreation; landscape architecture; urban and resource planning; landscape construction and contracting; nursery production; commercial floriculture; arboriculture; sales and services; teaching, research and extension. Offered in odd-numbered years.

Mr. Harris

98. Directed Group Study for Lower Division

Students. (1-5) I, II, III.

Prerequisite: consent of instructor.
The Staff (Mr. Kofranek in charge)

299. Research. (1-12) I, II, III. (Summer)

The Staff (Mr. Summers in charge)

99. Special Study for Lower Division Students.

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Kofranek in charge)

Upper Division Courses

104. Landscape Construction. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 1, 1L; Engineering 1 recommended. Analysis of the physical, mechanical, functional and aesthetic properties of materials used in landscape development with emphasis on construction techniques, methods and specifications.

Mr. Madison

105. Taxonomy and Ecology of Environmental Plants.
(4) II.

Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 5 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.

Mr. Leiser

107. Herbaceous Environmental Plants. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 5 or one course in taxonomy. The identification, ecology, and use of herbaceous environmental plants, with emphasis on floricultural and foliage plants, garden annuals, and perennials.

Mr. Madison

115. Advanced Taxonomy and Ecology of Environmental Plants. (4) III.

Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 105 or consent of instructor. Identification, nomenclature and classification of plants for man's environment are studied in relation to extensive variations and ecological modification. Emphasis is placed on the use of plants in western climatic zones. Nomenclatural codes are discussed.

Mr. Leiser

125. Floriculture and Nursery Management. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Science 2 or Botany 2. Practices and principles in planning, establishing and maintaining container grown crops with special consideration of green house production. Several field trips during scheduled laboratory hours and one all-day Saturday field trip required.

Mr. Hackett, Mr. Kofranek

§§ To be given between the winter and spring quarters. Considered a spring quarter course for preenrollment.

128A. Landscape Horticulture. (3) I.

Lecture—2 hours; laboratory—2 hours. Prerequisite: Plant Science 2 or Botany 2. Practices and principles of planting, establishing, and maintaining plantings in the landscape with emphasis on turf. Laboratory methods are used to analyze problems related to nutrition, salinity and water quality. Mr. Madison, Mr. Paul

128B. Landscape Horticulture. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Plant Science 2 or Botany 2. Principles and practices for the development and management of plants in urban and natural landscapes with emphasis on trees and shrubs. Mr. Harris

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Kohl in charge)

ENVIRONMENTAL PLANNING AND MANAGEMENT

Major Advisers.—See *Schedule and Directory* listing.

Major Program.—See pages 62 and 82.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Course**1. Environmental Quality. (3) I.**

Lecture—3 hours; one Saturday field trip. Components of environmental quality, significant issues, relationships and implications for planning, design, management and interpretation of urban and natural environments.

Mr. Gold

Upper Division Courses**110. Urban and Regional Planning. (3) II.**

Lecture—3 hours; one Saturday field trip. The history, nature, scope, and significance of planning in America including definitions and concepts, the planning process, significant problems, policy issues and the future. Mr. Gold

116. Outdoor Recreation. (3) III.

Lecture—3 hours; one Saturday field trip. The history, nature, scope, and significance of outdoor recreation in American life, with emphasis on user-resource relationships, special problems, policy issues, and innovation.

Mr. Gold

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. Selected problems in floriculture, nursery management, and landscape horticulture.

The Staff (Mr. Kohl in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor.

The Staff (Mr. Kohl in charge)

Graduate Courses**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Selected topics in floriculture, nursery management, and environmental horticulture. The Staff (Mr. Kohl in charge)

298. Group Study. (1-5) I, II, III.

Group study on advanced topics in floriculture, nursery management, and environmental horticulture. The Staff (Mr. Paul in charge)

299. Research. (1-6) I, II, III.

Prerequisite: graduate standing. Research in floriculture, nursery management, and landscape horticulture. The Staff (Mr. Paul in charge)

122. Recreation Policy. (3) II.

Lecture—3 hours. Prerequisite: course 116. Development of public policy and the decision process of recreation resource allocation, development and management at the national, state, and local levels. Offered in odd-numbered years.

124. Leisure Systems. (3) III.

Lecture—3 hours; one Saturday field trip. Prerequisite: course 116 (may be taken concurrently). Analysis of public and private means used to provide leisure opportunities in urban and natural areas emphasizing outdoor recreation as one component of a social service system including means-ends relationships, policy, planning and development of social indicators. Offered in odd-numbered years.

134. Planning of Recreation Environments. (3) I.

Lecture—3 hours. Prerequisite: course 116; course 124 recommended. Concepts, principles, techniques, and methods used in the planning, analysis and evaluation of leisure environments with emphasis on public outdoor recreation resources, landscape analysis, resource allocation, rationalization and the decision process. Offered in odd-numbered years.

Mr. Gold

136. Design of Recreation Environments. (3) III.

Lecture—3 hours. Prerequisite: course 1 and Environmental Horticulture 1 and 1L. Concepts, principles, techniques, problems and potentials in the design, analysis and evaluation of recreation environments.

ation environments with emphasis on public outdoor recreation resources, form and function, visual quality and the implications of design alternatives on the urban and natural landscape. Offered in even-numbered years.

160. Environmental Interpretation. (3) III.

Lecture—2 hours; laboratory—2 hours; two field trips. Prerequisite: course 1 recommended. Principles and analysis of interpretative techniques, media, materials and programs of public park and recreation agencies, museums, botanical and zoological gardens, schools and organizations, including the planning, construction and use of interpretive devices and facilities.

Mr. Harris

194H. Special Study for Honors Students.

(1–5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Gold in charge)

196. Outdoor Recreation Field Studies. (1–6)

(Summer)

Field study. Prerequisite: course 116; course 124 recommended. Survey, analysis and evaluation of the planning, design, management and program of public and private recreation environments with emphasis on field observation of administrative practices, user behavior, environmental design and program innovations. Offered in odd-numbered years.

The Staff (Mr. Gold in charge)

ENVIRONMENTAL STUDIES

Robert S. Loomis, Ph.D., *Associate Dean*

J. Herbert Snyder, Ph.D., *Assistant Dean*

Professors:

Charles R. Goldman, Ph.D.
William J. Hamilton, III, Ph.D.
Robert S. Loomis, Ph.D.
J. Herbert Snyder, Ph.D.

Associate Professor:

Alvin D. Sokolow, Ph.D. (*Political Science*)

Assistant Professors:

John W. Brewer, Ph.D.
Warren R. Cothran, Ph.D.
Theodore C. Foin, Jr., Ph.D.
James McEvoy, Ph.D.
Seymour I. Schwartz, Ph.D.
Geoffrey A. Wandesforde-Smith, Ph.D.



198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Gold in charge)

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

Prerequisite: 3 units of upper division work in park administration; consent of instructor.

The Staff (Mr. Gold in charge)

Graduate Courses

222. Recreation Policy. (3) II.

Lecture—3 hours. Prerequisite: course 122 or consent of instructor. Analysis of the development and application of public policy of recreation resource allocation, development and management. Offered in even-numbered years.

Mr. Gold

234. Planning Recreation Environments. (3) III.

Lecture—2 hours; laboratory—2 hours; weekend field trip. Prerequisite: course 134 or consent of instructor. Application of concepts, techniques, and methods to the analysis, evaluation, and planning of recreation environments. A multidisciplinary, team approach to actual situations. Offered in even-numbered years.

Mr. Gold

290. Seminar. (1–2) I, II, III.

Seminar—1–2 hours. An interdisciplinary seminar on selected current topics related to environmental planning, leisure behavior and environmental quality.

The Staff (Mr. Gold in charge)

299. Research. (1–6) I, II, III.

Research—3–18 hours.

The Staff (Mr. Gold in charge)

Professor:

Robert Sommer, Ph.D. (*Psychology*)

Assistant Professors:

Ruth Dixon, Ph.D. (*Sociology*)

Jess F. Kraus, Ph.D. (*Community Health*)

Lecturer:

Thomas E. Dickinson, Ph.D.

The Intercollege Division of Environmental Studies presents undergraduate and graduate programs relating to environmental and resource management problems, including theory and principles. Opportunities to learn methods for analysis and applications for problem-solving are provided through regular courses, workshops, and directed group studies. The goals of these programs provide

a concentration of broad focus courses that may be elected by students from any college or school to help establish the relevance of their discipline to environmental problems as well as a core program in environmentally oriented general studies for graduate and undergraduate students who are developing professional depth in such areas as resource sciences, ecology, environmental planning, engineering, or other fields important to environmental management.

For the latest information on current undergraduate and graduate programs in environmental studies, contact the Assistant Dean for Environmental Studies.

Lower Division Courses

10. Introduction to Environmental Studies. (4) I, III.

Lecture—3 hours; discussion—1 hour. A multidisciplinary survey of the ecology of natural systems and man-environment interactions. Lectures by specialists in the natural and social sciences, humanities and the professions. Topics include introductory concepts of natural ecosystems, animal behavior, and human ecology with emphasis on their relationship to human activities.

Mr. Foin

12. Environmental Planning. (4) II.

Lecture—3 hours; discussion and field trips—1 hour. Elementary concepts of the planning process with application to environmental problems.

The Staff

98. Directed Group Study. (1-5) I, II, III.

The Staff

Upper Division Courses

100. General Ecology. (5) I.

Lecture—4 hours; discussion—1 hour. Fundamental theories of ecology relating to understanding and managing the biosphere.

The Staff (Mr. Cothran in charge)

101. Social Processes. (4) III.

Lecture—3 hours; discussion—1 hour. An examination of the problem of determining what are the crucial variables in the social processes that relate man to the environment. Economic theory, human ecology and general systems theory are examined to evaluate their utility in isolating strategic social variables.

Mr. McEvoy

102. Environmental Decision Making. (4) III.

Lecture—3 hours; discussion—1 hour. A survey and examination of approaches and concepts in decision making relevant to environmental problems. Discussion of collective action, problems of institutional design, the implications of public sector entrepreneurship, and the effects of technology on alternative decision structures.

Mr. Wandesforde-Smith, Mr. Dickinson

112. Environmental Law and Administration. (4) II.

Lecture—4 hours. Introduction to environment as a political issue and the evolution of administrative legal mechanisms for dealing with environmental problems. Primary emphasis on the changing role of Congress, the Presidency, and the courts in formulating and implementing policy.

Mr. Wandesforde-Smith

131. Environmental Health. (4) II.

Lecture—3 hours; discussion—1 hour. Contemporary problems in environmentally dependent aspects of individual and public health. Diseases associated with pollution of air, water, soil and food; infectious diseases such as malaria and encephalitis and stress phenomena related to urban crowding, noise and occupation will be considered.

Mr. Kraus

133. Population Analysis. (4) III.

Lecture—3 hours; laboratory—3 hours. A comparative and historical examination of interrelations between population dynamics and social organization, technology, and the environment; statistical analysis of the relation of demographic processes of fertility, mortality, and migration to variations and changes in human population size, composition, and distribution.

Miss Dixon

***160. Public Mechanisms for Controlling Land Use. (4) II.**

Lecture-discussion—4 hours. Prerequisite: an introductory course in planning. Politics and administration of zoning, subdivision and building regulation and open space preservation, constitutional and legal bases for controls; community and political factors influencing legislation and administration of controls; and the relative effectiveness of specific controls in channeling urban growth.

Mr. Sokolow

***162. Planning and Decision Making in Small Urban Communities. (4) III.**

Lecture-discussion—4 hours. Examination of urban processes in small U. S. communities, with particular attention to how local governments respond in their structures and programs to community growth, or non-growth, and development. The political consequences of excessive subdivision development, overburdened utility plants, and alternative taxation strategies.

Mr. Sokolow

166. Case Studies in Institutional Failure and Reform. (4) I.

Lecture-discussion—4 hours. Selected case studies demonstrating the institutional constraints faced in environmental problem-solving in the public sector. Cases of legislative, regulatory, and administrative-management agencies covering national, international and subnational

* Not to be given, 1971-72.

problems in environmental management will be discussed.

Mr. Wandesforde-Smith

168. Environmental Problems and Market Failure.

(4) III.

Lecture-discussion—3 hours. Prerequisite: course 102 or 1 course in microeconomic theory and political science. Analyses of environmental problems as examples of market failure. The application of political and economic theories to external costs and irreversibilities in problems such as urban sprawl, depletion and pollution. Mr. Dickinson, Mr. Wandesforde-Smith

170. Environmental Awareness. (4) III.

Lecture—3 hours; discussion—1 hour. Interactions of people with man-made environments. Research methods for evaluating designed environments and reviews of current research in environmental psychology. Illustrations include the connection between the design of schools, parks, hospitals, and dormitories on the behavior of occupants. (Same course as Psychology 170).

Mr. Sommer

185. Methods for Analysis of Complex Systems.

(4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: elementary programming, calculus, and statistics. The strategy and tactics of ecosystem analysis is combined with analytical and simulation procedures to explore the problem-

solving capability of mathematical model build-up for complex environmental problems. Students will be exposed to simulation languages and will be expected to apply their training in individual projects.

The Staff

190. Workshops on Environmental Problems. (1-8)

I, II, III.

Laboratory—2-16 hours. Prerequisite: consent of instructor. Workshops featuring empirical analyses of contemporary environmental problems by multidisciplinary student teams. Guided by faculty and lay professionals, the teams seek to develop an integrated view of a problem and outline a series of alternative solutions. Open to all upper division and graduate students on application.

The Staff

198. Directed Group Study. (1-5) I, II, III.

Mr. Schwartz

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor. Directed study of a topic selected by the student and an instructor.

The Staff

Graduate Courses

298. Directed Group Study. (1-5) I, II, III. The Staff

299. Research. (1-12) I, II, III.

Prerequisite: graduate standing. (Satisfactory/Unsatisfactory grading only.) The Staff

ENVIRONMENTAL TOXICOLOGY

Related Undergraduate Majors and Graduate Study.—See pages 67 and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses

10. Protecting the Quality of the Environment.

(3) III.

Lecture—3 hours. Prerequisite: open to science and nonscience majors. A discussion of man-made hazards in the world around us, including how they might be minimized. Topics to be covered: air, water and soil pollution; food safety, waste disposal. Included are household, domestic and agricultural chemicals and industrial toxicants.

Mr. Kilgore, Mr. Walker

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

99. Special Study for Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

Upper Division Courses

110. Air Pollutants. (3) II.

Lecture—3 hours. Prerequisite: Chemistry 1C and Biology 1, or equivalents; course 10 recommended. The physical and chemical properties and biological functions of air contaminants; their behavior in the atmosphere, movement and fate; their effects on man, crops and animals; economic, social and legislative considerations.

Mr. Hsieh, Mr. Akesson

180. Principles of Environmental Toxicology. (3) I.

Lecture—3 hours. Prerequisite: Chemistry 8B or 112D (or equivalent); Biochemistry 101A recommended. A unified introduction to principles underlying the use and environmental consequences of pesticides, food additives, and other chemicals; their regulation; and their health significance.

Mr. Crosby

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Kilgore in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Kilgore in charge)

Graduate Courses**203. Environmental Toxicants. (4) II.**

Lecture—3 hours. Prerequisite: Chemistry 112B (or equivalent), or Chemistry 8B and consent of instructor. Toxic substances: selected topics illustrating their occurrence, structure, and reactions indicative of metabolism and environmental transformations. Mr. Crosby

214. Mechanisms of Toxic Action. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B and consent of instructor. Biochemical and physiological mechanisms underlying toxicity and detoxification. Mr. Kilgore

220. Analysis of Toxicants. (3) III.

Lecture—3 hours. Prerequisite: course 180 and consent of instructor; course 203 recommended. Principles of the microanalysis of toxicants. Theoretical considerations regarding separation, detection, and quantitative determi-

nation of toxicants using chemical and instrumental techniques. Mr. Seiber

220L. Analysis of Toxicants Laboratory. (2) III.

Laboratory—4 hours. Prerequisite: course 220 (may be taken concurrently) and consent of instructor. Laboratory techniques for micro-analysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental methods. Mr. Seiber

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff (Mr. Kilgore in charge)

298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Topics such as trace analysis of toxicants, natural toxicants, and new pesticides.

The Staff (Mr. Kilgore in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Kilgore in charge)

EPIDEMIOLOGY AND PREVENTIVE MEDICINE

Walter W. Sadler, D.V.M., M.P.H., *Chairman of the Department*

Department Office, 2075 Haring Hall

Professors:

- Henry E. Adler, D.V.M., Ph.D.
- Raymond A. Bankowski, D.V.M., Ph.D.
- John B. Enright, Ph.D.
- Livio G. Raggi, D.V.M., Ph.D.
- Hans P. Riemann, D.V.M., Ph.D.
- Walter W. Sadler, D.V.M., M.P.H.
- Calvin W. Schwabe, D.V.M., M.P.H., Sc.D.
- Richard Yamamoto, Ph.D.

Associate Professor:

- Charles E. Franti, Ph.D.

Assistant Professors:

- Joyce E. Coggin, D.V.M., M.P.H.
- Dan R. Harlow, Ph.D.
- Alvin D. Wiggins, Ph.D.

**Professors:**

- Ralph J. Audy, M.B., Ph.D. (*San Francisco Campus*)
- Nemat O. Borhani, M.D., M.P.H. (*Internal Medicine and Community Health*)
- Alfred G. Edward, D.V.M (*Clinical Sciences*)
- Stewart H. Madin, D.V.M., Ph.D. (*Berkeley Campus*)
- Nicholas L. Petrakis, M.D. (*San Francisco Campus*)

Assistant Professor in Residence:

- Constantin Genigeorgis, D.V.M., M.S., Ph.D.

Lecturers:

- Robert B. Bushnell, D.V.M.
- Fred N. Cooper, B.S.P.H.
- George L. Crenshaw, D.V.M.
- Fredric L. Frye, D.V.M.
- Murray B. Gardner, M.D.
- George L. Humphrey, D.V.M., M.P.H.
- Winifred E. Kistler, M.L.S.
- Wei Hwa Lee, Ph.D.
- Ming-Yu Li, Ph.D., M.L.S.
- Bryan Mayeda, D.V.M.
- Richard H. McCapes, D.V.M.
- Marjan Merala, M.S., Ldo. Vet.
- Lloyd J. Neurauter, D.V.M., M.P.H.
- Arnold S. Rosenwald, D.V.M., Ph.D.
- John C. Sawyer, D.V.M., M.P.V.M.
- Charles R. Schroeder, D.V.M.
- Herald G. Wixom, D.V.M.
- James H. Wommack, D.V.M.
- George K. York, Ph.D.

Upper Division Courses**101. Perspectives in Veterinary Medicine. (2) I.**

Lecture—2 hours. Consideration of the present-day scope of veterinary medicine and of the role of the veterinary profession in modern society. Mr. Schwabe

102. Biomedical Information Retrieval. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: enrollment in the School of Veterinary Medicine or consent of instructor. The use of bibliographic tools in the biomedical sciences; the use and availability of demographic data;

the application of manual and machine systems for storage and retrieval of data; and consideration of computerized systems in literature retrieval and clinical data processing.

Miss Goggin, Mr. Li, Mr. Merala, Mr. Franti

103A. Medical Statistics. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Use of statistics in clinical, laboratory and population medicine; graphical and tabular presentation; biomedical statistical laboratory to accompany introductory course in statistics. Mr. Franti, Mr. Wiggins

103B. Medical Statistics. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 103A or consent of instructor. Regression, correlation, analysis of variance in biomedical sciences; time-dependent variation and trends; bioassay; introduction to mathematical epidemiology; non-parametric methods. Mr. Franti, Mr. Wiggins

103C. Medical Statistics. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 103B, or consent of instructor. Continuation of course 103B; additional topics in bioassay; life tables and cohort studies; clinical trials; problems in sampling and surveys. Mr. Franti, Mr. Wiggins

111. Animal Hygiene. (3) III.

Lecture—3 hours. Prerequisite: Biology 1 or consent of instructor. The causes, prevention, and control of animal diseases important in economic agriculture and in public health, with emphasis upon animal management factors in disease. Mr. Adler

140. Principles of Epidemiology. (2) II.

Lecture—1 hour; case study—2 hours. Prerequisite: sophomore standing in the School of Veterinary Medicine or consent of instructor. Introduction to medical ecology with special consideration given to modes of disease transmission and to interrelationships between those host, agent, and environmental factors which are responsible for the distributional patterns of diseases in space and time. Mr. Schwabe

150. Food-borne Infections and Intoxications. (4) II.

Lecture—4 hours. Prerequisite: Bacteriology 2. Prevalence and characteristics of those diseases of man which are derived from food or food sources; access of disease agents to and distribution in food and food sources; exposure of man to those agents; prevention of food-borne diseases. Messrs. Genigeorgis, Lee, Riemann, York

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

The Staff (Chairman in charge)

Graduate Courses

201. Diseases of Laboratory Animals. (3) II.

Lecture—3 hours. Prerequisite: senior stand-

ing in veterinary medicine or consent of instructor. A study of infectious and noninfectious diseases of laboratory animals, including diagnostic procedures and treatment. Mr. Edward

Mr. Harlow

205. Physiological and Ecological Bases of Parasitism. (3) III.

Lecture—two 1½-hour lectures per week. Prerequisite: general parasitology and introductory biochemistry or consent of instructor. The physiological adaptations of protozoa and helminths for parasitism with consideration given to those host factors which influence the establishment of host-parasite associations. Offered in even-numbered years. Mr. Harlow

208. Avian Medicine. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: junior standing in the School of Veterinary Medicine or consent of instructor. Etiology, pathology, diagnosis, epidemiology, prevention and control of diseases of poultry, including those important to public health. Demonstration and discussion of selected diseases: necropsy, diagnosis, and prevention.

Messrs. Raggi (in charge),
Adler, Bankowski, Yamamoto

210. Advanced Epidemiology. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: a doctoral degree (or equivalent) in veterinary medicine, human medicine, or dental medicine, or consent of instructor. Methods for the study of diseases in populations both of lower animals and of man, with critical discussions of illustrative case examples of "classical" and contemporary epidemiological research.

Miss Goggin, Mr. Riemann, Mr. Schwabe

212. Epidemiology of the Zoonoses. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 210 or consent of instructor. The epidemiological features of infections and infestations shared by man and other animals with particular attention to those perpetuated in nature by wildlife and those which are of greater public health and economic significance.

Mr. Cooper

214. Comparative Epidemiology of Noninfectious Diseases. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 210 or consent of instructor. Study of the environmental and host factors which are associated with the occurrence of diseases of noninfectious or unknown etiology. Emphasis will be placed on the comparison of the epidemiologic features of these diseases in man and lower animals. Miss Goggin

216. Mass Screening for Diseases in Populations. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 210 or consent of instructor; Veterinary Microbiology 270 recommended.

Consideration of immunodiagnostic, biochemical, and other techniques for mass screening of human and animal populations for abnormalities and disease; evaluation of their usefulness to study incidence and/or prevalence of such conditions and for application in programs of prevention and control. Mr. Yamamoto, Mr. Adler

218. Disease Control and Eradication. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 216 or consent of instructor. Studies of various approaches used to control diseases in lower animals and man. Discussions will be concerned with past successes and failures and emphasis placed on future prospects and limitations of these methods. Mr. Bankowski

240. Public Health. (3) III.

Lecture—3 hours. Prerequisite: junior standing in the School of Veterinary Medicine or consent of instructor. Introduction to public health and to the responsibilities of the veterinarian; consideration of the roles of lower animals in the causation and perpetuation of human diseases; consideration of occupational health hazards associated with the practice of veterinary medicine. —, Mr. Cooper

250. Veterinary Food Hygiene. (2) III.

Lecture—1 hour; discussion—1 hour. Prerequisite: Junior standing in the School of Veterinary Medicine or consent of instructor. Discussion of public health importance of diseases transmitted to man through meat, poultry, and

FOOD SCIENCE AND TECHNOLOGY

Major Advisers.—See *Schedule and Directory* listing.

Major Program and Graduate Study.—See pages 62, 65, and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses

1. Introduction to Food Science. (3) I, III.

Lecture—3 hours. Open to nonmajors. Development and maintenance of an adequate food supply; food quality and its measurement; scientific and technological aspects of converting raw animal and plant products into a large variety of processed and preserved foods; maintenance and improvement of the acceptability and nutritional value of foods.

Messrs. Amerine, Stewart, Schweigert

49. Processing Plant Studies. (1) I.

Prerequisite: course 1. Field trips to observe processing, distribution, quality control and regulatory control of foods and related materials.

Mr. Leonard

milk; the means and likelihood of preventing their transmission; and the role and responsibility of the veterinary practitioner in preventing human illness from this cause.

Messrs. Sadler, Riemann, Genigeorgis

252. Principles and Practice of Meat and Milk Hygiene. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: senior standing in the veterinary curriculum or consent of instructor. Principles and practice of inspection and sanitary control of meat of mammalian origin and of milk.

Mr. Sadler, Mr. Genigeorgis

254. Public Health Aspects of Meat and Meat Products Technology. (2) III.

Lecture—2 hours. Prerequisite: consent of instructor. Study of the influence of techniques and procedures for processing meats and meat products upon their wholesomeness as food.

Mr. Riemann, Mr. Genigeorgis

290. Seminar in Epidemiology and Preventive Medicine. (1) I, II, III.

Seminar—2 hours. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

299. Research. (1-9) I, II, III.

The Staff (Chairman in charge)

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Schweigert in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

The Staff (Mr. Schweigert in charge)

Upper Division Courses

101. Biochemistry and Food Science. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101B. Topics on enzymes, proteins, lipids and vitamins. Biochemical principles related to food composition, preservation and processing.

Mr. Tappel

102. Malting and Brewing Technology. (3) I.

Lecture—3 hours; field trips and pilot-scale brewing by arrangement. Prerequisite: Biochemistry 101A. The technology of the malting, brewing, and fermentation processes is integrated with the chemistry, biochemistry, and microbiology that determines industrial practices and product quality.

Mr. Lewis

103. Physical and Chemical Methods for Food Analysis. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biochemistry 101B; Chemistry 5;

Chemistry 8B (may be taken concurrently). Theory and application of physical and chemical methods for analyzing foods.

Mr. Whitaker, Mr. Bernhard

104A. Food and Industrial Microbiology. (2) I.

Lecture—2 hours. Prerequisite: Bacteriology 2; Chemistry 8B. Taxonomy, physiology, ecology, and control of microorganisms important in manufacturing and ripening foods, producing defects, and spoilage; disposing of wastes and protecting public health; bacteriophage action and control.

Mr. Collins

104B. Food and Industrial Microbiology. (2) II.

Lecture—2 hours. Prerequisite: course 104A. Continuation of course 104A with emphasis on destruction of microorganisms, and food-borne infections and intoxications.

Mr. Collins

105A–105B. Food and Industrial Microbiology Laboratory. (2-2) I-II.

Laboratory—6 hours. Prerequisite: courses 104A–104B (should be taken concurrently); Bacteriology 2; Chemistry 8B. Laboratory procedures selected to follow subject matter sequence of course 104A–104B.

Mr. Crisan, Mr. Vaughn

106. Industrial Fermentations. (3) I.

Lecture—3 hours. Prerequisite: Bacteriology 2. Microorganisms and their activity in relation to industrial processes such as baking, brewing, and the production of industrial solvents, vitamins, enzymes, drugs, and other chemicals. For laboratory experience in this field, students may register in course 106L.

Messrs. Lewis, Phaff, Kunkee

106L. Food and Industrial Microbiology Laboratory. (3) (Summer).

Laboratory—90 hours total. Prerequisite: a course in industrial fermentation. Microorganisms and their activities in relation to industrial processes such as baking; brewing; production of industrial alcohol, yeasts, solvents, vitamins, enzymes, antibiotics, and other drugs.

Mr. Lewis

107A. Analysis of Variance as Applied to Sensory Evaluation Problems. (1) II.

Lecture, discussion and laboratory—2 hours. Prerequisite: Mathematics 13 or its equivalent. Intensive review of hypothesis testing and the analysis of variance.

Mrs. Pangborn

107B. Principles of Sensory Evaluation of Foods. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 107A or the ability to use analysis of variance. Nature of sensory response with emphasis on taste and smell as related to

foods; design and methodology of small panel and consumer panel testing; and application of appropriate mathematical procedures.

Mr. Amerine, Mrs. Pangborn

108A. Food Plant Sanitation. (2) I.

Lecture—2 hours. Prerequisite: Chemistry 1A. Principles of water conditioning and water treatment, chemical sanitizing agents, metallic corrosion, fundamental concepts in the disposal of wastes, and discussion of other factors relating to food plant sanitation.

Mr. Jennings

108B. Food Plant Sanitation. (2) II.

Lecture—2 hours. Prerequisite: Chemistry 8B. Principles of hard-surface detergency; detergent classification and formulations, soil and substrate considerations, energy relationships in detergency, and theories and mechanisms of detergency.

Mr. Jennings

110A. Engineering Principles of Food Processing. (3) I.

Lecture—3 hours. Prerequisite: Mathematics 16C; Physics 2B, 3B. Application of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, and heat transfer.

Mr. Merson

110B. Engineering Principles of Food Processing. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110A. Introduction to process principles, including counter-current operation and equilibrium stage processing. Treatment of heat exchanger, evaporation, and refrigeration unit operations. Field trips to processing plants.

Messrs. Merson, Harper, Guymon

110C. Engineering Principles of Food Processing. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110B. Principles of psychrometry and the unit operations of dehydration and distillation; process control and economic considerations. Field trips to selected processing plants.

Messrs. Merson, Harper, Guymon

111A. Preservation Technology. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Bacteriology 2; Chemistry 8B. Technology of the preservation of foods by pasteurization, sterilization, and radiation. Laboratories and field trips.

Mr. Dunkley, Mr. Leonard

111B. Preservation Technology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 111A. Technology of the preservation of foods by concentration, drying, refrigeration, freezing, fermentation and chemical additives. Laboratories and field trips.

Mr. Miller, Mr. Nickerson

113. Structure of Food Materials. (3) I.

Lecture—2 hours; laboratory—3 hours. Anatomical features and structural properties of foods; histochemical tests of food tissues; rheological characteristics; food texture.

Mr. Sterling

119. Principles of Dairy Processing. (3) III.

Lecture—3 hours. Prerequisite: Bacteriology 2; Chemistry 8B. Technical principles related to the commercial processing of milk and its products including ice cream, butter and cheese; theory and practical applications.

Mr. Nickerson, Mr. Dunkley

122. An Introduction to Enzymology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biochemistry 101B. Principles of purification, physicochemical and enzymatic properties, and utilization with emphasis on enzymes which are used, or have potential use, in the food and beverage industries.

Mr. Whitaker

125. Metals and Metal Complexes in Foods. (4) II.

Lecture—4 hours. Prerequisite: Biochemistry 101B; Chemistry 109B. Structure, reactions, and physical properties of metal complexes, particularly those of importance to food science. The biochemistry of metal ions in foods.

Mr. Gruenwedel

130. Chemistry of Milk and Dairy Products. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101A. The chemistry of milk constituents; physical and chemical properties of milk; and the changes that occur during the processing and storage of dairy products. with emphasis on quality.

Mr. Nickerson, Mr. Smith

131. Packaging Processed Foods. (3) III.

Lecture—3 hours. Prerequisite: course 1; open to nonmajors. Technical aspects of packaging processed foods. Definitions and functions of packages for food. Packaging materials and properties. Public health problems associated with packaging. Food-packaging interactions for major commodities and their control. Design criteria, construction technology and performance testing of food packages.

Mr. Stewart

190. Recent Advances in Food Technology. (1) I.

Lecture—1 hour. Prerequisite: two courses in Food Science and Technology. Assigned topics, reports, and discussions concerning recent advances in food technology.

Mr. Schweigert

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Schweigert in charge)

* Not to be given, 1971-72.

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Schweigert in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Schweigert in charge)

Graduate Courses***210A. Proteins: Functional Activities and Interactions. (3) II.**

Lecture—3 hours. Prerequisite: Biochemistry 101B. The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products.

Mr. Feeney

***210B. Proteins. Functional Activities and Interactions. (2) III.**

Lecture—2 hours. Prerequisite: course 210A or Biochemistry 201A or equivalent. Chemical approaches for studying proteins; chemical modifications of the structures and functions of proteins.

Mr. Feeney

211. Chemistry of the Food Lipids. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101A. Chemical constitution, molecular structure, and stereo chemistry of the fats, phospholipids, and related compounds. Methods of isolation, characterization, and synthesis. Relation of molecular structure to physical properties.

Mr. Smith

213. Macromolecular Gels. (2) I.

Lecture—2 hours. Prerequisite: Biochemistry 101A. Structural interrelationship of water with typical biological polymers in gels; xerogels; gel properties and methods of study.

Mr. Sterling

220. The Natural Coloring Matters. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: 3 units of biochemistry or plant biochemistry; 3 units of upper division organic chemistry. Chemistry of natural pigments and related compounds; spectrophotometric and chromatographic techniques; special emphasis on pigments in relation to foods.

***230. Principles of Comparative Biochemistry. (3) I.**

Lecture—3 hours. Prerequisite: Biochemistry 201C or consent of instructor. An advanced treatment of comparative biochemistry. Comparisons of living systems, their structures and functions on a molecular basis, biochemical unity and diversity; protein structures and organized enzyme systems. Comparison of biochemical processes related to photobiology, metabolism and excretion. Offered in odd-numbered years. (Same course as Biological Chemistry 230.)

Mr. Benisek, Mr. Feeney

250A-250B. Isolation and Characterization of Trace Volatiles. (2) I, II.

Lecture—2 hours. Prerequisite: consent of instructor. Preparation of volatile concentrates suitable for gas chromatographic separations; influence of the design and type of chromatograph on the efficiency of separation; techniques of trapping and reinjecting chromatographic fractions; and spectrometric characterization of the separated compounds. Mr. Jennings

251A-251B. Isolation and Identification of Trace Volatiles. (1) I, II.

Laboratory—3 hours. Prerequisite: course 250A-250B must be taken concurrently. Preparation of volatile concentrates for gas chromatographic separations; construction of gas chromatographic columns and determination of their efficiencies; trapping techniques; infrared and mass spectrometric characterization of isolated compounds. Mr. Jennings

FOODS

Major Advisers.—See *Schedule and Directory* listing under *Consumer Food Science*.

Major Program and Graduate Study.—See pages 62, 65, and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses

20. Food Habits and Culture. (3) II.

Lecture—3 hours. Prerequisite: sophomore standing or above. Cultural, geographical, socioeconomical, religious, and psychological influences on development and maintenance of food habits. Attention is given to past and present subcultural groups in the United States and other countries, with emphasis on the role of food within the total pattern of living of the social units. Mrs. Pangborn

47. Food Product Development Field Study. (1) III.

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. (Passed/Not Passed grading only.) Mr. Schutz

98. Directed Group Study for Lower Division Students. (1-5) I, II, III.

The Staff (Chairman in charge)

99. Special Study for Undergraduate Students. (1-5) I, II, III.

The Staff (Chairman in charge)

290. Seminar. (1) I, II, III.

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.) Mr. Mazelis

291. Current Research Literature. (1) I, II, III.

Seminar—1 hour. Prerequisite: graduate standing. Critical reading, evaluation, and presentation of papers from the literature as well as results of own research with emphasis on those dealing with all aspects of proteins, enzymes and nucleic acids.

The Staff (Mr. Schweigert in charge)

298. Group Study. (1-5) I, II, III.

Directed study on food chemistry, food microbiology, food processing or sensory evaluation.

The Staff (Mr. Schweigert in charge)

299. Research. (1-12) I, II, III.

Prerequisite: graduate standing.

The Staff (Mr. Schweigert in charge)

Upper Division Courses

100A. Principles of Food Composition and Preparation. (3) I.

Lecture—3 hours. Prerequisite: Chemistry 8B; one course in physics; Bacteriology 2 (may be taken concurrently). Science, sensory aspects and aesthetics of food preparation with emphasis on the chemical and physical properties of food products. Characteristics and functions of colloids, carbohydrates, lipids, and proteins in food combinations. Mr. Russell

100B. Principles of Food Composition and Preparation. (3) II.

Lecture—3 hours. Prerequisite: course 100A. Chemical, physical, microbiological, and sensory aspects relating to food. Edible plant tissues, protein foods, pigments, food preservation, packaging and marketing, food regulatory agencies, science and aesthetics of food combinations, food habits, world food problems.

Mr. Russell

101A. Principles of Food Composition and Preparation Laboratory. (1) I.

Laboratory—3 hours. Prerequisite: course 100A, should be taken concurrently. Studies of the chemical, physical and sensory properties of foods. Characteristics and functions of basic constituents and of food systems—solutions, colloidal dispersions, gel structures, emulsions and foams. Mrs. Bruhn

101B. Principles of Food Composition and Preparation Laboratory. (2) II.

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 100B, should be taken concurrently. Studies of the chemical, physical,

microbiological and sensory aspects relating to foods. Plant, meat and flour systems, science and aesthetics of food combinations. Mrs. Bruhn

134A-134B. Advanced Food Studies. (2-2) I, II.

Lecture—2 hours. Prerequisite: course 100B or an upper division course in food science and technology. Physical and psychological factors influencing food attitudes and consumption. Product development from the aspect of marketing, consumer needs, food regulations and research and development. Role of foods-trained individuals in applied research and development activities. Impact and problems related to food services.

Mr. Schutz

***135A-135B. Advanced Food Studies Laboratory.**

(2-2) I, II.

Laboratory—6 hours. Prerequisite: course 134A-134B (may be taken concurrently) or consent of instructor. Laboratory methods and theories employed to study changes occurring in foods during consumer usage.

The Staff (Mr. Schutz in charge)

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to honors students of senior standing. Independent study of selected

topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Miss Morris in charge)

197. Introduction to Research in Foods. (4) III.

Lecture—1 hour; laboratory—9 hours. Prerequisite: majors of senior standing. Senior thesis on independent problems.

Mr. Russell in charge

198. Directed Group Study. (1-5) I, II, III.

The Staff (Miss Morris in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Miss Morris in charge)

Graduate Courses

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff (Miss Morris in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Miss Morris in charge)

299. Research. (1-12) I, II, III.

The Staff (Miss Morris in charge)

FOREIGN LITERATURE IN TRANSLATION

The following courses are open to students throughout the campus. The readings are in English. Refer to departmental listing for descriptions of courses.

Classics

***139B. Greek Literature in Translation.**

***141. Greek and Roman Comedy.**

Dramatic Art

20. Introduction to Dramatic Art.

158A, 158B. World Drama.

159. Contemporary Drama.

English

170A. The Epic.

170B. European Influences on the English and American Novel.

171. English Bible as Literature.

185. Intercultural Literary Colloquium.

French

***39A. French Literature in English Translation: to the End of the Eighteenth Century.**

***39B. French Literature in English Translation: to the Nineteenth Century.**

39C. French Literature in English Translation: the Contemporary Period.

141. Gide and Proust.

142. French Novel from Malraux to the Nouveau Roman.

150. Masterpieces of French Literature.

***151. The French Novel.**

German

15. The Development of German Literature.

110. Masterpieces of German Prose from Goethe to Kafka.

111. Masterpieces of German Drama from Lessing to Brecht.

112. Masterpieces of German Poetry from Walther von der Vogelweide to Rilke.

114. Goethe's Faust.

115. German Literature of the Twentieth Century up to the Second World War.

* Not to be given, 1971-72.

116. German Literature of the Twentieth Century since the Second World War.

117. Kafka and Dada.

118. Brecht.

185. Intercultural Literary Colloquium.

Oriental Languages

35A-35B. Great Books of Eastern Asia.

132A-132B. History of Japanese Literature.

Russian

30. Great Russian Writers.

40. Survey of Russian Literature to 1800.

FRENCH

Max Bach, Ph.D., *Chairman of the Department*

Department Office, 515 Sproul Hall

Professors:

Max Bach, Ph.D.

Nicole A. D. Marzac, Docteur ès Lettres
Vitor de A. Ramos,
Docteur ès Lettres

Associate Professor:

Marshall Lindsay, Ph.D.

Assistant Professors:

Edward M. Bloomberg, Ph.D.

Gerald Herman, Ph.D.

Jurate Izokaitis, Ph.D.

George H. Keith, Ph.D.

Ruth B. York, Ph.D.

Emily Zants, Ph.D.

◇ ◇ ◇

Associate Professor:

Jean Marc Blanchard, Agrégé de Lettres
(Visiting)

Lecturer:

Margo R. Kaufman, M.A.

Assistant Professor:

Manfred Kusch, M.A. (Acting)

The Major Program

Lower Division Courses.—Required: French 1, 2, 3, 4, and 6 or their equivalents; French 30A, 30B. Recommended: courses 109A, 109B, and 109C; one year of college Latin or the equivalent.

Upper Division Courses.—Required: at least 36 units including one quarter of course 110, one of the following: 130, 131, 132, and a separate course in each of the following periods: sixteenth century, seventeenth century, eighteenth century, nineteenth century. Recommended: Classics 40, 41.

41. Survey of Russian Literature: Nineteenth Century.

42. Survey of Russian Literature: Twentieth Century.

121. The Nineteenth-Century Russian Novel.

123. The Twentieth-Century Russian Novel.

128. Modern Russian Poets.

140. Dostoevsky.

141. Tolstoy.

185. Intercultural Literary Colloquium.

Spanish

150. Masterpieces of Spanish Literature.

Courses 107A, 107B, 160 and either course 104 or 105 are required for the General Secondary Teaching Credential in French.

Honors and Honors Programs (see page 149). The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

Graduate Study.—The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in French. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of French and Italian.

Teaching Minor.—A minimum of 30 units in French including courses 30A, 30B, 104, 105, and 107A-107B. Recommended: courses 109A, 109B, 109C.

Lower Division Courses

A course may not ordinarily be taken for credit if it is a prerequisite to a course already completed. Students offering high school language preparation as a prerequisite must take a placement test.

Course Placement.—Students with two years of high school French normally take French 2, those with three years take French 3 and those with four years take French 4.

1. Elementary French. (4) I, II, III.

Discussion—5 hours.

The Staff

*1G. French for Graduate Students. (No Credit) III.

Recitation—3 hours. A course designed to prepare students for the graduate reading examination.

Mr. Herman

* Not to be given, 1971-72.

***1R. Elementary French—Reading. (4) I.**

Lecture—3 hours; laboratory—1 hour. Elementary French with emphasis on reading.

The Staff

2. Elementary French. (4) I, II, III.

Discussion—5 hours. Prerequisite: course 1 or equivalent. A continuation of course 1.

The Staff

***2R. Elementary French—Reading. (4) II.**

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 1R or equivalent. Elementary French with emphasis on reading.

The Staff

3. Elementary French. (4) I, II, III.

Discussion—5 hours. Prerequisite: course 2 or equivalent. A continuation of course 2.

The Staff

***3R. Elementary French—Reading. (4) III.**

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 2R or equivalent. Elementary French with emphasis on reading.

The Staff

4. Intermediate French. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 3 or equivalent.

The Staff

***4R. Intermediate French—Reading. (4) I, II.**

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 3R or equivalent. This variant of course 4 places greater emphasis on reading than the regular course.

The Staff

4X. Intermediate French—Intensive. (6) I.

Lecture—5 hours. Prerequisite: course 3. Intensive course combining present courses 4 and 5.

The Staff

5. Intermediate French. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 4 or equivalent. Continuation of course 4.

The Staff

***5R. Intermediate French—Reading. (4) II.**

Laboratory—2 hours; recitation—4 hours. Prerequisite: course 4R or equivalent. This variant of course 5 places greater emphasis on reading than the regular course.

The Staff

6. Reading and Conversation. (4) I, II, III.

Recitation—4 hours. Prerequisite: course 5 or equivalent. Class discussion; reading of selected works; oral reports; analysis of texts.

The Staff

30A. Grammar, Composition, and Conversation.**(4) I, II, III.**

Lecture—3 hours. Prerequisite: course 6.

The Staff

30B. Grammar, Composition, and Conversation.**(4) I, II, III.**

Lecture—3 hours. Prerequisite: course 30A.

The Staff

• Not to be given, 1971-72.

***39A. French Literature in English Translation: to the End of the Eighteenth Century. (4) II.**

Lecture—3 hours. An introduction to French literature for non-French majors. Knowledge of French not required.

Miss Zants

39B. French Literature in English Translation: the Nineteenth Century. (4) II.

Lecture—3 hours. An introduction to French literature for non-French majors. Knowledge of French not required.

Miss Zants

39C. French Literature in English Translation: the Contemporary Period. (4) I.

Lecture—3 hours. An introduction to French literature for non-French majors. Knowledge of French not required.

Miss Zants

Upper Division Courses**104. Advanced Grammar and Composition. (3) I.**

Lecture—3 hours; weekly essays. Prerequisite: course 30B.

Mr. Bach

105. Advanced Grammar and Composition. (3) II.

Lecture—3 hours; weekly essays. Prerequisite: course 104.

Mr. Bach

107A. Survey of French Culture and Institutions.**(4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6. From the origins of French civilization through the Renaissance.

Mrs. Kaufman

107B. Survey of French Culture and Institutions.**(4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6. From the seventeenth century to the present.

Mrs. Kaufman

***109A. Survey of French Literature: Middle Ages and Renaissance. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6. Readings from major works; discussion of literary history and theory.

Mr. Keith

***109B. Survey of French Literature from 1600 to 1800. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6. Readings from major works; discussion of literary history and theory.

109C. Survey of French Literature from 1800 to the Present. (4) I.

Lecture—3 hours; term paper. Prerequisite: course 6. Readings from major works; discussion of literary history and criticism.

Miss York

110. Advanced Composition and Translation.**(2) III.**

Lecture—2 hours. Prerequisite: course 30B. This course may be repeated for credit.

The Staff

115A. Medieval Literature: Epic and Romance.

(4) II.

Lecture—3 hours; term paper. Prerequisite: course 6. *La Chanson de Roland, Tristan et Iseut*, and selected works of Chrétien de Troyes.

Mr. Herman

***115B. Medieval Literature: Poetry, Drama and Satire. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6. "Chansonniers" *Roman de la Rose, Fabliaux, Renart, Villon.*

Mr. Herman

116A. Literature of the Sixteenth Century. (4) II.

Lecture—3 hours; term paper. Prerequisite: course 6. A study of the lyric poetry of the sixteenth century from Marot to d'Aubigné, with emphasis on the Pléiade.

Mrs. Marzac

116B. Literature of the Sixteenth Century. (4) I.

Lecture—3 hours; term paper. Prerequisite: course 6. Rabelais and Montaigne. A critical study of the works in relationship to the period.

Mrs. Marzac

117A. Theater of the Seventeenth Century. (4) I.

Lecture—3 hours; term paper. Prerequisite: course 6.

Mr. Bloomberg

117B. Moralists of the Seventeenth Century. (4) II.

Lecture—3 hours; term paper. Prerequisite: course 6.

Mr. Ramos

117C. Poetry and the Novel in the Seventeenth Century. (4) III.

Lecture—3 hours; term paper. Prerequisite: course 6.

Miss Izokaitis

118A. Les Philosophes. (4) I.

Lecture—3 hours; term paper. Prerequisite: course 6. Readings from Montesquieu, Voltaire, Diderot, Rousseau and the Encyclopédie.

Miss Zants

***118B. The Novel in the Eighteenth Century. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6. Novels of Lesage, Prévost, Diderot, Rousseau, Laclos, Sade.

Miss Zants

***118C. The Theater in the Eighteenth Century. (4) I.**

Lecture—3 hours; term paper. Prerequisite: course 6. Plays of Marivaux and Beaumarchais.

Mr. Ramos

119A. The Nineteenth Century. (4) II.

Lecture—3 hours; term paper. Prerequisite: course 6. Romanticism in the drama and novel.

Mr. Blanchard

119B. The Nineteenth Century. (4) III.

Lecture—3 hours; term paper. Prerequisite: course 6. Realism and naturalism: Balzac, Flaubert, Maupassant, Zola.

Miss Zants

***119C. The Nineteenth Century. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6. Symbolism: the poetry and poetics of Baudelaire, Mallarmé, Verlaine, Rimbaud, Corbière, Laforgue, and Lautréamont. Mr. Lindsay

***120A. Twentieth Century Drama. (4) II.**

Lecture—3 hours. Prerequisite: course 6. Representative plays from Jarry to Giraudoux.

Miss York

***120B. Twentieth Century Drama. (4) III.**

Lecture—3 hours. Prerequisite: course 6. Representative plays from Anouilh to Ionesco.

Miss York

130. Critical Reading of Poetry. (4) I.

Lecture—3 hours. Prerequisite: course 6 or its equivalent. Analysis and evaluation of works representing main types of French poetry. Study of poetic conventions and versification.

Mr. Lindsay

***131. Critical Reading of Fiction. (4) II.**

Lecture—3 hours. Prerequisite: course 6 or its equivalent. Analysis and evaluation of short stories and novels representing the main types of French fiction, with emphasis on narrative structure and techniques.

Miss Zants

132. Critical Reading of Drama. (4) III.

Lecture—3 hours. Prerequisite: course 6 or its equivalent. Analysis and evaluation of plays representing main types of French drama, with emphasis on dramatic structure and techniques.

Miss York

***138A. French Poetry from the Pre-Romantics to Baudelaire. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6 or equivalent. Offered in even-numbered years.

Miss Izokaitis

***138B. French Poetry from Baudelaire to the Surrealists. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6 or equivalent. Offered in even-numbered years.

Miss Izokaitis

140. Study of a Major Writer. (4) III.

Lecture—3 hours; term paper. Prerequisite: course 6. May be repeated for credit with consent of instructor.

Miss York

***141. Gide and Proust. (4) I.**

Lecture—3 hours; term paper. Prerequisite: course 6 for those reading in French. Lectures and discussion in English; reading in French or English.

Mr. Lindsay

***142. French Novel from Malraux to the Nouveau Roman. (4) II.**

Lecture—3 hours; term paper. Reading in French and English.

Mr. Lindsay

* Not to be given, 1971-72.

***145. Reading of Philosophical Texts. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6. Style and content of representative texts from the Renaissance to the present.

Mr. Bloomberg

150. Masterpieces of French Literature. (4) II.

Lecture—3 hours; term paper. Prerequisite: English 1. Reading, lectures, and discussion in English. May not be counted as part of the major in French. Offered in even-numbered years.

Mr. Lindsay

151. The French Novel. (4) I.

Lecture—3 hours; term paper. Reading, lectures, and discussion in English. May not be counted as part of major in French. Mr. Lindsay

160. Structure of the French Language. (4) II.

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. Linguistic analysis of modern French.

Mr. Keith

194H. Special Study for Honors Students.

(5) I, II, III.

Prerequisite: open only to honors students. Guided research leading to an honors paper.

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Chairman in charge)

Graduate Courses***200. Seminar in French Linguistics. (4) III.**

Seminar—3 hours. Prerequisite: graduate standing and consent of instructor. Study of substrata influences, dialect geography, homonymic conflict, jargons and argots, French contributions to linguistic theory.

Mr. Keith

201A. History of the French Language. (4) I.

Seminar—3 hours.

Mr. Keith

201B. History of the French Language. (4) II.

Seminar—3 hours. Prerequisite: course 201A.

Mr. Keith

202. Medieval French Literature. (4) II.

Seminar—3 hours. May be repeated for credit with consent of instructor.

Mr. Herman

203. Reading of Old French Texts. (4) III.

Seminar—3 hours. Prerequisite: course 201A-201B or equivalent.

Mr. Keith

204. Sixteenth-Century French Literature.

(4) II, III.

Seminar—3 hours. May be repeated for credit with consent of instructor.

Mrs. Marzac

* Not to be given, 1971-1972.

206. Seventeenth-Century French Literature.

(4) I, II, III.

Seminar—3 hours. May be repeated for credit with consent of instructor.

Messrs. Bloomberg, Ramos

208. Eighteenth-Century French Literature.

(4) I, II, III.

Seminar—3 hours. May be repeated for credit with consent of instructor.

Mr. Blanchard

215. Nineteenth-Century French Literature.

(4) II.

Seminar—3 hours. May be repeated for credit with consent of instructor.

Miss Izokaitis

220. Twentieth-Century French Literature.

(4) II, III.

Seminar—3 hours. May be repeated for credit with consent of instructor.

Miss Zants, Mr. Lindsay

***225. Problems in French Criticism. (4-4) II-III.**

Seminar—3-3 hours. Selected topics in criticism for intensive investigation. May be repeated for credit with consent of instructor. (Deferred grading only, pending completion of the sequence.)

Mr. Lindsay

***230. Old Provençal. (4) III.**

Seminar—3 hours. Prerequisite: courses 201A, 201B or equivalent. An introduction to Old Provençal phonology and morphology, with reading and interpretation of texts.

Mr. Keith

235. Explication de Textes. (4) III.

Seminar — 3 hours. Prerequisite: graduate standing in French. Theory of the *explication de textes* method and exercises according to this method.

Mr. Bloomberg

297. Individual Research. (1-5) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff

298. Group Study. (1-4) I, II, III.

Seminar—1-3 hours. May be repeated for credit with consent of instructor.

The Staff (Chairman in charge)

299. Research. (2-5) I, II, III.

The Staff (Chairman in charge)

299D. Individual Study. (1-6) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

Professional Course**300. Teaching of a Modern Foreign Language.**

(3) III.

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

Mrs. Kaufman

GENETICS

Major Advisers.—See *Schedule and Directory* listing.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrah Hall.

Two undergraduate majors in Genetics are offered: Bachelor of Science (Genetics), College of Letters and Science; and Bachelor of Science (Agricultural Genetics), College of Agricultural and Environmental Sciences. These majors are designed to provide a broad background in the biological, mathematical and physical sciences basic to the study of heredity and evolution. The Agricultural Genetics major provides opportunity for greater emphasis in applied genetics. Either major is suitable for students who plan graduate work in biology.

The Major Program (College of Agricultural and Environmental Sciences). See page 65.

The Major Program (Letters and Science)

Lower Division Courses.—Required: 18 units in one language begun in high school or 12 units in one language begun in college; Bacteriology 2; Biology 1; Botany 2; Chemistry 1A-1B-1C, 8A-8B; Mathematics 13; Mathematics 15, 16A-16B or 16A-16B-16C or 21A-21B-21C; Physics 2A-2B-2C; Zoology 2.

Upper Division Courses.—Required: Biochemistry 101A-101B or Mathematics 105A-105B (both sequences recommended); Genetics 100A-100B, 100L; one course in animal, microbial or plant physiology; three courses from the following group: Genetics 101, 102, 103, 104, 105; 28 additional upper division units in biological sciences.

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 graduate study in genetics, write the Chairman of the Genetics Graduate Group, Department of Genetics. (Also see page 171.)

Lower Division Course

10. Heredity and Evolution. (4) I, II.

Lecture—3 hours; discussion—1 hour. The general principles of the laws of heredity and evolution for students not specializing in biology. No credit to students who have had or are taking upper division genetics courses.

I. Mr. Stebbins, II. Mr. Gottlieb

Upper Division Courses

100A. Principles of Genetics. (3) I, II.

Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in biology, botany, microbiology, or zoology; not open for credit to students who have received credit for course

115. Introduction to genetics with some consideration of its applications in agriculture and biology.
I. Mr. Shleser; II. Mr. Edlin

100B. Principles of Genetics. (3) II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A; Mathematics 13 or equivalent recommended. Continuation of course 100A.
II. Mr. Ayala; III. Mr. Hansche

100L. Principles of Genetics Laboratory. (1) II, III.

Laboratory—3 hours. Prerequisite: course 100A. Laboratory work in basic genetics to supplement courses 100A, 100B, and 115.

Mr. Green

101. Cytogenetics. (3) III.

Lecture—3 hours. Prerequisite: course 100B or 115. Gross and fine structure of chromosomes and associated cell organelles; chromosome reproduction; behavior of chromosomes as related to genetics and evolution in polyploids, aneuploids, and structural heterozygotes.

Mr. Snow, Mr. Rick

101L. Cytogenetics Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 101 (may be taken concurrently). Laboratory study of chromosome structure and behavior.

Mr. Snow, Mr. Rick

102. Molecular and Biochemical Genetics. (3) I.

Lecture—3 hours. Prerequisite: course 100A, Biochemistry 101B. Study of gene structure, mutation and the biochemical basis of gene function.

Mr. Edlin

103. Organic Evolution. (3) III.

Lecture—3 hours. Prerequisite: course 100B or 115. Evolutionary processes in higher organisms.

Mr. Stebbins

104. Developmental Genetics. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B or 115; Biochemistry 101B. The action of genes in development at the levels of the enzyme molecule, cellular organelle, tissue and organ, with examples from microorganisms, plants, and animals. Mr. Boyd

105. Population Genetics. (3) I.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 100B or 115; Mathematics 13, 16B recommended. An introductory course in the analysis and interpretation of quantitative genetic systems.

Mr. Allard

107. Animal Breeding and Genetics. (3) I.

Lecture—3 hours. Prerequisite: course 100B; Mathematics 13. Qualitative and quantitative inheritance in relation to animal breeding; review of selection and breeding experiments with reference to livestock and poultry improvement.

Mr. Gall, Mr. Laben

107A. Mammalian Genetics Laboratory. (1) I.

Laboratory—3 hours. Prerequisite: course 100B or 115; Mathematics 13 recommended. Experiments in qualitative and quantitative genetics using the laboratory mouse. Segregation; linkage; evaluation of effects of inbreeding, selection and maternal influence on different kinds of traits. Mr. Bradford

107B. Animal Breeding Laboratory. (2) II.

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 107. Laboratory exercises in quantitative genetics using computer generated herd records. Selection progeny testing, and inbreeding experiments with statistical analyses using collected data. Evaluation of environmental effects. Mr. Gall

107C. Discussion of Animal Breeding Experiments and Methods. (1) III.

Discussion—1 hour. Prerequisite: course 107. Review of literature and discussion relating to animal breeding experiments and programs. Emphasis on cattle, sheep and swine. Mr. Rollins

107D. Discussion of Poultry Breeding Experiments and Methods. (1) II.

Discussion—1 hour. Prerequisite: course 107. A discussion of genetic experiments and breeding plans specifically related to poultry. Mr. Abplanalp

108. Methods in Quantitative Animal Breeding. (3) II.

Lecture—3 hours. Prerequisite: course 107. Principles, methods and procedures in quantitative animal breeding; heritability, intra- and inter-population selection methods, including selection index, family, pedigree and progeny selection; genetic correlation; relationship and inbreeding. Mr. Rollins

108L. Animal Breeding Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 108 (may be taken concurrently). Estimation of herabilities, genetic correlations and repeatabilities; calculation of inbreeding and relationship co-efficients, adjustment of data for environmental effects, construction of selection indexes, estimation of selection response and hybrid vigor. Mr. Rollins

109. Developmental Genetics in Animals. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 100A, Zoology 100. Gene and gene action in vertebrates; the gene in relation to genetic background and developmental environment. Mrs. Abbott

115. Human Genetics. (5) I.

Lecture—4 hours; discussion—1 hour. Prerequisite: introductory course in zoology, botany, or biology; Mathematics 13, or equivalent; upper division standing; not open for credit to

students who have received credit in courses 100A–100B. Introduction to genetics with special emphasis on man. This course will fulfill the needs of preprofessional students and those in other areas of human biology. Mr. Green

131. Genetics of Animal Adaptation. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100B (may be taken concurrently). Genetic principles applied to natural populations; species as plastic elements subject to genetic change through environmental influences and interaction with other species; the role of adaptation in population ecology and development. (Same course as Wildlife and Fisheries Biology 131.) Mr. Gall, Mr. Laben

197T. Tutoring in Genetics. (1–5) I, II, III.

Prerequisite: upper division standing with major in genetics and consent of Department Chairman. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. The Staff (Mr. Allard in charge)

199. Special Study for Advanced Undergraduates. (1–5) I, II, III.

Prerequisite: consent of instructor based on adequate preparation of the student in allied fields. The Staff (Mr. Allard in charge)

Graduate Courses**203. Advanced Organic Evolution. (3) III.**

Lecture-discussion—2 hours; discussion or laboratory—3 hours. Prerequisite: courses 103 and 105 or consent of instructor. Analysis of evolutionary processes. Mr. Gottlieb

205. Advanced Population Genetics. (3) II.

Lecture—3 hours. Prerequisite: course 105, Mathematics 131A. Analysis of the genetic structure and evolution of populations. Offered in even-numbered years. Mr. Hansche

206. Current Topics in Genetics. (3) I, II, III.

Lecture—2 hours; laboratory or discussion—2 hours. Prerequisite: course 100B or 115, consent of instructor. Selected topics of current interest in advanced genetics. May be repeated for credit.

207. Quantitative Genetics and Animal Breeding. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 105B; Mathematics 16A recommended. The genetic theory of selection, population structure, and induced variation, and its implications in the design of animal breeding experiments. Mr. Abplanalp

291. Seminar in History of Genetics. (2) II.

Seminar—2 hours. Prerequisite: course 100B or 115. The development of modern genetic theories beginning with Mendel. (Satisfactory/Unsatisfactory grading only.) Mr. Laidlaw

292. Seminar in Gene Structure and Action. (1-3) I.

Seminar—1-3 hours. Prerequisite: course 102 or 206. Topics of current interest related to the structure of genes mutation, and the mechanism of gene action. Offered in even-numbered years. (Satisfactory/Unsatisfactory grading only.)

Mr. Shleser

293. Seminar in Cytogenetics and Evolution.

(1-3) II.

Seminar—1-3 hours. Prerequisite: course 291 (may be taken concurrently). Topics of current interest related to chromosomal changes, mutation and other genetic changes in natural populations, and the application of genetics to study of organic evolution. (Satisfactory/Unsatisfactory grading only.)

Mr. Stanford

294. Seminar in Breeding Systems. (1-3) III.

Seminar—1-3 hours. Prerequisite: course 291. Topics of current interest relating genetics to problems of animal and plant breeding. (Satisfactory/Unsatisfactory grading only.)

Mr. Qualset

298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Directed group study of special topics in genetics. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Allard in charge)

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Allard in charge)

299. Research in Animal Genetics. (1-12) I, II, III.

The Staff (Mr. Bradford in charge)

GEOGRAPHY

Howard F. Gregor, Ph.D., *Chairman of the Department*

Department Office, 280 AOB-3

Professors:

Howard F. Gregor, Ph.D.

Herbert B. Schultz, Ph.D. (*Geography and Agricultural Engineering*)

Frederick J. Simoons, Ph.D.

Kenneth Thompson, Ph.D.

Assistant Professors:

Stephen C. Jett, Ph.D.

David R. Lee, Ph.D.

David S. McArthur, Ph.D.

Roy J. Shlemon, Ph.D.

Lecturer:

◇ ◇ ◇

Karl M. Kriesel, Ph.D.

Departmental Major Advisers.—Mr. Jett, Mr. Kriesel.

Graduate Adviser: Mr. McArthur.

The Major Program

Lower Division Courses.—Required: Geography 1, 2, 3, 5; Anthropology 2.

Upper Division Courses.—Required: 36 upper division units in geography. Each program should normally include Geography 105 and 151.

Students who wish to prepare for further training or employment in the field of Urban and Regional Planning may do so by completing certain additional courses, while fulfilling the requirements for the major, in consultation with the departmental adviser.

Teaching Major.—Requirements for the teaching major are the same as for the undergraduate major for degree, with the addition of Geography 300.

Teaching Minor.—A minimum of 30 quarter units in Geography, including course 300.

Subject Representative: Mr. Lee.

Graduate Study.—The department offers programs of graduate study leading to the M.A. and Ph.D. degrees. Information concerning these programs may be obtained from the Graduate Adviser, Department of Geography.

Lower Division Courses

1. Physical Geography. (4) I, III.

Lecture—4 hours. Basic physical elements of the human habitat, especially climate, landforms, soils, and natural vegetation.

Mr. McArthur, Mr. Shlemon

2. Man in the Habitat: An Introduction to Cultural Geography. (4) I, II, III.

Lecture—4 hours. Major systems of habitat use: their characteristics, origins, spread, ecology, and environmental impact. Principal themes in cultural geography. Emphasis on the non-industrial world.

Mr. Jett, Mr. Simoons

3. Climate and Weather. (3) II.

Lecture—3 hours. Composition and structure of atmosphere, weather elements, pressure, wind, temperature, moisture, fog, and clouds; weather maps; regional climates and world climate classification; instruments for obtaining climatological data; installation and maintenance of weather stations; evaluation of recordings.

Mr. Schultz

4. Introduction to Maps. (3) I.

Lecture—3 hours. History and principles of cartography; great map-makers; national surveys; modern trends in mapping.

Mr. Lee

5. Man and Resource Development: An Introduction to Economic Geography. (4) II.

Lecture—4 hours. The principal ways in which man has developed natural and human resources to meet his needs, and their spatial and morphological expression in the economic landscape.

Mr. Gregor

7. Problems in Regional Ecology. (4) II.

Lecture—4 hours. Selected historical and contemporary ecological problems from various parts of the world. Emphasis on interaction between cultural and physical environments. Regions selected from areas of faculty specialization.

The Staff (Chairman in charge)

11. Cultural Geography of Black America. (4) II.

Lecture—4 hours. Geographic origins, dispersals, and adaptations of blacks in the New World.

98. Directed Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

99. Independent Study. (1-5) I, II, III.

The Staff (Chairman in charge)

Upper Division Courses**102. Field Course in Physical Geography. (4) III.**

Lecture and Field trip—one day per week. Prerequisite: courses 1 and 2 and consent of instructor. Research methodology and field study. Systematic mapping and analysis of elements of the natural landscape.

Mr. Shlemon

103. Field Course in Human Geography. (4) III.

Lecture and Field trip—one day per week. Prerequisite: courses 1 and 2 and consent of instructor. Research methodology and field study. Systematic mapping and analysis of elements of the cultural landscape.

Mr. Lee

***104. Field Course in Urban Geography. (4) I.**

Lecture—1 hour; four 2-day field trips. Field analysis of selected urban problems in northern California. Special attention to regional interrelationships, functional structure, and land use changes as specifically related to the core of the city, changing residential and retail patterns, and urban encroachment on agricultural lands.

105. Cartography. (4) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 4 or consent of instructor. Theory and construction of map projections; interpretation of maps; compilation and generalization of base-map data; symbolization and processing of map data; cartographic designing and lettering techniques; map reproduction.

Mr. Lee

106. Interpretation of Aerial Photographs. (4) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 1 or consent of instructor. Analysis of landscape from aerial photographs: land forms; vegetation; land use; settlements; transport and communications. Preparation of contour and planimetric maps, and construction of aerial photo mosaics.

107. Advanced Cartography. (4) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 105 and 106. Advanced cartographic representation of field and aerial photographic data.

Mr. Lee

108. Analysis of Landforms. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Origin of land forms. Review of varied interpretations of processes involved, with emphasis on recent views.

Mr. McArthur, Mr. Shlemon

110. Statistical Methods in Geographical Research. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 13 or equivalent. Principles of statistical reasoning illustrated with examples from the field of geography. A critical review of current applications of statistical methods in geographical research.

119. Arid Lands. (4) II.

Lecture—4 hours. Prerequisite: course 1 or consent of instructor. Physical characteristics and human utilization of rainfall-deficient regions.

Mr. Jett

121. North America. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Natural and economic regions of the United States and Canada.

Mr. Gregor

122A. Middle America. (4) II.

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.

122B. South America. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and economy in the South American countries.

123A. Western Europe. (4) II.

Lecture—3 hours; term paper. 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.

Mr. Thompson

***123B. Eastern Europe. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of in-

* Not to be given, 1971-72.

structor. Geographic conditions and their relation to the economic, social and political problems of the countries of Eastern Europe.

124. The Soviet Union. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Physical landscapes and cultural regions of the U.S.S.R.

Mr. Kriesel

125A. North Africa and the Near East. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Physical, cultural, and historical geography of the Arab World and its neighbors.

Mr. Lee

125B. Sub-Saharan Africa. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Physical, cultural, and historical geography of Africa south of the Sahara. Mr. Simoons

***126. Southern Asia. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2, or consent of instructor. Physical, cultural, and historical geography of Southern Asia.

Mr. Simoons

131. California. (4) I, III.

Lecture—3 hours; discussion—1 hour. Regions of California: landforms, climate, and other physical characteristics; agricultural, mineral, and other resources; and patterns of settlement, population, transportation, and economy.

Mr. Shlemon, Mr. Gregor

141A. Economic Geography. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Factors in economic regionalism. Analysis of major agricultural regions of the earth.

***141B. Economic Geography. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Factors in economic regionalism. Analysis of major industrial regions of the earth.

143. Political Geography. (4) III.

Lecture—3 hours; term paper. Areal differentiation of major natural and cultural phenomena affecting the world's political organization.

Mr. Thompson

151. History of Geographic Thought. (4) I.

Lecture—3 hours; term paper. Prerequisite: three upper division courses in geography. The literature of geography: objectives, subdivisions, and development of the subject.

Mr. Kriesel

152. Geographical Discovery and Exploration. (4) I.

Lecture—3 hours; term paper. Expansion of western world's geographical horizons from ancient through modern times.

Mr. Thompson

155. Urban Geography. (4) I.

Lecture—3 hours; term paper. The geography of urban land use: the study of the economic, physical, political, and social forces responsible for the origin and development of urban and metropolitan-area land use patterns; theories of urban growth and structure. Emphasis is on American cities. Offered in odd-numbered years.

Mr. Kriesel

156. The Urban Region. (4) I.

Lecture—3 hours; term paper. Urban-regional and inter-urban relationships; the urban economic base; the Central Place Theory; the functional classification of American cities and the spatial distribution of the functional classes. Offered in even-numbered years.

Mr. Kriesel

161. Conservation of Resources and Environment. (4) III.

Lecture—4 hours. Principles of natural-resource and environmental-quality conservation. Land use conflicts between forestry, agricultural, mining, municipal, and recreational interests. Roles of industry, government, and society in creating and resolving resource and environmental problems.

Mr. Jett

162. Geography of Water Resources. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Geographical survey of water on the land; needs and opportunities for water-resource development and conservation. Historical solutions to water needs of specific areas, and geographical problems associated with current and future water requirements. Mr. Shlemon, Mr. McArthur

170. Cultural Ecology. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2; or Anthropology 2. Theories of environment-man relations. Ecologic relations of gatherers, fishermen, hunters, swidden cultivators, peasants; their impact on environment; their domestic plants and animals.

Mr. Jett

171. Cultural Geography. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Consideration of the principal approaches to cultural geography in modern times, including environmental determinism and possibilism, regional geography, cultural history, cultural ecology, and environmental perception.

Mr. Simoons

198. Directed Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

The Staff (Chairman in charge)

* Not to be given, 1971-72.

Graduate Courses**201. Sources and General Literature of Geography.**

(4) I, II, III.

Seminar—3 hours. Prerequisite: graduate status in geography. 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. The Staff

250. Theory and Method in Geography. (4) III.

Lecture—2 hours; discussion—1 hour.
Mr. Kriesel

***256. Regional Economic Organization. (4) III.**

Seminar—3 hours. Analysis of theories of spatial organization and examination of their applicability to selected examples of regional economic development.

290. Seminar: Selected Regions. (4) III.

Seminar—3 hours. Region to be announced annually.
Mr. Thompson

291. Seminar in Cultural Geography. (4) II, III.

Seminar—3 hours. Mr. Jett, Mr. Simoons

GEOLOGYIan D. MacGregor, Ph.D., *Chairman of the Department*

Department Office, 306A Young Hall

Professors:

Daniel I. Axelrod, Ph.D.
Cordell Durrell, Ph.D.
Charles G. Higgins, Ph.D.
Ian D. MacGregor, Ph.D.
James W. Valentine, Ph.D.

Associate Professors:

Jere H. Lipps, Ph.D.
Eldridge M. Moores, Ph.D.

Assistant Professors:

David H. Chipping, Ph.D.
Richard Cowen, Ph.D.
Harry W. Green, Ph.D.
Robert J. Twiss, Ph.D.

Departmental Major Advisers.—B.S. Degree:
Mr. Cowen, Mr. Durrell. A.B. Degree: Mr.
Higgins.

The Major Programs

Students interested in becoming professional geologists and continuing their geological studies at the graduate level should elect the program leading to the Bachelor of Science degree. Stu-

* Not to be given, 1971-72.

292. Seminar in Landform Analysis. (4) I, III.

Seminar—3 hours.

Mr. McArthur, Mr. Shlemon

294. Seminar in Climatology. (4) II.

Seminar—3 hours.

Mr. Schultz

295. Seminar in Urban Geography. (4) II.

Seminar—3 hours.

Mr. Kriesel

***296. Seminar in Agricultural Geography. (4) I.**

Seminar—3 hours.

Mr. Gregor

***297. Seminar in Industrial Geography. (4) II.**

Seminar—3 hours.

298. Group Study. (2-5) I, II, III.

Prerequisite: consent of instructor. The Staff

299. Research. (2-9) I, II, III.

The Staff (Chairman in charge)

Professional Course**300. Problems in Teaching Geography. (2) II.**

Lecture—2 hours. Prerequisite: course 1 or 2. Establishing, organizing, and conducting courses in geography and regional study. Designed primarily for prospective elementary and secondary school teachers of the social sciences.

Mr. Thompson

dents desiring a less intensive program in geology as part of their general education or as preparation for nonprofessional careers in geology should elect the program leading to the Bachelor of Arts degree. High school students should note that the preparation for either degree is simplified if their high school programs include chemistry and four years of mathematics.

Bachelor of Science Major Program

Lower Division Courses.—Biology 1; Chemistry 1A-1B-1C or preferably 4A-4B-4C, Geology 1, 1L, 2, 2L, 3, 3L, 51; Mathematics 11, 21A-21B-21C; Physics 4A-4B. In addition, for emphasis in physical geology, Mathematics 22A or 22B or 22C and Physics 4C; for emphasis in paleobiology, Mathematics 15 and Zoology 2.

Upper Division Courses.—Geology 101A-101B-101C, 102A-102B, 105, 106, 107, 118, and 190 repeated at least once. Additional courses in cognate sciences, mathematics, and geology, required for specialization within physical geology or paleobiology, must be selected on recommendation of the major adviser.

Bachelor of Arts Major Program

Lower Division Courses.—Biology 1; Chemistry 1A-1B or 4A-4B; Geology 1, 1L, 2, 2L, 3,

3L, 51; Physics 2A, 3A, 2B, 3B. Recommended: Chemistry 1C or 4C; Mathematics 13, 15, 16A; Physics 2C, 3C; Zoology 2.

Upper Division Courses.—Geology 101A–101B–101C, 102A, 105, 106, 107, and other upper division courses in geology and related fields to total not less than 36 units selected in accordance with a plan approved by the major adviser.

Graduate Study.—The Department of Geology offers a program of study and research leading to the M.S. and Ph.D. degrees. For information regarding graduate study in geology, address the Graduate Adviser, Department of Geology.

Teaching Major.—Requirements for the teaching major are the same as for undergraduate major for degree (A.B. or B.S.).

Teaching Minor.—Thirty units (quarter units) to be selected with the advice of the subject representative. Eighteen of the 30 units must be at the upper division or graduate level.

Subject Representative: Mr. Higgins

Course Revisions are currently being considered. Check with the department for up-to-date information.

Lower Division Courses

1. General Geology. (3) I.

Lecture—3 hours. Recommended: high school chemistry, course 1L (may be taken concurrently). Physical geology: rocks, minerals, geologic structures, and internal constitution and processes of the Earth.

1L. General Geology Laboratory. (1) I.

Laboratory—3 hours. Prerequisite: course 1 (preferably taken concurrently). Study of important minerals and rocks.

2. General Geology. (3) II.

Lecture—3 hours. Prerequisite: course 1. Recommended: course 2L taken concurrently. Physical geology and geomorphology: the Earth as a planet; processes which affect its erosional and depositional landforms. Mr. Higgins

2L. General Geology Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: courses 1, 2 (preferably taken concurrently). Recommended: stereoscopic vision. Introduction to landforms and geologic features as depicted on topographic and geologic maps, structure sections, and aerial photographs. Mr. Higgins

3. General Geology. (3) III.

Lecture—3 hours. Prerequisite: course 1. Recommended: course 3L taken concurrently. Historical geology; paleobiology, the fossil record, and stratigraphy; an introduction to Earth history.

3L. General Geology Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: courses 1, 3 (preferably taken concurrently). Study of important fossils; problems in paleobiology and stratigraphy.

16. The Physical Earth and Man. (2) II.

Lecture—2 hours. Geological aspects of the environment: nonrenewable natural resources and man's relationship to geological processes. Mr. Durrell, Mr. Lipps

*51. Map Interpretation. (2) III.

Laboratory—6 hours. Prerequisite: course 2L. Study of topographic and geologic maps and geologic structure sections. Mr. Durrell

Upper Division Courses

*101A–101B–101C. Mineralogy-Petrology.

(5–5–5) I–II–III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 1, 1L; Chemistry 1A (may be taken concurrently). Integrated sequence comprising fundamentals of physical and optical mineralogy, crystallography, crystal chemistry, petrography, and petrology. The Staff

102A. Field Geology. (3) I.

Field—eight 9-hour days; orientation-discussion—eight 1-hour sessions; 10-hours report preparation. Prerequisite: courses 51, 101C, 106 (may be taken concurrently). Introduction to geologic field study. The Staff

102B. Field Geology. (3) III.

Field—eight 9-hour days; discussion—eight 1-hour sessions; 10-hours report preparation. Prerequisite: courses 102A, 105. Recommended: course 152A. Continuation of course 102A. The Staff

105. Structural Geology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 1, 1L, 101A; Physics 4A (may be taken concurrently). Recommended: courses 51 and 102A. Behavior of deformed rocks in the laboratory and in the field; tectonic features and processes of the Earth. Graphic solutions to structural problems; analysis of deformed areas. Mr. Moores

106. Stratigraphy. (3) I.

Lecture—3 hours. Prerequisite: courses 2, 2L, 3, 3L. Lithologic and biologic aspects of stratified rocks and their interrelationships. Introduction to synthesis of Earth history. Mr. Chipping

107. Paleobiology. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 1, 1L, 3, 3L; Biology 1. The origin, history, and morphology of the major phyla; principles and methods of interpreting ancient biotic systems. Mr. Lipps, Mr. Cowen

* Not to be given, 1971–72.

111A. Paleobiology of Invertebrata. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of the major phyla of invertebrates. Mr. Cowen

111B. Paleobiology of Protista. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of single-celled organisms. Mr. Lipps

118. Summer Field Geology. (8) (Summer).

Six weeks in field. Prerequisite: course 102B. Preparation of a geologic map and report on a selected field area. Mr. Moores

124. Advanced Mineralogy. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 101C. Consideration of special topics in mineralogy by means of optical and x-ray diffraction studies. Offered in odd-numbered years. Mr. MacGregor

***125. Advanced Petrology. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 101C. Paragenesis of mineral assemblages as controlled by pressure, temperature, and composition. Laboratory study of selected petrologic problems. Offered in even-numbered years. Mr. MacGregor

126. Sedimentation. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 101C. Characteristics of sedimentary materials; principles of sediment transport and deposition. Laboratory analyses of sediment texture and composition. Mr. Chipping

140. Paleobotany. (5) III.

Lecture—2 hours; laboratory—6 hours; two all-day field trips and one three-day field trip. Prerequisite: senior standing. Guiding principles underlying an analysis of successive floral assemblages in Cenozoic and Cretaceous rocks. Development of modern vegetation, with emphasis on centers of origin and radiation, rates of evolution, and community evolution. (Same course as Botany 140.) Mr. Axelrod

***152A. Introduction to Aerial Photographs. (1) II.**

Lecture—½ hour; laboratory—1½ hours. Prerequisite: stereoscopic vision. Recommended: course 2L. Types and availability of aerial photographs; stereoscopic viewing; geometry of the single vertical photograph and of the stereoscopic model; planimetric plotting, data-transfer, and quantitative measurements from photographs. Mr. Higgins

***152B. Photogeology. (3) III.**

Lecture—1 hour; laboratory-workshop—6

hours. Prerequisite: stereoscopic vision; courses 1 and 2, or Geography 1, and course 152A or Geography 106. Recommended: courses 2L, 102A, 105. Group-learning experience in interpretation of geologic structures, rock types, and regional geologic history by analysis of landforms, drainage, vegetation and outcrop patterns, tone, texture, and other elements visible on aerial photographs. Workshop sections limited to 15 students. Mr. Higgins

***153. Studies in Geomorphology. (3) I.**

Lecture—3 hours. Prerequisite: course 2. Recommended: course 2L and Geography 108. Methods of analysis of geomorphic problems. Offered in even-numbered years. Mr. Higgins

190. Seminar in Geology. (1) I, II, III.

Seminar—1 hour; discussion 1 hour. Prerequisite: senior standing in geology. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. May be repeated for credit. (Passed/Not Passed grading only.) The Staff (Chairman in charge)

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: senior standing in geology or consent of instructor.

The Staff (Mr. MacGregor in charge)

199. Special Study for Advanced Undergraduates.

(1–4) I, II, III.

The Staff (Mr. MacGregor in charge)

Graduate Courses**201A. Ecological Theory. (3) I.**

Lecture—2 hours; discussion—1 hour. Prerequisite: a course in ecology. The course will focus on the ecologic community as a unit. The major generalizations concerning the structure and functioning of the community will be examined together with the generalizations relating both structure and function to the abiotic environment and its fluctuations. (Same course as Botany, Ecology and Zoology 201A.)

Ecology Group Staff

201B. Analysis of A Selected Ecosystem. (3) II.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 201A or consent of instructor. Application of basic ecological principles to the interpretation of biotic and abiotic interrelationships of a particular ecosystem. Recent advances in theory, technique, and basic information are emphasized. Lectures will be given by specialists from several fields. May be repeated for credit. (Same course as Botany, Ecology and Zoology 201B.)

Ecology Group Staff

* Not to be given, 1971–72.

201C. The Changing Biosphere. (3) III.

Lecture—2 hours; assigned problem. Prerequisite: courses 201A, 201B, or consent of instructor. Course deals with changing gas balance and weather in the biosphere and effects on plants and animals, the effects of structural, chemical and physical changes on living systems, changes in species diversity, effects of human population increase, and related topics. (Same course as Botany, Ecology and Zoology 201C.)

Ecology Group Staff

***213. Geomorphology. (3) I.**

Seminar—two 1½ hour sessions per week. Prerequisite: course 153 or Geography 108. Selected geomorphic studies of surficial processes and the evolution of landforms. Offered in odd-numbered years.

Mr. Higgins

216. Tectonics. (3) I.

Seminar—3 hours. Prerequisite: course 105. Tectonic features of the Earth; structural histories of selected deformed belts in relation to theories of orogenesis. Offered in odd-numbered years.

Mr. Moores

***218. Advanced Structural Analysis. (3) I.**

Lecture—2 hours; seminar—1 hour. Prerequisite: course 105. Analysis of stress and strain. Theoretical and experimental investigations of rock deformation. Principles of fracture, folding, and flow of rocks and their application to field occurrences. Offered in even-numbered years.

Mr. Green

236. Physical Geology of California. (2) I, II, III.

Seminar—2 hours.

Mr. Durrell

***254. Phase Equilibria. (3) II.**

Seminar—3 hours. Prerequisite: Chemistry 1C; Mathematics 22A; physical chemistry recommended. Physiochemical aspects of the phase relations in silicate systems and their application to the petrogenesis of igneous and metamorphic rocks. Offered in odd-numbered years.

Mr. MacGregor

***255. Genesis of Metamorphic Rocks. (3) II.**

Seminar—3 hours. Prerequisite: course 101C; courses 125, 254 recommended. Physicochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered in even-numbered years.

Mr. Twiss

257. Sedimentary Petrology: Terrigenous Rocks. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 126. Origin of land-derived non-carbonate clastic rocks. Textural and compositional analyses in thin section. Offered in odd-numbered years.

Mr. Chipping

***258. Sedimentary Petrology: Carbonate Rocks. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 126. Origin of biological, biochemical, and chemical sedimentary carbonate rocks. Textural and compositional analyses in thin section. Offered in even-numbered years.

Mr. Chipping

260. Paleontology. (3) III.

Seminar—3 hours. Prerequisite: course 111A or 111B, or graduate standing in a biological science. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting.

Messrs. Axelrod, Cowen, Lippis, Valentine

***261. Paleocoenology. (3) I.**

Lecture—2 hours; seminar—1 hour. Prerequisite: course 107; Mathematics 15. Recommended: Mathematics 13. Theoretical and operational analyses of the structure and evolution of ancient and modern biotic associations, chiefly marine. Offered in odd-numbered years.

Mr. Valentine

262. Paleosystematics. (3) I.

Lecture—1 hour; seminar—2 hours. Prerequisite: course 107, Mathematics 15. Recommended: Genetics 100B, Mathematics 13. Principles and methods of taxonomy of fossil organisms. Offered in even-numbered years.

Mr. Valentine

263. Functional Morphology of Fossil Invertebrates. (4) II.

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 phyla.

Mr. Cowen

***280. Igneous Petrology. (3) I.**

Seminar—2 hours; laboratory—3 hours. Prerequisite: course 101C. Integrated laboratory, field study, and seminar on igneous processes and products. Offered in even-numbered years.

Mr. MacGregor

290. Seminar in Geology. (1) I, II, III.

Seminar—1 hour; discussion—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

299. Research. (1-6) I, II, III.

The Staff (Chairman in charge)

* Not to be given, 1971-72.

GERMAN

Clifford A. Bernd, Ph.D., *Chairman of the Department*
 Department Office, 416 Sproul Hall

Professor:

Clifford A. Bernd, Ph.D.

Associate Professors:

Wolfgang F. Bender, Ph.D.
 Roland W. Hoermann, Ph.D.
 Wolfgang W. Moelleken, Ph.D.
 H. Guenther Nerjes, Ph.D.

Assistant Professors:

Wilbur A. Benware, Ph.D.
 John F. Fetzer, Ph.D.
 Karl R. Menges, Ph.D.
 Fritz Sammern-Frankenegg, Ph.D.

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Professor:

Ernest L. Stahl, Ph.D. (*Visiting*)

Lecturer:

William M. Estabrook, Ph.D.

Departmental Major Adviser.—Mr. Estabrook.

Graduate Advisers.—Mr. Nerjes, Mr. Bender, Mr. Moelleken.

The Major Program

Lower Division Courses.—German 1, 2, 3, 6A–6B or 7.

Upper Division Courses.—36 units in upper division courses, including German 101, 102, 103; 119A and 119B. Majors can take not more than two courses in translation for credit.

Honors and Honors Program (see page 149).—The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

The Master of Arts Degree

The Department offers programs of study leading to the M.A. degree. A minimum of 36 units is required. In addition, candidates for the M.A. will be expected to acquire a reading knowledge of French. Further information may be obtained by writing to the Graduate Adviser.

The Degree of Doctor of Philosophy

The Department offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Graduate Adviser.

Teaching Major.—Requirements are the same as for the departmental major.

Teaching Minor.—A minimum of 30 units in German, including 101, 102, 103.

Subject Representative: Mr. Estabrook.

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 6A, 6B, or 7.

1. Elementary German. (6) I, II, III.

Discussion—5 hours; laboratory—two $\frac{1}{2}$ hour sessions. Mr. Estabrook

***1G. German for Graduate Students. (3) I.**

Lecture—3 hours. Open to graduate students only. A course designed to prepare students for the graduate reading examination. (Satisfactory/Unsatisfactory grading only.) The Staff

2. Elementary German. (6) I, II, III.

Discussion—5 hours; laboratory—two $\frac{1}{2}$ hour sessions. Prerequisite: course 1. Mr. Estabrook

***2G. German for Graduate Students. (3) II.**

Lecture—3 hours. Continuation of course 1G. (Satisfactory/Unsatisfactory grading only.) The Staff

2X. Intensive Elementary German. (12) II.

Discussion—10 hours; laboratory—2 hours. Prerequisite: course 1. A special double-credit course, combining courses 2 and 3. Designed to confer greater oral-aural proficiency than the normal sequence and to permit selected students to satisfy the college language requirement at an earlier date. Prepares student for courses 6A, 6B, 7. Mr. Benware

3. Intermediate German. (6) I, II, III.

Discussion—5 hours; laboratory—two $\frac{1}{2}$ hour sessions. Prerequisite: course 2. Class discussions of events and life in Germany—present and past. Reading of modern short stories with inductive review of grammar. Mr. Estabrook

6A. Spoken German. (2) I, II, III.

Discussion—2 hours. Prerequisite: course 3. (Course 6A may be taken concurrently with 6B and/or 7.) Intensive conversational practice based on the everyday vocabulary of reading assignments in German newspapers and contemporary literature. The Staff

6B. Spoken German. (2) I, II, III.

Discussion—2 hours. Prerequisite: course 3. (Course 6B may be taken concurrently with 6A and/or 7.) Intensive conversational practice and discussions based on selected literary texts; oral interpretation of dramatic roles in representative dramas and one-act plays. The Staff

* Not to be given, 1971–72.

7. Advanced German. (4) I, II, III.

Recitation—3 hours. Prerequisite: course 3. (Course 7 may be taken concurrently with 6A and/or 6B.) Review of grammatical and stylistic principles by means of written exercises; expanding of comprehension vocabulary through rapid and extensive readings of modern prose, dramatic and verse texts.

The Staff

15. The Development of German Literature. (4) I, III.

Lecture—3 hours. Characteristic themes, problems, and genres in the mainstream of German literature, from medieval epics and love poetry to the modern period. Study of masterworks in English translation demonstrating problem continuity and relevance to contemporary values within the total intellectual framework.

The Staff

49. Freshman Seminar. (2) II.

Discussion—2 hours. Prerequisite: knowledge of German not required. Inquiry into the intellectual roots of problems confronting today's students, particularly as illustrated in translation by such modern German literary figures as Nietzsche, Kafka, Hesse, Brecht, and Günter Grass. Enrollment limited to 15 freshmen. (Passed/Not Passed grading only.)

The Staff

98. Directed Group Study. (1-5) I, II, III.

Mr. Hoermann

99. Special Study for Undergraduates. (1-5) I, II, III.

Mr. Hoermann

Upper Division Courses**101. Composition and Conversation. (4) I, II, III.**

Lecture—3 hours. Prerequisite: course 7 or courses 6A-6B, or their equivalents. The Staff

102. Composition and Conversation. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Intermediate essay-writing; analysis of literary and journalistic styles; extension of active writing and speaking vocabulary.

The Staff

103. Advanced Composition. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 102 or consent of instructor. Advanced prose style and original composition.

The Staff

104. German Grammar and Stylistics. (4) II.

Lecture—3 hours. Prerequisite: course 103 or consent of instructor. The grammar and stylistics of modern written usage.

Mr. Moelleken

105. History of the German Language. (4) I.

Lecture—3 hours. Prerequisite: course 102. Survey of the linguistic development from the Germanic and Old High German sound shifts; Middle High diphthongization and monophthongization, Ablaut and Umlaut phenomena; "Kanzleisprache" and Luther; origins of modern com-

parative philology with the Grimms; elementary phonetics.

Mr. Benware

106. Linguistic Structure of German. (4) I.

Lecture—3 hours. A linguistic analysis of modern standard German including phonetics, phonemics, morphology and syntax.

Mr. Benware

108. Contrastive Structures of English and German. (4) II.

Lecture—3 hours; other—1 hour. Prerequisite: course 106. A contrastive study of the linguistic structures of English and German.

Mr. Benware

109A. The Development of German Culture. (4) II.

Lecture—2 hours; term paper. Prerequisite: courses 6A and 6B or course 7, or their equivalents. The evolution of ideas, science, and the arts as dimensions of German society and national thought.

Mr. Fetzer

109B. The Development of German Culture. (4) III.

Lecture—3 hours; term paper. Prerequisite: courses 6A and 6B or course 7, or their equivalents. Continuation of course 109A. The evolution of ideas, science, and the arts as dimensions of German society and national thought.

Mr. Fetzer

110. Masterpieces of German Prose from Goethe to Kafka. (4) I.

Lecture—3 hours. Study in translation of works which have helped shape the European tradition in the novel and short story or were crucial in the development of German literature. Knowledge of German not required; may not be counted as part of the major in German.

Mr. Fetzer

111. Masterpieces of German Drama from Lessing to Brecht. (4) II.

Lecture—3 hours. Study in translation of works which have helped shape the European drama or were crucial in the development of German literature. Knowledge of German not required; may not be counted as part of the major in German.

Mr. Stahl

112. Masterpieces of German Poetry from Walther von der Vogelweide to Rilke. (4) III.

Lecture—3 hours. Study in translation of the German Lyric genius from medieval love poetry through the classicism of Goethe and Hölderlin to the mysticism of Rilke. Knowledge of German not required; may not be counted as part of the major in German.

Mr. Stahl

114. Goethe's Faust. (4) II.

Lecture—3 hours. A detailed analysis and aesthetic critique in English of both "Parts," together with the first-draft *Urfaust*. Knowledge of German not required; German majors fulfill readings in German.

Mr. Nerjes

**115. German Literature of the Twentieth Century
Up to the Second World War. (4) I.**

Lecture—3 hours. Knowledge of German not required. The sublimation of tradition and the exploration of new forms from Nietzsche's death until the Second World War, including readings in translation from Hofmannsthal, Hesse, Rilke, Kafka and Thomas Mann.

Mr. Hoermann

**116. German Literature of the Twentieth Century
Since the Second World War. (4) II.**

Lecture—3 hours. Knowledge of German not required. The period of reawakening since 1945, the search for identity and meaning within the European community East and West, and the German political-moral dilemma as reflected in translated works by Brecht, Frisch, Dürrenmatt, Grass, and other "Gruppe 47"

Mr. Hoermann

117. Kafka and Dada. (4) II.

Lecture—3 hours. Knowledge of German not required. Two contemporaneous confrontations with Nietzsche's legacy of cultural nihilism: Kafka's paradoxical dissection, and Dada's paradoxical sublimation of the twentieth-century's continuing encounter with the absurd in literature and art.

Mr. Hoermann

118. Brecht. (4) II.

Lecture—3 hours. Knowledge of German not required. A study of Brecht's Epic Theater and his doctrine of aesthetic alienation.

Mr. Hoermann

**119A. Survey of Literary Periods Through
Classicism. (4) I.**

Lecture—3 hours. Prerequisite: courses 6A and 6B or course 7, or their equivalents. An integrated view of the philosophical, historical, and stylistic components in the development of the German literary tradition up to German Romanticism.

Mr. Fetzer

**119B. Survey of Literary Periods from
Romanticism to the Present. (4) II.**

Lecture—3 hours. Prerequisite: course 119A. Romanticism to the present. Continuation of course 119A.

Mr. Fetzer

**120. The Medieval Period in German
Literature. (4) III.**

Lecture—3 hours; written reports. Prerequisite: course 119A or equivalent. The literary-philosophical profile of the "Mittelhochdeutsche Blütezeit" in terms of the significant courtly and folk epics and the "Minnesang." Readings in modern German translation.

Mr. Moelleken

**121. The Renaissance and Reformation Period in
German Literature. (4) II.**

Lecture—3 hours; written reports. Prerequisite: course 119A or equivalent. The distinctive

thought and literary values of the period from Der-Ackermann-aus-Böhmen through the "Meistersgesang" and "Fastnachtspiel" of Hans Sachs.

Mr. Bender

122. The Baroque Period. (4) I.

Lecture—3 hours; written reports. Prerequisite: course 119A or equivalent. The stylistic and philosophical predicament of the Thirty-Years War era as documented in the works of Opitz and the Silesian Schools to Grimmelshausen and Gryphius.

Mr. Bender

**123. Enlightenment, Sentimentality and Rococo
in German Literature. (4) I.**

Lecture—3 hours; written reports. Prerequisite: course 119A (may be taken concurrently) or equivalent, or consent of instructor. From the rationalism of Gottsched to the humanism of Lessing, from the hymodic verse of Klopstock, the anacreontic of Gellert, the rococo of Wieland to the beginnings of "Sturm und Drang" with Herder.

Mr. Nerjes

125A. Goethe. (4) I.

Lecture—3 hours; written reports. Prerequisite: course 119A (may be taken concurrently) or equivalent, or consent of instructor. Goethe's development from his anacreontic period to the Italian Journey, with particular emphasis on *Werther*, *Götz* and his early lyrics.

Mr. Stahl

125B. Goethe. (4) II.

Lecture—3 hours; written reports. Prerequisite: course 119A (may be taken concurrently) or equivalent, or consent of instructor. From the Italian Journey to his death. Study and discussion of the master works of his later period.

Mr. Stahl

126A. Young Schiller. (4) II.

Lecture—3 hours; written reports. Prerequisite: course 119A (may be taken concurrently) or equivalent, or consent of instructor. A study of the poetry and dramas of his "Sturm und Drang" period to the beginning of the classical era: from *Die Räuber* to *Don Carlos*.

Mr. Nerjes

126B. Classical Schiller. (4) III.

Lecture—3 hours; written reports. Prerequisite: course 119A (may be taken concurrently) or equivalent, or consent of instructor. Schiller's historical dramas in conjunction with his critical essays and "Ideeendichtung."

Mr. Nerjes

127. Romanticism. (4) III.

Lecture—3 hours; written reports. Prerequisite: course 119B (may be taken concurrently) or equivalent, or consent of instructor. The Napoleonic era from the Jena school of the Schlegels and Novalis, through the Arnim-Brentano group in Heidelberg, to the Berlin circle including Tieck, Eichendorff, and Hoffmann.

Mr. Fetzer

128. Early Nineteenth-Century German**Realism. (4) II.**

Lecture—3 hours; written reports. Prerequisite: course 119B (may be taken concurrently) or equivalent, or consent of instructor. An examination of the work of such important literary figures as Kleist, Hebbel, Büchner and Grillparzer.

Mr. Bernd

129. Naturalism to Neo-Classicism in German Literature. (4) I.

Lecture—3 hours; written reports. Prerequisite: course 119B (may be taken concurrently) or equivalent, or consent of instructor. From Hauptmann and the social protest of north-German naturalism, through the Viennese psychological impressionism of Schnitzler and the neo-romanticism of Hofmannsthal and Hesse, to Rilke and the collective mysticism of the "George-Kreis."

Mr. Nerjes

130. The Modern Period from Expressionism to the Present. (4) III.

Lecture—3 hours; written reports. Prerequisite: course 119B (may be taken concurrently) or equivalent, or consent of instructor. The moral and existential quandary from Nietzsche, Wedekind, and the wartime generation of dramatists, through the poetry of Trakl, Loerke, and Benn; novelistic mastery in Thomas Mann and Kafka, and the new theater of Brecht, Frisch, and Dürrenmatt.

Mr. Menges

132. The German "Novelle." (4) II.

Lecture—3 hours; written reports. Prerequisite: course 119B (may be taken concurrently) or equivalent, or consent of instructor. An inquiry into the art of the "Novelle" through analysis of the materials and formal devices of representative authors from Goethe to Kafka.

Mr. Nerjes

134. German Poetry. (4) III.

Lecture—3 hours; language laboratory. Prerequisite: courses 101, 102; or consent of instructor. Analysis and study of representative lyric modes as deduced from the master specimens of verse throughout German literature.

Mr. Stahl

185. Intercultural Literary Colloquium. (4) II.

Lecture—2 hours; discussion—1 hour; term paper; readings in English or German. Prerequisite: consent of instructor. Interdepartmental inquiry into such European and American themes as the anti-hero, guilt and judgment, escape, and utopia. Specific topics to be chosen by instructors. (To be given jointly with English 185 and Russian 185.)

Mr. Hoermann

190. Proseminar in a Major Writer. (4) I, II, III.

Lecture—3 hours; term paper. Prerequisite: courses 119A and 119B or their equivalent, and consent of instructor. Introduction to techniques

of independent research and seminar reporting and rebuttal. May be repeated for credit with consent of instructor.

The Staff

194H. Special Study for Honors Students.**(5) I, II, III.**

Prerequisite: open only to honors students. Guided research leading to an honors paper.

The Staff

198. Directed Group Study. (1-5) I, II, III.

(Passed/No Passed grading only.)

The Staff (Mr. Bernd in charge)

199. Special Study for Advanced Undergraduates.**(1-5) I, II, III.**

The Staff (Mr. Bernd in charge)

Graduate Courses**200. Gothic. (4) I.**

Seminar—3 hours. Phonology, grammar and reading of Gothic texts. Special topics including the relationship of Gothic to Indo-European and to the other Germanic languages. Knowledge of Modern German not required.

Mr. Benware

201. Old High German. (4) II.

Seminar—3 hours. A study of the beginnings of German as a written language through the reading of selected texts from the eighth through the eleventh centuries. A linguistic analysis of the dialects.

Mr. Benware

202. Middle High German. (4) III.

Seminar—3 hours. Outline of grammar; selections from Middle High German epic and lyric poetry.

Mr. Moelleken

203. Old Saxon. (4) III.

Seminar—3 hours. A study of the linguistic structure and the literary significance of the language of the Old Saxon *Heliand*. Knowledge of Modern German not required.

Mr. Moelleken

205. History of the German Language. (4) I.

Seminar—3 hours. The development of the German language with emphasis on the early periods, from Indo-European to Middle High German.

Mr. Benware

210. Techniques of Literary Scholarship. (4) I.

Seminar—3 hours. The bibliographical, organizational, and methodological tools and resources for advanced, independent research.

Mr. Fetzer

211. The Rise of German Literary Criticism. (4) I.

Seminar—3 hours. The history of criticism in Germany, with some attention to classical sources. The course proceeds chronologically until the modern period, then by a study of special topics broadens to a consideration of recent approaches to German literature.

Mr. Bernd

240. Forms of German Verse. (4) II.

Seminar—3 hours. The development of German verse from the Middle Ages to Gottfried Benn, with special emphasis on different techniques of text analysis and interpretation. May be repeated for credit with consent of instructor.

Mr. Stahl

241. The German Drama. (4) III.

Seminar—3 hours. The major forms of German drama from the origins to the middle of the twentieth century. May be repeated for credit with consent of instructor.

Mr. Nerjes

242. The German "Novelle." (4) III.

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.

Mr. Bernd

249. Medieval Epic Literature. (4) II.

Seminar—3 hours. Prerequisite: courses 202 and 285, or consent of instructor. A critical analysis of selected epic poetry of the "Stauferzeit," such as *Parzival*, *Tristan und Isolde*, and the *Nibelungenlied*. All texts are read in Middle High German.

Mr. Moelleken

250. Medieval Lyric Literature. (4) III.

Seminar—3 hours. Prerequisite: courses 202 and 285, or consent of instructor. A critical study of the great lyric poets of medieval Germany, such as Walther von der Vogelweide, Heinrich von Morungen, and Reinmar von Hagenau. All texts read in Middle High German.

Mr. Moelleken

251. Studies in the Works of Andreas Gryphius. (4) II.

Seminar—3 hours. A study of Gryphius' literary legacy, his lyrics, his tragedies and his comedies, with the purpose of showing his place in the world of seventeenth-century thought, artistic, religious and humanistic.

Mr. Bender

252. The Writings of Lessing. (4) I.

Seminar—3 hours. A study of Lessing's theory of literature with particular emphasis upon his critical attacks on French drama.

Mr. Bender

253. Goethe. (4) II.

Seminar—3 hours. A study of the origins of Goethe's thought in German Pietism, and his principal artistic autobiographical, scientific and philosophical works.

Mr. Stahl

254. Schiller. (4) I.

Seminar—3 hours. A critical analysis of Schiller's major works and his impact on the intellectual climate in Germany during the late eighteenth and early nineteenth centuries.

Mr. Nerjes

257. Heinrich von Kleist. (4) III.

Seminar—3 hours. Kleist's important dramatic and prosaic works; special attention will be given to the peculiar hermeneutic problems in modern German, French and Anglo-American Kleist criticism.

Mr. Bernd

258. The Novels of Thomas Mann. (4) II.

Seminar—3 hours. Reading of selected novels with emphasis on aesthetic techniques, originality, ethical and political views, and influence on the contemporary literary scene in Germany.

Mr. Menges

259. Studies in Kafka. (4) I.

Seminar—3 hours. Study of Kafka's nuclear fables.

Mr. Hoermann

260. The Poetry of Rilke. (4) I.

Seminar—3 hours. A study of the principal motifs, myths, images and problems in the poetry of Rainer Maria Rilke.

Mr. Stahl

261. Brecht and the Epic Theater. (4) III.

Seminar—3 hours. A reading of all works with emphasis on the ideas which impelled the development of new literary forms and concepts.

Mr. Hoermann

285. Middle High German Literature. (4) II.

Seminar—3 hours. An extensive reading of Middle High German texts with emphasis upon belletristic and cultural values; also examines linguistic problems. May be repeated for credit with consent of instructor.

Mr. Moelleken

288. The Renaissance and Reformation in German Literature. (4) I.

Seminar—3 hours. The parabolic and didactic style in Germany's literature during the sixteenth century. May be repeated for credit with consent of instructor.

Mr. Bender

289. German Literature of the Baroque. (4) III.

Seminar—3 hours. The "Elegantiaideal" and the varying methods used to portray it in seventeenth-century German literature. May be repeated for credit with consent of instructor.

Mr. Bender

290. The Enlightenment in German Literature. (4) II.

Seminar—3 hours. The revolt against the excesses of the "Elegantiaideal," and the evolution of a new literature based on reason and wit. May be repeated for credit with consent of instructor.

Mr. Nerjes

291. Rococo in German Literature. (4) II.

Seminar—3 hours. The essential novels of Christoph Martin Wieland and those contemporaries of his whose literary style mirrors the euphony that is characteristic of Mozart's music. May be repeated for credit with consent of instructor.

Mr. Nerjes

292. Sentimentality and "Sturm und Drang" in German Literature. (4) III.

Seminar—3 hours. The German liberal authors of the eighteenth century, such as Johann Georg Hamann and Johann Gottfried Herder, who lived in complete disagreement with the rationalistic tenets of their age. May be repeated for credit with consent of instructor. Mr. Nerjes

293. The Classical Age of German Literature. (4) I.

Seminar—3 hours. An inquiry into the aesthetic and humanistic qualities of Germany's greatest literary epoch. May be repeated for credit with consent of instructor. Mr. Nerjes

294. The Romantic Period in German Literature. (4) III.

Seminar—3 hours. Survey of the works of early nineteenth-century authors in reaction against the age of classicism. May be repeated for credit with consent of instructor. Mr. Fetzer

295. Poetic Realism in German Literature. (4) I.

Seminar—3 hours. Outstanding figures in German literature between 1840 and 1890. Im-

portant phases in their developments will be treated. May be repeated for credit with consent of instructor. Mr. Bernd

296. Twentieth Century German Literature. (4) II.

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. Mr. Menges

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Bernd in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Bernd in charge)

Professional Course

390. The Teaching of German. (3) I.

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Intended primarily for graduate teaching assistants.

GREEK—See Classics

HEBREW—See Oriental Languages

HISTORY

Walter L. Woodfill, Ph.D., *Chairman of the Department*
Department Office, 176 Voorhies Hall

Professors:

- 'William M. Bowsky, Ph.D.
- David Brody, Ph.D.
- Daniel Calhoun, Ph.D.
- Paul Goodman, Ph.D.
- W. Turrentine Jackson, Ph.D.
- David L. Jacobson, Ph.D.
- Kwang-Ching Liu, Ph.D.
- Jung-Pang Lo, Ph.D.
- C. Bickford O'Brien, Ph.D.
- Rollie E. Poppino, Ph.D.
- Richard N. Schwab, Ph.D.
- James H. Shideler, Ph.D.
- Wilson Smith, Ph.D.
- Donald C. Swain, Ph.D.
- F. Roy Willis, Ph.D.
- Walter L. Woodfill, Ph.D.

Associate Professors:

- Daniel Brower, Ph.D.
- Manfred P. Fleischer, Ph.D.,
José R. Juarez, Ph.D.
- Morgan B. Sherwood, Ph.D.
- Stylianos Spyridakis, Ph.D.

Assistant Professors:

- Arnold J. Bauer, Ph.D.
- Peter K. Cline Ph.D.
- Eugene Lunn, Ph.D.
- C. Roland Marchand, Ph.D.
- Richard J. Miller, Ph.D.

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Assistant Professors:

- William W. Hagen, M.A. (*Acting*)
- Ted W. Margadant, B.A. (*Acting*)

Departmental Advisers.—Mr. Bauer, Mr. Cline, Mr. Fleischer, Mr. Hagen, Mr. Jacobson, Mr. Lunn, Mr. Marchand, Mr. Margadant, Mr. Miller, Mr. Schwab, Mr. Sherwood, Mr. Spyridakis.

Graduate Advisers.—Mr. Bowsky, Mr. Brody, Mr. Brower, Mr. Liu, Mr. Lo, Mr. O'Brien, Mr. Poppino, Mr. Shideler, Mr. Smith, Mr. Willis.

Introductory Courses.—Courses 4A, 4B, 4C,

¹ Absent on leave, 1971-72.

² Absent on leave, fall quarter 1971.

9A, 9B, 17A, 17B, 21A, 21B, 27A, and 27B are open to all students.

The American History and Institutions requirement may be satisfied by any one of the following courses: History 17A, 17B, 21, 27A, 27B, 170A, 170B, 170C, 171A, 171B, 171C, 174A, 174B, 175A, 175B, 176A, 176B, 178A, 178B, 179A, 179B, 180, 183A, 183B, 184. See also page 30.

The Major Program

Lower Division Courses.—Required: Students majoring in history must complete five lower division history courses, including two courses in each of two of the following categories:

- a) history of Western Civilization,
- b) history of Asian Society and Culture,
- c) history of the United States.

It is recommended that History majors take all three of the courses in the history of Western Civilization. It is also recommended that students, in consultation with their advisers, take one or two courses (normally a two-quarter sequence of courses) in one of the following fields: classics, cultural anthropology, cultural geography, principles of economics, English literature, literature of the United States, philosophy, political science, psychology, sociology, or statistics. Foreign language study is recommended for all history majors, and especially for those who intend to undertake graduate study in history.

Upper Division Courses.—Required: Students majoring in history must complete at least 36 upper division units in history, including:

- a) a minimum of 3 courses (including a two-quarter sequence of courses) in a field of concentration (for "field" see below);
- b) a minimum of two courses each in two other fields of history. (The fields referred to are Ancient History, Medieval Europe, Modern Europe, Great Britain, Russia, East Asia, Latin America and the United States.)

Honors and Honors Program (see page 149).—A student may become eligible for graduation with high honors or highest honors in history by completing the Department's honors program. The program consists of the following work (along with normal major requirements): History 101 usually taken during the junior year; at least one undergraduate proseminar (History 102 or equivalent); an honors essay, to be written in 6 to 10 units of History 199, and completed during the two quarters before the beginning of the student's last quarter as an undergraduate. Any history major who has a departmental grade-point average of 3.2 in a total of at least 20 units of history may enter the program by registering in the departmental office. Those with special interests or qualifications may apply through their advisers.

Graduate Study.—The Department of History offers programs of study and research leading to the M.A. and Ph.D. degrees in history. Detailed

information may be obtained by writing to the Graduate Adviser, Department of History.

Teaching Major.—Requirements are the same as for the departmental major plus course 300.

Teaching Minor.—Thirty-two units of history, including 4A–4B–4C, 17A–17B, and 12 units of upper division course work. The 12 units of upper division work should include a two-quarter sequence.

Subject Representative: Mr. Jacobson

Lower Division Courses

4A. History of Western Civilization. (4) I, III.

Lecture—3 hours; discussion—1 hour. The growth of western civilization from ancient times through the middle ages. The Staff

4B. History of Western Civilization. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. The development of western civilization from the Renaissance through 1815. The Staff

4C. History of Western Civilization. (4) II, III.

Lecture—3 hours; discussion—1 hour. The development of western civilization in the nineteenth and twentieth centuries. The Staff

9A. History of Asian Civilizations. (4) I.

Lecture—3 hours; discussion—1 hour. The history of the major civilizations of Asia (Chinese, Japanese, Hindu, and Islamic) to the end of the eighteenth century. Emphasis will be put on the general features of the society and government, the economy, religion, philosophy, and the arts. Mr. Miller

9B. History of Asian Civilizations. (4) II.

Lecture—3 hours; discussion—1 hour. Introduction to the great changes in the major Asian countries in the past two centuries. Emphasis will be placed on the impact of the West, the search for a new culture, and the background of contemporary social and political problems.

Mr. Miller

17A. History of the United States. (4) I.

Lecture—3 hours; discussion—1 hour. The growth of the American people from colonial times through the Civil War. The Staff

17B. History of the United States. (4) III.

Lecture—3 hours; discussion—1 hour. The American people from Reconstruction to the present. The Staff

21A. Race and Nationality in American History.

(4) I.

Lecture — 3 hours; discussion — 1 hour. Sources of American nationality and its relationship to ethical, racial, and religious minorities, 1607–1865. Experiences of groups including American Indians, Orientals, Blacks, Catholics, Jews, Irish and Germans. Tensions between majorities and minorities in the American past.

Mr. Goodman

21B. Race and Nationality in American History.

(4) II.

Lecture — 3 hours; discussion — 1 hour. Sources of American nationality and its relationship to ethical, racial, and religious minorities, 1865 to present. Experiences of groups including American Indians, Orientals, Blacks, Catholics, Jews, Irish and Germans. Tensions between majorities and minorities in the American past.

Mr. Goodman

27A. Afro-American History. (4) I.

Lecture—3 hours; discussion—1 hour. The history of black people in the United States from the African background to Reconstruction.

The Staff

27B. Afro-American History. (4) II.

Lecture—3 hours; discussion—1 hour. The history of black people in the United States from Reconstruction to the Present.

The Staff

49. Freshman Seminar. (2) I, II, III.

Seminar—2 hours. Prerequisite: consent of instructor. Reports, discussion and elementary research in the several fields of history designed for the beginning student.

The Staff

98. Directed Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

The Staff (Chairman in charge)

Upper Division Courses**101. Introduction to Historical Thought and Writing.**

(5) II, III.

Lecture-discussion—4 hours; term paper. Prerequisite: consent of instructor. The study of the history of historical thought and writing, analysis of critical and speculative philosophies of history and evaluation of modes of organization, interpretation and style in historical writing.

Mr. Margadant

102. Undergraduate Proseminar in History.

(5) I, II, III.

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Designed primarily for history majors. Intensive reading, discussion, research and writing in selected topics in the various fields of history: A. Ancient; B. Medieval; C. Renaissance and Reformation; D. Modern Europe to 1815; E. Europe since 1815; F. Russia; G. China to 1600; H. China since 1600; I. Britain; J. Latin America since 1810; K. American History to 1787; L. United States, 1787-1896; M. United States since 1896; N. Japan. May be repeated for credit.

The Staff

111A. Ancient History. (4) I.

Lecture—3 hours. History of the ancient empires of the Near East and of the Greek city-states to the fifth century B.C.

Mr. Spyridakis

111B. Ancient History. (4) II.

Lecture—3 hours. History of Greece, the Hellenistic kingdoms, and Rome from the fifth century B.C. to the Punic Wars.

Mr. Spyridakis

111C. Ancient History. (4) III.

Lecture—3 hours. History of Rome and its empire from the Punic Wars to Constantine.

Mr. Spyridakis

121A. Medieval History. (4) I.

Lecture—3 hours. Western European history from the "fall of the Roman Empire" to the crusades.

Mr. Bowsky

121B. Medieval History. (4) II.

Lecture—3 hours. Western European history from the crusades to the Renaissance.

Mr. Bowsky

***131A. Early Modern European History. (4) I.**

Lecture—3 hours. Recommended: courses 4A, 4B. Western European history from about 1350 to about 1500.

Mr. Fleischer

131B. Early Modern European History. (4) II.

Lecture—3 hours. Recommended: courses 4A, 4B, 131A. Western European history from about 1500 to about 1650.

Mr. Fleischer

131C. Early Modern European History. (4) III.

Lecture—3 hours. Recommended: courses 4A, 4B, 131B. Western European history from about 1650 to about 1789.

Mr. Fleischer

133. The Age of Ideas. (4) I.

Lecture—3 hours. The Enlightenment and its background in the seventeenth century.

Mr. Schwab

134A. The Age of Revolution. (4) II.

Lecture—3 hours. Ideas and institutions during the French Revolution and the Napoleonic era.

Mr. Schwab

134B. The Age of Revolution. (4) III.

Lecture—3 hours. Ideas and revolution after 1815.

Mr. Schwab

***135. History of Science from the Sixteenth to Eighteenth Centuries. (4) III.**

Lecture—3 hours; term paper. Developments in the physical and biological sciences during the sixteenth to eighteenth centuries. Emphasis will be on analysis, synthesis, and interpretation rather than on a chronological narration of events.

137A. Russian History: Kievan and Muscovite Russia. (4) I.

Lecture—3 hours. Russian civilization from earliest times to the reign of Peter the Great.

Mr. O'Brien

^o Not to be given, 1971-72.

137B. Russian History: The Empire to 1856. (4) II.

Lecture—3 hours. Russian civilization from the Age of Peter the Great through the Crimean War.
Mr. O'Brien

137C. Russian History: The Empire, 1856–1917. (4) I.

Lecture—3 hours. Russian civilization from the Crimean War to the Revolution of 1917.
Mr. Brower

137D. Russian History: Soviet Russia. (4) II.

Lecture—3 hours. Russia from the Revolution of 1917 to the Age of Stalin.
Mr. Brower

141. France since 1815. (4) I.

Lecture—3 hours; term paper.
Mr. Margadant, Mr. Willis

***142. History of Italy since the French Revolution. (4) III.**

Lecture—3 hours. Prerequisite: courses 4A, 4B, 4C.
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143A. History of Eastern Europe. (4) I.

Lecture—3 hours; term paper. Recommended: course 4C. History, mid-eighteenth century to mid-nineteenth century, of the subject nationalities of the Habsburg and Russian Empires (Czechs, Slovaks, Poles, Hungarians, Baltic peoples) with focus on their socioeconomic development and struggles for cultural and political independence.
Mr. Hagen

143B. History of Eastern Europe. (4) II.

Lecture—3 hours; term paper. Recommended: courses 4C, 143A. Geographical focus as in course 143A. Concentration, mid-nineteenth century to the present, on (1) the socio-economic problems of rural society, industrialization and middle-class development and (2) the political problems of imperialism, nation-state formation and social revolution.
Mr. Hagen

144A. History of Germany to 1815. (4) II.

Lecture—3 hours. Prerequisite: courses 4A and 4B. A history of the Germanies through the Congress of Vienna.
Mr. Hagen

144B. History of Germany since 1815. (4) III.

Lecture—3 hours. Prerequisite: courses 4C and 144A. The German national unification, the age of Bismarck and William II, and the wars and revolutions of the twentieth century.
Mr. Hagen

145A. Europe in the Nineteenth Century. (4) II.

Lecture—3 hours. A survey of the history of Europe from 1815 to 1870.
Mr. Margadant

145B. Europe in the Nineteenth Century. (4) III.

Lecture—3 hours. A survey of the history of Europe from 1870 to 1918.
Mr. Margadant

* Not to be given, 1971–72.

146A. Europe in the Twentieth Century. (4) II.

Lecture—3 hours; term paper. A survey of the history of Europe from 1919 to 1939.
Mr. Willis

146B. Europe in the Twentieth Century. (4) III.

Lecture—3 hours. A survey of the history of Europe since 1939.
Mr. Willis

147A. European Intellectual History in the Nineteenth Century. (4) I.

Lecture—3 hours; term paper. Prerequisite: course 4C. A study of major currents of European thought in the nineteenth century viewed within the context of important social and political developments. Emphasis will be placed upon the emergence of the socialist and aesthetic critiques of nineteenth-century industrial civilization.
Mr. Lunn

147B. European Intellectual History in the Twentieth Century. (4) II.

Lecture—3 hours; term paper. Prerequisite: courses 4C and 147A. European thought since 1890 viewed within the context of major social and political developments. Topics will include: the development of modern sociological and psychological thought; divergent forms of twentieth-century Marxism; the politics of literary intellectuals; French Existentialism.
Mr. Lunn

151A. History of England. (4) I.

Lecture—3 hours. Recommended: course 4A. A survey of English history to the latter part of the fifteenth century.
Mr. Woodfill

151B. History of England. (4) II.

Lecture—3 hours. Recommended: courses 4A, 4B, and 151A. A survey of English history from the latter part of the fifteenth century to the latter part of the eighteenth century.
Mr. Woodfill

151C. History of England. (4) III.

Lecture—3 hours. Recommended: courses 4B, 4C, 151A, and 151B. A survey of English history from the latter part of the eighteenth century to the present.
Mr. Cline

***152A. English Constitutional History. (4) II.**

Lecture—2 hours; discussion—2 hours. Recommended: course 151A. From Anglo-Saxon times to the reign of Edward IV.
Mr. Woodfill

***152B. English Constitutional History. (4) III.**

Lecture—2 hours; discussion—2 hours. Recommended: courses 151B or 154, 151C, and 152A. From the reign of Edward IV to the present.
Mr. Woodfill

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 selected aspects of Tudor and Stuart history; emphasis on social problems and the arts and learning.

Mr. Woodfill

***156. Social and Economic History of Britain since 1760. (4) I.**

Lecture—2 hours; discussion—2 hours. Prerequisite: course 151C or consent of instructor. Integration of the history of industrial, commercial and agricultural development with the nature and course of change in demography, social organization and urbanization from preindustrial to postindustrial Britain.

Mr. Cline

***158A. The British Empire in the Nineteenth Century. (4) II.**

Lecture—3 hours. Prerequisite: course 4C; courses 151B, 151C recommended. The development of Britain's overseas empire, and the evolution of colonial policies, to the Boer War.

***158B. The British Empire in the Twentieth Century. (4) III.**

Lecture—3 hours. Prerequisite: course 4C. Recommended: courses 151B, 151C. The evolution and decline of the British Empire from the Boer War to the 1950s.

***160. History of the West Indies, 1492–1850. (4) III.**

Seminar—3 hours; reports and research papers. Prerequisite: consent of instructor. Study of selected topics on European expansion in the West Indies, with special emphasis on social and economic developments. (Passed/Not Passed grading only.)

Mr. Jacobson

161A. Latin American History. (4) I.

Lecture—3 hours. Colonial history of Latin America.

Mr. Bauer

161B. Latin American History. (4) II.

Lecture—3 hours. The national period of Latin American history.

Mr. Bauer

162. History of the Andean Region. (4) III.

Lecture-discussion—3 hours; term paper. History of the Andean region, the area that now comprises modern Peru, Bolivia, and Chile, from the beginning of human settlement to the present.

Mr. Bauer

163A. History of Brazil. (4) I.

Lecture—3 hours. The history of colonial and imperial Brazil from 1500 to 1889. Mr. Poppino

163B. History of Brazil. (4) II.

Lecture—3 hours. Prerequisite: course 163A or consent of instructor. The history of the Brazilian republic from 1889 to the present.

Mr. Poppino

164. History of Argentina. (4) III.

Lecture—3 hours. Prerequisite: courses 161A and 161B or consent of instructor. The history of Argentina from about 1800 to the present, stressing the contributions of the colonial heritage and nineteenth-century political, economic, and social developments to the rise of Argentine nationalism. Offered in even-numbered years.

Mr. Bauer

165. Latin American Social Revolutions. (4) III.

Lecture—3 hours. Prerequisite: a reading knowledge of Spanish is recommended. Major social upheavals since 1900 in Mexico, Argentina, Brazil, Bolivia, Guatemala, and Cuba, examined as to similarities and differences in causes, course, and consequences. Mr. Poppino

166. History of Mexico. (4) I.

Lecture—3 hours. The colonial origin and development of the Mexican nation; its political, economic, and social institutions. Emphasis on the period since 1910.

Mr. Juárez

168. History of Inter-American Realitions. (4) II.

Lecture—3 hours. Prerequisite: a reading knowledge of Spanish or Portuguese is recommended. Diplomatic history of Latin America since independence, intra-Latin American relations, relations with the United States, participation in international organizations, and communism in Latin America.

Mr. Poppino

***169A. Mexican-American History. (4) I.**

Lecture-discussion—3 hours; term paper. The origins and evolution of the Spanish-speaking population of the Southwest to 1848, with emphasis on native American cultures, Spanish conquest and settlement of Mexico, frontier conditions, missionary efforts, economical, cultural, and social developments in the Spanish Borderlands.

Mr. Juárez

169B. Mexican-American History. (4) I.

Lecture-discussion—3 hours; term paper. Prerequisite: course 169A or consent of instructor. The Spanish-speaking peoples of the American Southwest from 1848 to 1910, with emphasis on the impact of occupation and rule by Anglo-Americans, the Spanish heritage, the clash of cultures, and the role of Mexican-Americans in the mining, pastoral, and agricultural economies.

Mr. Juárez

169C. Mexican-American History. (4) II.

Lecture-discussion—3 hours; term paper. Prerequisite: course 169B or consent of instructor. The Spanish-speaking peoples in the American Southwest since 1910, with emphasis upon the heavy immigration from Mexico following the Mexican Revolution, the "Mexican problem," the bracero program, and the role of Spanish-speaking citizens in the society of the American Southwest.

Mr. Juárez

* Not to be given, 1971–1972.

170A. Colonial America. (4) I.

Lecture—3 hours; discussion—1 hour. Colonial society from 1607 to the American Revolution, with emphasis on European expansion, political, social, and economic foundations, colonial thought and culture, and imperial rivalry.

Mr. Jacobson

170B. The American Revolution. (4) II.

Lecture—3 hours. An analysis of the Revolutionary epoch with emphasis on the structure of British colonial policy, the rise of revolutionary movements, the War for Independence and its consequences, and the Confederation period.

Mr. Jacobson, Mr. Goodman

***170C. The Early National Period. 1789–1815.**

(4) III.

Lecture—3 hours. The political and social history of the American republic from the adoption of the Constitution through the War of 1812 and its consequences.

Mr. Goodman

171A. The Jacksonian Era. (4) I.

Lecture—3 hours. The political and social history of the American Republic from the end of the War of 1812 to the Compromise of 1850.

Mr. Calhoun

171B. American Civil War. (4) II.

Lecture—3 hours. Major developments in American history from 1848 to 1865: slavery and antislavery, immigration, sectional conflict, emergence of the Republican party, the Civil War.

Mr. Calhoun

171C. The Emergence of Modern America. (4) I.

Lecture—3 hours. From Reconstruction to the twentieth century, including political and intellectual change, the advent of big business, the rise of organized labor, ethnic adjustments, urbanization, and movements of social unrest.

Mr. Brody

174A. Recent History of the United States. (4) I, II.

Lecture—3 hours; discussion—1 hour. Study of political, economic, and cultural aspects of American democracy from 1900 to 1930s.

Mr. Shideler, Mr. Swain

174B. Recent History of the United States. (4) I, II.

Lecture—3 hours; discussion—1 hour. Study of political, economic, and cultural aspects of American democracy from the 1930s to the present.

Mr. Brody, Mr. Swain

174C. Selected Themes in Twentieth Century*American History. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 174A or 174B, or consent of instructor. Selected topical themes of the period from the 1890s to the present. Emphasis will be on analysis, synthesis and interpretive overview rather than a chronological narrative of events.

Messrs. Brody, Shideler, Swain

* Not to be given, 1971–72.

175A. Intellectual History of the United States.

(4) II.

Lecture—3 hours. Prerequisite: course 17A or its equivalent; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. American social thought from colonial times to the 1860s. Emphasis upon Puritanism, the American Enlightenment, Transcendentalism, Jacksonian democracy, in the context of ideas about the nature of man and his freedom and the idea of progress.

Mr. Smith

175B. Intellectual History of the United States.

(4) III.

Lecture—3 hours. Prerequisite: courses 17A and 17B; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. American social thought from the 1860s to the present. Emphasis upon the social relevance of philosophical and religious idealism, naturalism, and pragmatism.

Mr. Smith

176A. Social and Cultural History of the United States. (5) I.

Stated.

Lecture—4 hours; term paper. A study of social and cultural forces in American society from colonial times through the Civil War with emphasis on social structure, religious movements, labor systems, racial and national groups, social reform movements and changes in social values.

Mr. Marchand

176B. Social and Cultural History of the United States. (5) III.

Stated.

Lecture—4 hours; term paper. A study of social and cultural forces in American society since the Civil War and with emphasis on social structure, religious movements, labor systems, racial and national groups, social reform movements, problems and urbanization, and changes in social values.

Mr. Marchand

***178A. Great Issues in United States History: Ideas and Interpretations. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior standing or consent of instructor. Selected topics in the political, economic, social and intellectual history of the United States. A study in historical thought and interpretation concerning the main currents of national development to 1865.

Mr. Jackson

***178B. Great Issues in United States History: Ideas and Interpretations. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior standing or consent of instructor. Selected topics in the political, economic, social and intellectual history of the United States. A study in historical thought and interpretation concerning the main currents of national development since 1865.

Mr. Jackson

***179A. Economic Growth of the United States.**

(4) II.

Lecture—3 hours. Development of the American economy from colonial agriculture and mercantilism to the emergence of industrial capitalism.

***179B. Economic Growth of the United States.**

(4) III.

Lecture—3 hours. The changing nature of industrial capitalism and its effects on agriculture, labor, business, and government in the late nineteenth and twentieth centuries. Mr. Brody

183A. The Frontier Experience: Trans-Mississippi

West. (4) I.

Lecture—3 hours; discussion—1 hour. 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.

Mr. Jackson

183B. The Frontier Experience: Trans-Mississippi

West. (4) II.

Lecture—3 hours; discussion—1 hour. 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.

Mr. Jackson

185A. History of Science and Technology in America. (4) II.

Lecture—3 hours. A study of science and technology in America, emphasizing the development of scientific ideas and institutions to 1890.

Mr. Sherwood, Mr. Swain

185B. History of Science and Technology in America. (4) III.

Lecture—3 hours. A study of science and technology in America, emphasizing the development of scientific ideas and institutions since 1890.

Mr. Sherwood, Mr. Swain

187. Issues in American Educational History. (4) III.

Lecture—3 hours; discussion—1 hour. An exploration of the patterns by which educational institutions have developed, with emphasis on the ways in which Americans have used the transmission of culture between generations as a focus for general social criticism. Offered in odd-numbered years.

Mr. Calhoun

***188A. History of Agriculture in the United States. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior or senior standing. History of agricultural development to 1900 with emphasis on social and economic institutions. Mr. Shideler

***188B. History of Agriculture in the United States. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior or senior standing. History of agricultural changes from 1900 to the present with emphasis on the background and evolution of government policy.

Mr. Shideler

***189A. History of California. (4) II.**

Lecture—3 hours; discussion—1 hour. History of California to 1865.

Mr. Jackson

189B. History of California. (4) II.

Lecture—3 hours; discussion—1 hour. History of California since 1865.

Mr. Jackson

***191A. Early Imperial China. (4) I.**

Lecture—3 hours; discussion—1 hour. Chinese history to 960 with emphasis on the basic ideas and institutions which have molded the culture and society of China.

Mr. Lo

***191B. Late Imperial China. (4) II.**

Lecture—3 hours; discussion—1 hour. China, 960 to 1800, with attention to the growth of autocracy, economic and intellectual development, and problems of foreign relations. Offered in even-numbered years.

Mr. Lo

191C. Modern China. (4) III.

Lecture—3 hours; discussion—1 hour. The revolutionary transformation of China from the nineteenth century to the present.

Mr. Lo

192A. Modern China and the West. (4) I.

Lecture—3 hours. A survey of China's relations with the West since 1800, with emphasis on the impact of imperialism, the profound effects of Western technology and ideas, and the changes in the Chinese worldview and foreign policy.

Mr. Liu

192B. Modern China and the West. (4) II.

Lecture—1 hour; discussion—2 hours. Prerequisite: course 192A or consent of instructor. Intensive study of topics in the history of China's relations with the West.

Mr. Liu

193. China's Relations with Southeast Asia. (4) I.

Lecture—3 hours; discussion—1 hour. China's historical relations with Southeast Asia—military, political, cultural, and economic. Offered in odd-numbered years.

Mr. Lo

194A. History of Japan, I. (4) I.

Lecture—3 hours. A survey of Japanese history to the end of the Tokugawa period.

Mr. Miller

194B. History of Japan, II. (4) II.

Lecture—3 hours. Prerequisite: course 194A or consent of instructor. A survey of Japanese history from the late Tokugawa period to the present.

Mr. Miller

* Not to be given, 1971-72.

197T. Tutoring in History. (2) I, II, III.

Discussion—1 hour; laboratory—3 hours. Prerequisite: enrolled as a history major with senior standing and consent of Department Chairman. Tutoring of students in lower division courses. Weekly meeting with instructors in charge of courses. Written reports on methods and materials required. May be repeated once for credit. No final examination. (Passed/Not Passed grading only.)

The Staff (Mr. Woodfill in charge)

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor; upper division standing.

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

Graduate Courses**201. Sources and General Literature of History.**

(4) I, II, III.

Seminar—3 hours. Designed primarily for students preparing for higher degrees in history. A. Ancient; B. Medieval; C. Renaissance and Reformation; D. Modern Europe to 1815; E. Europe since 1815; F. Russia; G. China to 1600; H. China since 1600; I. Britain, J. Latin America since 1810; K. American history to 1787; L. United States, 1787-1896; M. United States since 1896; N. Japan. The Staff

***202. Social Science in Historical Practices. (4) III.**

Seminar—4 hours. Explores sociological and economical ideas that have actually been used by working historians, especially in United States history, and develops ways to evaluate and plan such efforts.

Mr. Calhoun

***211. Ancient History. (4) II.**

Seminar—3 hours. Prerequisite: courses 111A, 111B, 111C. A seminar dealing with the various aspects of Near Eastern and Greco-Roman civilization.

Mr. Spyridakis

***221. Medieval History. (4) III.**

Seminar—3 hours. Recommended: courses 121A, 121B. Topics in the history of medieval Europe.

Mr. Bowsky

***237. Russian History. (4) I.**

Seminar—3 hours. Prerequisite: a reading knowledge of Russian. Topics relating to the history of Muscovite and Imperial Russia before 1856.

Mr. O'Brien

***242. History of the Enlightenment. (4) III.**

Seminar—3 hours. Prerequisite: a reading knowledge of French. Intellectual and social

history of Europe during the Enlightenment. May be repeated for credit. Mr. Schwab

246. Europe in the Twentieth Century. (4) III.

Seminar—3 hours. Political history of Europe since 1919, with particular emphasis on the post-1939 period.

Mr. Willis

251. English History. (4) I, II, III.

Seminar—3 hours. Recommended: courses 151A, 151B, and 151C; 152A and 152B; 154. Mr. Woodfill

261. Latin American History. (4) I, II, III.

Seminar—3 hours. Prerequisite: two courses in Latin American history; reading knowledge of Spanish or Portuguese.

Mr. Bauer, Mr. Poppino

***270. Early American History. (4) III.**

Seminar—3 hours. Mr. Jacobson

***271. History of the United States, 1760-1815.**

(4) II.

Seminar—3 hours. Mr. Goodman

272. History of the United States, 1815-1848.

(4) II.

Seminar—3 hours. Mr. Calhoun

***273. History of the United States, 1848-1900.**

(4) I, II.

Seminar—3 hours. —————

274. Recent History of the United States. (4) I.

Seminar—3 hours. Topics in twentieth century American history.

Mr. Swain

275. American Social and Intellectual History.

(4) III.

Seminar—3 hours. Prerequisite: courses 175A, 175B or their equivalent; or consent of instructor. Studies in the recent historiography of, or research in, American social and intellectual history. May be repeated for credit.

Mr. Smith

***276. Social History of Science and Technology in America. (4) I.**

Seminar—3 hours. Prerequisite: graduate standing. Studies in the historiography of, and research in, the history of science and technology in America from colonial times to the present.

Mr. Sherwood

***279. History of the United States: the Twentieth Century. (4) I.**

Seminar—3 hours. Emphasis on social and economic developments.

Mr. Brody

***283. History of the United States: The Frontier. (4) I.**

Seminar—3 hours. Mr. Jackson

* Not to be given, 1971-72.

***288. History of the United States. (4) II, III.**

Seminar—3 hours. Prerequisite: graduate standing. Emphasis on agricultural history and closely related topics such as exports, transportation and politics.

Mr. Shideler

291A-291B. Chinese History. (4-4) I-II.

Seminar—3 hours. Prerequisite: consent of instructor. Research on topics to be chosen by the student for the purpose of writing article-length papers.

Mr. Liu, Mr. Lo

291C. Chinese History. (4) III.

Seminar—3 hours. Prerequisite: reading knowledge of Chinese. Readings in Chinese historical materials. Training in the techniques of using Chinese reference works will be provided.

Mr. Lo

HOME ECONOMICS EDUCATION

Major Advisers.—See *Schedule and Directory* listing.

Major Program and Graduate Study.—See pages 62, 85, and 171.

Questions pertaining to the following course should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

298. Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

299. Research. (1-9) I, II, III.

The Staff (Chairman in charge)

299D. Individual Study. (1-6) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

Professional Course

300. The Teaching of History in the Secondary School and the Junior College. (3) III.

Lecture—3 hours. Prerequisite: junior or senior standing with a teaching major or minor in social studies. Methods for the presentation of history at the secondary and junior college level.

Professional Course

300. Teaching Home Economics in Secondary Schools. (3) I, II, III.

Lecture—3 hours. Prerequisite: senior or graduate standing; a teaching major or minor in home economics. Instructional procedures and materials used in teaching home economics in secondary schools. This course should be completed before student teaching and is accepted as a part of the professional education requirements for the teaching credential. Mrs. Adams

HOME MANAGEMENT

Related Undergraduate Major.—See page 65.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Upper Division Courses

140. Home Management. (4) III.

Lecture—4 hours. Prerequisite: Psychology

1A. Management principles in relation to family resources, goals, and values. Mrs. Bruhn

140L. Laboratory in Home Management. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 140 and senior or graduate standing. Integrated experiences in the various phases of home management. Mrs. Bruhn

HUMAN DEVELOPMENT

Related Undergraduate Major.—See page 65.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses

12. Human Sexuality and Sexual Behavior. (2) I.

Lecture—2 hours. Structure and function of genital system; sexual response; fertility; birth control; pregnancy and childbirth; homosexu-

ality; cross-cultural, social and psychological considerations; sex education; courtship and marriage; communication; attitudes and values; lovemaking. (Passed/Not passed grading only.) Mr. Hildebrand

33. Introduction to Supervised Observation. (2) I, II, III.

Lecture—1 hour; discussion—1 hour. Observation of individuals in a variety of settings; emphasis on observational techniques and the discrimination of individual differences.

The Staff (Mrs. Welker in charge)

* Not to be given, 1971-72.

98. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Thompson in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

The Staff (Mr. Thompson in charge)

Upper Division Courses**131. Infancy and Early Childhood. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Psychology 1A or 10. Psychological and cultural factors in the development of infants and preschool children.

I-II. Mr. Lynn, III. Mr. Harper

133. Case Study of a Preschool Child. (2) I, II, III.

Lecture—1 hour; observation—3 hours. Prerequisite: course 131 or consent of instructor. Intensive case study of an individual child, age 3 to 5; use of observational techniques, cumulative records, test results.

Mrs. Welker

133L. Laboratory in Early Childhood Education.

(3) I, II, III.

Discussion—1½ hours; laboratory—5 hours. Prerequisite: course 133 and consent of instructor. Participation, under supervision, in the University Laboratory Nursery School. Interaction with groups of young children, observation in schools, evaluation and testing of theories of preschool education and child development. Consideration is given to the student's specific interests and skills.

Mrs. Welker

136. Middle Childhood and Adolescence. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: Psychology 1C. Psychological and cultural factors in the development of school-age children and adolescents.

I. Mr. Horowitz, II. Mr. Harper,
III. Miss Werner**136L. Laboratory in Child Development. (2) II, III.**

Discussion—1 hour; laboratory—3 hours. Prerequisite: courses 133 or 136 or Psychology 112. Laboratory work with school-age children and adolescents including supervised tutorial work with children with special needs. May be repeated for credit.

Mrs. Bachtold

137. Contemporary American Family. (4) II III.

Lecture—4 hours. Sociological and psychological factors influencing marriage and the family in present-day society.

Mr. Hawkes

139. Diagnostic Techniques with Children.

(4) I, II, III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 131 and 136, or Psychology 112. Evaluation of intelligence, personality, and special abilities of children. Class demonstration of individual tests for infants, preschool, and school-age children. Concepts of environment. Relevant research findings.

Miss Werner

140. Emotionally Disturbed Children. (4) II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 131 and 136, or Psychology 112. Discussion of psychosis, neurosis, behavior disorders, and learning difficulties in children.

Mrs. Bachtold

141. Physically Handicapped and Mentally Retarded Children. (3) I, II.

Lecture—3 hours. Prerequisite: courses 131 and 136 or Psychology 112. Etiology and diagnosis of sensory handicaps, brain damage, and mental retardation in children; education of these children.

Miss Werner

142. Gifted Children. (3) I, II.

Lecture—3 hours. Prerequisite: course 136 or Psychology 112 or consent of instructor. Review of research on intellectually gifted; planning appropriate classroom experiences; role of parents and teachers in encouraging creative thinking.

Mrs. Bachtold

143. The Adult. (3) III.

Lecture—3 hours. Prerequisite: courses 131 and 136, or psychology 112. Developmental stages of early, middle, and late adulthood; the mature personality.

Mr. Burch

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Thompson in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Thompson in charge)

Graduate Courses**210. Child Development and Behavior. (3) I.**

Lecture—discussion—3 hours. An analysis of the historical, theoretical and empirical issues in child development.

Mr. Harper

231. Issues in Cognitive and Linguistic Development. (3) III.

Seminar—3 hours. Prerequisite: Education 212 and consent of instructor. The study and evaluation of key issues in the theoretical and empirical literature on cognitive and linguistic development.

Mr. Horowitz

290. Seminar. (2) I, II, III.

Discussion—2 hours. Discussion and analysis of research in human development. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Thompson in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Thompson in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Thompson in charge)

INSTITUTION MANAGEMENT

Related Major Program.—See page 65.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

123. Quantity Food Production and Service. (3) I.

Lecture—3 hours. Prerequisite: Foods 100B. The principles and problems involved in selection, preparation, service, and sanitary handling of food for institutions. Mrs. Sugars

123L. Quantity Food Production and Service Laboratory. (3) II.

Discussion—1 hour; laboratory—6 hours. Prerequisite: course 123. The implementation and application of the principles of quantity food service. Mrs. Sugars

*124. Food Service Organization and Management. (6) III.

Lecture—5 hours; laboratory—3 hours. Prerequisite: Foods 100B. Administration of quantity food service units: general principles of organization and management, work simplification, personnel management, planning for layout and equipment, financial management. Miss Zeman

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: senior standing and consent of instructor. The Staff (Miss Zeman in charge)

*199. Special Study for Advanced Undergraduate

(1-5) I, II, III.

Prerequisite: senior standing and consent of instructor. The Staff (Miss Zeman in charge)

INTEGRATED STUDIES

Arthur E. McGuinness, Ph.D., *Chairman of the Group*
Group Office, 822 Sproul Hall

1A-1B-1C. Major Figures of the Seventeenth and Twentieth Centuries: Philosophy, Theology and the Sciences. (4-4-4) I-II-III.

Lecture—4 hours. Prerequisite: courses 2A-2B-2C and 6 to be taken concurrently. An interdisciplinary study of the ideas and methods of Galileo, Newton, Pascal, Descartes, Hobbes, Whitehead, Einstein and Nietzsche.

The Staff (Mr. McGuinness in charge)

ciplinary study of psychology, drama, the novel, art and music. The Staff (Mr. Swift in charge)

4A-4B-4C. Tradition and Change in the Sciences, Philosophy and Psychology. (4-4-4) I-II-III.

Lecture—4 hours. Prerequisite: courses 1C and 2C; courses 3A-3B-3C and 8 to be taken concurrently; consent of instructor. An interdisciplinary study of biology, genetics, philosophy of science and psychology.

The Staff (Mr. Swift in charge)

6. Seminar. (1) I-II-III.

Discussion—1 hour. Prerequisite: courses 1 and 2 to be taken concurrently. Concentrates on the integration of knowledge in the arts and sciences with emphasis upon major figures studied in courses 1 and 2. May be repeated for credit.

The Staff (Mr. Swift in charge)

8. Seminar. (1) I-II-III.

Discussion—1 hour. Prerequisite: courses 3 and 4 to be taken concurrently. Concentrates on the integration of knowledge about tradition and change in the arts and sciences. May be repeated for credit. The Staff (Mr. Swift in charge)

2A-2B-2C. Major Figures of the Seventeenth and Twentieth Centuries: The Arts. (4-4-4) I-II-III.

Lecture—4 hours. Prerequisite: courses 1A-

1B-1C and 6 to be taken concurrently. An interdisciplinary study of the ideas and work of Rembrandt, Donne, Monteverdi, Stravinsky, Picasso and Eliot.

The Staff (Mr. Swift in charge)

and 2 to be taken concurrently. Concentrates on the integration of knowledge in the arts and sciences with emphasis upon major figures studied in courses 1 and 2. May be repeated for credit.

The Staff (Mr. Swift in charge)

3A-3B-3C. Tradition and Change in the Arts and Political Science. (4-4-4) I-II-III.

Discussion—1 hour. Prerequisite: courses 3

and 2C; courses 4A-4B-4C and 8 may be taken concurrently; consent of instructor. An interdis-

ciplinary study of the arts and political science with emphasis upon tradition and change in the arts and sciences. May be repeated for credit. The Staff (Mr. Swift in charge)

INTERNAL MEDICINE—See Medicine

INTERNATIONAL AGRICULTURAL DEVELOPMENT

Major Advisers.—See *Schedule and Directory* listing.

Major Program and Graduate Study.—See pages 62, 86, and 171.

Lower Division Course

10. Population, Food, and Life; Quality or Subsistence? (3) I.

Lecture—3 hours. Food requirements versus self-realization as the limiting force in population growth; the interaction of changing human goals and new technology through successive

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

* Not to be given, 1971-72.

stages in economic development; agriculture's contributions to development. Mr. Hansen

suited to these areas and their management; uses of animals and their by-products.

The Staff (Mr. Vohra in charge)

Upper Division Courses

101. Crop Production under Tropical Conditions. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Science 2 or Botany 2. Climatic and soil adaptation; varieties and varietal improvement in annual and perennial crops; pests, diseases, and their control; fertilization and other management practices. Mr. Williams

190. Proseminar in International Agricultural Development. (3) III.

Lecture—1 hour; seminar—2 hours. Prerequisite: consent of instructor. Coordination of concepts, principles, and information drawn for technical agriculture and the social sciences presented in the context of economic development. Special emphasis on the problems of program design and implementation. Mr. Davis

102. Livestock and Poultry Production in Developing Areas. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Ecological considerations of developing areas including feed resources, pests, diseases and their control; kinds of livestock, wild game, poultry and fish

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Akesson in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Hedges in charge)

INTERNATIONAL AGRICULTURAL DEVELOPMENT (A Graduate Group)

Lynn D. Whittig, Ph.D., *Chairman of the Group*
Group Office, 187 Hoagland Hall

Graduate Courses

280A-280B. Social, Technological, and Economic Factors; Strategies, Planning Procedures and Case Studies. (3-3) II-III.

Seminar—3 hours. Prerequisite: consent of instructor. Problems and analysis in agricultural development; cultural, political, social, and economic organization; human factors in relation to

resource use and technology; strategies and planning procedures in agricultural development; case studies of development programs in individual countries.

II. Mr. Hedges, Mr. Peterson
III. Mr. Hedges, Mr. Akesson

299. Research. (1-9) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Whittig in charge)

INTERNATIONAL RELATIONS

Robert J. Lieber, Ph.D., *Chairman of the Committee*
Committee Office, 257 Voorhies Hall

Committee in Charge:

Andrzej Brzeski, Ph.D. (*Economics*)
Howard F. Gregor, Ph.D. (*Geography*)
Robert J. Lieber, Ph.D. (*Political Science*)
H. Guenther Nerjes, Ph.D. (*German and Russian*)

Rollie E. Poppino, Ph.D. (*History*)

Major Adviser: See Schedule and Directory.

International relations embraces the social relationships which transcend the boundaries of national states. The major in international relations is devised to meet the needs of students interested in acquiring an understanding of the forces and influences conditioning present-day world politics and economics, as well as the main problems and policies of organized states in their relations with one another. Because these

problems and policies must be dealt with and determined by governments, the major is built around courses dealing with intergovernmental diplomatic and economic relations. However, it cuts across departmental lines, for foreign policies are made in relation to political, geographic, economic, and social conditions, and in the light of historical precedents.

The Major Program

Language requirement: approximately 28 quarter units in one modern foreign language. Equivalent course coverage by a placement test or transfer credit is accepted.

Lower Division Courses.—Required: Economics 1A-1B or 2A-2B-2C; History 4B, 4C, or 9A, 9B or 17A, 17B; Political Science 2, 3; one course in sociology; one course to be selected from the following: anthropology, geography, art or philosophy.

Upper Division Courses.—From the following four disciplines select 3 courses from each of two disciplines, and 2 courses from each of the remaining two; or select 3 courses from each of three disciplines, and at least one course in the remaining discipline.

- a) Economics: 115A, 115B, 116, 117, 160, 161;
- b) Political Science: 123, 124, 128A, 128B, 131, 132, 134, 137, 139, 144, 145, 149;
- c) History: 102, 137D, 143A, 143B, 146A, 146B, 147B, 151C, 161B, 162, 163B, 164, 165, 166, 168, 169C, 174A, 174B, 190B;
- d) Sociology: 118, 125, 130, 141, 142, 143. Two courses to be selected from the following: anthropology, geography, literature, art, dramatic art, philosophy. Interdisciplinary seminar (listed under political science 192A, 192B), 2 quarters of 4 units each, required in junior or senior year.

ITALIAN

Department Office, 515 Sproul Hall

Assistant Professors:

Jonathan L. Butler, Ph.D.

Alfonso De Petris, *Dottore in Lettere*.

Enrico Marelli, *Dottore in Lettere*.

Departmental Major Adviser.—Mr. Marelli.

The Major Program

Lower Division Courses.—Required: Italian 1, 2, 3, 4, 5, and 6 or their equivalents. Recommended: one year of college Latin or a Romance Language.

Upper Division Courses.—Required: at least 36 units of upper division courses of which two may be chosen from department-approved courses in related fields.

Honors and Honors Program (see page 149). The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—A minimum of at least 30 units in Italian of which 12 are upper division units including Italian 101 and 102.

Lower Division Courses

A course may not ordinarily be taken for credit if it is a prerequisite to a course already completed. Students offering high school language preparation as a prerequisite must take a placement test.

1. Elementary Italian. (4) I, II, III.

Laboratory—2 hours; recitation—3 hours.
The Staff

Additional accepted courses: Economics 110B; History 141, 144B, 184, 191C, 192A, 192B, 193, 194B; Political Science 141, 142, 143, 146A, 146B, 147A, 147B, 148A, 148B, 172, 174; Sociology 145, 155, 175; German 110, 111, 114, 115, 116; Russian 40, 41, 42, 125, 128; French 107A, 107B, 141, 142, 150; Italian 120A 120B; Oriental Languages 132A, 132B, 142; Spanish 101A, 101B, 101C, 120A, 134, 150.

Teaching Major.—For the secondary credential: In addition to the departmental major, one (three or four unit) upper division course in history, economics, political science, or sociology is required. This course is to be selected from the courses listed above.

For the elementary credential: The teaching major is the same as the departmental major.

Subject Representative: Mr. Lieber

2. Elementary Italian. (4) I, II, III.

Laboratory—2 hours; recitation—3 hours.
Prerequisite: course 1. Continuation of course 1.
The Staff

3. Elementary Italian. (4) I, II, III.

Laboratory—2 hours; recitation—3 hours.
Prerequisite: course 2 or equivalent. Continuation of course 2.
The Staff

4. Intermediate Italian. (3) I, II, III.

Laboratory—1 hour; recitation—3 hours. Prerequisite: course 3 or equivalent.
The Staff

5. Intermediate Italian. (3) II, III.

Laboratory—1 hour; recitation—3 hours. Prerequisite: course 4 or equivalent. Continuation of course 4.
The Staff

6. Reading and Conversation. (4) I, III.

Recitation—4 hours. Prerequisite: course 5 or equivalent. Class discussion; reading of selected works; oral reports; analysis of texts.
The Staff

Upper Division Courses

101. Advanced Conversation, Composition, and Grammar. (4) I.

Lecture—3 hours; weekly essays. Prerequisite: course 6 or consent of instructor.
Mr. De Petris

102. Advanced Conversation, Composition, and Grammar. (4) II.

Lecture—3 hours; weekly essays. Prerequisite: course 101 or consent of instructor. Offered in odd-numbered years.
Mr. De Petris

**113A. Italian Literature before the Renaissance:
from St. Francis to Petrarch. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. A study of the origins of lyrical forms of Italian literature of the thirteenth and fourteenth centuries. The development of an Italian standard of poetry, with emphasis on the Sicilian school of Poetry. The "Sweet New Style," and Petrarch. Mr. Butler

**113B. Italian Literature before the Renaissance:
Dante's Divine Comedy and Boccaccio. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. A study of the origins of non-lyrical forms of Italian literature of the thirteenth and fourteenth centuries. The *Divine Comedy* and the development of a prose style with emphasis on Boccaccio's *Decameron*. Mr. Butler

**115A. Italian Literature of the Renaissance and
the Baroque: from Humanism to Machiavelli.
(4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. A detailed examination of the development of the Renaissance ideal of man and the subsequent loss of faith in this ideal as evidenced in the work of Lorenzo de' Medici, Poliziano, Ariosto and Machiavelli. Mr. De Petris

***115B. Italian Literature of the Renaissance and
the Baroque: from Cellini to Marino. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 115A. A continued examination into the loss of an ideal. Emphasis on the conflicts in Michelangelo and Tasso leading to Marino, with an excursus on Galileo's role in the formation of a modern literary standard. Mr. De Petris

**118. Italian Literature of the Eighteenth
Century. (4) I.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. An examination of the struggle for the establishment of a modern Italian literature. Emphasis on the work of Goldoni, Bettinelli, Baretti, Parini, Alfieri and Vico. Offered in odd-numbered years. Mr. Marelli

**119. Italian Literature of the Nineteenth
Century. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. The various aspects of romanticism in Italy; Manzoni, Verga and *Verismo*. Offered in even-numbered years. Mr. Marelli

JAPANESE—See Oriental Languages

* Not to be given, 1971-72.

**120A. Italian Literature of the Twentieth Century:
The Novel. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. A study into the development of the novel from Svevo to the present. Emphasis on the work of Svevo, Levi Moravia, Pavese and Vittorini. Offered in odd numbered years. Mr. Marelli

***120B. Italian Literature of the Twentieth Century:
Poetry and Drama. (4) III.**

Lecture—3 hours; term paper. Prerequisite course 6 or consent of instructor. The main trends in Italian poetry with emphasis on hermeticism; the theater of Luigi Pirandello and its role in the development of contemporary Italian drama. Offered in even-numbered years. Mr. Marelli

**139A. Italian Literature in English: Early Italian
Literature and Dante Alighieri. (4) I.**

Lecture—3 hours; term paper. The origin of the Italian Lyric Tradition, with emphasis on authors of the Sicilian School, the Dolce Stile Novo, and Dante's *Vita Nova* (offered in even-numbered years); the *Divina Commedia*. Offered in odd-numbered years. The Staff

**139B. Italian Literature in English: Boccaccio,
Petrarch and the Renaissance. (4) II.**

Lecture—3 hours; term paper. Petrarch and Boccaccio and their relations to the Middle Age and the Renaissance (offered in even-numbered years); the Renaissance, with particular attention to the works of Lorenzo de' Medici, Leonardo da Vinci, Machiavelli, Ariosto, Michelangelo and Tasso. Offered in odd-numbered years. The Staff

**139C. Italian Literature in English:
Modern Italian Literature. (4) III.**

Lecture—3 hours; term paper. The Romantic Movement in Italy in its relationship to European Romanticism with emphasis on Foscolo, Leopardi and Manzoni (offered in even-numbered years); twentieth-century Italian authors differing emphasis according to the needs of the students. Offered in odd-numbered years. The Staff

**194H. Special Study for Honors Students.
(5) I, II, III.**

Prerequisite: open only to honors students. Guided research leading to an honors paper. The Staff (Mr. Bach in charge)

**199. Special Study for Advanced Undergraduates.
(1-4) I, II, III.**

Prerequisite: consent of instructor. Directed individual study for advanced undergraduates. The Staff (Mr. Bach in charge)

LATIN—See Classics**LAW**

Daniel J. Dykstra, LL.B., S.J.D., *Dean of the School and Chairman of the Department*

Richard D. Lee, LL.B., *Assistant Dean of the School*

John F. Petrini, J.D., *Assistant Dean of the School (Administrative)*

Department Office, 1011 Martin Luther King, Jr. Hall

Professors:

Homer G. Angelo, J.D., LL.M.

Edward L. Barrett, Jr., J.D.

Edgar Bodenheimer, J.U.D., LL.B.

Daniel J. Dykstra, LL.B., S.J.D.

James E. Hogan, LL.B.

Edward H. Rabin, LL.B.

Mortimer D. Schwartz, J.D., LL.M., M.S.
(*Law Librarian*)

John W. Whelan, LL.B.

Donald H. Wollett, LL.B.

◇ ◇ ◇

Professors:

Gerald J. Adler, LL.B., LL.M. (*Acting*)

John D. Ayer, J.D. (*Acting*)

Edwin J. Bradley, LL.B. (*Visiting*)

David L. Crump, J.D. (*Acting*)

Charles Davenport, LL.B. (*Acting*)

Harrison C. Dunning, LL.B. (*Acting*)

Stephen S. Dunham, LL.B. (*Acting*)

Floyd F. Feeney, LL.B. (*Acting*)

Daniel W. Fessler, J.D., LL.M. (*Acting*)

Dov M. Grunschlag, LL.B. (*Acting*)

Kellis E. Parker, J.D. (*Acting*)

Raymond I. Parnas, J.D., LL.M. (*Acting*)

John W. Poulos, J.D. (*Acting*)

Paul N. Savoy, LL.B. (*Acting*)

Richard V. Wellman, J.D. (*Visiting*)

Lecturers:

Brigitte M. Bodenheimer, J.U.D., LL.B.

Roger F. Cox, LL.B.

Duncan E. Haynes, J.D.

Richard D. Lee, LL.B.

Alfred J. Lewis, LL.B., A.M.L.S.
(*Assistant Librarian*)

Lee J. Sclar, J.D.

Admission Requirements and Curriculum:
for details consult the *Announcement of the School of Law*.

Professional Curriculum**First Year****200. Introduction to the American Legal Process.**

(3) I.

Lecture—3 hours. An introduction to American Legal Process through study of how courts

resolve disputes in selected areas. Emphasis will be upon operation of the case law system, the lawmaking roles of the courts and the legislatures and the acquisition of skills of a lawyer.

Mr. Grunschlag, Mr. Poulos

201A-201B-201C. Property. (3-3-2) I-II-III.

Lecture—3-3-2 hours. The development of the law of property, including estates and other interests in land, real property marketing and conveyancing, land-use control, and landlord-tenant problems. (Deferred grading only, pending completion of sequence.)

Mr. Dunning, Mr. Wellman

202A-202B. Contracts. (4-3) I-II.

Lecture—4-3 hours. Examination of the sorts of promises that are enforced at law and the nature of protection given. Inquiry into the means by which traditional doctrine adjusts—or fails to adjust—to changing social demands. (Deferred grading only, pending completion of sequence.)

Mr. Ayer, Mr. Fessler

203A-203B. Pleading and Procedures in Civil Cases.

(3-3) II-III.

Lecture—3-3 hours. A study of the methodology by which a civil suit is initiated and carried through the courts (excluding, however, the rules and tactics relating to the proof of disputed facts, which are the subject matter of Evidence and Trial Practice, respectively). In depth study of the decision on the proper court in which to litigate; the steps necessary to perfect that court's jurisdiction over the individual suit; the extent to which pleadings are used to frame the issues for trial; when and how a case may be disposed of without trial; the discovery devices available to learn the details of the opponent's case; various motions that may or should be made during and after trial; and the procedures related to appealing the result of the trial. At all stages, the code pleading system in use in California State courts is contrasted with that used by the Federal court system. (Deferred grading only, pending completion of sequence.)

Mr. Hogan, Mr. Poulos

204A-204B. Torts. (4-4) I-II.

Lecture—4-4 hours. A study of the legal concepts which apply to actions brought by litigants who seek relief for injury; thus, concern with intentional invasions of personality and property and with the unintentional invasion of these same interests. More specifically, anal-

ysis of civil actions based upon wrongs carrying labels such as: assault, battery, false imprisonment, negligence, defamation, invasion of privacy, misrepresentation and nuisance. (Deferred grading only, pending completion of sequence.)

Mr. Adler, Mr. Dykstra

205. Introduction to Public Law. (2) II.

Lecture—2 hours. An introduction to the legal aspects of government including the legislative and executive processes, administration and regulation. Study of Federal and State materials. Consideration of statutory construction and interpretation. Mr. Whelan

207A-207B-207C. Legal Research and Writing.

(1-1-2) I-II-III.

Seminar—1-1-2 hours. Small group instruction in the techniques of legal research and writing. (Deferred grading only, pending completion of sequence.) Mr. Lewis, Mr. Schwartz

208. Criminal Law Administration. (5) III.

Lecture—5 hours. An introduction to the administration of the criminal process, with an emphasis upon the constitutional and administrative problems raised by various police investigative procedures such as: temporary detention and arrest; "frisks" and searches; the use of informers and decoys; electronic surveillance; interrogation; fingerprinting; blood tests; and line-ups. Also, consideration of the following pre-trial stages of the criminal process: bail; the preliminary examination; the motion to suppress; plea bargaining and discovery.

Mr. Savoy, Mr. Parnas

209. Current Legal Problems. (3) III.

Lecture—3 hours. Opportunity to consider in small groups legal problems of current significance. Each section will focus on a separate problem area. Problems to be announced in advance by the instructor teaching the particular sections. Messrs. Ayer, Dunning, Parker, Wollett

Second and Third Year Courses

214. Constitutional Law I. (3) II.

Lecture—3 hours. An introductory analysis of the judicial process in constitutional cases; division of powers between the national government and the states. Mr. Barrett, Mr. Poulos

215A-215B-215C. Business Associations.

(2-2-3) I-II-III; or

215A-215B. Business Associations.

(4-3) II-III.

Lecture—2-2-3 or 4-3 hours. An introduction to the legal rules and concepts applicable to corporations and partnerships including materials related to the agency, the process of incorporation, the financing of corporations, the role of management, the role of shareholders, and the means by which corporate structure is

changed. (Deferred grading only, pending completion of sequence.) Mr. Bradley, Mr. Fessle

216. Commercial Law I. (3) I.

Lecture—3 hours. The basic course in Commercial Law. Emphasis on secured commercial transactions, particularly under Article 9 of the Uniform Commercial Code. Attention also to the developing law of consumer protection under retail installment sales acts, "truth in lending" acts, and the like. Some coverage of negotiable instruments (often described as a field in which form has triumphed over substance). Enrollment in this course is helpful before, though not prerequisite to, enrollment in either course 237 or 243. Mr. Le

217. Constitutional Law II. (4) III.

Lecture—4 hours. Constitutional limitations on governmental power, civil rights and civil liberties. Mr. Barrett, Mr. Poulos

218. Criminal Law. (4) I.

Lecture—4 hours. A study of the elements and policies of selected criminal offenses. Mr. Poulos

219A-219B-219C. Evidence. (2-2-2) I-II-III.

Lecture—2-2-2 hours. The rules regulating the admissibility of testimonial and documentary proof during the trial of civil and criminal cases, including the concept of relevancy, the hearsay rule, the examination and impeachment of witnesses, the opinion rule, constitutional and statutory privileges, presumption, and burden of proof. (Deferred grading only, pending completion of sequence.)

Mr. Crump, Mr. Hoga

220A-220B. Federal Taxation I. (3-3) I-II.

Lecture—3-3 hours. A study of the statutory, judicial, and administrative material concerning federal income taxes. (Deferred grading only, pending completion of sequence.)

Mr. Davenport

221. Introduction to Estate Planning I. (3) I, III.

Lecture—3 hours. The basic estate planning devices, with emphasis on wills and trusts. Mr. Crump, Mr. Wellma

222A-222B. Federal Taxation I—Short Course.

(3-2) I-II.

Lecture—3-2 hours. A study of the statutory, judicial, and administrative material concerning federal income taxes. (Deferred grading only, pending completion of sequence.)

Mr. Davenport

223A-223B. Introduction to Estate Planning II.

(2-2) I-II.

Lecture—2-2 hours. Prerequisite: course 221. Stresses implementation as well as conception of a modern estate plan. Substantive legal subjects will include future interests. (Deferred grading only, pending completion of sequence.)

Mr. Wellma

224. Criminal Law—Short Course. (3) I.

Lecture—3 hours. A study of the elements and policies underlying selected criminal offenses. Mr. Cox

225. Marital Property and the Custody of Children.

(2-4) II.

Lecture—2-4 hours. Property consequences of marriage dissolution, marital property settlement agreements, California community property law, and child custody determinations following marriage dissolution and in other legal settings. Students who have had course 268 may elect this course for two units.

Mrs. Bodenheimer

230. The Family and the Law. (4) I.

Lecture—4 hours. An introduction to the role of the law in regulating the family process. Emphasis will be placed not on the development of legal doctrine but on an experiential and interdisciplinary perception of the dynamics of family life and the role of the lawyer in helping people to organize, maintain, and dissolve husband-wife and parent-child relationships.

Mr. Savoy

231. Legislation. (3) III.

Lecture—3 hours. Organization and operation of the legislature under constitution and rules; relationship among the legislative, executive and judicial branches; statutory interpretation and drafting; executive administration.

Mr. Whelan

232. Private Land Development and Finance. (3) III.

Lecture—3 hours. A transactional study of selected problems in the acquisition, financing, and development of large-scale real estate developments, particularly "new town" and "recreational" subdivisions. Mr. Lee

233. Philosophy of Responsibility and Punishment.

(3) III.

Lecture—3 hours. Prerequisite: consent of instructor. Freedom of will and responsibility in the light of recent developments in philosophy and psychology; the significance of the concept of responsibility in the administration of criminal justice; modern approaches to the problems of punishment and rehabilitation.

Mr. Bodenheimer

234. Agricultural Law. (3) II.

Seminar—3 hours. Selected legal problems related to agricultural industries. Mr. Dunning

235. Administrative Law. (3) III.

Lecture—3 hours. Recommended: concurrent enrollment in course 277. An examination of the powers and procedures of federal and state administrative agencies, with an emphasis on administrative and judicial roles in the performance of a major regulatory function.

Mr. Grunschlag

236. Securities Regulation. (3) III.

Lecture—3 hours. Prerequisite: course 215. Study of laws and regulations, federal and state, relating to the issuance of and trading in corporate securities. It includes materials pertaining to the scope of the term "securities," the registration of securities, intrastate and private offerings, broker-dealer regulations and civil liability under the Securities Act of 1933 and the Securities Exchange Act of 1934.

Mr. Bradley

237. Commercial Law II. (3) II.

Lecture—3 hours. Recommended: course 216. Law governing buyers and sellers, chiefly as embodied in the Uniform Commercial Code. Consumer protection through warranties will be studied as it develops negotiable instruments.

Mr. Dunham

238. Selected Problems in Comparative Law.

(2) II.

Seminar—2 hours. Introduction to different legal systems and the comparative method in research and practice; examination of actual cases from foreign law practice; in depth study of files in recent cases from a civil law country, comparing substantive and procedural aspects with American law and practice. (Satisfactory/Unsatisfactory grading only.) Mr. Angelo

242A-242B. Conflict of Laws. (2-3) I-II.

Lecture—2-3 hours. A study of the decisions in cases in which some of the operative facts are connected with some other state or country than the one in which suit is brought, and of the jurisdiction of courts and the recognition and enforcement of judgments of sister states and foreign countries. Special attention will be given to the constitutional aspects of multi-state problems and the judicial techniques used in making choice of law decisions. (Deferred grading only, pending completion of sequence.) Mr. Adler

243. Debtor and Creditor. (3) III.

Lecture—3 hours. Recommended: course 216. Focuses on the climax of litigation wherein creditors seek to separate debtors from their wealth (however loosely defined). Students research the collection law of California or any other state of their choice. Class explores the evolving law of debtors' rights. Bankruptcy studied in its role as a sword and a shield. If class has small enrollment, students will write research memoranda in place of a final examination.

Mr. Ayer

244. Criminal Procedure. (3) I.

Lecture—3 hours. Selected problems in procedure in criminal cases. Mr. Parnas

245. Estate Planning and Taxation. (4) III.

Lecture—4 hours. Prerequisite: courses 221, 223B. Federal estate and gift taxes; federal income taxation as it affects trusts, estates and their beneficiaries. Mr. Davenport

246. Federal Jurisdiction. (4) II.

Lecture—4 hours. Prerequisite: course 214. Congressional power over the jurisdiction of the federal courts; Supreme Court review of state court decisions; federal post-conviction review; the federal-question jurisdiction of the federal district courts; the choice-of-law applicable in federal litigation; the role of state courts in enforcing federal law. Mr. Grunschlag

247. Federal Taxation II. (4) I.

Lecture—4 hours. Prerequisite: course 220B or 222B. Emphasis on income tax problems of corporations and their shareholders. Mr. Haynes

248. International Business Transactions. (4) II.

Lecture—4 hours. A basic introduction to legal rules and techniques in doing business with and in foreign countries. Foreign and U.S. law materials will be examined. Students will be presented with actual recent transactions which have arisen in the representation of U.S. interests in Europe, Africa, and Latin America, involving sales of goods (including agricultural products), establishing foreign corporations, taxation in more than one country, anti-trust, and regulation by international organizations such as the GATT, and the European Common Market.

Mr. Angelo

249. Introduction to Transnational Legal Problems.

(4) I.

Lecture—4 hours. An analysis of the functions and shortcomings of law in international relations. Basic and emerging concepts and terminology in public international law and in the relations between national legal systems and efforts to establish regional (e.g. E.E.C., O.A.S.) and universal (U.N. and other organizations) legal systems will be examined. Students will undertake case studies of key problems in current efforts to regulate and limit the use of armed force and to peacefully settle transnational disputes. This course is recommended for completion prior to courses 238, 248, 269.

Mr. Angelo

250. Jurisprudence. (3) I.

Lecture—3 hours. The course will, among other things, explore the relation between power and law, the impact of individual and social psychology upon the law, the goals of legal ordering, and the problems engendered by conflicts between moral conscience and legal command. The last part of the course will focus on the relation between the formal and nonformal sources of adjudication in the context of an analysis of the judicial function.

Mr. Bodenheimer

251A-251B. Labor Relations Law. (3-3) I-II.

Lecture—3-3 hours. Prerequisite: 251A may be taken independently of 251B, but only those who have taken 251A may enroll for 251B. Collective bargaining, that is, the participation by employees through organizational representa-

tives of their own choosing, in the making of decisions which determine their wages, hours, and other terms and conditions of employment. Course 251A: Basic functions and purposes of collective bargaining, its aspirations and limitations. Establishment and maintenance of collective bargaining systems, the dimensions of the bargaining unit, designation of the bargaining representative, employer unfair labor practices and union unfair labor practices bearing on the selection process and the relationship of the parties at the bargaining table, with emphasis on the scope of bargaining and the role of the strike. Course 251B: Interpretation and application of the collective bargaining agreement, the interrelationship between the administrative, judicial, and arbitral forms in this process and protection of rights of individual employees in a collective bargaining system.

Mr. Wollett

256. Land Use Planning. (3) II.

Lecture—3 hours. Zoning, subdivision controls, housing, and urban development will be studied in the context of the "population explosion" and the "urban crisis."

Mr. Dunham

257. Law and Social Science. (2) II.

Seminar—2 hours. A study of the methodology of social science and its application to law.

Mr. Poulos

258. Legal Profession. (2) II.

Lecture—2 hours. Legal ethics, the responsibility of the organized bar.

Mr. Parnas

259. Problems in Modern Social Legislation. (2) I.

Lecture—2 hours. An examination of selected problems in welfare and other recent legislation. An additional 2 units credit either as research or as clinical experience will be available to students with consent of instructor. Mr. Feeney

260. Remedies. (4) I.

Lecture—4 hours. Surveys judicial remedies in private civil litigation beginning with a brief review of interests protracted in the private arena; special emphasis on the expectancy interest, the compensatory interest and the public interest. Old distinctions such as "torts," "contracts," "law," and "equity" are questioned, traditional remedies are scrutinized to determine their goals, adequacies, and applications. Students are in position of analysts of remedial devices of claimants who seek the judicial protection of interests in property, personal interests, and business interests. A thorough comprehension of the modern utility of damages, equity, and restitution is sought through the development of case and statutory law.

Mr. Parker

261. Local Government—Managing the Urban Environment. (3) I.

Lecture—3 hours. Study of institutional problems that arise—and that lawyers must solve—

whenever great numbers of people live close together. Inquiry into substantive doctrines allocating power to and among local governments. Consideration as to whether it is possible to describe a viable administrative framework for solving urban problems. It may be possible to use some of instructor's material from a study of the Tahoe Basin.

Mr. Ayer

262A-262B. Trade Regulation. (2-3) II-III.

Lecture—2-3 hours. Examination of the economic and social policies of federal antitrust laws governing collaboration among competitors, restraints upon distribution of goods and services, monopolization, and mergers. (Deferred grading only, pending completion of sequence.)

Mr. Grunschlag

263A-263B-263C. Trial Practice and Procedure. (3-1-1) I-II-III.

Lecture—3-1-1 hours. Prerequisite: course 219. Combines what was formerly Trial Practice with Applied Civil Procedure. First, develops skill in handling the various procedural matters which require attention as a case is being moved toward trial. Materials are based upon the fact patterns of cases which have actually been litigated so students can compare their own pleadings and tactical solutions with attorneys who conducted the real litigation. Second, imparts an understanding of the various stages encountered in the trial of criminal and civil cases. Transcripts of cases which have been tried are analyzed, and demonstrations of how to assemble, describe and present facts in trial setting will be made by instructors. This latter goal will require time in excess of that allotted unit credit. Students wishing to develop skills in the trial area by conduct of mock trial may elect *optional* winter and spring quarters of course, with one unit credit for each mock trial presented. Mr. Dunham, Mr. Hogan

264. Natural Resources. (3) III.

Lecture—3 hours. The law governing natural resources, with emphasis upon the law relating to water.

Mr. Dunning

265. Government Contracts. (2) II.

Lecture—2 hours. A study of the organization and operation of the Federal Government with respect to acquisition and disposal of public property; expenditure of public funds; federal contracts as vehicles for carrying public policies into effect; making, administering, and terminating contracts; subcontracts; state power and federal contractors' remedies. Mr. Whelan

266. Law and Medicine. (3) I.

Lecture—3 hours. Selected studies, special projects, and field trips to develop familiarity with human behavior problems and the com-

munity resources available to deal with them; physical medicine and rehabilitation; public health; government regulation; current problems.

Mr. Schwartz

269. Problems in International and Transnational Law. (3) III.

Seminar—3 hours. Recommended: Prior international law study. Application of the international legal process to recent and current problems of international force, including war and other armed conflict; world order, including alternatives to the use of force; utilization of non-national resources, including the oceans and seabeds; and human rights in international law, including race relations and enforcement of individual rights.

Mr. Adler

270. Selected Problems in Jurisprudence, Legal Sociology, and Legal History. (2) III.

Seminar—2 hours. Prerequisite: course in Jurisprudence strongly recommended but not required. Individual research performed in collaboration with the instructor.

Mr. Bodenheimer

271. Selected Problems in Tax Policy. (2) III.

Seminar—2 hours. A study of selected problems of public policy in relation to the tax laws.

Mr. Davenport

272. Readings Concerning the Political, Economic, and Legal Aspects of Business. (1) I.

Lecture—1 hour. An introductory course for second-year students planning to concentrate in the law governing business activities. Readings will be selected from major works in economics, political science, philosophy, business and law, and will be designed to examine the social and economic impact of business activity. It will seek to emphasize the nonlegal aspects of the business lawyer's role and intellectual equipment.

Mr. Crump, Mr. Fessler

273. The Law and the Police. (3) III.

Seminar—3 hours. A study of all aspects of legal control of police practice and behavior. In addition to constitutional problems such as arrest, search and seizure, line-ups and confessions, attention will be given to state legislation, municipal codes, basic authorizing statutes, administrative practices, and informal controls. (An additional 2 units credit either as research or as clinical experience is available to students with consent of instructor.)

Mr. Feeney

274. Unfair Trade Practice. (3) III.

Lecture—3 hours. Business torts, including interferences with contractual relations, commercial disparagements, and appropriation of values created by another (trade secrets, trademarks, copyrights); the privilege to compete as a defense.

Mr. Grunschlag

276. Juvenile Justice. (3) III.

Lecture—3 hours. A study of the problems arising in the administration of the laws dealing with juvenile offenders. Mr. Parnas

277. Public Administration. (2) III.

Lecture—2 hours. A study of the administration of law by the principal executive departments; the function of the nonlitigant lawyer in public administration; interdepartmental relationships. Guest lecturers will be featured.

Mr. Whelan

278. Seminar in Public Employee Bargaining. (3) III.

Seminar—3 hours. The emphasis in this seminar is on the development of structured collective bargaining by public employees at the federal, state, and local levels. The principal focus is on developments at the local level, which is where most of the action thus far has taken place. The subjects covered will largely parallel the matters covered in the basic course on Labor Relations Law, with appropriate consideration of the similarities and dissimilarities between bargaining in the public sector and bargaining in the private sector. The methodological focus will be on actual problems of public employee bargaining. There will be no examination, however, each student will be required to submit a written report in respect to some problem or aspect of a problem. The course in Labor Law is not prerequisite.

Mr. Wollett

279A-279B. Manpower Planning. (2-1) I-II.

Lecture—2-1 hours. Problems which arise in developing and using the capacities of human beings as actual or potential members of the labor force. The thesis of the course is that poverty and the problems which it creates may be alleviated and diminished by creating jobs and educating, training, and upgrading disadvantaged persons and bringing them into the labor market in a meaningful and productive way. Particular attention will be given to the barriers which prevent the disadvantaged from finding and holding decent jobs; deficiencies in education and skill, poor location, discrimination in hiring and employment, etc. It is anticipated that a substantial part of the course work will involve exposure to some of the federal manpower programs which operate in this area. The course in Labor Relations Law is not prerequisite. (Deferred grading only, pending completion of sequence.)

Mr. Wollett

280. Seminar on Legal Problems of the Disadvantaged. (3) II.

Lecture—3 hours. Selected legal problems of low income populations and of minority groups are examined. Study of existing judicial remedies and the development of more appropriate responses are encouraged.

Mr. Parker

281. Obscenity and Censorship: The Legal Regulation of Sex in Literature. (3) I.

Lecture—3 hours. An interdisciplinary examination of the legal concept of obscenity.

Mr. Savoy

282. Professional Intervention in Family Crises. (3) II.

Lecture—3 hours. Prerequisite: enrollment limited to students who have completed course 230. An interdisciplinary course oriented toward understanding the responses that a community can make to a family in crisis and more specifically toward a reevaluation of the role of the law in responding to family disturbances which currently bear such labels as "marital conflict," "mental illness," "juvenile delinquency" and other forms of "anti-social" behavior.

Mr. Savoy

283. African Legal Systems. (2) I.

Lecture—2 hours. An introduction to the development of legal systems in anglophonic Africa. Emphasis on the historical development of these systems under colonial rule, their response to particular problems such as the maintenance of law and order, resource allocation and the maintenance of legality and the directions in which they may develop as part of independent states. Offered in even-numbered years.

Mr. Dunning

284. Seminar on Consumer Protection. (3) III.

Seminar—3 hours. Selected problems in the developing law regarding consumer protection.

Mr. Dunham

285. Problems of Administrative Regulation and the Environment. (2) II.

Lecture—2 hours. Focus on the operations of one major administrative agency (e.g., Federal Power Commission in 1970) which makes decisions affecting the environment. Mr. Crump

287. American Indian Law. (2) III.

Seminar—2 hours. Selected problems in Indian law.

Mr. Sclar

295A-295B-295C. Instruction in Legal Research and Writing. (2-2-2) I-II-III.

Laboratory—2-2-2 hours. Each participant in this course will be responsible for planning and carrying out a program of instruction in legal research and writing for eight or nine first-year students. Enrollment limited to 20 students and subject to approval of the professor in charge. (Deferred grading only, pending completion of sequence.)

Mr. Schwartz

296. Clinical Seminar in the Administration of Criminal Justice. (6-12) II.

Laboratory—6-12 hours. An experimental program for law students interested in an intensive clinical experience in criminal law ad-

ministration. Each student will be assigned to an office of a District Attorney or Public Defender. Those devoting an entire quarter to the program will work full time in the office to which assigned (12 units). Those who wish to take other courses must devote a minimum of 20 hours per week to the program (6 units).

Mr. Parnas

297. Clinical Programs. (1-10) I-II-III.

Students may receive a maximum of 10 hours

LINGUISTICS

Wayne C. Harsh, Ph.D., *Chairman of the Committee*
Committee Office, 813 Sproul Hall

Committee in Charge:

Professors:

Martin A. Baumhoff, Ph.D. (*Anthropology*)

Denzel Carr, Ph.D.

(*Oriental Languages, Emeritus*)

David L. Olmsted, Ph.D. (*Anthropology*)

¹Benjamin E. Wallacker, Ph.D. (*Oriental Languages*)

Associate Professors:

Jarvis R. Bastian, Ph.D. (*Psychology*)

Wayne C. Harsh, Ph.D. (*English and Linguistics*)

Wolfgang W. Moelleken, Ph.D.
(*German and Russian*)

Edward J. Tully, Jr., Ph.D. (*Mathematics*)

Assistant Professors:

Ronald A. Arbini, Ph.D. (*Philosophy*)

Wilbur A. Benware, Ph.D.
(*German and Russian*)

Jonathan L. Butler, Ph.D. (*French and Italian*)

Thomas P. Campbell, III, B.A.
(*Acting; English*)

Linnea Ehri, Ph.D. (*Education*)

Gustavo Gonzalez, Ph.D. (*Anthropology*)

James R. Hurford, Ph.D. (*English*)

George H. Keith, Ph.D. (*French and Italian*)

Eric S. Liu, Ph.D. (*Oriental Languages*)

Jiri Marvan, Ph.D. (*German and Russian*)

Major Advisers.—Mr. Harsh, Mr. Hurford

Graduate Adviser.—Mr. Harsh

The Major Program

The required courses include the one-year introductory sequence Phonetics (*Anthropology*

¹ Absent on leave, 1971-72.

credit. For more details and regulations see page 12 of the *Announcement of the School of Law*.

Mr. Lee

298. Group Study. (1-5) I-II-III.

Students may receive a maximum of 20 hours credit in their second and third years, in any combination of courses 296, 297, 298 and 299.

The Staff (Mr. Barrett in charge)

299. Research. (1-5) I, II, III.

The Staff (Mr. Barrett in charge)

109), Elementary Linguistic Analysis (*Anthropology* 110), Intermediate Linguistic Analysis (*Anthropology* 111), Comparative Linguistics (*Anthropology* 112); Grammatical Analysis (*Linguistics* 140); two courses from the following: Language and Culture (*Anthropology* 120); Present day English (*English* 105A); History of English Language (105B); Language Change (105C); Theory and Methods of Modern Linguistics (*English* 192); Language, Thought and Expression (*English* 195); Structure of French Language (*French* 160); History of German Language (*German* 105); Linguistic Structure of German (*German* 106); Contrastive Structures of English and German (*German* 108); Phonological Analysis (*Linguistics* 139); Contrastive Analysis: English and Spanish (*Linguistics* 150); Languages of Eastern Asia (*Oriental Languages* 100); Chinese Phonology (*Oriental Languages* 123A); Chinese Morphology (*Oriental Languages* 123B); Chinese Syntax (*Oriental Languages* 123C); Philosophy of Language (*Philosophy* 137); Language and Cognition (*Psychology* 132); Sociology of Language (*Sociology* 174); Modern Spanish Syntax (*Spanish* 131A, 131B); Introduction to Spanish Linguistics (*Spanish* 132). The student is required also to complete one year's study, or the equivalent, of a non-Indo-European language.

Graduate Study.—Requirements for the M.A. degree are 30 units in addition to a thesis. The courses must be graduate courses or upper division undergraduate courses. At least 12 of the 30 units must be strictly graduate work in the major subject. The following courses, or their equivalent, are specifically required: Grammatical Analysis (*Linguistics* 140); Modern Linguistic Theory (*Linguistics* 225); Principles of Historical Linguistics (*Linguistics* 202). Graduate courses in related departments that candidates may take include the following: Field Course in Linguistics (*Anthropology* 220); Introduction to Old English (*English* 205); Middle and Early Modern English (*English* 207); Seminar in French Linguistics (*French* 200); History of the French Language (*French* 201A, 201B); Old Provençal (*French* 230); Gothic (*German* 200);

Old High German (German 201); Middle High German (German 202); Old Saxon (German 203); Psycholinguistics (Psychology 264); Old Church Slavic (Russian 200); Descriptive Russian Grammar (Russian 202); Historical Russian Grammar (Russian 204); History of Spanish Language (Spanish 230A, 230B); Teaching of English as a Foreign Language (English 301).

Lower Division Course

35. Introduction to Linguistics. (4) III.

Lecture—3 hours; laboratory—2 hours. Introduction to the study of language: its nature, diversity, and structure. Mr. Butler

Upper Division Courses

139. Phonological Analysis. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 111. Introduction to and application of phonological theory. Mr. Hurford

140. Grammatical Analysis. (3) II.

Lecture—3 hours. Prerequisite: Anthropology 111. Introduction to the theory of grammatical analysis; practice in solving exercise problems. Mr. Liu

150. Contrastive Analysis: English and Spanish.

(4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Comparison of the linguistic structures of English and Spanish with emphasis on problems of the Spanish-speaker learning English. Analysis of the role of the school and of the sociolinguistic situation of Spanish-speakers in California and the Southwest. Mr. Gonzalez

MANDARIN—See Oriental Languages

MATHEMATICS

Kurt Kreith, Ph.D., *Chairman of the Department*

Department Office, 565 Academic Office Building III.

Professors:

- Henry L. Alder, Ph.D.
- George A. Baker, Ph.D. (*Emeritus*)
- *Dallas O. Banks, Ph.D.
- Donald C. Benson, Ph.D.
- Albert C. Burdette, Ph.D.
- *Gulbank D. Chakerian, Ph.D.
- Curtis M. Fulton, Ph.D.
- Robert D. Glauz, Ph.D.
- Charles A. Hayes, Jr., Ph.D.
- Kurt Kreith, Ph.D.
- David G. Mead, Ph.D.

² Absent on leave, winter quarter 1972.

⁴ Absent on leave, spring quarter 1972.

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

The Staff (Mr. Harsh in charge)

Graduate Courses

202. Principles of Historical Linguistics. (3) I.

Lecture—3 hours. Prerequisite: Anthropology 112. Advanced treatment of the theory and method of historical linguistics. Mr. Harsh

210. Historical Germanic Linguistics. (4) II.

Seminar—3 hours. The principles and techniques of historical linguistics will be used to study the development of the Germanic languages from Proto-Indo-European through Proto-Germanic and into early Germanic dialects such as Old Norse, Gothic, Old Saxon, and Old English. Mr. Benware

215. Computational Linguistics. (2) III.

Lecture—2 hours. Prerequisite: consent of instructor. The use of electronic computers and other computational devices in linguistic analysis, mechanical translation, and lexicography. Mr. Liu

220. Romance Linguistics. (4) II.

Seminar—3 hours. Prerequisite: consent of instructor. Phonology, morphology, and lexicography of the major Romance languages. Mr. Butler, Mr. Keith

225. Modern Linguistic Theory. (3) III.

Lecture—3 hours. Prerequisite: course 140 and Anthropology 111. Survey of leading contributions to linguistic theory from de Saussure to the present.

299. Research. (1–12) I, II, III.

The Staff (Mr. Harsh in charge)

Edward B. Roessler, Ph.D. (*Emeritus*)

Sherman K. Stein, Ph.D.

Takayuki Tamura, D.Sc.

Associate Professors:

- Hubert A. Arnold, Ph.D.
- David W. Barnette, Ph.D.
- Carlos R. Borges, Ph.D.
- Melven R. Krom, Ph.D.
- Gary J. Kurowski, Ph.D.
- Donald A. Norton, Ph.D.
- Washek F. Pfeffer, Ph.D.
- George T. Sallee, Ph.D.
- Edward J. Tully, Jr., Ph.D.
- Howard J. Weiner, Ph.D.

Assistant Professors:

- Robert J. Buck, Ph.D.
 Doyle O. Cutler, Ph.D.
 James R. Diederich, Ph.D.
 Steven A. Douglass, Ph.D.
 George T. Duncan, Ph.D.
 Allan L. Edelson, Ph.D.
 Maxwell W. J. Layard, Ph.D.
 Peter Linz, Ph.D.
 E. O. Milton, Ph.D.
 John K. Moore, Ph.D.
 Raymond N. Sproule, Ph.D.
², ³Robert W. Stringall, Ph.D.

◇ ◇ ◇

Associate Professor:

- Charles E. Franti, Ph.D. (*Biostatistics*)

Assistant Professor:

- Alvin D. Wiggins (*Biostatistics*)

Lecturer:

- Shirley A. Goldman, M.S.

Major Subject Advisers.—Mr. Alder, Mr. Barnette, Mr. Borges, Mr. Buck, Mr. Chakerian, Mr. Douglass, Mr. Krom, Mr. Layard, Mr. Milton, Mr. Norton, Mr. Pfeffer.

Special Area Advisers.—Statistics, Mr. Layard; Computer Science, Mr. Glauz; Biological Sciences, Mr. Moore; Physical Sciences, Mr. Banks; Social Sciences, Mr. Sallee.

Graduate Advisers.—Mr. Banks, Mr. Cutler, Mr. Sproule, and Mr. Stein. Assistance in planning an undergraduate major program in mathematics should be obtained from a major subject adviser. In addition, students seeking information pertaining to statistics, computer science, or applications of mathematics to the biological, physical, or social sciences may contact the appropriate special area adviser. Beyond this, students with particular questions concerning preparation for graduate work may contact a graduate adviser.

The Major Programs.—There are two degree programs: Bachelor of Arts and Bachelor of Science. The latter is especially recommended for students who intend to pursue mathematics at the graduate level. Under either degree program the student may prepare for various careers by an appropriate choice of elective courses.

Lower division requirements: courses 11 (or its high school equivalent), 21A–21B–21C, 22A–22B–22C, 23, and 24.

Upper division requirements: courses 101, 108A. For the A.B. program, the student must complete an additional 31 units of upper division mathematics courses; for the B.S. program, 35 additional units of upper division mathematics must be completed.

Early in the junior year each mathematics

major is required to submit to his adviser for approval, a written statement of his proposed upper division program. A total of 9 units in special study courses, 198 and 199, may be counted toward the upper division requirements for either degree. Those special study courses which are to be applied toward this requirement, must have prior approval from the department. Grading in such courses will be on a Passed/Not Passed basis. With prior departmental approval, certain mathematically-oriented courses given by other departments may be admissible in partial satisfaction of the 31- or 35-units requirements mentioned above.

Recommended preparation for *Graduate study in pure mathematics*: courses 127A–127B–127C and 151A–151B–151C. The remainder of the 31 or 35 units may be chosen from those courses reflecting special interests of the student. To ensure that appropriate combinations of courses are included, the student should seek the counsel of advisers in the department.

Recommended preparation for *secondary teaching in mathematics*: courses 108A–108B, 139A–139B–139C and 141 are virtually essential; a selection from courses 13, 19 (or 29), 36A–36B, 113, 114, 115A, 128A–128B–128C is highly recommended.

Recommended preparation for a career in *statistics*: courses 13, 29, 105A–105B, 127A–127B–127C, 131A–131B–131C, 132A–132B, and at least one quarter of 134, 135, and 136. It is strongly recommended that courses 127A–127B–127C and 131A–131B–131C be taken in the junior year.

Recommended preparation for a career in *applied mathematics*: Because of the great variety of possibilities, the student should obtain advice from advisers in the department concerning his special interests.

Recommended *B.S. Language Preparation*: B.S. degree candidates are advised (but not required) to satisfy the same language requirement as that for the A.B. degree, but to fulfill it in French, German or Russian.

Graduate Study.—The Department of Mathematics offers programs of study and research leading to the M.A. and Ph.D. degrees in mathematics. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Mathematics.

Qualifying Examinations.—A student entering from high school who believes that he has had the equivalent of a course offered by the Department of Mathematics (e.g., analytic geometry and calculus) may demonstrate his proficiency in this course by examination. If, in the opinion of the department, his level of achievement is sufficiently high, he will be permitted to enter the next course in the sequence. No Uni-

² Absent on leave, fall quarter 1971.

³ Absent on leave, winter quarter 1972.

versity credit is earned by passing such an examination. Arrangements for an examination must be made with the Department secretary on or before the Monday of registration week.

Teaching Major.—The teaching major is satisfied by either the A.B. or the B.S. degree in mathematics. Recommended preparation is given under the major programs section above.

Teaching Minor.—Thirty units of mathematics which must include: 4 units of fundamentals of mathematics (course 36A); 8 units of calculus (courses 11, 21A, 21B or 16A-16B-16C); 3 units of probability and/or statistics (courses 13, 15, or 131A); 3 units of geometry (course 37 especially recommended, 112, 113, 114, 116, or 141).

The remainder of the 30 units are elective, except that students with a non-academic major must include 18 units in mathematics at the upper division or graduate level.

Subject Representative: Mr. Burdette.

Lower Division Courses

7. Topics in Algebra. (4) II.

Lecture—4 hours. Prerequisite: two years of high school algebra, plane trigonometry. Natural numbers; integers; rational, real, and complex numbers; permutations; combinations; theory of equations; matrices; determinants. The Staff

11. Analytic Geometry. (2) I, II, III.

Lecture—2 hours. Prerequisite: two years high school algebra, plane geometry, plane trigonometry. Analytic geometry in two dimensions. Not open to students who have received credit for course 16A. The Staff

13. Elementary Statistics. (4) I, II, III.

Lecture—4 hours. Prerequisite: two years of high school algebra. Measures of central tendency and dispersion; binomial, normal, Student-t, and chi-square distributions; testing hypotheses; non-parametric statistics; regression and correlation theory. (Students having had courses 130A or 131A may not take course 13 for credit.) The Staff

15. Discrete Mathematics. (3) I, II.

Lecture—3 hours. Courses 15, 16A, and 16B constitute a year sequence recommended for students in the biological, management, and social sciences. Introduction to probability, vectors, and matrices. Applications to elementary Markov chains. The Staff

16A. Analytic Geometry and Calculus. (3) I, II, III.

Lecture—3 hours. Prerequisite: one and one-half years of high school algebra, plane geometry, plane trigonometry. Not open for credit to students who have received credit in course 21A. Only 2 units of credit allowed students who have received credit for course 11. A short

course in analytic geometry and differential and integral calculus. Not recommended for students who may wish to major in the mathematical sciences.

The Staff

16B. Analytic Geometry and Calculus. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 16A or 21A. Not open for credit to students who have received credit in course 21B. Continuation of course 16A.

The Staff

16C. Analytic Geometry and Calculus. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 16B or 21B. Only 1 unit of credit will be allowed to students who have received credit for course 21B. Continuation of course 16B with special emphasis on the calculus of three dimensions including partial differentiation and total differentials; designed for students desiring to take physical chemistry.

The Staff

19. Basic Concepts of Computing. (3) I.

Lecture—2 hours; laboratory—2 hours. Prerequisite: two years of high school algebra. Introduction to principles of computing. Methods and algorithms for solving problems by use of a digital computer. Course not intended for students in physical science and mathematics. Students electing this course may not receive credit for course 29 or Engineering 5.

Mr. Linz

21A. Calculus. (3) I, II, III.

Lecture—3 hours. Prerequisite: two years high school algebra, plane geometry, plane trigonometry, and analytic geometry (or course 11 concurrently). In addition, the student must achieve a passing score on the algebra and trigonometry examination which is given during the first class meeting of the quarter. Basic concepts of the calculus, limits, derivatives, definite integrals, and application to maximum-minimum problems. Only two units of credit will be allowed for students who have received credit for course 16A.

The Staff

21B. Calculus. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 21A. Continuation of course 21A. The fundamental theorem of calculus, techniques of integration, applications of definite integrals. Only 2 units of credit will be allowed for students who have received credit for course 16B.

The Staff

21C. Calculus. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 21B or course 16C. Continuation of course 21B. Improper integrals, multiple integrals, partial derivatives, calculus of vector functions.

The Staff

22A. Linear Algebra. (3) I, II, III.

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 4 sequence, 4C, 4D, 4E, courses should be taken in reverse order, 22C, 22B, 22A.)

The Staff

22B. Differential Equations. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 21C. Solutions of elementary differential equations. Students electing this course will not receive credit for Physics 4DM. The Staff

22C. Vector Analysis. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 21C. Green's theorem, Stoke's theorem, divergence theorem. Students electing this course will not receive credit for Physics 4CM. The Staff

23. Applications of the Calculus. (2) II, III.

Lecture—2 hours. Prerequisite: course 21C (may be taken concurrently). Significant applications of the calculus in various sciences.

The Staff

24. Infinite Series. (2) II, III.

Lecture—2 hours. Prerequisite: course 21C (may be taken concurrently). Elements of infinite series including Fourier series and series with complex terms. The Staff

29. Introduction to Computer Science. (3) I, II.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 21C. Introduction to properties of a digital computer. Implementation of mathematical algorithms on a computer. Students electing this course may not receive credit for Engineering 5 and only two units of credit will be allowed for students who have had course 19. Mr. Norton

36A. Fundamentals of Mathematics. (4) I, II, III.

Lecture—4 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.

The Staff

36B. Fundamentals of Mathematics. (2) III.

Lecture—2 hours. Prerequisite: course 36A. The content will be selected from the following topics: number systems, set theory, number theory, the axiomatic method, topology, and combinatorics. The Staff

37. Topics in Geometry. (4) III.

Lecture—4 hours. Topics in Euclidian geometry selected from the theory of geometric transformations, the area and dissection of plane figures, convex polyhedra, foundations of geometry. Mr. Barnette

Upper Division Courses

101. Survey of Contemporary Mathematics. (2) II.

Lecture—2 hours. Prerequisite: course 21C. An introduction to modern mathematics, its methods and applications, including the rela-

tionship between pure and applied mathematics. (Passed/Not Passed grading only.) The Staff

105A. Applied Statistical Methods: Analysis of Variance. (4) II, III.

Lecture—4 hours. Prerequisite: course 13. Design of experiments including randomized complete block designs, Latin squares, split-plot designs, factorial designs, and incomplete block designs. Mr. Moore

105B. Applied Statistical Methods: Multiple Regression. (3) III.

Lecture—3 hours. Prerequisite: course 105A. Continuation of course 105A. Multiple regression and analysis of covariance. Mr. Moore

108A. Introduction to Abstract Algebra and Analysis. (3) I, III.

Lecture—3 hours. Prerequisite: course 21C. Introduction to abstract mathematics, including the real number system, sets, mappings, mathematical induction, and algebraic structures.

The Staff

108B. Introduction to Abstract Algebra and Analysis. (3) II.

Lecture—3 hours. Prerequisite: course 108A. Unique factorization, Gaussian integers and applications. Introduction to integration theory. Course 108B may not be taken for credit after students have completed courses 127A or 151A, and may not be taken concurrently with 127A or 151A. The Staff

***112. Higher Geometry. (3) I.**

Lecture—3 hours. Prerequisite: course 108A or consent of instructor. Homogeneous point and line coordinates, cross ratio, one- and two-dimensional projective geometry, point and line conics. Offered in even-numbered years.

Mr. Fulton

113. Synthetic Projective Geometry. (4) I.

Lecture—4 hours. Prerequisite: course 108A or consent of instructor. Duality, perspectivity, harmonic sets, projectivity, definition of conics, theorems on conics, pole and polar. Offered in odd-numbered years.

Mr. Fulton

114. The Theory of Convex Sets. (3) III.

Lecture—3 hours. Prerequisite: courses 21C, 22A, 108A; or consent of instructor. Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Offered in even-numbered years.

Mr. Sallee

115A. The Theory of Numbers. (3) I.

Lecture—3 hours. Prerequisite: course 108A. Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers. Offered in odd-numbered years.

Mr. Alder

* Not to be given, 1971-72.

115B. The Theory of Numbers. (3) II.

Lecture—3 hours. Prerequisite: course 108A. Euler-function, Moebius function, congruences, primitive roots, quadratic reciprocity law. Offered in even-numbered years. Mr. Alder

115C. The Theory of Numbers. (3) III.

Lecture—3 hours. Prerequisite: course 108A. Continued fractions, partitions. Offered in even-numbered years. Mr. Alder

***116. Metric Differential Geometry. (4) III.**

Lecture—4 hours. Prerequisite: courses 22A, 22C; or consent of instructor. Vector analysis, curves and surfaces in three dimensions. Offered in odd-numbered years. Mr. Chakerian

118A-118B. Introduction to Partial Differential Equations. (3-3) II-III.

Lecture—3 hours. Prerequisite: courses 22A, 22B, 22C. Solutions of partial differential equations of mathematical physics by separation of variables, series of orthogonal functions. Applications to boundary value problems. Mr. Douglass

119. Theory of Ordinary Differential Equations.**(3) I.**

Lecture—3 hours. Prerequisite: courses 22A, 22B. Existence and uniqueness theorems, theory of linear equations of the second and higher orders, regular singular points, Sturm-Liouville systems, Laplace transforms. Mr. Diederich

***125. Introduction to Mathematical Logic. (3) I.**

Lecture—3 hours. Prerequisite: course 108A or consent of instructor. Propositional calculus, predicate calculus, normal forms, completeness. Offered in even-numbered years. Mr. Krom

***126. Introduction to the Theory of Sets. (3) I.**

Lecture—3 hours. Prerequisite: course 21C or consent of instructor. Fundamental concepts including cardinal numbers, order types, ordinal numbers. Offered in even-numbered years. Mr. Stringall

127A. Advanced Calculus. (4) I, II.

Lecture—4 hours. Prerequisite: courses 22A, 22C. The real number system, continuity, differentiation and integration on the real line, vector calculus and functions of several variables, theory of convergence. Mr. Krom, Mr. Milton

127B. Advanced Calculus. (4) II, III.

Lecture—4 hours. Prerequisite: course 127A. Continuation of course 127A. Mr. Krom, Mr. Milton

127C. Advanced Calculus. (4) I, III.

Lecture—4 hours. Prerequisite: course 127B. Continuation of course 127B. Mr. Benson

128A. Numerical Analysis. (4) I.

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 29 or a knowledge of FORTRAN or ALGOL. Error analysis, approximation, interpolation, numerical differentiation and integration. Mr. Linz, Mr. Kurowski

128B. Numerical Analysis in Solution of Equations.**(4) II.**

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 22A, and course 29 or a knowledge of FORTRAN or ALGOL. Solution of nonlinear equations, simultaneous equations, eigenvalues, linear programming. Mr. Linz, Mr. Kurowski

128C. Numerical Analysis in Differential Equations.**(4) III.**

Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 22A, 22B, and course 29 or a knowledge of FORTRAN or ALCOL. Difference equations, operators, numerical solution of differential equations, partial differential equations. Mr. Linz, Mr. Kurowski

129A. Introduction to the Theory of Programming.**(3) II.**

Lecture—3 hours. Prerequisite: course 22A, course 29 or equivalent. Assembly languages; arrays and lists; data processing algorithms. Mr. Norton

129B. The Theory and Structure of Computer Languages. (3) III.

Lecture—3 hours. Prerequisite: course 129A. Theory of compilers; structure of computer languages, their limitations and ambiguities; study of a particular language. Mr. Norton

130A-130B. Mathematical Statistics, Brief Course. (4-4) I-II.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 16B. A course in mathematical statistics for non-majors. Concepts of probability and sampling, principles of estimation, properties of estimators, sampling distributions, bivariate normal and principles of testing. Mr. Weiner

131A-131B-131C. Introduction to Mathematical Statistics. (4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 21C or 16C. An introduction to the mathematical theory of probability and statistics. Mr. Duncan

132A-132B. Introduction to Stochastic Processes.**(3-3) II-III.**

Lecture—3 hours. Prerequisite: course 131A. Random walks, recurrent events, Markov chains, birth-and-death processes. Mr. Weiner

*Not to be given, 1971-72.

133. Probabilistic Models in Operations Research.

(3) I.

Lecture—3 hours. Prerequisite: course 130B or 131B. Applications of probability and statistics to the study of systems and organizations. Topics in reliability theory, replacement models, waiting-line models, inventory models.

Mr. Sproule

134. Nonparametric Inference. (3) II.

Lecture—3 hours. Prerequisite: course 130B or 131B. Selected topics in nonparametric statistical inference from a one-sample and a k-sample point of view. Topics include Kolmogorov-Smirnov type tests; confidence intervals for quantiles, locations and scale parameters; rank tests, dispersion tests, efficiency.

Mr. Layard

135. Trend Analysis. (3) III.

Lecture—3 hours. Prerequisite: course 130B or 131B. Trend analysis from masses of data using applied time series. Quantitative description and analysis of social and biological problems. Cluster analysis.

Mr. Duncan

136A–S136B. Development of Mathematical Ideas.

(3–3) II, III.

Lecture—3 hours. Prerequisite: course 21C. Topics and mathematicians studied with an emphasis on the origin of modern mathematics.

Mr. Hayes

139A–139B–139C. Introduction to Algebra.

(3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: courses 22A, 108A; or consent of instructor. Not open for credit to students who have received credit in course 151A without consent of Department, and may not be taken concurrently with 151A. Theory of equations, symmetric functions, vector space aspects of Galois theory, Euclidean rings, integers in quadratic fields.

Mr. Buck

140. Applications of Mathematics. (3) III.

Lecture—3 hours. Prerequisite: course 108A. Applications of algebra, geometry and analysis in the natural, social and physical sciences.

Mr. Edelson

141. Euclidean Geometry. (3) II.

Lecture—3 hours. Prerequisite: course 108A. An axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries.

Mr. Barnette

147. Topology. (3) II.

Lecture—3 hours. Prerequisite: course 127C, and 151A or 139A–139B. The basic notions of point set and combinatorial topology.

Mr. Borges

151A. Algebra. (4) I, II.

Lecture—4 hours. Prerequisite: course 108A. Introduction to groups, rings, fields and linear transformations.

Mr. Tamura, Mr. Mead

151B. Algebra. (4) II, III.

Lecture—4 hours. Prerequisite: course 151A. Continuation of course 151A.

Mr. Mead, Mr. Tamura

151C. Algebra. (4) I, III.

Lecture—4 hours. Prerequisite: course 151B. Continuation of course 151B.

Mr. Mead

***168. Linear Programming and Game Theory. (3) I.**

Lecture—3 hours. Prerequisite: course 21C, 7 or 15. Introduction to zero-sum, two-person games; the fundamental theory for matrix games; basic concepts of linear inequalities; the duality theorem; the simplex method. Offered in even-numbered years.

Mr. Sallee

185A. Geometry of Functions of a Complex Variable.

(3) I.

Lecture—3 hours. Prerequisite: course 22C. Complex number system, Cauchy-Riemann equations, elementary functions, conformal mapping.

Mr. Arnold

185B. Analysis of Functions of a Complex Variable.

(3) II.

Lecture—3 hours. Prerequisite: course 185A. Cauchy's integral theorem, power series, Laurent series, residue theorem, special topics.

Mr. Burdette

187. Lebesgue Measure and Integration. (3) III.

Lecture—3 hours. Prerequisite: course 127C. Theory of Lebesgue measure and integration on the real line.

Mr. Milton

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor. (Passed/Not Passed grading only.)

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

(Passed/Not Passed grading only.)

The Staff (Chairman in charge)

Graduate Courses**201A–201B–201C. Real Analysis. (3–3–3) I–II–III.**

Lecture—3 hours. Prerequisite: course 127C. Point set topology; Lebesgue measure and integration on the real line; abstract spaces; general measure and integration.

Mr. Hayes

202A–202B–202C. Functional Analysis.

(3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: courses 127C, 151C, 201C. Hilbert spaces, spectral theorem, Banach spaces, commutative Banach algebras.

Mr. Buck

* Not to be given, 1971–72.

§ Not to be given, spring quarter 1972.

205A-205B-205C. Functions of a Complex Variable.
(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 127C. Theory of analytic functions, Cauchy integral theorem, power series, analytic continuation, conformal mapping, special functions.

Mr. Diederich

210A-210B-210C. Topics in Algebra, Analysis, and Geometry.
(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. This course presents topics in advanced algebra, analysis, and geometry that are closely related to the mathematics of the secondary and lower-division curriculum. Required in the M.A. program for prospective junior college and high school teachers.

Mr. Stein

215A-215B-215C. Topology.
(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Topics selected from point set topology and homotopy theory.

Mr. Edelson

***216. Integral Equations.**
(3) I.

Lecture—3 hours. Prerequisite: courses 22A, 127C. Volterra equations, Fredholm equations, symmetric kernels. Offered in even-numbered years.

Mr. Kreith

***218A-218B. Partial Differential Equations.**
(3-3) II-III.

Lecture—3 hours. Prerequisite: courses 22A, 127C; 216 recommended. Topics from the theory of first order, hyperbolic and elliptic partial differential equations. Offered in odd-numbered years.

Mr. Chakerian

219. Ordinary Differential Equations.
(3) I.

Lecture—3 hours. Prerequisite: courses 22A, 127C. Ordinary differential equations in the real and complex domains; existence and uniqueness theorems; linear systems; analysis of singular points; Sturm-Liouville theory; asymptotic expansions. Offered in odd-numbered years.

Mr. Kreith

220A-220B-220C. Mathematics for the Physical Sciences.
(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 185A, 185B (may be taken concurrently). Topics in ordinary and partial differential equations, boundary value problems, functions of a complex variable, matrices and calculus of variations.

Mr. Benson

***225A-225B. Metamathematics.**
(3-3) II-III.

Lecture—3 hours. Prerequisite: courses 151A and either 125 or Philosophy 12A-12B; or consent of instructor. Axiomatizability, consistency, and completeness of the formalized mathematical theories; definability in formal languages; topics from the theory of models. Offered in odd-numbered years.

Mr. Krom

***228A-228B. Advanced Numerical Analysis of Ordinary Differential Equations.**
(3-3) I-II.

Lecture—3 hours. Prerequisite: course 128C. Numerical solutions of initial and boundary value problems for systems of ordinary differential equations; error analysis and stability. Offered in even-numbered years. Mr. Kurowski

229A-229B-229C. Numerical Methods in Linear Algebra and Selected Topics.
(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: consent of instructor. Computational methods and theoretical aspects in the solution of simultaneous algebraic equations and matrix eigenvalue problems. Numerical analysis in the solution of partial differential equations, optimization, data analysis, Monte Carlo, etc. Offered in odd-numbered years.

Mr. Glauz

231A-231B-231C. Mathematical Statistics.
(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: courses 22C and 131C, or consent of instructor. A first year graduate course in theoretical statistics. Offered in even-numbered years.

Mr. Layard

232. Analysis of Variance.
(3) I.

Lecture—3 hours. Prerequisite: course 131C. Estimation and testing for the general linear hypothesis, components of variance, multiple comparisons. Offered in odd-numbered years.

Mr. Duncan

***233A-233B. Design of Experiments.**
(3-3) II-III.

Lecture—3 hours. Prerequisite: course 232. Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces.

Mr. Duncan

235A-235B-235C. Analytic Probability Theory.
(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 187 or equivalent. Measure-theoretic foundations of probability, distribution functions and characteristic functions, law of large numbers and central limit theorems, conditional probabilities, martingales.

Mr. Sproule

***236A-236B-236C. Advanced Mathematical Statistics.**
(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: courses 127C and 131C. Distribution theory, parametric and nonparametric estimation, principles of statistical tests, sequential analysis, statistical decision functions.

Mr. Layard

***237A-237B. Nonparametric Inference.**
(3-3) II-III.

Lecture—3 hours. Prerequisite: course 131C. A survey of nonparametric methods in estimation and hypothesis testing. Offered in odd-numbered years.

Mr. Sproule

* Not to be given, 1971-72.

238A-238B-238C. Analysis of Stochastic**Processes. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: course 132B. The analytical theory of second-order stochastic processes, Poisson processes, birth-and-death processes, and Markov processes, including a study of statistical inference for these processes. Offered in odd-numbered years. Mr. Weiner

240A-240B-240C. Differential Geometry.**(3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: course 116. Transformation of coordinates, tensor analysis, intrinsic geometry of surfaces, parallel displacement, Riemannian manifolds, the geometry of subspaces, subspaces of a flat space, application of tensor analysis to the theory of relativity. Offered in odd-numbered years. Mr. Pfeffer

245A-245B-245C. Algebraic Topology. (3-3-3)*I-II-III.**

Lecture—3 hours. Prerequisite: course 215C. Algebraic invariants of spaces and their behavior with respect to continuous functions. Offered in even-numbered years. Mr. Pfeffer

250A-250B-250C. Algebra. (3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. The theory of groups, rings, and fields.

Mr. Tully

251A-251B. Theory of Groups. (3-3) I-II.

Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Normal subgroups, composition series, Sylow subgroups, nilpotent groups, solvable groups, group representations, groups with operators, group extensions, free groups, ordered groups.

Mr. Cutler

MEDICAL EDUCATION—See Medicine**MEDICAL MICROBIOLOGY—See Medicine****MEDICAL SCIENCES—See Medicine Bulletin****MEDICINE**C. John Tupper, M.D., *Dean of the School*Alexander Barry, Ph.D., *Associate Dean*Loren D. Carlson, Ph.D., *Associate Dean*Morton Levitt, Ph.D., *Associate Dean*Earl F. Wolfman, Jr., M.D., *Associate Dean*Robert E. Stowell, M.D., Ph.D., *Assistant Dean*John R. Beljan, M.D., *Assistant to the Dean***Professors:**Charles F. Abildgaard, M.D. (*Pediatrics*)Len H. Andrus, M.D. (*Family Practice*)Alexander Barry, Ph.D. (*Human Anatomy*)

* Not to be given, 1971-72.

***252. Linear Algebra. (3) I.**

Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Vector spaces. Offered in even-numbered years. Mr. Mead

253. Theory of Binary Systems. (3) III.

Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Elements of semigroups, quasigroups, and groupoids. Mr. Tamura

290. Seminar. (1-6) I, II, III.

Advanced study in various fields of mathematics as follows: homological algebra (Mr. Cutler); K-theory (Mr. Edelson); differential geometry (Mr. Fulton); mathematical logic (Mr. Krom); numerical analysis (Mr. Linz); differential algebra (Mr. Mead); mathematical machine theory (Mr. Norton); differential topology (Mr. Pfeffer); semigroup theory (Mr. Tamura).

299. Research. (2-6) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

Professional Courses**300A. The Teaching of Mathematics. (3) I, II, III.**

Lecture—3 hours. Prerequisite: senior or graduate standing. Mathematics for elementary school grades K-6. Anyone who has completed 20 units or more of college mathematics will receive only 1 unit credit. Mrs. Goldman

300B. The Teaching of Mathematics. (3) II.

Lecture—3 hours. Prerequisite: senior or graduate standing. Methods of teaching mathematics in grades 7-12. Mrs. Goldman

Eliezer Benjamini, Ph.D.

(*Medical Microbiology*)Robert J. Bolt, M.D. (*Internal Medicine*)Nemat O. Borhani, M.D. (*Community*)(*Health, Internal Medicine*)

Robert H. Brownson, Ph.D. (*Human Anatomy*)
 Loren D. Carlson, Ph.D. (*Human Physiology*)
 Robert S. Chang, M.D., D.Sc. (*Medical Microbiology*)
 Loring F. Chapman, Ph.D. (*Behavioral Biology*)
 Hamilton S. Davis, M.D. (*Anesthesiology*)
 Pierre M. Dreyfus, M.D. (*Neurology*)
 Paul D. Hoeprich, M.D. (*Internal Medicine, Pathology*)
 Robert L. Hunter, Ph.D. (*Human Anatomy*)
 Edward J. Hurley, M.D. (*Surgery*)
 Gordon D. Jensen, M.D. (*Psychiatry, Pediatrics*)
 Keith F. Killam, Jr., Ph.D. (*Pharmacology*)
 Edwin G. Krebs, M.D. (*Biological Chemistry*)
 Donald G. Langsley, M.D. (*Psychiatry*)
 Morton Levitt, Ph.D. (*Psychiatry*)
 Jerry P. Lewis, M.D. (*Internal Medicine*)
 Paul R. Lipscomb, M.D. (*Orthopedic Surgery*)
 George H. Lowrey, M.D. (*Postgraduate Medicine, Pediatrics*)
 Dean T. Mason, M.D. (*Internal Medicine, Human Physiology*)
 Rashid Massumi, M.D. (*Internal Medicine*)
 Arnold Meadow, Ph.D. (*Psychiatry*)
 Kenneth R. Niswander, M.D. (*Obstetrics, Gynecology*)
 Philip E. S. Palmer, M.D. (*Radiology*)
 Demosthenes Pappagianis, M.D., Ph.D. (*Medical Microbiology*)
 Robert S. Pollack, M.D., (Surgery)
 Antolin Raventos, M.D. (*Radiology*)
 Boris H. Ruebner, M.D. (*Pathology*)
 Calvin W. Schwabe, D.V.M., D.Sc. (*Community Health*)
 Robert S. Stempfel, Jr., M.D. (*Pediatrics*)
 Harold M. Sterling, M.D. (*Physical Medicine and Rehabilitation*)
 Robert E. Stowell, M.D., Ph.D. (*Pathology*)
 Makepeace U. Tsao, Ph.D. (*Surgery*)
 C. John Tupper, M.D. (*Internal Medicine*)
 Irving H. Wagman, Ph.D. (*Human Physiology*)
 Sefton R. Wellings, M.D., Ph.D. (*Pathology*)
 Theodore C. West, Ph.D. (*Medical Education, Pharmacology*)
 Earl F. Wolfman, Jr., M.D. (*Surgery*)

Julian R. Youmans, M.D., Ph.D. (*Neurosurgery*)
 Antonio Zappala, M.D. (*Human Anatomy*)

Associate Professors:

John R. Beljan, M.D. (*Surgery*)
 E. Jack Benner, M.D. (*Internal Medicine*)
 Louis W. Conway, M.D. (*Neurosurgery*)
 Gerald L. DeNardo, M.D. (*Radiology*)
 William M. Fowler, Jr., M.D. (*Physical Medicine and Rehabilitation*)
 Jerry R. Gillespie, D.V.M., Ph.D. (*Human Physiology, Physiological Sciences*)
 Anthony J. Hance, Ph.D. (*Pharmacology*)
 Arnold C. L. Hsieh, M.D., D.Sc. (*Human Physiology*)
 Albert B. Iben, M.D. (*Surgery*)
 Lindy F. Kumagai, M.D. (*Internal Medicine*)
 Malcolm R. MacKenzie, M.D. (*Internal Medicine*)
 Edwin S. Munson, M.D. (*Anesthesiology*)
 John M. Palmer, M.D. (*Urology*)
 V. J. Polidora, Ph.D. (*Behavioral Biology*)
 Lawrence Rabinowitz, Ph.D. (*Human Physiology*)
 Robert El. Smith, Ph.D. (*Human Physiology*)
 Robert R. Traut, Ph.D. (*Biological Chemistry*)
 John D. Trefford, M.D. (*Obstetrics, Gynecology*)
 Joe P. Tupin, M.D. (*Psychiatry*)
 G. Worden Waring, Ph.D. (*Physical Medicine and Rehabilitation*)
 David W. Watson, M.D. (*Internal Medicine*)

Assistant Professors:

Ezra A. Amsterdam, M.D. (*Internal Medicine, Pharmacology*)
 William F. Benisek, Ph.D. (*Biological Chemistry*)
 Willard J. Blankenship, M.D. (*Pediatrics*)
 Nanine H. Clark, Ph.D. (*Human Anatomy*)
 Carroll E. Cross, M.D. (*Internal Medicine, Human Physiology*)
 John H. Eisele, M.D. (*Anesthesiology, Human Physiology*)
 Andrew J. Gabor, M.D., Ph.D. (*Neurology*)
 Andrew M. Goldner, Ph.D. (*Human Physiology*)
 Elliot Goldstein, M.D. (*Internal Medicine*)
 Frederick W. Hanson, M.D. (*Obstetrics, Gynecology*)
 Gary L. Henderson, Ph.D. (*Pharmacology*)
 John W. B. Hershey, Ph.D. (*Biological Chemistry*)

Mannfred A. Hollinger, Ph.D.
(*Pharmacology*)

Julian J. A. Irias, M.D. (*Pediatrics*)
Jess F. Kraus, Ph.D. (*Community Health*)
Thomas C. Lee, Ph.D. (*Human Physiology*)
Larry W. McDonald, M.D. (*Pathology*)
Stanley Meizel, Ph.D. (*Human Anatomy*)
Lois F. O'Grady, M.D. (*Internal Medicine*)
Mark P. Owens, M.D. (*Surgery*)
Richard S. Riggins, M.D. (*Orthopedic Surgery*)
John A. Reitan, M.D. (*Anesthesiology*)
Don A. Rockwell, M.D. (*Psychiatry*)
Robert P. Scobey, Ph.D. (*Behavioral Biology*)
Bagher Sheikholislam, M.D. (*Pediatrics*)
Larry G. Stark, Ph.D. (*Pharmacology*)
Jerold H. Theis, D.V.M. (*Medical Microbiology*)
Frederic A. Troy, II, Ph.D. (*Biological Chemistry*)
Thomas L. Volk, M.D. (*Pathology*)
Donal A. Walsh, Ph.D. (*Biological Chemistry*)
Richard F. Walters, Ph.D. (*Medical Education, Human Physiology*)
Lowell D. Wilson, M.D., Ph.D. (*Internal Medicine, Biological Chemistry*)
Phillip R. Yarnell, M.D. (*Neurology*)
Robert F. Zelis, M.D. (*Internal Medicine, Human Physiology*)



Professors in Residence:

Neil C. Andrews, M.D. (*Surgery, Regional Medical Program*)
Eva K. Killam, Ph.D. (*Human Physiology*)

Associate Professors in Residence:

Paul G. Hattersley, M.D. (*Internal Medicine, Pathology*)
Paul R. Miller, M.D. (*Psychiatry*)

Assistant Professors in Residence:

Otmar W. Albrand, M.D. (*Neurosurgery*)
Hanne M. Jensen, M.D. (*Pathology*)
Nazhiyath Vijayan, M.D. (*Neurology*)

Adjunct Professor:

Marvin Goldman, Ph.D. (*Human Physiology*)

Adjunct Assistant Professor:

Stanley E. Geel, Ph.D. (*Neurology*)

Lecturers:

Arthur L. Barry, Ph.D. (*Internal Medicine*)
Reed M. Nesbit, M.D. (*Urology*)

Jimmy P. Scott, Ph.D. (*Behavioral Biology, Psychiatry*)

Vijaya K. Vijayan, M.B.B.S. (*Human Anatomy*)

Charles H. White, Ph.D. (*Medical Education, Regional Medical Program*)

Jean A. Zellé, B.A., (*Physical Medicine and Rehabilitation*)

Instructor:

James J. Donaldson, A.B. (*Psychiatry, Behavioral Biology; Acting*)

Admission Requirements and Professional Curriculum.—For details consult the *Bulletin of the School of Medicine*.

Departmental Courses

Anesthesiology

Professional Courses

420. Case Management Conference. (1) I, II, III, IV.

Discussion—1 hour. Prerequisite: interns and residents; advanced medical and veterinary students; consent of instructor. Informal 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 preventive, as well as corrective measures.

The Staff (Mr. Davis in charge)

421. Basic Science Conference. (1) I, II, III, IV.

Discussion—1½ hours. Prerequisite: advanced medical and veterinary students; consent of instructor. Discussion of basic science material related directly to anesthesiology particularly in the areas of physiology and pharmacology. Selected reading assignments are given in advance and utilized by the instructor to encourage discussion. In selected instances, the topics are organized and presented by the students and residents.

Mr. Eisele

490. Resident Seminar. (1) I, II, III, IV.

Lecture—1 hour. Prerequisite: degree in medicine or veterinary medicine or consent of instructor. A series of lectures covering a spectrum of anesthesia and related topics in depth, primarily clinically oriented but also including relevant research material. Presented by faculty, residents, and visiting professors. Pertinent reference lists are circulated in advance of seminars. (Honors/Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Eisele in charge)

499. Anesthesiology Research. (4-18) I, II, III, IV.

Laboratory—3-15 hours. Prerequisite: third- or fourth-year medical students or consent of instructor. Problems in clinical and/or laboratory research. (Honors / Satisfactory / Unsatisfactory grading only.) The Staff (Mr. Munson in charge)

Behavioral Biology

Upper Division Courses

198. Directed Group Study. (1-3) I, II, III.

Discussion—1-3 hours. Prerequisite: consent of instructor. Extended evaluative and critical discussions of selected topics relating to the physiological and biochemical bases of behavior. Primary emphasis within any topic will be on the methodology, theory and concepts of current research.

The Staff (Mr. Chapman in charge)

199. Special Study for Advanced Undergraduates.

(1-3) I, II, III.

Discussion—1 hour; laboratory—2-4 hours. Prerequisite: consent of instructor. Laboratory research on selected topics relating to the biological bases of behavior. Participation in ongoing research projects or planning, initiation and execution of individual research problem.

The Staff (Mr. Chapman in charge)

Graduate Courses

235. Mood, Motivation, Arousal and Sleep. (3)

I, II, III, IV.

Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor. A critical examination of the current concepts and research on the physiological and biochemical correlates of these behavior processes. Mr. Polidora

240. Medical Aspects of Sleep. (3) I, II, III, IV.

Lecture—3 hours. Prerequisite: consent of instructor. A consideration of clinical aspects of sleep. After a general review of sleep, emphasis is placed on topics of special medical interest: psychiatric conditions (depression, schizophrenia, etc.), drug effects, epilepsy, enuresis, and others. Mr. Scott

290. Seminar. (2) I, II, III, IV.

Seminar—2 hours. Prerequisite: consent of instructor. Group discussion and critique of current topics of importance and relevance to Behavioral Biology.

The Staff (Mr. Chapman in charge)

298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Extended evaluative and critical discussions of selected topics relating to the physiological and biochemical bases of behavior. Primary emphasis within any topic will be on the methodology, theory and concepts of current research. The Staff (Mr. Chapman in charge)

299. Research. (1-12) I, II, III.

Prerequisite: consent of instructor. Laboratory research on selected topics relating to the

physiological and biochemical bases of behavior. Participation in ongoing research projects or planning, initiation and execution of individual research problem.

The Staff (Mr. Chapman in charge)

Biological Chemistry

Upper Division Course

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III, IV.

Prerequisite: consent of instructor.

The Staff (Mr. Krebs in charge)

Graduate Courses

215. Structure and Metabolic Functions of Proteins.

(3) I.

Discussion—1 hour; laboratory—7 hours. Prerequisite: Biochemistry 101B or consent of instructor. Introduction to the laboratory investigation of protein structure, enzyme mechanism and the metabolic roles that these molecules play in the intact animal. Emphasis will be placed on aspects of these topics that can be correlated with phenomena of medical interest.

Messrs. Benisek, Troy, Walsh

230. Principles of Comparative Biochemistry. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 201C or consent of instructor. An advanced treatment of comparative biochemistry. Comparisons of living systems, their structures and functions on a molecular basis, biochemical unity and diversity; protein structures and organized enzyme systems. Comparison of biochemical processes related to photobiology, metabolism and excretion. (Same course as Food Science and Technology 230.)

Mr. Benisek, Mr. Feeney

298. Group Study. (1-5) I, II, III, IV.

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. The Staff (Mr. Krebs in charge)

299. Research. (1-12) I, II, III, IV.

Prerequisite: consent of instructor.

The Staff (Mr. Krebs in charge)

Community Health

Graduate Course

203. Medicine, Health and the Environment. (2) I.

Lecture—1 hour; discussion—1 hour. Prerequisite: medical students and graduate students with consent of instructor. Lecture and seminar-type discussions and directed readings led by Davis campus and guest instructor on

issues of environmental health as they relate to changing patterns or accelerated onset of disease.

Mr. Kraus

Professional Courses

401. Medical and Environmental Epidemiology.

(3) III.

Lecture—2 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: medical, graduate and/or veterinary medicine student with consent of instructor. Lectures, group discussions and laboratory exercises on the basic concepts of medical and environmental epidemiology as related to selected infectious, non-infectious or environmental disease processes including applications to: community health, environmental control, medical ecology, and prevention and disease control. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Borhani, Mr. Kraus

404. Medical and Health Care Delivery Patterns.

(3) II.

Lecture—2 hours; discussion—2 hours. Prerequisite: medical or graduate student and consent of instructor. Lectures and seminar-type open discussions led by resident and guest lecturers on current problems and practices in medical health care practice; delivery organization and financing systems, (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Bauer, Mr. Kraus

405. Issues in Community Health. (3) III.

Lecture—2 hours; discussion—2 hours. Prerequisite: medical or graduate student and consent of instructor. Seminar-type discussions and lecture on selected topics and problems in community health including population control, drug abuse, malnutrition, abortion, suicide, and health problems of certain population groups. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Borhani, Mr. Kraus

498. Group Study in Community Health. (1-9)

I, II, III, IV.

Prerequisite: medical or graduate students and consent of instructor. Directed readings, discussions or community investigations in issues or problems of community health. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

The Staff

499. Research in Community Health. (1-9)

I, II, III, IV.

Prerequisite: medical or graduate student and consent of instructor. Directed population and community based research in selected topics in community health. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

The Staff

Human Anatomy

Upper Division Courses

102. Development and Structure of the Human Body.

(4) III.

Lecture—4 hours. Prerequisite: Biology 1 or 10; Physiology 2, 2L or Zoology 2 recommended. The development and structure of the human body. Not open to pre-dental or pre-medical students. The Staff (Mrs. Vijayan in charge)

102L. Development and Structure of the Human Body. (2) III.

Laboratory—6 hours. Prerequisite: course 102 (may be taken concurrently). A laboratory analysis of the structure of the human body.

Mrs. Vijayan

198. Directed Group Study. (2-4) I, II, III, IV.

Discussion—2 hours; laboratory—0-6 hours. Prerequisite: consent of instructor. Directed reading and group discussion and/or laboratory experience on selected topics.

The Staff (Mr. Hunter in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III, IV.

Prerequisite: consent of instructor.

The Staff (Mr. Hunter in charge)

Graduate Courses

201A. Gross Anatomy. (3) IV.

Lecture—1 hour; discussion—2 hours; laboratory—1 hour. Prerequisite: consent of instructor. Study of the head and neck and upper extremities.

Mrs. Vijayan

201B. Gross Anatomy. (3) I.

Lecture—1 hour; discussion—2 hours; laboratory—1 hour. Prerequisite: course 201A and consent of instructor. Study of the trunk and lower extremities.

Mr. Zappala

203. Human Histology. (3) III.

Discussion—1 hour; laboratory—5 hours. Prerequisite: Zoology 107; Anatomy 157; Medical Sciences 101 and/or consent of instructor. Course systematically covers the microscopical anatomy of the adult human being. Mr. Hunter

205. Biochemical and Morphological Aspects of Animal Gametogenesis and Fertilization. (3) II.

Lecture—2 hours; discussion—1 hour. Prerequisite: Biology 1 and Biochemistry 101B or equivalents. The molecular and ultrastructural mechanisms of oogenesis, ovulation, spermatogenesis, sperm maturation, capacitation and fertilization.

Mr. Meizel

207. Survey of Human Morphogenesis. (3) I.

Lecture—2 hours; discussion—2 hours. Prerequisite: consent of instructor. A comprehensive survey of human development from fertili-

zation through fetal development. Lectures, student-directed discussions and demonstrations.

Mr. Barry, Mr. Hendrickx

208. Normal and Abnormal Human Morphogenesis.

(2) II.

Lecture—1 hour; discussion—1½ hours. Prerequisite: course 207 or consent of instructor. Consideration of the normal and abnormal development of one organ system in detail. Each student will select area for individual study and will present paper to class.

Mr. Barry, Mr. Hendrickx

280. Human Surgical Anatomy. (4) III.

Discussion—2 hours; laboratory—4 hours. Prerequisite: human gross anatomy or completion of second-year medical curriculum, and consent of instructor. Regional and radiological anatomy as applied to the clinical sciences. Offered in odd-numbered years. Mr. Zappala

285. Anatomy of the Neonate. (3) III.

Discussion—2 hours; laboratory—4 hours. Prerequisite: Anatomy 100, or Human Gross Anatomy, or completion of Second-year Medical Curriculum, and consent of instructor. Regional and radiological anatomy of the newborn, and comparison with adult morphology. Offered in odd-numbered years. Mr. Zappala

290. Seminar. (1) I, II, III, IV.

Seminar—1 hour. Prerequisite: consent of instructor. The Staff (Mr. Hunter in charge)

298. Advanced Group Study. (1-5) I, II, III, IV.

The Staff (Mr. Hunter in charge)

299. Research. (2-12) I, II, III, IV.

Laboratory 6-36 hours.

The Staff (Mr. Hunter in charge)

Professional Courses

400A. Topographical Anatomy of the Brain and

Spinal Cord. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. The course is designed to provide the student with detailed understanding of the human skull and vertebrae and their contents. Special emphasis will be placed on structural relationships and their functional or clinical importance. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mrs. Vijayan

400B. Brain Dissection and Regional Anatomy. (2) II.

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 400A or its equivalent with consent of instructor. This course will provide the student with the opportunity to study three-dimensional brain sections on human fresh fixed material and glass preparations. Special emphasis will be placed on orange stick dissection techniques. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Brownson

402A. Neuroanatomy. (4) I.

Lecture—2 hours and laboratory—6 hours (2 days a week). Prerequisite: consent of instructor; human or sub-human gross anatomy and/or comparative neuroanatomy is recommended. Includes microscopic and gross anatomy of the nervous system, stressing the internal organization of brain and brain stem. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Brownson

402B. Neuroanatomy. (4) II.

Lecture—2 hours and laboratory—6 hours (2 days a week). Prerequisite: course 402A or its equivalent with consent of instructor. Emphasizes: 1) spinal and cranial pathways to cortical and subcortical levels; 2) cerebral cortex; 3) voluntary and involuntary motor systems; 4) autonomic, hypothalamic and limbic systems; and 5) special senses. The course will stress human neuroanatomy and basic neurology. (Honors / Satisfactory / Unsatisfactory grading only for medical students.)

Mr. Brownson

406. Brain Reconstruction. (4) III.

Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. Building a human brain model in three dimension using wire, wood, plastics and precut forms as the basis for teaching clinical neurophysiology to all qualified students. Also includes human wet specimens and slides. (Honors/ Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Brownson

Human Physiology

Upper Division Courses

151. Information Systems: Design and Analysis of Computerized Information Systems. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: programming desirable; consent of instructor. Basic storage devices; organization of information; design of information systems, on-line, off-line and multilevel; relation of systems design to retrieval requirements and storage elements. Laboratory in preparation of modest information system.

Mr. Walters

198. Directed Group Study. (1-5) I, II, III, IV.

Prerequisite: consent of instructor. Directed reading, discussion and/or laboratory experience on selected topics.

The Staff (Mr. Carlson in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III, IV.

Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. Undergraduate research project.

The Staff (Mr. Carlson in charge)

Graduate Courses**221. Surgical Approaches to Physiology. (2) I, II, III, IV.**

Discussion—1 hour; laboratory—3 hours. Prerequisite: Physiology (Animal) 210A–210B or Medical Sciences 102A–102B. A practical laboratory experience in the classical surgical techniques used to obtain physiological information. The Staff (Mr. Carlson in charge)

231. Renal Physiology. (3) I.

Lecture—3 hours. Prerequisite: Physiology (Animal) 110A–110B or the equivalent; graduate standing and consent of instructor. Topics in mammalian renal physiology and related areas of biological transport, fluid and electrolyte homeostasis, comparative renal physiology, and pathophysiology of the kidney in man. Offered in odd-numbered years. Mr. Rabinowitz

260. Physiological Systems Analysis. (5) I.

Lecture—4 hours; discussion—1 hour. Prerequisite: Mathematics 16B and Physiology 108 and 110B; or consent of instructor. The quantitative analysis of physiological control systems; mathematical models and analytic methods appropriate for the study of different types of physiological control; the application of these techniques to investigations of homeostasis. Offered in odd-numbered years. Mr. R. El. Smith

280. Pulmonary Function Evaluation. (4) I, II, III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Medical Sciences 102B or Physiological Sciences 140A, 140B. Clinical laboratory, physiological evaluations of pulmonary function. The Staff (Mr. Cross in charge)

282. Comparative Pulmonary Physiology. (3) I, II, III.

Laboratory—8 hours. Prerequisite: Medical Sciences 102B or Physiological Sciences 140A, 140B. Comparative studies of pulmonary function. The Staff (Mr. Cross in charge)

298. Group Study. (1–5) I, II, III, IV.

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. The Staff (Mr. Carlson in charge)

299. Research. (1–12) I, II, III, IV.

Prerequisite: consent of instructor. The Staff (Mr. Carlson in charge)

Internal Medicine—Hematology**Graduate Course****298. Topics in Hematology. (2–4) I, II, III, IV.**

Discussion—2 hours. Prerequisite: one year of graduate work and consent of instructors. Basic concepts of the physiology of the hematopoietic organ, the pathophysiology of hematopoietic disease, and concepts of therapeutics will be offered for study. The specific topics to be dictated by the interest and background of the students.

The Staff (Mr. Bolt in charge)

Professional Courses**400. Blood and Marrow Morphology in Disease.**

(1–2) I, II, III, IV.

Discussion—1–2 hours; laboratory—1–4 hours. Prerequisite: one year of human or veterinary medicine and consent of instructor. Study of the morphologic changes in hematological disease presented through case description and including review of pathophysiology and appropriate therapeutics. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mrs. O'Grady

402. Topics in Medical Immunology. (1) I, II, III, IV.

Discussion—1 hour; library work. Prerequisite: one year of post-baccalaureate work and consent of instructor. Outside reading and discussion of current advances in medical immunology with emphasis on application of laboratory studies to clinical disease. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. MacKenzie

Medical Education**Upper Division Courses****151. Biomedical Applications of Computers. (2) III.**

Lecture—2 hours; computer demonstrations. Prerequisite: consent of instructor. Survey of computer applications in patient monitoring, simulation of biological systems, data acquisition and reduction systems, interpretation of electrocardiograms, and the use of analytical programs for research purposes. Mr. Walters

160. Instructional Media in Biomedical Education.

(2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Medical Sciences 101, 102A or equivalent; consent of instructor. A didactic and practical experience in the variety, operation and uses of instructional aids in the presentation of instruction in biology and medicine.

Mr. West, Mr. Walters

Graduate Courses**220. Evaluation in the Medical Curriculum. (2) III.**

Lecture—1 hour; discussion—1 hour. Prerequisites: courses 101, 102A or equivalent; consent of instructor. Development of educational goals and objectives; criteria for measurement of results as related to stated objectives; evaluation of instructional methodology; evaluation of learning achieved; comparative evaluation of alternate instructional pathways.

Mr. West, Mr. Walters

290. Course Planning and Implementation in a Interdisciplinary Medical Curriculum. (1) I.

Seminar—1. Prerequisites: courses 101, 102A or equivalent; consent of instructor. A weekly seminar-discussion presentation on the history, present problems and future trends of the medical curriculum, particularly in the United States.

Mr. West, Mr. Walters

Medical Microbiology**Graduate Courses****291. Seminar in Developmental Immunobiology. (1) II, III.**

Seminar—1 hour. Prerequisite: second-year medical students status, Veterinary Microbiology 121, or consent of instructor. Mechanisms of host defense in primitive and advanced species, including man; correlation of ontogenetic and phylogenetic data with theories of the genesis of immunity and tolerance.

Mr. Bryant

298. Group Study in Medical Microbiology and Immunology. (1-5) I, II, III, IV.

Prerequisite: consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics.

The Staff (Mr. Pappagianis in charge)

299. Research. (1-12) I, II, III, IV.

Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree.

The Staff (Mr. Pappagianis in charge)

Professional Course**401. Medical Virology. (2) II.**

Lecture—1 hour; discussion—1 hour. Prerequisite: Medical Sciences 101 and consent of instructor. This course deals with the clinical, epidemiological, and experimental aspects of viral diseases of man.

Mr. Chang

Neurology**Professional Course****402. Neurology: Biomedical Engineering Research. (1) I, II, III, IV.**

Seminar—1 hour. Prerequisite: Medical Sciences 102B and 402D or interested engineering students. Students will participate in both seminars and experimental work dealing with current problems in biomedical engineering as it applies to the field of neurology.

Mr. Yarnell

Neurosurgery**Graduate Course****286. Diseases of the Nervous System. (3)**

I, II, III, IV.

Lecture—1 hour; discussion—1 hour; seminar—1 hour. Prerequisite: general pathology

or special training in pathology and neurological sciences; consent of instructor. Reaction of the nervous system to injury and infection; degenerative and vascular diseases of the nervous system; neoplasia in the nervous system. Given jointly with Departments of Neurology and Pathology.

Mr. Youmans

Professional Course**423. Brain-Cutting Conference. (1) I, II, III.**

Seminar—1 hour. Prerequisite: for medical students, veterinary students, interns, residents, and graduate students; consent of instructor. Current specimens are sectioned and discussed. Given jointly with Departments of Neurology and Pathology. (Honors/Satisfactory/Unsatisfactory grading only; same course as Pathology 422E, Medicine.)

Mr. Youmans

Pathology**Graduate Courses****210. Introduction to Human Pathology. (6) IV.**

Lecture—2 hours; discussion—2 hours; laboratory—4 hours. Prerequisites: open to upper division undergraduate, graduate, and veterinary students with an adequate background in gross anatomy, histology, physiology, and biochemistry. Study of the processes, causes, and effects of disease, including inflammation, neoplasia, immunology, parasitism, degeneration, abnormalities of growth, injuries due to environmental and toxic agents. Offered in even-numbered years.

Mr. Ruebner and Staff

298. Advanced Group Study. (1-5) I, II, III, IV.

Lecture—1-2 hours; discussion—1-2 hours; laboratory—2 hours. Prerequisite: consent of instructor. Group study in a variety of advanced topics in general and special pathology.

The Staff (Mr. Wellings in charge)

299. Research. (1-12) I, II, III, IV.

Prerequisite: consent of instructor. Research in the mechanisms of disease, the effects and causes of injury, neoplasia, neuropathology and comparative pathology.

The Staff (Mr. Wellings in charge)

Professional Courses**400. Ultrastructure of Disease. (3) III.**

Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor. The contribution of ultrastructure to the understanding of disease processes. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Volk and Staff

401. Conference in Primate Pathology. (1) I, II, III.

Prerequisites: graduate standing and consent of instructor. Discussion of selected topics in primate pathology based on currently available material. Given jointly by the Departments of

Pathology in the Medical and Veterinary Schools, and the National Center for Primate Biology. (Honors / Satisfactory / Unsatisfactory grading only for medical students.)

Mr. Ruebner and Staff

402. Current Topics in Tumor Biology. (1) I, II, III.

Seminar—2 hours. Prerequisites: graduate students and medical students. A discussion of current topics in tumor biology by invited speakers and members of the class. A forum for presentation of proposed and completed experiments by persons interested in tumor biology. (Honors / Satisfactory / Unsatisfactory grading only for medical students.)

Messrs. Welling, Bustad, Faulkin

403. Gross Autopsy Review. (1) I, II, III.

Discussion-seminar—1 hour. Prerequisites: medical students or consent of instructor. Current autopsies are reviewed in detail with clinicopathological correlation. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Ruebner and Staff

404. Forensic Pathology. (2) I.

Lecture—1 hour; laboratory—1 hour. Prerequisites: medical students or consent of instructor. Systemic study of current forensic cases with emphasis on differential diagnosis, preservation of evidence, and medicolegal procedure. Includes introduction to histopathologic diagnosis and toxicology. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Rooney and Staff

405. Brain-cutting Conference. (1) I, II, III.

Seminar—1 hour. Prerequisite: medical student or consent of instructor. Current specimens are sectioned and discussed. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) The Staff (Mr. McDonald in charge)

406. Histopathologic Diagnosis. (1) II.

Seminar—1 hour. Prerequisite: medical student or consent of instructor. Intensive and detailed histopathologic diagnosis. Material covered varies. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

The Staff (Mr. Volk in charge)

407. Diseases of the Nervous System. (3) III.

Lecture—1 hour; discussion—1 hour; seminar—1 hour. Prerequisite: general pathology or special training in pathology and neurological sciences; consent of instructor. Reaction of the nervous system to injury and infection; degenerative and vascular diseases of the nervous system; neoplasia in the nervous system. Given jointly with the Departments of Neurology and Neurosurgery. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

The Staff (Mr. McDonald in charge)

408. Autopsy Case Studies. (1-12) I, II, III, IV.

Discussion—1-4 hours; laboratory—3-24 hours. Prerequisites: medical and veterinary students; consent of instructor. Participation and performance under supervision of complete autopsies with correlative studies of clinical material, gross, microscopic, and laboratory findings. (Honors/Satisfactory/Unsatisfactory grading for medical students.) Mr. Ruebner and Staff

409. Neuropathology Conference. (1) I, II, III.

Seminar—1 hour. Prerequisites: medical students or consent of instructor. Neuropathological findings are correlated with clinical findings. Given jointly with Departments of Neurology and Neurosurgery. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. McDonald and Staff

490. Seminar in Pathology. (2) I, II, III.

Seminar—2 hours. Prerequisite: consent of instructor. Student participation course in the mechanisms of disease. Given jointly by the Departments of Pathology in the Medical and Veterinary Schools. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

The Staff (Mr. Ruebner in charge)

491. Surgical Pathology Seminar. (1) I, II, III.

Seminar—1 hour. Prerequisites: medical student or consent of instructor. Gross and microscopic pathology of current surgical specimens and study sets with clinicopathological correlation. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Tesluk and Staff

492. Ultrastructure Seminar. (1) I, III.

Seminar—1 hour. Prerequisites: medical, veterinary, or graduate student; or consent of instructor. Electron micrograph and methodology; workshop participants are encouraged to bring their own material and problems for discussion. (Honors / Satisfactory / Unsatisfactory grading only for medical students.)

Mr. Jensen and Staff

Pediatrics

Upper Division Course

199. Special Study in Pediatric Research. (1-5)

I, II, III, IV.

Laboratory—3-15 hours. Prerequisite: limited to undergraduates with consent of instructor, based on adequate preparation in chemistry and/or physiology. Opportunity to discuss and learn about problems related to growth and development including the functions of different organ systems. Also learn different laboratory techniques and use of different laboratory equipment. The Staff (Mr. Stempfel in charge)

Pharmacology

Upper Division Courses

101. Principles of Pharmacology. (2) III.

Lecture—1 hour; discussion—1 hour. Prerequisite: Medical Sciences 101 or equivalent. Drug-enzyme interactions; receptor sites and characteristics; absorption, distribution, metabolism and excretion of drugs; drug tolerance, dependence, addiction and abuse; special toxicities; allergy, behavioral toxicity and teratology, and drug alteration of subcellular function.

Mr. Hollinger, Mr. Stark

102. Pharmacodynamics A. (2) I.

Lecture—1 hour; discussion—1 hour. Prerequisite: Medical Sciences 101 and 102B or equivalent. Pharmacology of the Autonomic system; pharmacology of the cardiovascular system; renal pharmacology and pharmacology of nerve and neuromuscular junction.

Messrs. Hance, Schmitt, West

103. Pharmacodynamics B. (2) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: Medical Sciences 101, 102B, and 104 or equivalent. Pharmacology of general anesthetics, hypnotics, sedatives, analgesics and anti-pyretics; narcotic analgesics; convulsants and stimulants, anticonvulsants and drug altering behavior. Mrs. E. K. Killam, Mr. K. F. Killam

104. Pharmacology Laboratory A: Pharmacodynamics. (2) I.

Discussion—1 hour; laboratory—4 hours. Prerequisite: courses 102 and 103 or equivalent. Laboratory techniques used to evaluate the action of drugs. Offered in even-numbered years.

Messrs. Hollinger, Schmitt, West

105. Pharmacology Laboratory B: Neuropharmacology. (2) II.

Discussion—1 hour; laboratory—4 hours. Prerequisite: Medical Sciences 101, 102B and 104 or equivalent. Specialized laboratory techniques used to evaluate centrally acting drugs. Offered in odd-numbered years.

Mr. Hance, Mrs. Killam

106. Pharmacology Laboratory C: Psychopharmacology. (2) III.

Discussion—1 hour; laboratory—4 hours. Prerequisite: Medical Sciences 101, 102B and 104 or equivalent. Specialized laboratory techniques used to evaluate drugs altering behavior. Offered in odd-numbered years.

Mr. Killam, Mr. Stark

Graduate Courses

201. Pharmacology of the Nervous System I: Transmitter. (1-3) I.

Lecture—1 hour; discussion—1 hour. Prerequisite: courses 101, 102 and 103 or Medical Sciences 101, 102B and 104 or equivalent.

Pharmacology of substances affecting nervous transmission. Offered in odd-numbered years.

Mr. Hance

202. Pharmacology of the Nervous System II: Hypnotics. (1-3) I.

Lecture—1 hour; discussion—1 hour. Prerequisite: courses 101, 102, 103 or Medical Sciences 101, 102B, 104 or equivalent. Pharmacology of centrally acting sedative, hypnotic and anesthetic agents with emphasis on alterations in brain function. Offered in even-numbered years.

Mrs. Killam

203. Pharmacology of the Nervous System III: Stimulants and Anticonvulsants. (1-3) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: courses 101, 102, 103 or Medical Sciences 101, 102B or equivalent. Pharmacology of stimulant and convulsants agents, anticonvulsant agents and their evaluation in animal models. Offered in even-numbered years.

Mr. Stark

204. Pharmacology of the Nervous System IV: Drug Alteration of Behavior. (1-3) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: courses 101, 102, 103 or Medical Sciences 101, 102B, 104 or equivalent. Activity of drugs altering mood and behavior: psychopharmacologic agents, hallucinogens, antidepressants. Offered in odd-numbered years.

Mr. Killam

205. Drug Distribution and Metabolism. (1-3) III.

Lecture—1 hour; discussion—1 hour. Prerequisite: course 101 or Medical Sciences 101, 102B or equivalent. Evaluation of problems of drug distribution and metabolism with special reference to autoradiographic techniques. Offered in even-numbered years.

Mr. Stark

207. Drug Alteration of Subcellular Function. (1-3) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: course 101 or Medical Sciences 101 or equivalent. The interaction of drugs and subcellular components with special emphasis on mechanism of action. Offered in odd-numbered years.

Mr. Hollinger

208. Application of Computers to Pharmacology A. (1) I, II, III.

Lecture—1 hour. Prerequisite: consent of instructor. Presentation of basic concepts and problems.

Mr. Stark

209. Application of Computers to Pharmacology B. (1-2) I, II, III.

Lecture—1 hour. Prerequisite: course 208. Use of laboratory based devices employed in data reduction.

Mr. Killam

210. Application of Computers to Pharmacology C.
(1-3) I, II, III.

Lecture—1 hour. Prerequisite: course 209. Advanced applications and programming.

Mr. Hance

298. Group Study. (1-5) I, II, III, IV.

Prerequisite: consent of instructor. Directed reading and discussion of topics in modern pharmacology. The Staff (Mr. Killam in charge)

299. Research. (1-12) I, II, III, IV.

Prerequisite: consent of instructor.

The Staff (Mr. Killam in charge)

Physical Medicine and Rehabilitation**Professional Courses****451. Physical Medicine Basic Science Seminar.**

(2) I, II, III.

Lecture—1 hour; discussion—1 hour. Prerequisite: completion of first-year medical curriculum and physical therapy students. Faculty and consultants from other departments lecture on neuroanatomy, anatomy, neurophysiology. Electrophysiology, research methods and basic principles of Physical Medicine and Rehabilitation. Research by members of the staff is also reported.

Mr. Waring

452. Physical Modality Laboratory and Seminar.

(2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: completion of third year of Medical School and physical therapy students. Designed to acquaint the resident with the physiology, biophysics and methodology of the various physical modalities. In the laboratory, instruction is given in the technical use, contraindications and indications for these modalities. Mr. Waring

470. Rehabilitation Medicine for Allied Health Sciences. (2) IV, I, II, III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: limited to students in the allied health sciences. Designed to acquaint the allied health science student in the clinical application of the physical modalities and the principles of medical and vocational rehabilitation including the physical, psychosocial and occupational aspects.

Mr. Zellé

Psychiatry**Graduate Courses****220. Interdisciplinary Research Seminar in Family Psychology. (3) I, II, III, IV.**

Seminar—3 hours. Prerequisite: medical, law, or social sciences graduate student; consent of instructor. Participation in research project designed to study the relationship between family structures and communication processes and

normal and abnormal behavior. Families will be selected from patient and "normal" populations, ethnic groups, and a variety of socioeconomic classes. The Staff (Mr. Langsley in charge)

222. Sociology of Mental Illness. (4) I, II, III, IV.

Lecture—2 hours; discussion—4 hours. Prerequisite: medical student or social sciences graduate student; consent of instructor. Social and cultural aspects of mental illness; theories of "mental illness," mental illness as deviance, exploration of social and organizational responses, sociologic studies of the mental hospital. (Honors / Satisfactory / Unsatisfactory grading only for medical students.) Mr. Rockwell

Professional Courses**401. Family and Marital Counseling. (2) III.**

Lecture—1 hour; discussion—2 hours. Prerequisite: enrollment as medical student; open to graduate and professional school students with consent of instructor. Principles and techniques of family and marital counseling as conducted by the practicing physician. Cases will be presented. Videotaped clinical examples of marriage counseling.

Mr. Langsley

420. Grand Rounds for Department of Psychiatry.

(1) I, II, III, IV.

Prerequisite: student or staff School of Medicine or other qualified mental health professionals with consent of instructor. One and one-half hour weekly conference at Sacramento Medical Center for presentation of selected clinical cases, presentation of lecture and research reports.

Mr. Langsley

430B. Diagnostic Interviewing. (1) IV, I.

Lecture—1 hour; discussion—1 hour. Prerequisite: first-year psychiatric residents or consent of instructor. Demonstration and discussion of interviewing techniques for psychiatric case assessment. Readings assigned from current literature. Discussion of treatment planning.

Mr. Blacker

430C. Clinical Neurology for Psychiatrists. (1) I, II, III, IV.

Discussion—2 hours. Prerequisite: first- or second-year psychiatric residents or consent of instructor. Lecture, discussion, and case presentation of neurological examination, differential diagnosis and treatment of neurological diseases.

The Staff (Mr. Dreyfus in charge)

430D. Readings in General Psychiatry. (1) IV, I, II, III.

Discussion—1 hour. Prerequisite: residents in psychiatry or students in other mental health professions with consent of instructor. Assigned readings from classical and recent psychiatric literature on clinical and research topics.

Mr. Barter

430E. Biological Psychiatry. (1) IV, I.

Lecture—1 hour. Prerequisite: first-year psychiatric residents or students in other mental health professions with consent of instructor. Lecture and discussion on biological underpinnings of behavior to include neurophysiology, neurochemistry, neuropsychopharmacology and pertinent topics.

The Staff (Mr. Langsley in charge)

430F. Social and Environmental Influences on Human Behavior. (1) II, III.

Lecture—1 hour. Prerequisite: first-year psychiatric residents or students in other mental health professions with consent of instructor. Lectures and assigned readings on social and environmental factors which influence human behavior. Emphasis on contributions of sociology, anthropology and other behavioral sciences to understanding of behavior. Mr. Rockwell

430G. Treatment of Child and Adolescent Problems. (1) II, III.

Lecture—1 hour. Prerequisite: first-year psychiatric residents or students in other mental health professions with consent of instructor. Lectures, assigned readings and clinical examples illustrating principles and practice of treatment of children and adolescents with psychiatric illness. Mr. Shatkin

MICROBIOLOGY—See Also Veterinary Microbiology

MICROBIOLOGY (A Graduate Group)

Herman J. Phaff, Ph.D., *Chairman of the Group*
Group Office, 156 Hutchison Hall

Graduate Courses

290. Seminar. (1) I, II.

Seminar—1 hour. One seminar is offered during the fall and winter quarters. One weekly meeting is held. (Satisfactory/Unsatisfactory grading only.) The Staff

430H. Psychological Theories of Behavior.

(1) II, III.

Lecture—1 hour. Prerequisite: first-year psychiatric residents or students in other mental health professions with consent of instructor. Lectures, readings and clinical examples illustrating the various psychological theories of human behavior. Emphasis on psychoanalytic psychology.

Mr. Blacker

430I. Psychodiagnostic Evaluation. (1) II, III.

Lecture—1 hour. Prerequisite: first-year psychiatric residents or students in other mental health professions with consent of instructor. Theory and clinical examples of evaluation of disorders of behavior and psychiatric illness using psychodiagnostic testing and consultation techniques.

Mr. Meadow

473. Anti-Social Behavior. (9) I, II, III, IV.

Clinical assignment with selected conferences $\frac{1}{4}$ quarter full time. Prerequisite: completion of 2 years of medical school or consent of instructor. Evaluation of juvenile and adult offenders at County jail, Juvenile Center of Sacramento County, or California Medical Facility. Special clinical experiences to be arranged. May be repeated for credit with consent of instructor.

Mr. Tupin

MICRONESIAN LANGUAGES—See Oriental Languages

MILITARY SCIENCE

Bruce M. Carswell, Colonel, *Chairman of the Department*
Department Office, 125 Gymnasium

Professor:

Bruce M. Carswell, Colonel

Associate Professors:

George W. Crofoot, Major

William R. Henson, Jr., Major

Assistant Professors:

Thomas J. Ford, Jr., Captain

Justin R. Hughes, Captain

The Military Science Department offers instruction and training which, combined with a baccalaureate degree, qualifies a student for a commission in the Army Reserve. The objective of the ROTC program is to produce junior officers who by their education, training and inherent qualities are suitable for continued development. The program assists qualified men in all academic fields to prepare for positions of leadership in a military or civilian career. A continuing effort is made to assign graduates to military career fields aligned with their major field of study, individual capabilities and preferences. Active duty obligation for upper division ROTC will not exceed two years.

Department Programs

Students are enrolled in military science under one of two programs.

Four-Year Program.—Students are enrolled in lower division for the first two years on a voluntary basis. No military obligation is accrued during completion of the lower division courses. Admission to the upper division is by application from those second-year lower division students who meet the academic, physical, and military aptitude requirements.

Upper division students receive \$50 subsistence per month after executing a contract agreeing to complete the course and accept a commission if offered. The commission must be obtained prior to the student's 28th birthday. During the course all military science textbooks, uniforms and equipment are provided without cost to the student. Students are trained at summer camp between their third and fourth years of the course. Camp training stresses the evaluation and practical application of tactical, technical and administrative procedures with particular emphasis on individual participation, leadership development and the capability to function effectively in positions of significant responsibility. Each cadet is paid half of a Second Lieutenant's pay during the period of the camp, plus travel expenses.

Two-Year Program.—This program is primarily designed for the student who has not had the opportunity to pursue lower division ROTC. Applications are accepted during the winter term of the year preceding enrollment in the two-year program. In lieu of lower division courses the applicant must successfully complete a six-week summer camp conducted during the summer preceding enrollment in the upper division program. All other provisions explained above regarding upper division apply to the two-year program.

Scholarship Program.—Four-year scholarship students are selected by nationwide competitive examination. Successful candidates receive all tuition, fees, books, uniforms and \$50 subsistence per month. One-, two- and three-year scholarships with similar benefits are awarded

by the department to outstanding students enrolled in the ROTC program.

Leadership Laboratory.—Students enrolled in ROTC for the purpose of pursuing a commission are required to participate in approximately 10 hours of leadership laboratory per quarter in addition to classroom instruction. No academic credit will be given for leadership laboratory.

Academic Credit

College of Letters and Science.—The Bachelor of Arts degree requires the completion of 180 units, of which at least 150 units shall be in courses given by teaching departments in the College of Letters and Science. Military Science courses do not fall within this category and must be counted in the 30-unit allowance indicated above.

College of Agricultural and Environmental Sciences.—The Bachelor of Science degree in agriculture requires the completion of 180 units. All units of upper and lower division military science courses combined may be accredited toward this requirement.

College of Engineering.—Up to six units of military science may be accredited as free electives toward the requirement of the College of Engineering for the Bachelor of Science degree.

School of Veterinary Medicine.—The number of Military Science units acceptable toward the Bachelor of Science degree in Veterinary Medicine is on an individual program basis approved by the Dean of the School. Graduates with the D.V.M. degree may apply for direct commission in the United States Army Veterinary Corps.

Lower Division Courses

2. Introduction to Military Science. (1) I.

Lecture—1 hour. Discussion of the nature of armed conflict, traditions of the military service, and principles of warfare, with emphasis on examples drawn from both classical and contemporary conflicts.

Mr. Hughes

3. Growth and Development of the U. S. Army. (1) II.

Lecture—1 hour. Examination of the growth, development, and magnitude of management of the present-day Army, with emphasis on evolution of current personnel, logistical, and operational organization and policies.

Mr. Hughes

4. Principles of Basic Tactics. (1) III.

Lecture—1 hour. Principles of basic operations, tactics, and military combat formations, with emphasis on the individual and small unit. Relationship between the small unit and parent organization.

Mr. Hughes

21. Fundamentals of Military Communications Systems. (1) I.

Lecture—1 hour. An introduction to the elements of military communications systems and their application to civil and military operations.

Mr. Hughes

22. Military Maps and Aerial Photograph Interpretation. (1) I.

Lecture—1 hour. Military map systems and aerial photography; interpretation and application of the military grid system, including terrain evaluation, basic map data, military and civil map symbols, methods of orientation, and use of grid references. Mr. Hughes

23. Introduction to Military Operations. (1) III.

Lecture—1 hour. Prerequisite: course 4 or consent of instructor. Analysis and application of the principles of offensive and defensive combat as applied to small tactical units. Mr. Hughes

26. Military History. (3) II.

Lecture—3 hours. An analysis of selected military battles of history, with emphasis on the strategical and tactical concepts employed. Mr. Hughes

Upper Division Courses

131. Principles of Military Instruction. (2) I.

Lecture—2 hours. Principles and practice in fundamentals applicable to military instruction, briefings and staff studies, to include those used in planning, presenting and evaluating. Students presentation exemplifying lecture material. Mr. Henson

132. Theory of Leadership. (2) II.

Lecture—2 hours. Principles and theory of leadership; individual and group solution of leadership problems common to small groups. Mr. Henson

MUSIC

Richard G. Swift, M.A., *Chairman of the Department*

Department Office, 112 Music Building

Professors:

Larry D. Austin, M.M.
Jerome W. Rosen, M.A.
Richard G. Swift, M.A.

Associate Professors:

Sydney R. Charles, Ph.D.
Theodore C. Karp, Ph.D.
Albert J. McNeil, M.S.

Assistant Professors:

Duyong Chung, M.M.
Sven H. Hansell, Ph.D.



Lecturer:

Arthur N. Woodbury, M.M.

Major Subject Advisers. Mr. Hansell, Mr. Karp.

133. Advanced Military Operations. (2) III.

Lecture—2 hours. Prerequisite: course 23 or consent of instructor. An advanced study of military operations, to include an analysis of the functions of primary and supporting branches and commands. Mr. Henson

141. The Military Team. (2) I.

Lecture—2 hours. Prerequisite: course 133. Fundamentals and dynamics of the military team to include command and staff structures, functions and operations at division and lower levels. Analysis of logistical operations and intelligence collection and collation. Mr. Ford

142. Managerial Principles and Theories. (2) II.

Lecture—2 hours. Military administrative principles and personnel management theories, including the military occupational structure, and the administration of military justice. Mr. Ford

143. Unconventional Warfare. (2) III.

Lecture—2 hours. Prerequisite: course 141. An analysis of unconventional warfare, to include an examination of insurgency and counter-insurgency operations in the world arena. Mr. Ford

150. The Development and Control of Nuclear Weapons. (3) III.

Lecture—3 hours; term paper. A survey of the development of nuclear weapons and post-war attempts at arms control, including the Baruch Plan, strategic weapons control, test ban treaty, nonproliferation treaty, and problems of verification in arms control. Mr. K. Kreith

The Major Program

Preparation for the major—required: first year, Music 4A–4B–4C; second year, 5A–5B–5C and 21A–21B–21C; one year of Music 30. Beginning and transfer students must take an examination in piano playing. Those showing deficiencies will be required to take Music 405. Sufficient pianistic ability to perform four-part chorales and compositions comparable in difficulty with *The Little Preludes* of Bach is prerequisite to upper division courses in the major. Students transferring from other colleges should take the Placement Examination and consult with departmental major advisers before enrolling in any music course.

The major—required: Music 104A–104B–104C, one year of Music 130, and at least 20 units selected from the following courses: 107, 108A, 108B, 111, 112, 114, 115, 116, 117, 118, 119, 120, 198, and 199. In addition, a total of at least 4 units in performance courses

is required of all music majors. These courses include Music 41, 42, 43, 44, 46, 141, 142, 143, 144, 146.

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 in both composition and musicology. Undergraduates contemplating advanced study in music should prepare to satisfy these requirements as they proceed to the bachelor's degree.

Individual Group Major.—Individual group majors may be established by combining the work offered in this department with courses in allied fields. The major subject adviser should be consulted for details.

Graduate Study.—The Department of Music offers programs of study and research leading to the M.A. degree in composition or musicology. Detailed information regarding graduate study may be obtained from the Graduate Adviser for Music, Mrs. Charles.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major. In addition, teaching methods courses (Music 321A–321B, 322, 323A–323B) are required. Music 300 or 301 recommended.

Teaching Minor.—Required: courses 4A–4B–4C, 5A–5B–5C, 108A–108B, 405A–405B–405C or equivalent, and either 111 or 112. In addition, students are advised to enroll in at least two quarters of performance courses. Music 300 is recommended. Students must consult with the subject representative.

Subject Representative: Mr. McNeil.

Lower Division Courses

4A–4B–4C. Elementary Theory. (5–5–5) I–II–III.

Lecture—5 hours. The development of writing and listening techniques through the study of music fundamentals; ear training; beginning tonal counterpoint and harmony; keyboard harmony, score reading; analysis of repertory.

Messrs. Chung, Karp, McNeil

5A–5B–5C. Intermediate Theory. (4–4–4) I–II–III.

Lecture—4 hours. Prerequisite: course 4C. Intermediate tonal counterpoint and harmony.

Mr. Swift

10. Basic Musicianship. (2) I, II, III.

Lecture—3 hours. Fundamentals of music, singing, ear-training, and conducting for the general student.

The Staff (Mr. McNeil in charge)

21A–21B–21C. History and Literature of Music.

(4–4–4) I–II–III.

Lecture—3 hours; listening section—1 hour. Prerequisite: course 4C.

Mr. Hansell

27A. Introduction to Musical Literature. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Lectures, guided listening and readings designed to

furnish the student with an understanding of basic music concepts. Intended primarily for non-majors.

Mr. Austin, Mr. Woodbury

27B. Introduction to Musical Literature. (4) II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 27A or consent of instructor. A survey of the history of musical styles from antiquity to the present. Lectures, guided listening and readings. Intended primarily for non-majors.

Mr. Woodbury, Mrs. Charles

28. Introduction to Afro-American Music. (4) II.

Lecture—3 hours; listening and discussion—1 hour. A historical and stylistic survey of Afro-American music.

Mr. McNeil

30A–30B–30C. Applied Study of Music Literature: Intermediate. (1–1–2) I–II–III.

Class instruction in performance—2 hours. Prerequisite: consent of instructor; student must demonstrate ability to perform scales and small compositions. Non-majors and auditors not accepted. Class instruction in individual wind, brass, string or keyboard instruments. May not be repeated for credit.

The Staff (Mr. Swift in charge)

41. University Symphony. (2) I, II, III.

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal and performance of music from the orchestra literature.

Mr. Chung

42. Repertory Band. (2) I, III.

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Rehearsal and performance of music for wind ensembles.

Mr. Austin

43. University Concert Band. (2) II.

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Rehearsal and performance of music for band.

Mr. Austin, Mr. Woodbury

44. University Chorus. (2) I, II, III.

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University. Rehearsal and performance of choral music.

Mr. McNeil

46. Chamber Music Ensemble. (2) I, II, III.

Rehearsal—3 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose

proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, piano, harpsichord, and organ. Mr. Hansell

98. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Swift in charge)

99. Special Study for Undergraduates. (1-5)

I, II, III.

The Staff (Mr. Swift in charge)

Upper Division Courses

104A-104B-104C. Advanced Theory.

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 5C. Continuation of Music 5. Mr. Rosen

107. Elements of Electronic Composition.

(3) I, II, III.

Lecture—1 hour; laboratory—4 hours. Prerequisite: consent of instructor. Introduction to composition utilizing Buchla and Moog synthesizers. Mr. Rosen

108A-108B. Orchestration. (2-2) I-II.

Lecture—2 hours. Prerequisite: course 5C. The techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations. Mr. Chung

***111. Choral Conducting. (2) III.**

Lecture—2 hours. Prerequisite: course 5C. A study of the principles and techniques of conducting choral ensembles. Mr. McNeil

112. Instrumental Conducting. (2) III.

Lecture—2 hours. Prerequisite: course 108B. A study of the principles and techniques of conducting instrumental ensembles. Mr. Woodbury

***114. Music of the Middle Ages. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the middle ages. Mrs. Charles

115. Music of the Renaissance. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the period from 1430-1600.

Mrs. Charles

116. Music of the Baroque Period. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the period from Monteverdi to Handel and J. S. Bach. Mr. Karp

117. Music of the Classic Period. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the eighteenth century. Mr. Hansell

***118. Music of the Romantic Period. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the nineteenth century.

***119. Music of the Twentieth Century. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the twentieth century. Mr. Swift

120. Introduction to Musical Analysis. (2) III.

Lecture—2 hours. Prerequisite: course 4C. Introduction to modes of analyzing music of all style periods. The Staff (Mr. Swift in charge)

***127A. Musical Literature: The Opera. (3) I.**

Lecture—3 hours. Prerequisite: course 27B or consent of instructor. A study of selected operas such as Monteverdi's *Orfeo*, Mozart's *Don Giovanni*, Wagner's *Tristan und Isolde*, Verdi's *Otello*, Debussy's *Pélleas et Mélisande*, and Berg's *Wozzeck*. Intended primarily for non-majors.

***127B. Musical Literature: The Symphony. (3) III.**

Lecture—3 hours. Prerequisite: course 27B or consent of instructor. A study of selected symphonies by composers such as Haydn, Mozart, Beethoven, Schubert, Brahms, and Stravinsky, emphasizing form and style. Intended primarily for non-majors.

130A-130B-130C. Applied Study of Music

Literature: Advanced. (1-1-2) I-II-III.

Class instruction in performance—2 hours. Prerequisite: course 30C, consent of instructor. Advanced class instruction in individual wind, brass, string or keyboard instruments. To complete the course students must perform in public concert or before faculty examination board. Non-majors and auditors not accepted. May not be repeated for credit.

The Staff (Mr. Swift in charge)

141. University Symphony. (2) I, II, III.

Rehearsals—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal and performance of music from the orchestra literature.

Mr. Chung

142. Repertory Band. (2) I, III.

Rehearsals—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Rehearsal and performance of music for wind ensembles. Mr. Austin

* Not to be given, 1971-72.

143. University Concert Band. (2) II.

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Rehearsal and performance of music for band. Mr. Austin, Mr. Woodbury

144. University Chorus. (2) I, II, III.

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University. Rehearsal and performance of choral music. Mr. McNeil

146. Chamber Music Ensemble. (2) I, II, III.

Rehearsal—3 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, piano, harpsichord, and organ. Mr. Hansell

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Swift in charge)

199. Special Study for Advanced Undergraduates.

(2-4) I, II, III.

The Staff (Mr. Swift in charge)

Graduate Courses**200A-200B. Music Research. (4-4) I, II.**

Seminar—3 hours. Survey of basic materials for music research. Selected projects.

Mrs. Charles

200C. Notation. (4) III.

Seminar—3 hours. Study of selected notation practices.

Mr. Karp

203A-203B-203C. Composition. (4-4-4) I-II-III.

Seminar—3 hours. Technical projects and free composition.

Mr. Austin

240A-240B-240C. Techniques of Analysis.

(4-4-4) I-II-III.

Seminar—3 hours. Analysis and analytical techniques as applied to music of all historical style periods.

Mr. Hansell, Mrs. Charles, Mr. Swift

NATIVE AMERICAN STUDIES

Related Undergraduate Major.—See page 66.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses**1. Introduction to Native American Studies. (4) II.**

Lecture—3 hours; discussion—1 hour. Introduction to U.S. Indian tribal-reservation culture;

***291A-291B-291C. Seminar: Topics in Music History. (4-4-4) I-II-III.**

Seminar—3 hours. Studies in selected areas of music history and theory.

Mrs. Charles, Mr. Hansell

297. Topics in Twentieth Century Music. (4) III.

Seminar—3 hours. Analytical approaches to musical thought of the twentieth century.

Mr. Swift

299. Individual Study. (2-5) I, II, III.

Special studies and projects in musical composition or music history.

The Staff (Mr. Swift in charge)

Teaching Methods Courses**Instrumental Methods**

The courses in this series consider methods of teaching orchestra and band instruments, and include repertory and program planning for secondary schools.

300. The Teaching of Music. (3) II, III.

Lecture—3 hours. Prerequisite: course 10 or equivalent. Methods of teaching music in grades K-6.

The Staff (Mr. McNeil in charge)

301. The Teaching of Music. (3) III.

Lecture—3 hours. Prerequisite: course 5C or equivalent. Methods of teaching music in grades 7-12.

Mr. McNeil

***321A-321B. Stringed Instruments. (1-1) I-II.**

Discussion—2 hours. Prerequisite: course 4C.

322. Brass Instruments. (2) I.

Discussion—2 hours. Prerequisite: course 4C.

Mr. Austin

323A-323B. Woodwind Instruments. (1-1) II-III.

Discussion—2 hours. Prerequisite: course 4C.

Mr. Woodbury

Professional Course**405A-405B-405C. Elementary Piano.**

(1-1-1) I-II-III.

Laboratory—2 hours. Prerequisite: open to music majors and candidates for the general secondary credential with a minor in music.

relationship of Native American Studies to other academic disciplines.

Mr. Martin

20. The Native American Experience. (4) III.

Lecture—3 hours; discussion—1 hour. An introduction to American Indian historical and socio-cultural development with emphasis upon the U. S. area and upon those processes, such as relations with non-Indians which have contributed to the current condition of Indian people. (Same course as Anthropology 20.)

Mr. Forbes

^a Not to be given, 1971-72.

NEMATOLOGY

Related Undergraduate Major.—See page 66. Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Upper Division Courses

100. General Plant Nematology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biology 1 or 10. An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.

Mr. Lownsbery

110. Introduction to Nematology. (2) II.

Lecture—2 hours. The relationship of nematodes to man's environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil and as parasites of plants and invertebrate animals.

Mr. Allen

130. Principles of Nematode Control. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Recommended: Chemistry 8B; Mathematics 13. Principles and techniques used for derivation of data and their interpretation as the basis for control of plant parasitic nematodes. The biological, physical, and chemical factors influencing nematodes and their control are studied in laboratory and greenhouse. Some field trips required.

Mr. Lear

Graduate Courses

220. Principles and Techniques of Nematode Taxonomy and Morphology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Analysis and evaluation of the techniques used in the collection, extraction, and preparation of specimens, free-hand and histologic sections; presentation of illustrative material.

Mr. Maggenti

*222. Nematode Pathogenicity to Plants. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 100. Investigations of problems in proving nematode pathogenicity; the role of nematodes in plant disease.

Mr. Lownsbery

225. Nematode Taxonomy and Comparative Morphology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 220. The taxonomy, morphology, and comparative morphology of soil, freshwater, and marine nematodes.

Mr. Allen

290. Seminar. (1) II.

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Raski in charge)

299. Research. (1-9) I, II, III.

The Staff (Mr. Raski in charge)

NEUROLOGY—See Medicine

NEUROSURGERY—See Medicine

NUTRITION

Major Advisers.—See *Schedule and Directory* listing.

Major Program and Graduate Study.—See pages 62, 66, 86, and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Course

10. Discoveries and Concepts in Nutrition. (3) II.

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.

Mr. Hill

Upper Division Courses

102A-102B. General Nutrition. (4-4) I-II.

Lecture—4 hours. Prerequisite: Chemistry 8B; Physiology 101 or 2; not open for credit to

students who have taken Nutrition 110 and 111. Introduction to the principles of nutrition; study of the nutrients and their chemical and physiological roles in metabolism; nutrient requirements of man.

Miss Oace

102L. General Nutrition Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 102A; course 102B (should be taken concurrently); not open for credit to students who have taken 111L. Laboratory study of the principles of nutrition; study of the nutrients and their chemical and physiological roles in metabolism.

Miss Oace

103. Animal Nutrition and Feeding. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B. The basic principles of animal nutrition as they are applied to livestock feeding; the composition and uses of feedstuffs in their relation to the feeding of farm animals and poultry; the balancing of rations. Not open for credit to animal science majors.

Mr. Garrett

* Not to be given, 1971-1972.

109. Nutritional Principles of Livestock Feeding. (3) I.

Lecture—3 hours. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. The principles of nutrition and their application to the solution of problems in animal feeding. Nutritive requirements for maintenance and productive functions, nutritional disorders, composition and use of feed-stuffs.

110. Principles of Nutrition. (5) II.

Lecture—4 hours; discussion—1 hour. Prerequisite: Biochemistry 101B (may be taken concurrently); a course in physiology or zoology. The fundamental principles of the nutrition of man and other animals. The nutrients in relation to physiological processes of growth, maintenance, and reproduction. Nutritional disorders.

Messrs. Robinson, Grau, Rucker

111. Human Nutrition. (4) III.

Lecture—4 hours. Prerequisite: course 110. Nutrition of man; critical study of nutrient requirements at various phases of the life cycle.

Mrs. Hurley

111L. Nutrition Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 110. Laboratory study of the chemical and physiological roles of nutrients in metabolism; use of experimental animals in determining the essentiality and function of nutrients.

Mrs. Hurley, Mr. Vohra

114. Nutrition and Development. (4) I.

Lecture—4 hours. Prerequisite: course 110 or 102B. The role of nutritional factors in embryonic and postnatal development. Mrs. Hurley

116A-116B. Diet Therapy. (3-3) I, II.

Lecture—3-3 hours. Prerequisite: course 111 or 102B; Physiology 101 or equivalent. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions.

Miss Zeman

117. Experimental Nutrition. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 111 or 102B; 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.

Mr. Rucker

118. Community Nutrition. (3) II.

Lecture—3 hours. Prerequisite: course 102B or 111. Examination of nutrition problems in contemporary communities. Consideration of social, political, and economic forces in development and implementation of community nutrition programs. Principles and methods of nutrition education. Evaluation of community nutrition programs and resources.

Mrs. Adams

118L. Laboratory in Community Nutrition. (1) II.

Laboratory—3 hours. Prerequisite: course 118 (must be taken concurrently). Observation and evaluation of various community nutrition programs.

Mrs. Adams

119. Field Work in Community Nutrition. (3) III.

Discussion—1 hour; laboratory—6 hours. Prerequisite: courses 118, 118L. Student participation in community nutrition programs in public, private, and volunteer agencies and in citizens' groups with active nutrition programs. Analysis of the methods used and evaluation of the effectiveness of the programs.

Mrs. Adams

121. Animal Nutrition Laboratory. (2) III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 110. Studies, demonstrations, and exercises in the measurement of nutritional values of feeds, nutrient requirements for physiological functions, and ration formulation. Students who have completed course 122 and/or 123 will have units of credit reduced by one unit per course.

Mr. Ronning

122. Ruminant Nutrition. (3) III.

Lecture—3 hours. Prerequisite: course 110; Bacteriology 2; Physiology 110B. A study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in the ruminant. Students who have completed course 121 may only receive 2 units of credit.

123. Nutrition of Non-Ruminant Animals. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110. Application of nutrition principles to the feeding of non-ruminant species, including swine, poultry and laboratory animals. Students who have completed course 121 may only receive 2 units of credit.

Mr. Robinson, Mr. Kratzer

190. Proseminar in Nutrition. (1) I, II, III.

Seminar—1 hour. Prerequisite: senior standing, course 102B or 111. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated for credit with consent of instructor.

The Staff (Mr. Hill in charge)

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to animal science majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Hill in charge)

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Hill in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Hill in charge)

Graduate Courses**201. Advanced Protein and Amino Acid****Nutrition. (4) I.**

Lecture—4 hours. Prerequisite: course 110, Bacteriology 2, Biochemistry 101B, Physiology 110B. Nutritional significance of protein and amino acids, including studies of the influence of dietary protein on digestion, absorption, metabolism, resistance to disease and food intake. A study of dietary requirements and interrelationships among amino acids.

The Staff (Mr. Rogers in charge)

202. Advanced Animal Energetics and Energy Metabolism. (3) II.

Lecture—3 hours. Prerequisite: course 110, Bacteriology 2, Biochemistry 101B, Physiology 110B. History of nutritional energetics; evaluation of energy transformations associated with food utilization by animals; energy expenditures at cellular, tissue and animal levels as affected by physiological and nutritional states and functions. The Staff (Mr. Rogers in charge)

203. Advanced Vitamin and Mineral Nutrition. (3) III.

Lecture—3 hours. Prerequisite: course 110, Bacteriology 2, Biochemistry 101B, Physiology 110B. Advanced studies of metabolic function and nutritional interrelationships of vitamins and minerals. Comparative aspects.

The Staff (Mr. Rogers in charge)

250. Concepts of Animal Nutrition. (3) II.

Lecture—3 hours. Prerequisite: courses 201, 202, 203. Dynamic interrelationships between food animals and environment including concepts in food intake, digestion, absorption, and utilization of nutrients.

251. Single Carbon Metabolism in Nutrition. (2) I.

Lecture—2 hours. Prerequisite: course 203. Nutritional and metabolical interrelationships involved in the transfer of single carbon units in various animals; the involvement of the metabolical function of biotin, folic acid, vitamin B₁₂, pyridoxine, choline, methionine and other nutrients. Offered in even-numbered years.

Miss Oace, Mr. Vohra, Mr. Kratzer

252. Nutrition and Development. (3) II.

Lecture—3 hours. Prerequisite: courses 201, 202, 203. The relationship of nutrition to prenatal and early postnatal development. Offered in even-numbered years.

Mrs. Hurley, Miss Zeman, Mr. Grau

253. Control of Food Intake. (3) III.

Lecture—2 hours; discussion—1 hour; 2 or 3 laboratory demonstrations. Prerequisite: courses 201, 202 or Physiology 210B or consent of instructor. A comprehensive study of the biochemical, nutritional, behavioral, and physiological mechanisms controlling food intake. The subject matter will be approached through lectures, laboratory demonstration and discussions where students and staff will critically evaluate the literature. Offered in even-numbered years. Messrs. Rogers, Robinson, Mendel

254. Ruminant Digestion and Metabolism. (3) I.

Lecture—3 hours. Recommended: courses 122, 201, 202, 203. Qualitative and quantitative aspects of ruminant digestive and metabolic processes; nutrient requirements; rumen microbiology and biochemistry; digestive physiology; nutrient absorption; patterns, rates and mechanisms of nutrient utilization; regulatory processes. Offered in even-numbered years.

Messrs. Hungate, Robinson

255. Natural Toxicants in Foods. (2) II.

Lecture—2 hours. Prerequisite: courses 201, 202, 203. The occurrence, mode of action and alleviation of several natural toxicants in foods and feeds. Offered in odd-numbered years.

Messrs. Vohra, Kratzer, Walker

256. Nutritional and Hormonal Control of Animal Metabolic Function. (3) III.

Lecture—3 hours. Prerequisite: courses 201, 202, 203; Physiological Sciences 205A, 205B. Significance and interpretation of enzyme, metabolite, *in vitro* and *in vivo* isotope tracer, energetic and other data. Critical evaluation of methodology and limitations in evaluation of animal metabolism. Diet-hormone interactions in carbohydrate, amino acid and lipid metabolism will be discussed. Offered in odd-numbered years. Mr. Baldwin, Mr. Freedland

290. Beginning Nutrition Seminar. (1) I, II, III.

Discussion—1 hour; seminar—1 hour. Prerequisite: first-year graduate standing. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field.

The Staff (Mr. Hill in charge)

291. Advanced Nutrition Seminar. (1) I, II, III.

Seminar—1 hour. Prerequisite: second-year graduate standing. Discussion and critical evaluation of advanced topics in nutrition research. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Rogers in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Rogers in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Rogers in charge)

ORIENTAL LANGUAGES

(Department of Anthropology)

Department Office, 331 Voorhies Hall

Associate Professor:

*Benjamin E. Wallacker, Ph.D.

Assistant Professors:

Eric S. Liu, Ph.D.

Marian B. Ury, Ph.D.

◇ ◇ ◇

Lecturers:

Key H. Kim, M.A.

Peter Leung, E.D.

The Major Program

Emphasis in Chinese.

Lower Division Courses.—Required: courses 1M-2M-3M, 4M-5M-6M. Recommended: elementary Japanese; Art 1D; History 9A-9B.

Upper Division Courses.—Required: Courses 100, 112, 123A, 123B, 123C; at least 12 units of courses 101-102; courses from the following list to bring the total upper division units to 45: Anthropology 190; History 191A, 191B, 191C, 192A, 192B, 193; Political Science 148A, 148B.

Emphasis in Japanese.

Lower Division Courses.—Required: courses 1J-2J-3J, 4J-5J-6J. Recommended: elementary Modern Mandarin, courses 35A, 35B; Art 1D; History 9A-9B.

Upper Division Courses.—Required: course 100 or other course in linguistics; 12 units from courses 121, 131, 132A, 132B. Choose from the following to bring the total upper division units to 45: Anthropology 191; History 190A, 190B, 194A, 194B; Political Science 148A, 148B.

Lower Division Courses

1C-2C-3C. Elementary Standard Cantonese.

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours.
(Same course as Asian American Studies 1C-2C-3C.)

Mr. Leung

1J-2J-3J. Elementary Modern Japanese.

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours.

Mr. Kim

4J-5J-6J. Intermediate Modern Japanese.

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 3J. A continuation of course 3J.

Mr. Kim

¹ Absent on leave, 1971-72.

² Not to be given, 1971-72.

1M-2M-3M. Elementary Modern Mandarin.

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Introduction to the "National Language" (Kuo Yu) of China.

Mr. Liu

4M-5M-6M. Intermediate Modern Mandarin.

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 3M. A continuation of course 3M.

Mr. Liu

***22. Indonesian Civilization. (4) III.**

Lecture—3 hours; discussion—1 hour. A survey of Indonesian civilization and the effects of contacts with Indian, Islamic, and Western cultures. Emphasis on Hinduism, Buddhism, and Islam.

***35A-35B. Great Books of Eastern Asia. (2-2) I-II.**

Lecture—1½ hours; readings and term paper. Lectures and readings on the great classics of Eastern Asia, in English translation, such as Confucian Analects, Mencius, Lao-Tzu, the Book of Poetry, Kojiki, and The Tale of Genji. Knowledge of an oriental language not required.

Mr. Wallacker

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

99. Special Study for Undergraduates. (1-5)

I, II, III.

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

Upper Division Courses

***100. Languages of Eastern Asia. (4) II.**

Lecture—3 hours; discussion—1 hour. A survey course on the nature and distribution of the main languages of Eastern Asia.

Mr. Wallacker

***101. Chinese Fiction. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 6M. Readings in selected texts. May be repeated twice for credit.

Mr. Wallacker

***102. Chinese Fiction. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 6M. Readings in selected texts. May be repeated twice for credit. Offered in quarters when course 101 is not being given.

Mr. Wallacker

121. Advanced Japanese. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 6J. Practice in reading modern Japanese, and introduction to classical Japanese. May be repeated twice for credit. Mrs. Ury

***123A. Chinese Phonology. (4) I.**

Lecture—3 hours. Prerequisite: consent of instructor. Offered if sufficient number of students enroll. Mr. Liu

***123B. Chinese Morphology. (4) II.**

Lecture—3 hours. Prerequisite: consent of instructor. Offered if sufficient number of students enroll. Mr. Liu

***123C. Chinese Syntax. (4) III.**

Lecture—3 hours. Prerequisite: consent of instructor. Offered if sufficient number of students enroll. Mr. Liu

***131. Research and Bibliography: Japanese. (5) I.**

Lecture—3 hours; discussion—2 hours. Prerequisite: open also to qualified graduate students in history. Students are introduced to the reference aids available in libraries and to the methods and aims of research in Japanese. Emphasis will be on research—history and literature. Mrs. Ury

**132A-132B. History of Japanese Literature. (4-4)
II-III.**

Lecture—3 hours; discussion—1 hour. From the beginning to modern times, with emphasis on Chinese, Buddhist, and Western influences. Knowledge of Japanese not required. Mrs. Ury

ORTHOPEDIC SURGERY—See Medicine

PARK AND RECREATION ADMINISTRATION

—See Environmental Planning and Management

PATHOLOGY—Veterinary Medicine, this page; Medicine, see page 348

PATHOLOGY

Donald L. Dungworth, B.V.Sc., Ph.D., *Chairman of the Department*
Department Office, 1126 Haring Hall

Professors:

Donald R. Cordy, D.V.M., Ph.D.
Donald L. Dungworth, B.V.Sc., Ph.D.
Peter C. Kennedy, D.V.M., Ph.D.
Jack E. Moulton, D.V.M., Ph.D.

Associate Professor:

B. I. Osburn, D.V.M., Ph.D.

* Not to be given, 1971-72.

***142. Civilization of Eastern Asia: Japan. (4) I.**

Lecture—3 hours; discussion—1 hour. A broad survey of Japanese civilization dealing with cultural, literary, religious, and social developments. Mrs. Ury

***174. Chinese Folk Religion. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Knowledge of Chinese not necessary. Exploration of the eclectic but unsystematic religious beliefs common in varying forms and degrees to nearly all Chinese and discussion of the influence of this form of religion on various aspects of Chinese society.

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates.

(1-3) I, II, III.

The Staff (Chairman in charge)

Graduate Courses

***201. Proseminar in Sinological Methods. (4) III.**

Seminar—3 hours. Prerequisite: knowledge of classical Chinese. Mr. Wallacker

299. Research. (1-12) I, II, III.

Mr. Wallacker

Assistant Professors:

David H. Gribble, D.V.M., Ph.D.
R. R. Pool, Jr., D.V.M., Ph.D.



Associate Professors:

Leslie J. Faulkin, Jr., Ph.D. (*Anatomy*)
Gordon H. Theilen, D.V.M. (*Clinical Sciences*)

Assistant Professor:

Anthony A. Stannard, D.V.M. (*Acting, Clinical Sciences*)

Assistant Adjunct Professor:

Thomas G. Kawakami, Ph.D.

Lecturer:

Lynn A. Griner, Ph.D.

Upper Division Courses**122A. Veterinary Pathology. (5) I.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. The fundamental degenerative, vascular, and inflammatory processes, disturbances of cell growth, including oncology. Mr. Cordy, Mr. Pool

122B. Veterinary Pathology. (5) II.

Lecture—4 hours; laboratory—3 hours. Prerequisite: course 122A. Special pathology of organ systems and related communicable diseases. Messrs. Dungworth, Kennedy, Osburn

Messrs. Cordy, Gribble, Pool

122C. Veterinary Pathology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 122A. Special pathology of organ systems and related communicable diseases.

Messrs. Cordy, Gribble, Pool

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Chairman in charge)

Graduate Courses**282. Tumor Pathology. (3) II.**

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 122A–122B–122C. 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.

Mr. Moulton, Mr. Dungworth

283. Tumor Biology. (3) I.

Lecture—2 hours; discussion—1 hour. 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.

Messrs. Dungworth, Faulkin, Theilen

284. Pathology of Reproductive Failure. (2) III.

Lecture—1 hour; discussion—1 hour. Prerequisite: course 122A–122B–122C. Selected topics on cause and effects of fetal disease. Offered in odd-numbered years. Mr. Kennedy

285. Neuropathology. (3) II.

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 122C and 295C. Patterns of nervous tissue reaction in disease. Offered in odd-numbered years. Mr. Cordy

290. Seminar in Veterinary Pathology. (1) I, II, III.

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

291. Histopathology Conference. (1) I, II, III.

Discussion—1 hour. Prerequisite: course 295C. Discussion of selected cases based on records and slides. Defense of diagnoses. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

292. Surgical Pathology Conference. (1) I, II, III.

Discussion—1 hour. Prerequisite: course 295C. Diagnosis and discussion of current surgical pathology cases based on clinical records and microscopic study. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

293. Necropsy and Surgical Pathology.

(1-4) I, II, III.

Discussion—1 hour; laboratory—32 hours. Prerequisite: course 295C. Responsible diagnostic casework. Performance of necropsies, slide reading and case reporting. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

294. Primate Pathology Conference. (1) I, II, III.

Discussion—1 hour. Prerequisite: graduate standing and 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 National Center for Primate Biology. (Satisfactory/Unsatisfactory grading only.) (Same course as Pathology 294, Medicine.) The Staff (Chairman in charge)

295A–295B–295C. Necropsy Laboratory. (1) I–II–III.

Laboratory—33 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Supervised experience in necropsy diagnosis, including techniques and interpretation. (Satisfactory/Unsatisfactory grading only.) The Staff

298. Group Study. (1-4) I, II, III.

Prerequisite: course 122A–122B–122C. Group Study of advanced topics in pathology.

The Staff (Chairman in charge)

299. Research in Veterinary Pathology.

(1-9) I, II, III (Summer).

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

PEDIATRICS—See Medicine**PHARMACOLOGY—See Medicine****PHILOSOPHY**John F. Malcolm, Ph.D., *Chairman of the Department*Melvin W. Beal, Ph.D., *Vice Chairman of the Department*

Department Office, 922 Sproul Hall

Professors:

- William H. Bossart, Ph.D.
- Arthur Child, Ph.D.
- Neal W. Gilbert, Ph.D.
- Marjorie Grene, Ph.D.

Associate Professor:

- John F. Malcolm, Ph.D.

Assistant Professors:

- Ronald A. Arbini, Ph.D.
- Melvin W. Beal, Ph.D.
- Fred R. Berger, Ph.D.
- Joel I. Friedman, Ph.D.

**Assistant Professor:**

- Vernon E. Wedin, M.A. (*Acting*)

The Major Program

Lower Division Courses.—Required: courses 12A and 20A-20B-20C.

Upper Division Courses.—Required: 36 units of upper division courses in philosophy, selected with the approval of the departmental major adviser.

Graduate Study.—The Department of Philosophy offers programs of study leading to the M.A. and Ph.D. Degrees. Detailed information may be obtained by writing to the Graduate Adviser.

Lower Division Courses**6. Introduction to Philosophy. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Political, aesthetic, religious, metaphysical, and other concerns of philosophy, as exemplified in major works from various periods. The Staff

6F. Freshman Seminar in Philosophy. (4) I, II, III.

Seminar—4 hours. Prerequisite: consent of instructor. An intensive introduction to philosophical inquiry. Open only to freshmen with strong interest or background in philosophy.

Messrs. Beal, Child, Friedman

12A. Introduction to Logic. (4) I.

Lecture—3 hours; discussion—1 hour. Theorems and principles of inference of formal deductive systems; propositional calculus and predicate calculus; translation of English into symbolic formulas.

Mr. Berger

12B. Introduction to Logic. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 12A or consent of instructor. Development of the full predicate calculus; identity and description calculus; decision procedures; more advanced translation of English; elementary theory of classes and relations.

Mr. Friedman

20A. History of Philosophy. (4) I, III.

Lecture—3 hours; discussion—1 hour. A survey of Greek philosophy with special attention to the Pre-Socratics, Plato and Aristotle.

Mr. Gilbert, Mr. Wedin

20B. History of Philosophy. (4) I, II.

Lecture—3 hours; discussion—1 hour. The seventeenth century and its background.

Mr. Arbini, Mr. Bossart

20C. History of Philosophy. (4) II, III.

Lecture—3 hours; discussion—1 hour. Eighteenth-century philosophy. Mr. Arbini, Mr. Beal

Upper Division Courses**101. Metaphysics. (4) I.**

Lecture—3 hours. Prerequisite: two courses in philosophy to be chosen from the 20A, 20B, 20C sequence and the upper division course list with the exception of 105, 114A, 114B, 117, 123. Theories of being. Such topics as reality, substance, universals, space, time, causality, becoming, body, experience, persons, freedom and determinism. Views of the nature and method of metaphysics. Anti-metaphysical arguments.

Mr. Malcolm

102. Theory of Knowledge. (4) III.

Lecture-discussion—3 hours. Prerequisite: two courses in philosophy to be chosen from the 20A, 20B, 20C sequence and the upper division course list with the exception of 105, 114A, 114B, 117, 123. Philosophical problems of perception and thought, memory and pre-ognition, imagination, truth and error, belief and knowledge. Types of epistemology.

Mr. Child

103. Philosophy of Mind. (4) I.

Lecture-discussion—3 hours. The relation between mind and body, our knowledge of other minds, and the explanation of mental acts. Discussion of such concepts as action, intention, and causation. Offered in odd-numbered years.

Mr. Arbini

105. Philosophy of Religion. (4) I.

Lecture—3 hours. Prerequisite: two courses in philosophy. Logical, metaphysical, epistemological and existential aspects of selected religious concepts and problems. Mr. Child

107A. Philosophy of the Physical Sciences. (4) I.

Lecture-discussion—3 hours. Prerequisite: one philosophy course or a major in science. Introduction to the nature of scientific laws, theories, explanations, and models. Problems of causality, determinism and indeterminism, induction and probability. Mr. Friedman

107B. Philosophy of the Biological Sciences. (4) II.

Lecture-discussion—3 hours. Prerequisite: one philosophy course or a major in science. The relation of the biological to the physical sciences; the nature of theories, explanations, and models in biology and psychology. Problems of taxonomy, ethology, and evolutionary theory. Mrs. Grene

107C. Philosophy of the Social Sciences. (4) III.

Lecture-discussion—3 hours. Prerequisite: one philosophy course or a major in a social science. The nature of laws and explanations in the social sciences; their relation to mathematics and the physical sciences; the role of value judgments in the social sciences; theories of historical knowledge; theoretical problems of data-processing. Mrs. Grene

114A. Introduction to Ethics. (4) II.

Lecture—3 hours; term paper. Prerequisite: one course in philosophy. An introduction to major writings of philosophers on central problems of right conduct; principles of obligation, responsibility, justice, the meaning of the basic terms of ethical language. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill. Mr. Berger

114B. Problems of Ethical Theory and Practice. (4) III.

Lecture—3 hours; term paper. Prerequisite: course 114A or consent of instructor. Discussion of important problems of ethical theory with application to contemporary moral problems. Examples: relativism, utility and justice, act and rule utilitarianism, concept of a right, justification of punishment, the death penalty, morality of civil disobedience, abortion, war. Mr. Berger

117. Political Philosophy. (4) II.

Lecture-discussion—3 hours. Recommended: course 6 or 6F. Intensive examination of some central concepts of political thought such as the state, sovereignty, rights, obligation, freedom, law, authority, and responsibility. Offered in even-numbered years. Mr. Berger

118. Philosophy of History. (4) II.

Lecture-discussion—3 hours; term paper. A survey of philosophical theories of history and an analysis of contemporary problems of historical explanation. Offered in odd-numbered years. Mr. Beal

123. Aesthetics. (4) II.

Lecture—3 hours. Prerequisite: one course in philosophy; one course in music, the plastic arts, or literature. Nature of art, of artistic creation, of the work of art, and of aesthetic experience; nature and validity of criticism; relations of art to its environment. Mr. Beal

131. Philosophy of Logic. (4) III.

Lecture-discussion—4 hours. Prerequisite: course 12A; or Mathematics 125. Discussion of such topics as identity, descriptions, meaning, and denotation. The nature and development of axiomatic systems; philosophical discussion of certain results in mathematical logic such as the Löwenheim-Skolem Theorem; and consideration of non-standard logics, such as modal logic. Mr. Friedman

132. History of Logic. (4) III.

Lecture-discussion—3 hours; term paper or conferences. Study of special problems or authors in the history of logic. Offered in odd-numbered years. Mr. Malcolm

133. Philosophy of Mathematics. (4) III.

Lecture-discussion—3 hours. Prerequisite: course 12A or a major in mathematics. The nature of mathematical theories; set theory and type theory as foundations for mathematics; logicism, intuitionism, and formalism; philosophical discussion of Gödel's theorems; and relations between pure and applied mathematics. Offered in odd-numbered years. Mr. Friedman

***134. Metalogic. (4) II.**

Lecture-discussion—3 hours. Prerequisite: course 12B or consent of instructor. Systematic treatment of formal languages and metalanguages; theorems about theorems of logic; consistency and completeness of formal systems; theory of models of formal systems. Offered in odd-numbered years. Mr. Friedman

* Not to be given, 1971-72.

137. Philosophy of Language. (4) III.

Lecture-discussion—3 hours. Recommended: course 20C, 156A, or Linguistics 35. Discussion of problems arising from consideration of the syntax and semantics of natural and formalized languages. Nature of linguistic rules and universals; theories of universal grammar; linguistic implications for theories of cognition. Mr. Wedin

143. Hellenistic Philosophy. (4) III.

Lecture-discussion—3 hours; term paper. Prerequisite: course 20A. Offered in even-numbered years.

Mr. Gilbert

145. Medieval Philosophy. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 20A. A study of major philosophers in the medieval period. Mr. Malcolm

***146. Renaissance Philosophy. (4) III.**

Lecture-discussion—3 hours. Renaissance conceptions of man, as found in the writings of Valla, Ficino, Pico, Pomponazzi, Erasmus, Vives, and Montaigne. Some reference to current religious and social developments. Offered in even-numbered years.

Mr. Gilbert

***151. Philosophy of the Nineteenth Century. (4) II.**

Lecture-discussion—3 hours. Recommended: courses 20A, 20B, or 20C. The idealism of Hegel, his contemporaries and his successors; Marxism; the positivism of Comte and Mill; the irrationalism of Kierkegaard and Nietzsche. Offered in even-numbered years. Mr. Bossart

155. American Philosophy. (4) II.

Lecture-discussion—3 hours. Recommended: course 6 or 6F. Study of such American thinkers as Peirce, James, Royce, Dewey, Santayana, Whitehead, and C. I. Lewis. Offered in odd-numbered years.

Mr. Berger

156A. Contemporary British Philosophy. (4) III.

Lecture—3 hours; term paper. Recommended: course 20C or 151. Interpretation and analysis of the most influential work of Bertrand Russell, G. E. Moore, Wittgenstein, J. L. Austin, and G. Ryle. Offered in odd-numbered years.

Mr. Arbini

156B. Special Topics in Contemporary British Philosophy. (4) I.

Lecture—3 hours; term paper. Recommended: course 155 or 156A. Intensive study of special topic or author in contemporary British or American philosophy.

Mr. Arbini

157A. Contemporary European Philosophy. (4) II.

Lecture-discussion—3 hours. Recommended: course 20C, 151, or 175A, 175B. A study of contemporary directions in European philosophy, with particular attention to the develop-

ment of phenomenology and *Existenzphilosophie* in Germany. Readings in Husserl, Heidegger, Jaspers, and related philosophers. Offered in even-numbered years.

Mr. Bossart

157B. Contemporary European Philosophy. (4) III.

Lecture-discussion—3 hours. A study of contemporary directions in European philosophy, paying particular attention to the development of phenomenology and existentialism in France. Readings in Sartre, Marcel, Merleau-Ponty, and related philosophers. Offered in even-numbered years.

Mr. Bossart

157C. Contemporary European Philosophy. (4) I.

Lecture—3 hours; term paper. Recommended: course 157A or 157B. Intensive study of special topic or author from the general field covered in 157A and 157B. Offered in even-numbered years.

Mr. Bossart

161. Plato. (4) I.

Lecture-discussion—3 hours. Prerequisite: course 20A. Offered in odd-numbered years.

Mrs. Grene, Mr. Wedin

162. Aristotle. (4) I.

Lecture-discussion—3 hours. Prerequisite: course 20A or consent of instructor. Offered in even-numbered years.

Mr. Malcolm

168. Descartes. (4) I.

Lecture-discussion—3 hours; term paper. Prerequisite: course 20B. Offered in even-numbered years.

Mr. Arbini

169. Spinoza. (4) III.

Lecture-discussion—3 hours; term paper. Prerequisite: course 20B. Offered in odd-numbered years.

Mr. Gilbert

170. Leibniz. (4) II.

Lecture-discussion—3 hours; term paper. Prerequisite: course 20B. Offered in even-numbered years.

Mr. Friedman

171. Hobbes. (4) II.

Lecture-discussion—3 hours; term paper. Recommended: course 20B. Offered in even-numbered years.

Mr. Gilbert

172. Locke. (4) III.

Lecture-discussion—3 hours. Offered in odd-numbered years.

Mr. Child

***173. Berkeley. (4) II.**

Lecture-discussion—3 hours; term paper. Prerequisite: course 20C. Offered in even-numbered years.

Mr. Beal

174. Hume. (4) III.

Lecture-discussion—3 hours. Offered in even-numbered years.

Mrs. Grene

* Not to be given, 1971-72.

175A. Kant. (4) I.

Lecture-discussion—3 hours. Prerequisite: course 20C. Offered in even-numbered years.
Mr. Bossart

175B. Kant. (4) II.

Lecture-discussion—3 hours. Prerequisite: course 20C. Offered in odd-numbered years.
Mr. Bossart

176. Hegel. (4) I.

Lecture-discussion—3 hours. Recommended: courses 20C, 175A, 175B. Offered in odd-numbered years.
Mr. Bossart

178. Kierkegaard. (4) I.

Lecture—3 hours. Prerequisite: course 20A; course 20C or 185. Offered in odd-numbered years.
Mr. Child

***183. Russell. (4) II.**

Lecture-discussion—3 hours. Recommended: course 12A or Mathematics 125. Offered in even-numbered years.
Mr. Friedman

***185. Founders of Modern Thought. (4) I.**

Lecture-discussion—3 hours; term paper. Not open to philosophy majors or students who have had course 20B or 20C. A survey of modern philosophy from Descartes to Kant. Major emphasis upon problems still current today.

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Malcolm in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Malcolm in charge)

Graduate Courses

Graduate courses 201, 202, 207, 214, and 290 are offered every year by different instructors and may be repeated for credit with permission of the Graduate Adviser. The other graduate courses will be varied from year to year.

201. Metaphysics. (4) II.

Seminar—3 hours. Mr. Arbini, Mr. Wedin

202. Theory of Knowledge. (4) III.

Seminar—3 hours. Mr. Arbini

***206. Philosophical Argumentation. (4) III.**

Seminar—3 hours. Prerequisite: graduate standing. Investigation and evaluation of philosophical arguments. Critical discussion of student papers on various aspects of philosophical disputes.
Mr. Arbini

***207. Philosophy of Science. (4) I.**

Seminar—3 hours. Mrs. Grene

209. Theory of History. (4) II.

Seminar—3 hours. Offered in odd-numbered years.

214. Ethics. (4) I.

Seminar—3 hours. Mr. Berger

***223. Aesthetics. (4) II.**

Seminar—3 hours. Offered in even-numbered years.

261A. Plato. (4) I.

Lecture-discussion—3 hours. Offered in odd-numbered years. Mrs. Grene

261B. Plato. (4) II.

Seminar—3 hours. Offered in odd-numbered years. Mr. Malcolm

262A. Aristotle. (4) I.

Lecture-discussion—3 hours. Offered in even-numbered years. Mr. Malcolm

262B. Aristotle. (4) II.

Seminar—3 hours. Offered in even-numbered years. Mr. Malcolm

***274. Hume. (4) III.**

Lecture-discussion—3 hours. Offered in even-numbered years. Mrs. Grene

275A. Kant. (4) I.

Lecture-discussion—3 hours. Offered in even-numbered years. Mr. Bossart

275B. Kant. (4) II.

Lecture-discussion—3 hours. Prerequisite: course 275A. Offered in odd-numbered years. Mr. Bossart

290. History of Philosophy. (4) I, II, III.

Seminar—3 hours. Special topics in the history of philosophy. Messrs. Gilbert, Bossart, Child

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Malcolm in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Malcolm in charge)

* Not to be given, 1971-72.

PHYSICAL EDUCATION

E. Dean Ryan, Ed.D., *Chairman of the Department*

Department Office, 264 Gymnasium

Professors:

Charles R. Kovacic, Ed.D.

Willard S. Lotter, Ed. D.

E. Dean Ryan, Ed.D.

Associate Professors:

Edmund M. Bernauer, Ph.D.

Maryya Welch, Ed.D.

Assistant Professor:

William C. Adams, Ph.D.

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Assistant Professor:

Melvin R. Ramey (*Civil Engineering*)

Lecturer and Supervisor of Physical Education:

George A. Stromgren, M.S.

Supervisors:

Robert R. Brooks, M.A.

Barbara J. Heller, Ed.D.

Herbert A. Schmalenberger, M.A.

Associate Supervisors:

Joseph E. Carlson, M.A.

Robert I. Hamilton, M.S.

Jerry W. Hinsdale, A.B.

Judith L. Meyers, M.A.

John W. Pappa, M.A.

Joe L. Singleton, M.A.

James L. Sochor, Ed.D.

Phillip S. Swimley, M.A.

Assistant Supervisors:

June M. Breda, M.S.

Jere H. Curry, M.A.

The incidental fee payable by all students at the time of registration, entitles students to the use of gymnasium, shower, towels, lockers, tennis courts, and the athletic fields. Certain equipment for games and sports is available for exercise and recreation, either with or without instruction. Courses may be elected with or without academic credit. Lockers will be turned in on the last day of class, before the final examination period.

Fines are imposed for each formal transaction necessitated by failure of the student to comply with the regulations of the department.

Major Advisers.—Mr. Bernauer, Miss Heller, Mr. Kovacic, Mr. Lakie, Mr. Ryan, Miss Welch.

Minor Adviser.—Mr. Adams.

² Absent on leave, fall quarter 1971.

The Major Program

Students will specialize in one of two areas: biological aspects or psychosocial aspects of physical education.

Lower Division Courses.—Required of all students: Biology 1, Chemistry 1A, Mathematics 13, Physical Education 45, Physics 2A or 10, Physiology 2, Psychology 1A. Students interested in the biological aspects of physical education will be required to take Chemistry 8A, 8B and Zoology 2.

Upper Division Courses.—Required of all students: Human Anatomy 102, Physical Education 103, 104A–104B, 110, 120, and 135. Required of students in the biological area; Physiology 110A–110B and a minimum of 6 units selected from the following: Zoology 100, 106A, 106B, and Physiology 102. Required of students in the psychosocial area: Psychology 112 and three upper division psychology or sociology courses selected in consultation with the major adviser.

Teaching Major.—The teacher-training curriculum in physical education requires not only the departmental major, but also courses 130, 180, 380B and 380C.

Teaching Minor.—The teaching minor consists of 34 quarter units of course work, including 12 lower division units, 16 upper division units, and 6 units for teacher certification. Course selection must be made in consultation with the minor adviser.

Graduate Study.—A program of study and research leading to the M.A. degree is available in physical education. For detailed information regarding graduate study, write to the Graduate Adviser, Department of Physical Education.

Lower Division Courses

1. Physical Education for Men and Women. (1/2)

I, II, III.

Laboratory—2 hours. Sections in archery, badminton, dance (ballet, modern, social, folk and square), baseball, basketball, fencing, football, golf, trampolining, tumbling, wrestling, volleyball, handball, soccer, tennis, touch football, track, swimming. (Men qualified for athletics may enroll in any sport pursued at Davis, such as baseball, basketball, football and receive credit.) This course may be repeated for credit not to exceed a total of 6 units.

The Staff (Mr. Ryan in charge)

5. First Aid. (2) I, II, III.

Lecture—2 hours. Standard course. Upon successful completion of the course the Red Cross Certificate is awarded.

Messrs. Stromgren, Pappa, Sochor, Swimley

10. Professional Physical Education Activities

(Men). (1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Fundamental knowledges and skills in swimming, basketball, football, track, baseball, tennis, golf, combative sports, developmental activities, court sports, tumbling and gymnastics.

The Staff (Mr. Ryan in charge)

22. Professional Physical Education Activities

(Women). (1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Fundamental skills in aquatics (swimming—beginning, intermediate, advanced, synchronized; diving; lifesaving; water safety); archery; badminton; basketball; dance (folk and square, modern, social); tennis; track; tumbling; gymnastics; volleyball.

The Staff (Mr. Ryan in charge)

25. The Theory of Lifesaving and Water Safety.

(1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 1 and a course in intermediate swimming. Basic skills in swimming and small craft safety. Life saving procedures and techniques for which Red Cross Senior Lifesaving Certificates will be awarded upon successful completion of necessary requirements.

Mr. Hinsdale

27. Organization and Teaching of Recreational and Competitive Swimming and Diving Skills.

(1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Prerequisite: Red Cross Lifesaving Certificate and Advanced Swimming and Diving. Organization and teaching of swimming and lifesaving skills. (Red Cross Water Safety instructors certificate awarded upon successful completion of necessary requirements.) Organization of competitive swimming and diving programs and coaching techniques.

Mr. Hinsdale

29. Basic Scuba. (2) I, II, III.

Lecture—2 hours; laboratory—2 hours; two 8-hour field trips of ocean diving. Prerequisite: advanced swimming skills equivalent to course 25; diver medical examination; and consent of instructor. Development of physical skills and knowledge required for S.C.U.B.A. diving, viz., function and maintenance of equipment, physics and physiology of diving, safety and first aid, currents and wave action, marine life and underwater communication.

Mr. Bernauer

35A-35B. Dance Composition. (2-2) I-II.

Discussion-demonstration—three 3-hour sessions. Prerequisite: intermediate dance. Principles of choreography for solo and group compositions.

Mr. Curry

36A-36B. History of Dance. (3-3) I-II.

Lecture—3 hours. A 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.

Mr. Curry

44. Principles of Healthful Living. (2) II.

Lecture—2 hours. Use of scientific information, proper attitudes, knowledge, and health practices in daily living.

Miss Heller

45. Foundations of Physical Education. (4) I.

Lecture—4 hours. An introduction to the historical, biological, psychological, sociological and philosophical foundations of physical education.

Mr. Adams

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

Upper Division Courses**103. Analysis of Human Movement. (5) I.**

Lecture—4 hours; laboratory—3 hours. Prerequisite: Physics 2A; Human Anatomy 102. Anatomical and physiological concepts and physical laws as applied to human movement.

Mr. Kovacic

104A-104B. Physiology of Muscular Activity.

(3) II-III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biology 1, Physiology 2. Circulatory-respiratory and metabolic response to exercise in man under various physiological and ambient conditions.

Mr. Bernauer

110. Psychosocial Factors in Motor Performance.

(4) I, III.

Lecture—3 hours. Prerequisite: Psychology 1A. Analysis of various psychological and social factors affecting the development and use of motor skills.

Mr. Ryan

120. Sports in American Society. (4) III.

Lecture—4 hours. Prerequisite: History 17A. The interrelationships of sports with other aspects of society, including the family, church, school and government; consideration of the manner in which sports may be used to contribute to human welfare in our advanced technological society.

Miss Welch

130. Principles and Theory of Physical Education.

(4) II.

Lecture—4 hours. A critical analysis of the assumptions underlying the physical education program.

Mr. Lotter

135. Research Design and Instrumentation in Physical Education. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 13. Methods, techniques, and design of experimental research in physical education.

Mr. Bernauer

140. Recreation in the Community. (3) III.

Lecture—3 hours. The nature, scope and significance of recreation with its implications for leisure. The development, organization, and purpose of public and voluntary agencies which serve the recreational needs of the community.

Mr. Lotter

145. School Health Education. (3) III.

Lecture—3 hours. Prerequisite: course 44 or consent of instructor. A study of the school health program as an integral part of the school curriculum; the underlying principles and functions of health instruction, health service, healthful school living and the contributing community health agencies.

Miss Heller

171. Conditioning of Athletes and Care of Injuries. (2) III.

Lecture—2 hours. Prerequisite: course 5. A study of current concepts in the care and prevention of accidents in athletic and recreational programs. Analysis and evaluation of associated educational principles and teachings. The American Red Cross instructor certificate will be awarded upon successful completion of requirements.

Mr. Stromgren, Mr. Pappa

171L. Conditioning and Accident Emergency Care Services. (1) I.

Laboratory—3 hours. Prerequisite: course 5 and consent of instructor. Prevention and care of injuries; adhesive strapping, protective devices, and injury care therapies. Training and first aid room organization, equipment and supplies.

Mr. Stromgren

180. Physical Education in the Secondary School. (3) I.

Lecture—3 hours. An analysis and study of the principles and methods basic to physical education in the secondary school.

Miss Meyers, Mr. Schmalenberger

197T. Tutoring in Physical Education. (1-5) I, II, III.

Tutorial—1-5 hours. Prerequisite: consent of instructor. Tutoring of students in lower division physical activity courses. Weekly meetings with instructor in charge of courses. Written reports on methods and materials required. May be repeated once for credit.

The Staff (Chairman in charge)

198. Directed Group Study. (1-3) I, II, III.

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Prerequisite: consent of department.

The Staff (Chairman in charge)

Graduate Courses

200. Proseminar in Physical Education. (3) I.

Seminar—3 hours. Prerequisite: course 135. The meaning, methods, and techniques of research procedure as applied to physical education; a critical review of selected studies, literature, practices, and procedures in the field; application to a particular problem in the field.

Mr. Adams

210. Historical and Cultural Bases of Physical Education. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 120. An examination of political, economic, social, and religious factors which have influenced sports in various countries and cultures.

Miss Welch

220. Kinesiology. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103. Critical review of current literature and research in kinesiology; neurophysiological concepts and physical laws.

Mr. Kovacic

221. Anthropometry in Relation to Physical Performance. (4) II.

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 104 and 135. Consideration of growth, physical constitution, body proportions and body composition in man as they affect physical performance; measurement of selected structural and functional changes accompanying prolonged, systematic physical conditioning.

Mr. Adams

222. Metabolic Functions in Exercise. (4) III.

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 104, Physiology 110B. A review of the current research literature on the metabolic responses to exercise in man; a laboratory survey of respiratory response, metabolic and water balances, blood gas adjustments and acid-base balance with particular reference to the effect of environmental conditions.

Mr. Bernauer

230. Motor Performance: Psychological Aspects. (4) II.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 110. Critical review of current

literature on motor learning; coordination; kinesiology; and reaction time; consideration of sensory-motor perception, motivation, and personality factors in relation to physical activities.

Mr. Ryan

290. Physiological Basis of Physical Fitness.

(2) II.

Seminar—2 hours. Prerequisite: graduate standing. Review and critical discussion of current research topics concerned with the physiological aspects of physical fitness. Mr. Bernauer

298. Group Study. (1-3) I, II, III.

Prerequisite: graduate study and consent of instructor. The Staff (Chairman in charge)

299. Research. (1-12) I, II, III.

The Staff (Chairman in charge)

Professional Courses

300. Physical Education Activities and Methods in the Elementary School. (2) II, III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: senior standing. Principles, theories, materials, and practices of the elementary school physical education program.

Mr. Curry, Mr. Adams

380A-380B-380C. Methods of Physical Education in the Secondary School. (3-3-3) I, II, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 180 and demonstrated competence in selected skills. The methods of teaching group and individual activities in the secondary school; program planning; class management; organization of the intramural and extramural programs.

Miss Meyers, Mr. Schmalenberger

PHYSICAL MEDICINE AND REHABILITATION—See Medicine

PHYSICAL SCIENCES

Eldridge M. Moores, Ph.D., *Chairman of the Committee*

Committee Office, 135 Young Hall

Committee in Charge:

Alan L. Balch, Ph.D. (*Chemistry*)

Eldridge M. Moores, Ph.D. (*Geology*)

Roderick V. Reid, Jr., Ph.D. (*Physics*)

Major Adviser: See Schedule and Directory.

The major in physical sciences is designed primarily for students who wish to obtain a general secondary credential. The lower division course requirements are similar to those of the major in chemistry or physics. This major may lead to the Bachelor of Arts or the Bachelor of Science degree.

Preparation for the Major

Required: Chemistry 1A, 1B, 1C; Physics 4A, 4C, 4D, 4E; Geology 1, 1L; Mathematics 21A, 21B, 21C. Recommended: Chemistry 5; Physics

4B; Geology 101A; Mathematics 22A, 22B. The choice of recommended courses will be governed by the field of specialization within the major.

The Major Program

A total of 36 units of upper division courses in the physical sciences, of which not less than 23 units must be taken of the physical sciences in either chemistry, physics, or geology.

Teaching Major.—Requirements for the teaching major are the same as for the undergraduate major.

Teaching Minor.—The teaching minor must take at least 30 quarter units in two of the physical science fields with at least 18 units in one of these two fields. The program must have the approval of the subject representative.

Subject Representative: Mr. Vincent.

PHYSICS

William J. Knox, Ph.D., *Chairman of the Department*

Department Office, 141 Young Hall

Professors:

James E. Draper, Ph.D.

Milton E. Gardner, Ph.D. (*Emeritus*)

Kenneth R. Greider, Ph.D.

¹ Absent on leave, 1971-72

John A. Jungerman, Ph.D.

William J. Knox, Ph.D.

Charles G. Patten, Ph.D.

William W. True, Ph.D.

Associate Professors:

Franklin P. Brady, Ph.D.
 Glen W. Erickson, Ph.D.
 Claude Garrod, Ph.D.
 James P. Hurley, Ph.D.
 Richard L. Lander, Ph.D.
 Douglas W. McColm, Ph.D.

Assistant Professors:

Thomas A. Cahill, Ph.D.
 Ching-Yao Fong, Ph.D.
 Olaf S. Leifson, Ph.D.
 David E. Pellett, Ph.D.
 Wendell H. Potter, Ph.D.
 Roderick V. Reid, Jr., Ph.D.

**Lecturers:**

Natalie R. Leonard, A.B. (*Astronomy*)
 Neal Peek, Ph.D.
 Philip M. Yager, M.S.

Major Subject Advisers.—Mr. Leifson, Mr. Pellett, Mr. Patten.

The Major Programs

Lower Division Courses.—Required: Physics 4A, 4B, 4C, 4D, 4E; Chemistry 1A, and either 1B-1C or 4B-4C; Mathematics 21A, 21B, 21C, 22A, 22B, 22C. Recommended: a reading knowledge of French, German, or Russian.

Upper Division Courses.—Both *Bachelor of Arts* and *Bachelor of Science* programs require the completion of the core program consisting of: Physics 104A-104B, 105A-105B, 115A, 110A-110B (-110C for B.S. only), one quarter of an upper division lab, Physics 112A. Additional upper division units are required to add up to the following requirement totals: Bachelor of Arts—38 upper division units total. Bachelor of Science—55 upper division units total. Any upper division physics courses open to majors satisfy the additional units requirement. Substitutions from other departments for these upper division units, as well as the core, may be made by written permission of the Undergraduate Curriculum Committee Chairman as approved by the Department Chairman. Upper division lab requirement satisfied by any one of the following: 116A, 116B, 122, or approved substitution. Recommended: Mathematics 24, 118, 119, 185; Mathematics 128 or Applied Science 115.

Honors and Honors Program.—The honors program in physics consists of 4 units of course 194H, open to seniors who qualify for the honors program. Students may be graduated with honors in physics on completion of the required major and this program.

Graduate Study.—The Department of Physics offers programs of study and research leading to the M.A. and Ph.D. degrees.

Lower Division Courses

Physics 4A, 4B, 4C, 4D, and 4E are for students whose major is physics and for students preparing for applications of physics in Engineering and Chemistry.

All students planning to take lower division courses (except course 10) should have completed trigonometry.

The Physics 2 series may be started in any quarter and completed without interruption since either sequence, 2A, 2B, 2C or 2A, 2C, 2B, is satisfactory. Also, 2B and 2C may be taken concurrently.

The Physics 4 series may be started in either winter or spring quarter and completed without interruption since either sequence, 4A, 4B, 4C, 4D, 4E or 4A, 4C, 4D, 4B, 4E, is satisfactory.

Upper Division Courses

Courses 4A, 4B, 4C, 4D, 4E, or their equivalent, and Mathematics 21A, 21B, and 21C are prerequisite to all upper division courses except course 107; in addition, Mathematics 22A, 22B, 22C or their equivalents are recommended. Some prerequisites may be waived with consent of the instructor.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major for degree (A.B. or B.S.).

Teaching Minor.—The teaching minor must take Physics 4A, 4B, 4C, 4D, 4E, and any other upper division physics courses necessary to complete 30 quarter units.

Subject Representative: Mr. Patten.

Astronomy**Lower Division Courses****1A. Introduction to General Astronomy: The Solar System. (4) II.**

Lecture—4 hours. Introduction to the celestial sphere, constellations of the seasons, effects of diurnal and annual motions of the Earth; planetary motions, phases and configurations, including study of Earth as planet. Not intended for advanced physical science majors. (Courses 1A and 1B may be taken in either order.)

Mrs. Leonard

1B. Introduction to General Astronomy: Stars and the Universe. (4) III.

Lecture—4 hours. Introduction to stellar motions, magnitudes and distances; distribution of stars in space; the sun; the galaxy. Not intended for advanced physical science majors. (Courses 1A and 1B may be taken in either order.)

Mrs. Leonard

Physics

Lower Division Courses

2A. General Physics Lecture. (3) I, II, III.

Lecture—3 hours. Mechanics; introduction to electricity and magnetism.

I. Mr. Patten, Mr. Peek, II. Mr. Patten,
Mr. Potter, III. Mr. Patten

2B. General Physics Lecture. (3) II, III.

Lecture—3 hours. Prerequisite: course 2A. Electricity and magnetism, heat, kinetic theory, and thermodynamics.

II. Mr. Erickson, Mr. Patten, III. Mr. Potter

2C. General Physics Lecture. (3) I, III.

Lecture—3 hours. Prerequisite: course 2A. Wave motion, optics, modern physics.

I. Mr. Potter, III. Mr. Peck, Mr. Potter

3A. General Physics Laboratory. (1) I, II, III.

Laboratory—3 hours. Prerequisite: course 2A (may be taken concurrently). Mechanics, introduction to electricity and magnetism. Experimental work planned to accompany the lectures in course 2A. Recommended for all students who elect course 2A.

I. Mr. Patten, Mr. Peek, II. Mr. Peek,
III. Mr. Patten

3B. General Physics Laboratory. (1) II, III.

Laboratory—3 hours. Prerequisite: course 2B (may be taken concurrently). Electricity and magnetism, heat, kinetic theory, and thermodynamics. Experimental work planned to accompany the lectures in course 2B. Recommended for all students who elect course 2B.

II. Mr. Erickson, Mr. Patten, III. Mr. Peck

3C. General Physics Laboratory. (1) I, III.

Laboratory—3 hours. Prerequisite: course 2C (may be taken concurrently). Wave motion, optics, modern physics. Experimental work planned to accompany the lectures in course 2C. Recommended for all students who elect course 2C.

I. Mr. Patten, III. Mr. Erickson

4A. General Physics. (4) II, III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 21B (may be taken concurrently). Mechanics.

II. Mr. Cahill, III. Mr. Draper

4B. General Physics. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4A; Mathematics 21C (may be taken concurrently). Properties of many body systems; rigid body motion, hydrodynamics, kinetic theory, thermodynamics and statistical physics.

Mr. Leifson

4C. General Physics. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4A, Mathematics 22C. Course contains only the physics portion of course 4CM (lectures will occur on different days of the week in different weeks of the quarter); intended only for students who have completed the vector calculus portion of course 4CM (Mathematics 22C).

Mr. McColm, Mr. Draper

4CM. General Physics and Vector Calculus. (6) I.

Lecture—5 hours; laboratory—3 hours. Prerequisite: course 4A, Mathematics 21C. Fundamentals of electromagnetic theory; Maxwell's equations; elementary vector calculus. Students electing this course will not receive credit for course 4C and Mathematics 22C.

Mr. McColm, Mr. Draper

4D. General Physics. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4C, Mathematics 22B. Course contains only the physics portion of course 4DM (lectures will occur on different days of the week in different weeks of the quarter); intended only for students who have previously completed the differential equations portion of course 4DM (Mathematics 22B).

Mr. McColm

4DM. General Physics and Differential Equations.

(6) II.

Lecture—5 hours; laboratory—3 hours. Prerequisite: course 4CM or course 4C and Mathematics 22C. Application of electromagnetism; A.C. circuitry, electromagnetic waves, optics, electric and magnetic fields in matter. Solutions of elementary differential equations. Students electing this course will not receive credit for course 4D and Mathematics 22B.

Mr. Yager

4E. General Physics. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4D; Mathematics 22A recommended. Physics since 1900: special relativity, quantum mechanics and particle physics.

Mr. Reid

10. Basic Concepts of Physics. (4) I, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Survey of the basic principles of physics and how they have evolved since the time of Copernicus. Includes lecture-demonstrations and problem solving using elementary algebra.

I. Mr. Cahill, III. Mr. Knox

Upper Division Courses

104A-104B. Introduction to Methods of Mathematical Physics. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 4C; Mathematics 22C. Elements of vector and tensor analysis, matrix methods, boundary value problems, integral transforms with applications to physics.

Mr. Garrod

105A-105B-105C. Analytical Mechanics.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 4A; Mathematics 22C. Principles and applications of Newtonian mechanics. Mr. Pellett

110A-110B-110C. Electricity and Magnetism.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 4D; Mathematics 22C. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. I. Mr. Reid, II. Mr. Hurley, III. Mr. Hurley

112A-112B. Thermodynamics and Statistical Physics. (3-4) I-II.

Lecture—3 hours; (4th unit) outside work—9 hours. Prerequisite: course 4; Mathematics 22C. Thermodynamics, kinetic theory, and introduction to statistical mechanics. Mr. Knox

115A-115B. Introduction to Quantum Mechanics.

(3-4) III, I.

Lecture—3 hours; (4th unit) problem sets. Prerequisite: courses 4E, 104B, 105B. The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics. Mr. Yager

116A. Electronic Instrumentation. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4D; Mathematics 22C. Recommended: course 104B; partial differential equations and Laplace transforms. An experimental and theoretical study of important electronic circuits commonly used in physics. Mr. Cahill

116B. Electronic Instrumentation. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 116A. Continuation of course 116A with special emphasis on recent developments in semiconductor circuitry. Mr. Cahill

121. Foundations of Atomic and Molecular Physics.

(4) III.

Lecture—3 hours; outside work—9 hours. Prerequisite: course 4E; Mathematics 21C. The phenomena of atomic physics; introduction to quantum phenomena and quantum mechanics; selected topics dealing with atoms, molecules, nuclei, and the solid state. Mr. McColm

122. Advanced Physics Laboratory. (2) II, III.

Laboratory—3–6 hours; outside work—0–3 hours. Prerequisite: course 4. Experimental techniques and measurements in atomic, nuclear, and solid-state physics. May be repeated for credit not to exceed a total of 4 units.

II. Mr. Pellett, III. Mr. Brady

129A. Nuclear Physics. (4) II.

Lecture—3 hours; outside work—9 hours. Prerequisite: course 4E; Mathematics 22C. Sur-

vey of basic nuclear properties and concepts requiring only rudimentary knowledge of quantum mechanics.

Mr. Draper

129B. Nuclear Physics. (4) III.

Lecture—3 hours; outside work—9 hours. Prerequisite: courses 115B, 129A. Continuation of course 129A.

Mr. Draper

140A. Introduction to Solid State Physics. (4) II.

Lecture—3 hours; outside work—9 hours. Prerequisite: course 115A. A survey of basic concepts and classification of experimental phenomena in solids. Introduction to band theory.

Mr. Leifson

140B. Introduction to Solid State Physics. (4) III.

Lecture—3 hours; outside work—9 hours. Prerequisite: course 140A. A thorough treatment of one or more of the following: energy bands and fermi surfaces, transport phenomena, cooperative phenomena, magnetic resonance.

Mr. Leifson

150. Topics in Current Research. (2) I, II, III.

Discussion—1 hour; outside work—5 hours. Prerequisite: consent of instructor. Discussion of topics of current interest in physics. May be taken for credit not more than four times.

I. ———; II. Mr. Pellett; III. Mr. Lander

194H. Special Study for Honors Students.

(4) I, II, III.

Prerequisite: open only to seniors who qualify for the honors program. Independent research and/or reading on selected topics.

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Chairman in charge)

Graduate Courses**200A. Theory of Mechanics and Electromagnetics.**

(3) I.

Lecture—3 hours. Prerequisite: courses 105C and 110C or equivalent, Mathematics 220A concurrently. Special theory of relativity, covariant formulation of mechanics and electromagnetic theory, Lagrange's equations, variational principles for discrete and continuous mechanical and electromagnetic systems. Courses 200A, 200B, 200C, 200D, an integrated sequence, will emphasize physical content as they are coordinated with Mathematics 220A, 220B, 220C.

Mr. Hurley

200B. Theory of Mechanics and Electromagnetics.

(3) II.

Lecture—3 hours. Prerequisite: course 200A, Mathematics 220B concurrently. Hamilton's equations. Hamilton-Jacobi theory and contact transformations, action-angle variables and per-

turbation theory, selected topics in mechanics of continuous media; incompressible and compressible flow, gravity waves and shock theory.

Mr. Hurley

200C. Theory of Mechanics and Electromagnetics. (3) III.

Lecture—3 hours. Prerequisite: course 200B, Mathematics 220C concurrently. Brief review of static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics.

Mr. True

200D. Theory of Mechanics and Electromagnetics. (3) I.

Lecture—3 hours. Prerequisite: course 200C. Diffraction theory. Radiating systems and electron theory.

Mr. True

215A. Quantum Mechanics. (3) I.

Lecture—3 hours. Prerequisite: course 115B. Non-relativistic quantum mechanics. Formal development and interpretation of quantum mechanics, including the Schrödinger wave equation, matrix mechanics, and use of state vectors in describing a dynamical system.

Mr. Fong

215B. Quantum Mechanics. (3) II.

Lecture—3 hours. Prerequisite: course 215A. Wave packets, Wentzel-Kramers-Brillouin approximation, and perturbation methods applied to atomic, nuclear, molecular, and solid-state problems.

Mr. Fong

215C. Quantum Mechanics. (3) III.

Lecture—3 hours. Prerequisite: course 215B. Scattering theory, radiation theory, and a brief introduction to relativistic quantum mechanics and the Dirac equation.

Mr. Fong

219A. Statistical Mechanics. (3) I.

Lecture—3 hours. Prerequisite: courses 112B and 115B. Foundations of classical and quantum statistical mechanics.

Mr. Garrod

219B. Statistical Mechanics. (3) II.

Lecture—3 hours. Prerequisite: course 219A. Applications to properties of solids, real gases, nuclear matter, fluctuations about the equilibrium state.

Mr. Garrod

***221A-221B-221C. Atomic Physics. (3-3) I-II-III.**

Lecture—3 hours. Prerequisite: course 215C. Term structure of atoms using the angular momentum formalism; methods of computing wave functions and radial integrals; splitting in external fields; term structure in crystals; scattering and collisions.

I. Mr. Leifson, II. Mr. McColm, III. ———

224A. Nuclear Physics. (3) I.

Lecture—3 hours. Prerequisite: course 215B. Comprehensive study of the nucleon-nucleon interaction including the deuteron, nucleon-

nucleon scattering, polarization, determination of real parameters of S-matrix, and related topics.

Mr. Brady

224B. Nuclear Physics. (3) II.

Lecture—3 hours. Prerequisite: course 224A. Study of nuclear models, including shell model, collective model, unified model. Energy level spectra, static momenta, and electromagnetic transition rates.

Mr. Brady

224C. Nuclear Physics. (3) III.

Lecture—3 hours. Prerequisite: course 224B. Study of nuclear scattering and reactions including the optical model and direct interactions. Beta decay and an introduction to weak interactions.

Mr. Brady

229A. Advanced Nuclear Theory. (3) I.

Lecture—3 hours. Prerequisite: course 224C. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for two-body scattering.

Mr. True

229B. Advanced Nuclear Theory. (3) II.

Lecture—3 hours. Prerequisite: course 229A. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for three-body scattering.

Mr. True

230A. Quantum Theory of Fields. (3) I.

Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization.

Mr. Erickson

230B. Quantum Theory of Fields. (3) II.

Lecture—3 hours. Prerequisite: course 230A. Continuation of 230B, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations.

Mr. Erickson

***239A. Quantum Many-Body Systems. (3) III.**

Lecture—3 hours. Prerequisite: courses 215C and 219B. The quantum theory of many-particle systems. Theoretical analysis of superfluids, superconductors, and nuclear matter.

Mr. Garrod

***239B. Quantum Many-Body Systems. (3) I.**

Lecture—3 hours. Prerequisite: course 239A. Perturbation and variation techniques in many-particle systems. Band theory of solids, electron-phonon interactions, and other topics.

Mr. Garrod

240A-240B. Solid State Physics. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 221A-221B. One electron model of solids. Properties of lattice waves. Optical and magnetic properties of solids. Fermi surface. Superconductivity.

Mr. Leifson, Mr. Fong

* Not to be given, 1971-72.

245A-245B. High Energy Physics. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 215A. Systematics of elementary particle interactions; determination of quantum numbers; interpretation of experiments; selected special topics in second quarter. Mr. Lander

250. Modern Physics Colloquium. (2-3) I.

Seminar—1½ hours; lecture—½ hour and/or discussion—1 hour. Prerequisite: graduate standing in physics. To familiarize students with the forefront of physics, guest lecturers report current research in diverse fields at a weekly colloquium, preceded by intensive preparation and followed by a critical review. Mr. McColm

251. Frontier Physics. (3) II.

Lecture—3 hours. Prerequisite: courses 200C, 215B; or consent of instructor. Provides an introduction to and summary of the types of research that are of current interest in physics and a detailed analysis of a particularly important recent discovery in each major area. Mr. Reid

PHYSIOLOGICAL SCIENCES

Arthur L. Black, Ph.D., *Chairman of the Department*
Department Office, 2163 Haring Hall

Professors:

Arthur L. Black, Ph.D.
Leo K. Bustad, D.V.M., Ph.D.
Richard A. Freedland, Ph.D.
Stuart A. Peoples, M.D.
Robert E. Smith, Ph.D.

Associate Professors:

Victor W. Burns, Ph.D.
Jerry R. Gillespie, D.V.M., Ph.D. (*Physiological Sciences and Human Physiology*)
Alfred A. Heusner, Ph.D.
Harold R. Parker, D.V.M., Ph.D.
Quinton R. Rogers, Ph.D.

Assistant Professors:

Gaylord M. Conzelman, Jr., Ph.D.
Donald L. Curry, Ph.D.
Shri N. Giri, Ph.D.
Robert J. Hansen, Ph.D.
Robert M. Joy, Ph.D.

◇ ◇ ◇

Associate Professor:

Richard L. Bell, Ph.D. (*Chemical Engineering*)

Lecturers:

Allen C. Andersen, V.M.D., Ph.D.
Rocco J. Della Rosa, Ph.D.
Marvin Goldman, Ph.D.
Sally Huff, Ph.D.
Michael Momeni, Ph.D.

252. Techniques of Experimental Physics. (3) III.

Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples will be drawn from various fields of current experimental research—low temperature solid state to high energy scattering experiments. Mr. Potter

290. Seminar. (1-3) I, II, III.

Seminar—1-3 hours. (Satisfactory/Unsatisfactory grading only.)

I. Mr. Landers; II. Mr. Knox; III. Mr. McColm

291. Seminar in Nuclear Physics. (1-2) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

I. Mr. Draper; II. Mr. Brady; III. Mr. Cahill

292. Seminar in Theoretical Physics. (1-2) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

I. Mr. Hurley; II. Mr. Reid; III. Mr. Erickson

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

Upper Division Courses**101A-101B. Physiological Chemistry. (4-3) I, II.**

Lecture—4-3 hours. Prerequisite: quantitative and organic chemistry. Recommended: a course in physiology (may be taken concurrently). 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 fluids; energy metabolism and nutrition.

Mr. Black, Mr. Freedland

102A-102B. Physiological Chemistry Laboratory.

(1-2) I-II.

Laboratory—3-6 hours. Prerequisite: course 101A-101B (should be taken concurrently); open to first-year Veterinary Medicine Students; or consent of instructor. Laboratory practice to illustrate the chemical and physical properties of important constituents of animal cells including enzymes; blood and urine analysis; animal experiments on intermediary metabolism using isotopes. (Deferred grading only, pending completion of the sequence.)

Sec. 1: Mr. Rogers, Sec. 2: Mr. Hansen

123. Comparative Pharmacology. (5) III.

Lecture—4 hours; laboratory—3 hours. Prerequisite: regular standing in the School of Veterinary Medicine or consent of instructor. The action of drugs on the physiological mechanisms of domestic animals.

Messrs. Peoples, Giri, Conzelman, Joy

124. Comparative Pharmacology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 123 or consent of instructor. The effect of drugs on organ systems of domestic animals and their application to the treatment of disease. Laboratory exercises to illustrate the principles of therapeutics and toxicology. Messrs. Peoples, Giri, Conzelman, Joy

140A. Mammalian Physiology. (5) II.

Lecture—5 hours. Prerequisite: good standing in the School of Veterinary Medicine or consent of instructor, based upon evidence of adequate preparation in mathematics and the physical and biological disciplines. A general survey of comparative mammalian physiology with emphasis on systemic mechanisms.

Messrs. Bustad, Curry, Heusner, Parker, Scobey, Stabenfeldt

140B. Mammalian Physiology. (5) III.

Lecture—5 hours. Prerequisite: course 140A and good standing in the School of Veterinary Medicine or consent of instructor, based upon evidence of adequate preparation in mathematics and the physical and biological disciplines. A general survey of comparative mammalian physiology with emphasis on systemic mechanisms. Messrs. Bustad, Curry, Heusner, Parker

141A-141B. Laboratory in Mammalian Physiology.

(1-2) II-III.

Laboratory—3-6 hours. Prerequisite: courses 140A-140B (may be taken concurrently). Non-veterinary students must obtain consent of instructor. Laboratory exercises designed to illustrate physiological interactions among systems in different animal species.

Mr. Parker, Mr. Curry

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Chairman in charge)

Graduate Courses**200. Cell Physiology: Biophysical Aspects. (2) III.**

Lecture—2 hours. Prerequisite: consent of instructor. Recommended: Physiology 100B or Bacteriology 130; Biochemistry 101B and Chemistry 109 or 110. Discussion of modern approaches to understanding the cell as an organized system. Topics include: analysis of regulation and coordination in the cell; energetic and statistical relations in the cell; tracer kinetics applied to cells; fluorescence of cells and constituents. Offered in even-numbered years.

Mr. Burns

205A. Intermediary Metabolism of Animals. (3) I.

Lecture—3 hours. Prerequisite: biochemistry and physiology or consent of instructor. General considerations in use of biochemical data

as 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 pools and turnover rates. Mr. Black, Mr. Hansen

205B. Intermediary Metabolism of Animals. (3) II.

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; including hormonal, nutritional, and genetic effects. Mr. Freedland, Mr. Rogers

225. Fundamentals of Radiation Biology. (5) I.

Lecture—5 hours. Prerequisite: one year of physics, biochemistry and physiology or consent of instructor. Radiation effects at atomic, molecular, cellular, tissue, and organism levels including genetic, immunologic, carcinogenic, and aging responses in terms of dose quality and quantity. Included also are discussions of dose-effect relationships, environmental radiation, radiation protection criteria and radiation therapy. Mr. Bustad, Mr. Goldman

243A-243B. Use of Isotopes as Tracers in Biological Research. (2-2) I-II.

Lecture—2 hours. Prerequisite: biochemistry or physiological chemistry, elementary physics and calculus or consent of instructor. Discussion of the properties of isotopes and their use as tracers in biological systems. Mr. Burns

243L. Laboratory in Use of Isotopes as Tracers in Biological Research. (2) II.

Laboratory—6 hours. Prerequisite: course 243B. Study of radioisotope properties, uses and measurement methods relevant to the biological sciences. Mr. Burns

253. Drug Metabolism. (2) II.

Lecture—2 hours. Prerequisite: courses 101A-101B, 140A, 140B or Physiology 110A-110B; consent of instructor. General pathways of drug metabolism; and factors influencing the drug metabolism. Emphasis will be laid upon the species, age, and genetic differences affecting the biological disposition of the drugs. Offered in even-numbered years. Mr. Giri

254. Applied and Clinical Pharmacology. (2) III.

Lecture—2 hours. Prerequisite: courses 123, 124; or consent of instructor. Course will be structured to reinforce and strengthen the students' knowledge of pharmacology. Some sessions will resemble therapeutic conferences in which clinicians and pharmacologists will discuss actions and dangers of drugs used in management of specific animal diseases.

Messrs. Conzelman, Giri, Peoples, Joy

255. Pharmacogenetics. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: consent of instructors. The genetic basis of interspecific and intraspecific differences in animals to the action of drugs. The laboratory exercises are designed to illustrate these differences and their biological basis.

Mr. Peoples, Mr. Stormont

256. Medical Toxicology. (3) I.

Lecture—3 hours. Prerequisite: course in pharmacology or consent of instructor. Studies considered essential to preclinical evaluation of new drugs intended for use in human or veterinary medicine are discussed in depth. The following facets of toxicity tests are covered: hypersensitivity; blood dyscrasias; hepatotoxicity, nephrotoxicity, behavioral effects; addiction potential; teratogenicity; carcinogenicity.

Messrs. Peoples, Conzelman, Giri, Joy

257. Pharmacology Literature. (1) I.

Discussion—1 hour. A critique of selected papers in pharmacology with the objective of

discerning those general principles, techniques, and guides for procedures which successful investigators have found helpful in the pursuit of their research.

Mr. Conzelman

265. Experimental Physiology. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. Selected lectures and experiments on cardiovascular, renal and pulmonary mechanisms with emphasis on chronically maintained preparations and perinatal problems. Offered in odd-numbered years.

Mr. Parker

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff (Chairman in charge)

298. Group Study. (1-4) I, II, III.

The Staff (Chairman in charge)

299. Research. (1-12) I, II, III.

The Staff (Chairman in charge)

PHYSIOLOGY—See the following two entries; and Zoology, page 423**PHYSIOLOGY**

The major in Physiology, leading to the Bachelor of Science degree, may be in either the *College of Letters and Science* or the *College of Agriculture and Environmental Sciences*. The major is designed to provide students with 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. The major will provide the foundations for a challenging career in Physiology and also serve as a basis for further training in schools of human and veterinary medicine, medical technology, pharmacy, dentistry, optometry, and other health sciences. Students interested in research and advanced training may use this program as preparation for continued study leading to the M.S. and Ph.D. degrees.

Major Adviser.—Mr. Boda.

The Major Program (College of Agricultural and Environmental Sciences).—See page 66.

PHYSIOLOGY

Major Advisers.—See *Schedule and Directory listing*.

Major Program and Graduate Study.—See pages 62, 87, and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

The Major Program (College of Letters and Science).

Lower Division Courses.—Required: Biology 1; Chemistry 1A-1B-1C, 5, 8A-8B; Mathematics 13, 16A-16B, and 16C or Physiology 108; Physics 2A-2B-2C.

Upper Division Courses.—Required: Physiology 100A-100B, 100L, 110A-110B, 111A-111B; 19 additional units of physiology; 40 units in mathematics and/or the physical and biological sciences, in addition to the 36-unit physiology requirements, selected according to a plan developed in consultation with the major adviser.

In addition to the courses listed above, the student must also complete 16 units in the social sciences and humanities, including 8 units of English and/or rhetoric, and also satisfy the requirements of the College and University.

Upper Division Courses**100A-100B. General Physiology. (3-3) I-II.**

Lecture—3 hours. Prerequisite: Biology 1; Chemistry 8B; Physics 2C. Chemical, mathematical, and physical characteristics of the life process common to living things, with particular reference to the cell.

Messrs. Colvin, Horowitz, Smith

100L. General Physiology Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 100B (may be taken concurrently). Laboratory in the physical and chemical processes of cells and tissues.
Mr. Colvin

101. Functions of Organ Systems. (4) III.

Lecture—4 hours. Prerequisite: Biology 1. Physiology of organ systems; concepts of integrative and homeostatic mechanisms, especially in adaptation, growth, and reproduction.

Messrs. Horowitz, Lorenz, Wagman,
Mrs. Woolley

101L. Organ Function Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 101 (should be taken concurrently). Dissections, primarily of domestic animals, and selected experiments to illustrate functional relationships.

Messrs. Horowitz, Lorenz, Wagman,
Mrs. Woolley

102. Physiology of Growth. (3) III.

Lecture—3 hours. Prerequisite: course 101, 101L; or equivalent. Biological, physical, and chemical aspects of the growth of cells, organisms, and populations.
Mr. Smith

103. Physiology of Animal Cells. (3) III.

Lecture—3 hours. Prerequisite: course 100B or Zoology 121B. Organization of metazoan systems at the cellular level. Life cycles of cells; regulation and development of specialized cell functions.
Mr. B. W. Wilson

103L. Physiology of Animal Cells Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 103 (may be taken concurrently). Laboratory in the growth, division, differentiation, and metabolism of animal cells.
Mr. B. W. Wilson

107. Avian Physiology. (3) III.

Lecture—3 hours. Prerequisite: courses 101 and 101L, or Zoology 2. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and the nervous system.
Mr. Burger

107L. Avian Physiology Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 107 (may be taken concurrently); and consent of instructor. Selected problems in the physiology of birds.
Mr. Burger

108. Biodynamics. (4) III.

Lecture—4 hours. Prerequisite: course 110B; Mathematics 16B; Physics 2C. Rates and dynamics of physiological processes.
Mr. Morrison

110A-110B. Mammalian Physiology. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 101 and 101L, or Zoology 2; Chemistry 8B. The physiology of the neuromuscular, central nervous, circulatory, respiratory, digestive, endocrine, reproductive, and excretory systems of mammals.

Messrs. Horowitz, Burger, Mendel, Boda

111A-111B. Mammalian Physiology Laboratory.

(2-2) I-II.

Discussion—1 hour; laboratory—3 hours including independent carrel instruction. Prerequisite: course 110A-110B (may be taken concurrently). Selected experiments in depth on the neural, cardiovascular, respiratory, renal, and endocrine systems. Emphasis on modern conceptual and methodological approaches using several species in demonstrating the physiology of organ systems.

Messrs. Horowitz, Burger, Mendel

120A. Comparative Physiology. (3) I.

Lecture—3 hours. Prerequisite: course 101 or 110A. Comparisons of physiological functions in the animal kingdom: neurophysiological mechanisms of integration including aspects of phylogenetic development at both neuronal and systemic levels.
Mrs. Woolley

120B. Comparative Physiology. (3) II.

Lecture—3 hours. Prerequisite: course 101 and 101L. Comparisons of physiological functions in the animal kingdom: respiration and circulation.
Mr. Smith, Mr. Rhode

120C. Comparative Physiology. (3) III.

Lecture—3 hours. Prerequisite: course 101 and 101L. Comparisons of physiological functions in the animal kingdom: digestion and excretion.
Mr. Colvin, Mr. Boda

120D. Comparative Physiology. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: humoral integrative mechanisms.
Mr. Lorenz

121. Physiology of Reproduction. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B. The physiological mechanisms related to reproduction, breeding efficiency, and fertility, with special reference to domestic animals.
Mr. Cupps

121L. Physiology of Reproduction Laboratory.

(1) III.

Laboratory—3 hours. Recommended: course 121. Experiments on the reproductive systems of domestic animals including male and female gametes.
Mr. Cupps

130. Physiology of the Endocrine Glands. (5) III.

Lecture—4 hours; discussion—1 hour. Prerequisite: course 110B. Control of endocrine secretion and the physiological effects of the hormones, with emphasis on endocrine problems relating to domestic animals.
Mr. Moberg

148. Principles of Environmental Physiology. (3) II.

Lecture—3 hours. Prerequisite: course 101 or 110B (may be taken concurrently). Intensive treatment of basic aspects of environmental physiology; introduction to physiological control

mechanisms; special emphasis on adaptation to the environment.

Mr. Evans

149. Environmental Physiology of Domestic Animals. (3) III.

Lecture—3 hours. Prerequisite: courses 101 and 101L, or Zoology 2. The influences of environmental factors on physiological processes related to domestic animals. Mr. W. O. Wilson

190. Proseminar in Physiology. (3) I.

Seminar—3 hours. Prerequisite: upper division standing. Relationships between form and function of living systems from the molecular to the organismal levels, with emphasis upon animal systems.

Mr. B. W. Wilson

194H. Special Study for Honors Students.

(1–5) I, II, III.

Prerequisite: open only to animal science or physiology majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Boda in charge)

197T. Tutoring in Physiology. (4) III.

Lecture—4 hours; tutorial—1 hour. Prerequisite: course 110B with grade of B or better and consent of instructor. Intensive review of systemic physiology through leading a weekly tutorial session with a small group of students taking course 101. (Students will attend all course lectures plus a weekly discussion session with the course 101 instructors.)

The Staff (Mr. Boda in charge)

198. Directed Group Study. (1–5) I, II, III.

The Staff (Mr. Boda in charge)

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III. The Staff (Mr. Boda in charge)

Graduate Courses

200A. Advanced General Physiology. (3) I.

Lecture—3 hours. Prerequisite: course 100B or Zoology 120, Biochemistry 101B and Chemistry 110B; or consent of instructor. Physicochemical bases of living systems with emphasis on recent investigations in membrane physiology. Offered in odd-numbered years.

Mr. Deamer

200B. Advanced General Physiology. (3) II.

Lecture—3 hours. Prerequisite: course 100B or Zoology 120, Biochemistry 101B and Chemistry 110B; or consent of instructor. Physicochemical bases of living systems with emphasis on recent investigations in cellular dynamics. Offered in even-numbered years. Mr. B. W. Wilson

210A–210B. Advanced Systemic Physiology. (4–4) I–II.

Lecture—3 hours; one paper per week, independent self-study of course 110A–110B. Prerequisite: course 110B or consent of instructor. Advanced consideration of the physiology of the neuromuscular, circulatory, respiratory, digestive, endocrine, reproductive, and excretory systems. Messrs. Boda, Burger, Horowitz, Mendel

211. Advanced Systemic Physiology Laboratory. (5) III.

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 110B. Advanced treatment of systemic physiology, with special emphasis on current developments; laboratory exercises illustrating modern physiological concepts and procedures.

Mr. Horowitz

214. Neurophysiology. (4) II.

Lecture—4 hours. Prerequisite: courses 110B, 111B; course 210B recommended. Electrical activity of neurons and neuroeffector junctions; physiology of the nervous system as studied by its electrical activity. Offered in odd-numbered years.

Mr. Wagman

215. Neurophysiology Laboratory. (6) II.

Discussion—2 hours; laboratory—12 hours. Prerequisite: course 214 (may be taken concurrently). Offered in odd-numbered years.

Mr. Wagman

216. Neurophysiology Literature. (2) III.

Discussion—2 hours. Prerequisite: course 214. Critical reading and group discussion of current and classic original papers in neurophysiology.

Mr. Wagman

220. General and Comparative Physiology of Reproduction. (3) I.

Lecture—3 hours. Prerequisite: course 110B; Biochemistry 101B; Genetics 100B. Basic phenomena of sexual and asexual reproduction and comparisons of processes in a wide variety of animals: gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproductive cycles; behavioral aspects.

Mr. Ogasawara, Mr. Cupps

225. Physiology of Lactation. (3) III.

Lecture—3 hours. Prerequisite: course 110B; Biochemistry 101B. The physiology and biochemistry of milk formation, with special reference to the metabolic pathways leading to the synthesis of milk in various species of mammals. Offered in even-numbered years.

Mr. Baldwin

231. Selected Topics in Neuroendocrinology. (2) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: course 120A or 130; or consent of instructor. Neural-endocrine interactions; neurosecretion; neural regulation of endocrine systems; hormonal modifications of neural develop-

ment and activity. May be repeated once for credit. Offered in even-numbered years.

Mrs. Wooley

242. Physiological Rhythmicity. (1) I.

Lecture—1 hour. General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronization in areas of pharmacology and space medicine; telemetry; mathematical methods; chronometry; tidal, lunar, and annual periods; periodic desynchronization.

Mr. Winget

290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion and critical

evaluation of advanced topics and current trends in research. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Boda in charge)

291. Seminar in General Physiology. (1) III.

Seminar—1 hour. Discussion of selected topics concerning the physical and chemical processes of cells and tissues.

Mr. Colvin, Mr. Burns

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Boda in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Boda in charge)

PLANT PATHOLOGY

Major Advisers.—See *Schedule and Directory listing*.

Related Undergraduate Majors and Graduate Study.—See pages 62, 67 and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Upper Division Courses

120. Introduction to Plant Pathology. (4) I, III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2; Bacteriology 2 recommended. The nature, cause, and control of plant diseases.

I. Mr. Campbell, III. Mr. English

125. Diagnosis and Control of Plant Diseases. (4) III.

Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 120. Clinical plant pathology with emphasis on diagnosis, epidemiology, and control of diseases of economic plants. Students may specialize in diseases of fruits, vegetables, field crops, or ornamentals in the laboratory exercises.

Mr. Nyland

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Grogan in charge)

Graduate Courses

206A-206B. Diseases of Crop Plants. (5-4)

III. (Summer).

Lecture—3-1 hours; laboratory—6-9 hours. Prerequisite: course 120; Botany 119. A clinical study of plant diseases with emphasis on etiology, epidemiology, diagnosis, and control. (Deferred grading only, pending completion of the sequence.) The Staff (Mr. Ogawa in charge)

210A-210B. Physiology and Biochemistry of Plant Pathogens and Diseases. (3-3) I-II.

Lecture—3 hours. Prerequisite: Biochemistry 101B or equivalent. A study of the fundamental concepts and current information on the

physiology and biochemistry of plant pathogens and host-parasite relationships.

I. Mr. DeVay, II. Mr. Kosuge

212. Physiology of Plant Pathogens Laboratory.

(4) II.

Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: Biochemistry 101L or equivalent. Advanced laboratory methods and techniques applicable to the study of physiology and biochemistry of plant pathogens and host-parasite interaction.

Mr. DeVay, Mr. Kosuge

215. Genetics of Plant Pathogens. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 120; Genetics 100B; Botany 119B. Study of fundamental concepts, research techniques and current information on the genetics of plant pathogenic microorganisms; origin and determination of physiologic specialization, host resistance and virulence in the pathogen as related to the host-parasite interaction. Special emphasis on the fungi.

Mr. Webster

224. Pathogenic Fungi. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Botany 119. Morphology and taxonomy of plant pathogenic fungi.

Mr. Butler

226. Plant Virology. (5) II.

Lecture—2 hours; laboratory—9 hours. Prerequisite: consent of instructor. Viruses as causal agents of plant diseases; chemical and physical properties of viruses; methods of transmission; procedures for assay and diagnosis; multiplication of viruses; pathological cytology and anatomy; application of equipment and techniques used in research.

Mr. Shalla, Mr. Shepherd

228. Bacterial Plant Diseases. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 120; Bacteriology 2 or equivalent; general biochemistry recommended. Study of plant diseases caused by bacteria. Fundamentals on the mechanisms of disease development and the biology of plant bacteria.

Mr. Kado

230. Advanced Plant Virology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 226; Biochemistry 101B, 101L. Advanced study for research specialists in plant virology with emphasis on the physical-chemical nature of virus components and their role in the biology of viruses.

Mr. Shepherd

235A-235B. Advanced Plant Pathology. (4-4) I-II.

Lecture—3 hours; discussion—3 hours. Prerequisite: consent of instructor. A study of the factors influencing pathogenicity and of the reaction of host plants to disease.

I. Mr. Webster, II. Mr. Grogan

PLANT SCIENCE

Major Advisers.—See *Schedule and Directory* listing.

Major Program.—See pages 62, and 88.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses**1. Plants and Man. (3) I, II.**

Lecture—3 hours. Plants as a basic resource for food, fiber, shelter, and recreation; their use and effect on man, past, present, and future.

Mr. Howard

2. Production of Cultivated Plants. (4) I, III.

Lecture — 1 hour; discussion — 1 hour; V.A.S.T.— $\frac{1}{2}$ hours; laboratory—3 hours.

Principles of plant production, improvement, propagation, harvesting, preserving, processing and marketing. This course will proceed by the Video-Audio-Self-Tutorial method with students making use of the learning facilities at their own convenience.

Mr. Flocker, Mr. Lider

98. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Flocker in charge)

Upper Division Courses**101. Ecology of Cultivated Plants. (3) II.**

Lecture—3 hours. Prerequisite: course 2 or consent of instructor. Plant population dynamics in cultivated ecosystems; the response of plant communities to light, temperature, soil, water, and air-pollution.

Mr. Loomis, Mr. Kohl

101D. Ecology of Cultivated Plants Discussion. (1) II.

Discussion—1 hour. Prerequisite: course 101 (must be taken concurrently). Discussion of the subject matter of course 101.

Mr. Loomis, Mr. Kohl

102. Physiology of Cultivated Plants. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. The

290. Seminar. (1) I, II, III.

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.) I. Mr. Shalla, II. Mr. Butler, III. Mr. DeVay

291. Seminar in Host-Parasite Physiology.

(1) I, II, III.

Seminar—1 hour. Prerequisite: course 120. (Satisfactory/Unsatisfactory grading only.) I. Mr. Kado, II. Mr. DeVay, III. Mr. Kosuge

298. Special Group Study. (1-4) I, II, III.

The Staff (Mr. Grogan in charge)

299. Research. (1-9) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Grogan in charge)

plant as a dynamic unit; physiological processes in the vegetative growth, development, flowering and fruiting of cultivated plants.

Mr. Sachs, Mr. Rappaport

109. Principles of Plant Propagation. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 2 or Botany 2; or consent of instructor. Principles and practices of propagating horticultural plants with emphasis on anatomical and physiological relationships.

Mr. Hartmann

112. Postharvest Physiology and Handling of Horticultural Commodities. (3) I.

Lecture—3 hours. Prerequisite: Botany 111 or consent of instructor. Course 112L is recommended to be taken concurrently. Physiological processes related to the maturation and senescence of fruits and vegetables; fundamentals involved in handling, transportation, storage, and marketing practices, e.g., temperature and humidity control, protective treatments, controlled atmospheres.

Messrs. Claypool, Morris, Nelson

112L. Postharvest Physiology and Handling Laboratory. (2) I.

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 112 (may be taken concurrently). Demonstrations and exercises following the subject matter of course 112. One or more field trips to observe commercial practices.

Messrs. Claypool, Morris, Nelson

113. Plant Breeding. (3) II.

Lecture—3 hours. Prerequisite: Genetics 100B. The principles of plant breeding.

Mr. Knowles, Mr. Hansche

120. Introduction to Weed Science. (2) II.

Lecture—2 hours. Prerequisite: Botany 2; Chemistry 8B. A general course covering the principles underlying the control of weeds.

Mr. Ashton

Graduate Course**216. Principles of Plant Nutrition. (5) III.**

Lecture—3 hours; laboratory—6 hours. Pre-requisite: Botany 111 or equivalent. Evolution

and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetical and ecological aspects of plant nutrition.
Mr. Epstein

POLITICAL SCIENCE

Richard W. Gable, Ph.D., *Chairman of the Department*

Department Office, 227 Voorhies Hall

Professors:

Richard W. Gable, Ph.D.
Charles M. Hardin, Ph.D.
Clyde E. Jacobs, Ph.D.
Lloyd D. Musolf, Ph.D.
John R. Owens, Ph.D.
Donald S. Rothchild, Ph.D.
Paul E. Zinner, Ph.D.

Associate Professors:

Edmond Costantini, Ph.D.
Alexander J. Groth, Ph.D.
Joyce K. Kallgren, Ph.D.
¹Alvin D. Sokolow, Ph.D.
¹Larry L. Wade, Ph.D.
Marvin Zetterbaum, Ph.D.

Assistant Professors:

Kenneth I. Hanf, Ph.D.
Alan M. Jones, Jr., Ph.D.
Robert J. Lieber, Ph.D.
Larry I. Peterman, Ph.D.
Randolph M. Siverson, Ph.D.
William S. Tuohy, Ph.D.
Geoffrey A. Wandesforde-Smith, Ph.D.

*Lecturer:*

Judith May, M.A.

Department Major Advisers.—Consult Department Office.

Graduate Adviser.—Mr. Hanf.

The American History and Institutions Requirement may be satisfied by any two of the following courses: 1A, 1B, 100, 102, 103A, 103B, 104, 105, 106, 113, 128A, 128B, 163, 164, 166A, 166B. See also page 30.

The Major Program

Lower Division Courses.—Required: choose three from courses 1A, 1B, 2, 3, and two from History 4A, 4B, 4C.

Upper Division Courses.—Required: 40 units as follows:

- (a) 28 units in Political Science with a minimum of two courses in each of three fields,

which must be selected from at least *two* of the following groups:

Group A
Political Theory (courses 110–119).

Group B
American Government (courses 102–109).
Political Parties (courses 160–169).
Public Law (courses 150–159).
Public Administration (courses 180–189).

Group C
Comparative Government (courses 140–149, 170–179).
International Relations (courses 120–139).

(b) 12 additional units in Political Science or related subjects.

Political Science students *must* maintain at least a grade C average in the major.

Graduate Study.—The Department offers programs of graduate study leading to the M.A. and Ph.D. degrees. Information concerning admission to these programs and requirements for completion is available in the department office.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Thirty units of political science to be selected in consultation with the subject representative.

Subject Representative: Mr. Jones

Lower Division Courses**1A. American Government. (4) I, II.**

Lecture—3 hours; discussion—1 hour. National, state and local government in the United States.
The Staff

1B. American Government. (4) II, III.

Lecture—2 hours; discussion—2 hours. National, state, and local government in the United States.
The Staff

2. Introduction to Comparative Politics. (4) I, III.

Lecture—3 hours; discussion—1 hour. Introduction to various methods of political analysis and their application to the study of politics in selected foreign countries. Psychological and cultural dimensions of the political process as well as more formal structures and institutions of government.
The Staff

¹ Absent on leave, 1971–72.

3. International Relations. (4) I, II.

Lecture—3 hours; discussion—1 hour. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics.

Mr. Lieber, Mr. Siverson

98. Directed Group Study. (1-5) I, II, III.

Directed group study for lower division students in research problems in political science.

The Staff (Mr. Gable in charge)

Upper Division Courses**100. American National Government. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students having credit for course 1A or 1B. Presidential leadership; executive-legislative relationships; the development of effective and accountable administration; defense and foreign policy; and government and science.

The Staff

102. Comparative State Government and Politics. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students who have credit in course 104. The comparative study of the government and politics of American states, including their constitutional frameworks, their participation in the federal system, the dynamics of governmental institutions, and the behavior of parties and interest groups.

Mr. Sokolow

103A. Local Government and Politics. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A or consent of instructor. The politics and government of local communities in the United States, including cities, counties, and special districts. The expression and resolution of political conflict in communities, local government structure and functions, municipal reform, and community power structures.

Mr. Sokolow

103B. Local Government and Politics: Urban Problems. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A or consent of instructor. The politics and government of urban communities in the United States. Special attention to the problems of metropolitan and regional areas.

Mrs. May

103C. Local Politics and Government: Politics and Urban Poverty. (4) III.

Lecture—4 hours. Explores the attributes of low-resource politics, with emphasis upon the position of blacks and ethnic minorities in northern urban areas. Special attention paid to the interaction between social science theory and social policy in bringing about social change in various policy areas.

Mrs. May

104. California State and Local Government. (3) III.

Lecture-discussion—3 hours. California's constitution, party system, legislature, executive agencies, administration, courts, major public programs and problems; state-local relations; county, city, school and special district governments. Offered in odd-numbered years.

105. The Legislative Process. (4) I.

Lecture—3 hours; discussion—1 hour. An analysis of the legislative process with emphasis on the United States Congress; legislative organization and procedures, legislative leadership and policy making, legislators and constituents, relations between Congress and other agencies.

Mr. Owens

106. The Presidency. (4) II.

Lecture—3 hours; discussion—1 hour. The office, powers, and role of the President of the United States.

Mr. Hardin

***110. Contemporary Political Science. (4) I.**

Lecture-discussion—4 hours. History, nature, and methodology of the discipline; the problems, schools of thought, and trends within the field at present. Offered in even-numbered years.

111. Systematic Political Science. (4) II.

Lecture-discussion—4 hours. Philosophical basis of modern political science; major specific approaches; selected concepts relevant to modern political concerns; and research design and execution.

Mr. Siverson

***112. Contemporary Democratic Theory. (4) II.**

Lecture—3 hours; discussion—1 hour. The 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. Mr. Zetterbaum

***113. American Political Thought. (4) III.**

Lecture—4 hours. Origins and nature of American political thought. The principles of American thought as they emerge from the founding period to the present. Offered in odd-numbered years.

Mr. Peterman

***115. Medieval Political Thought. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 118A. Offered in even-numbered years.

Mr. Peterman

116. Foundations of Political Thought: A Study in Depth of a Major Political Philosopher. (4) II.

Lecture-discussion—3 hours; term paper. Intensive analysis and evaluation of the seminal works of a major political philosopher.

Mr. Peterman, Mr. Zetterbaum

* Not to be given, 1971-72.

117A. Marxism. (4) I.

Lecture-discussion—4 hours. Historical background and context of Marxism. Exploration of Marx's writing toward understanding his significance in the nineteenth century and his relevance today. Offered in odd-numbered years.

***117B. Contemporary Marxism. (4) II.**

Lecture—4 hours. Marxism after Marx to the present, with reference to Engels, Kautsky, Bernstein, Lenin, and contemporary figures and movements. Special attention to Marxism in America. Communism and democratic socialism as legacies of Marx related to contemporary problems. To be offered in even-numbered years.

118A. History of Political Theory. (4) I.

Lecture—3 hours. Critical analyses of the works of major political philosophers. Classical and medieval political philosophy—Plato, Aristotle, Cicero, St. Thomas. Mr. Peterman

118B. History of Political Theory. (4) II.

Lecture—3 hours; special assignments. Critical analyses of the works of major political philosophers. Modern political philosophy—Machiavelli, Hobbes, Locke, Rousseau, Burke.

Mr. Zetterbaum

118C. History of Political Theory. (4) III.

Lecture—3 hours; research assignment. Prerequisite: course 118B. Critical analyses of the works of major political philosophers. Nineteenth and twentieth centuries: Hegel, Tocqueville, Mill, Marx, Nietzsche, Sartre.

Mr. Zetterbaum

***119. Modern Political Thought. (4) III.**

Lecture-discussion—4 hours. The search for community from Marx to the present. Communism, fascism, capitalism, socialism, irrationalism, immorality, and existentialism as responses to the decline of liberalism and the nature of modern problems. Offered in odd-numbered years.

122A. International Law. (4) II.

Lecture—4 hours. Sources and theories of international law. The relation of international law to municipal law. Territory, sovereign immunity, responsibility, recognition, and succession in the law of nations. Mr. Jacobs

***122B. International Law. (4) III.**

Lecture—4 hours. Neutrality, belligerency, and war in the international community. Pacific settlement of disputes. Mr. Jacobs

123. Theories of International Politics. (4) II.

Lecture—4 hours. Major contemporary approaches to the study of international politics, including balance of power, game theory, Marx-

* Not to be given, 1971-72.

ist-Leninist theory, systems theory, and decision-making analysis. Mr. Lieber

***124. International Organization. (4) I.**

Lecture—4 hours. The preservation of world peace through collective security arrangements. Analysis of the conditions under which international organizations can or cannot preserve peace, through examination of the record of the United Nations, League of Nations, and more restricted security organizations. Mr. Jones

125. National Security Policy. (4) III.

Lecture—3 hours; research assignment. The development of American military policy since 1945. An analysis of the policy of deterrence and the assumptions upon which it is based. The effects of nuclear weapons upon the conduct of war, alliance systems, and the international system. The prospects of security and stability through arms control. Mr. Siverson

128A. Recent American Foreign Policy. (4) I.

Lecture—4 hours. Abandonment of isolation and assumption of leadership during the First World War. Return to isolationist policies in the twenties. The neutrality acts of the thirties. The second World War and reversal of the policy of isolation. Mr. Jones

128B. The Conduct of American Foreign Relations. (4) II.

Lecture—3 hours; discussion—1 hour. Diplomacy and the conduct and control of foreign relations. The Department of State and the Foreign Service. Case studies in recent diplomacy to illustrate policy formation and execution. Some comparative materials will be introduced but emphasis will be placed upon the United States. Mr. Jones

131. Soviet Foreign Policy. (4) II.

Lecture—3 hours; discussion—1 hour. The conduct of Soviet foreign relations in contemporary world affairs; ideology and power as mainsprings of policy; foreign policy as an instrument of revolution; the role of diplomacy, economic aid and nuclear armaments. Offered in odd-numbered years. Mr. Zinner

***132. The Role of the United States in the Far East. (4) I.**

Lecture—4 hours. Recommended: course 3. A survey of the role the United States has played in the Far East through an examination of such topics as America's participation in Asiatic westernization, United States Far Eastern policy, Oriental attitudes toward the United States. An evaluation of present problems. To be offered in odd-numbered years. Mrs. Kallgren

134. International Relations in Africa. (4) III.

Lecture—3 hours; discussion—1 hour. Inter-African state relations, pan-Africanism, regional

integration, policies toward South Africa, and relations between African and major non-African powers.
Mr. Rothchild

***137. Nationalism and Imperialism. (4) III.**

Lecture—4 hours. Recommended: course 3. The theory of nation building illustrated by Western and non-Western experience. Offered in even-numbered years.
Mrs. Kallgren

***139. International Relations in Western Europe. (4) III.**

Lecture—4 hours. Study of the emerging unity in Western Europe and its implications for the North Atlantic area. Offered in even-numbered years.
Mr. Lieber

140A. Comparative Politics: Ideology, Institutions and Political Process in the Modern State. (4) I.

Lecture—3 hours. Prerequisite: consent of instructor. Ideological orientations of democratic, socialist, communist, fascist, and other states as related to their institutions and political processes.
Mr. Groth

140B. Comparative Politics: Political Systems and Public Policies. (4) II.

Seminar—3 hours; special assignments. Prerequisite: course 140A or consent of instructor. Critical evaluation of the linkage between the framework and process of policy-making on the one hand, and the actual results of this process on the other; a comparative, cross-national perspective will be employed.
Mr. Groth

141. Communist Political Systems. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Systematic comparative analysis of the origin, structure and performance of communist political systems with emphasis on the Soviet Union and the states of Eastern Europe.
Mr. Zinner

142. Revolution and Political Change. (4) II.

Lecture—4 hours. The attributes, problems, means, and impact of political change through evolution and revolution in the twentieth century. Emphasis upon movements and systems representative of communism, fascism, and nationalism.
Mr. Groth

143. Latin American Politics. (4) I.

Lecture—4 hours. Prerequisite: course 2 and a basic economics course, or consent of instructor. Survey of political processes in Latin America, with special attention to basic political problems, and major socio-political groups in three nations: Argentina, Brazil and Mexico (a fourth country may be added).
Mr. Tuohy

***144. British Government and Politics. (4) III.**

Lecture—3 hours; discussion—1 hour. The British political system, party and pressure group politics, political culture, evolution of the British Commonwealth. Offered in odd-numbered years.
Mr. Lieber

***145. Government and Politics in Emergent Nations. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Conceptual study of problems of political organization and procedure in the context of rapid change engendered by social revolution in "emergent countries" and liberation from colonial oppression. Offered in even-numbered years.
Mr. Zinner

146A. African Governments and Politics. (4) I.

Lecture—4 hours. An analysis of political systems in Africa south of the Sahara.
Mr. Rothchild

146B. African Governments and Politics. (4) II.

Lecture—4 hours. A continuation of course 146A.
Mr. Rothchild

147A. Western European Governments: France and Italy. (4) I.

Lecture—4 hours. The evolution and contemporary nature of French and Italian political institutions.
Mr. Groth

147B. Western European Government: Germany. (4) II.

Lecture—4 hours. Comparative study of the politics and institutions of constitutional and totalitarian government in Germany since 1930. Current problems of a divided Germany.
Mr. Hanf

***148A. Government and Politics in East Asia. (4) I.**

Lecture—4 hours. The structure and evolution of political institutions in China, Japan, and Korea. Emphasis upon such topics as nationalism, political modernization, and ideology up to World War II.
Mrs. Kallgren

148B. Government and Politics in East Asia. (4) II.

Lecture—4 hours. The structure and evolution of political institutions in China, Japan, and Korea since World War II, with emphasis upon political modernization, ideology, and nationalism.
Mrs. Kallgren

149. International Communism. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 3 or consent of instructor. The international communist movement: ideology, organization, strategy. Relations among communist parties; problems of leadership and social composition; the Sino-Soviet conflict and its effects on revolutionary struggle. Offered in even-numbered years.
Mr. Zinner

* Not to be given, 1971-72.

150. Jurisprudence. (4) II.

Lecture—4 hours. An analysis of the nature and functions of law. Particular attention will be directed to law as an instrument of social control and the relationship between law and morality. Offered in even-numbered years.

151. Civil Rights and the Constitution. (4) III.

Lecture—4 hours. Prerequisite: course 1A. The constitutional rights and political possibilities of minority groups. Citizenship in the American federal system. Offered in even-numbered years.

152. The Administration of Justice. (4) I.

Lecture—4 hours. Prerequisite: course 1A, 1B, or 100, or consent of instructor. The evolution of judicial machinery; present arrangements and plans for reorganization; justice and social classes; the revolution in the constitutional law for the criminally accused; problems in welfare and family law. Offered in odd-numbered years.

156. Administrative Law. (4) I.

Lecture—1 hour; discussion—3 hours. The political-legal factors in the decision-making processes of administrative legislation, adjudication and discretion; legal controls as an aspect of administrative responsibility; relationship of substance and procedure in regulatory action.

Mr. Musolf

157A. American Constitutional Law. (4) I.

Lecture—1 hour; discussion—3 hours. Prerequisite: courses 1A and 1B or consent of instructor. Judicial review, jurisdiction of the federal courts, interstate and foreign commerce, and taxation.

Mr. Jacobs

157B. American Constitutional Law. (4) II.

Lecture—1 hour; discussion—3 hours. Prerequisite: course 157A. The Bill of Rights of the Federal Constitution. Students, either individually or in teams of two members, prepare a written argument in a hypothetical case raising current constitutional issues. In lieu of a standard final examination, an oral defense of his written argument is presented by each student.

Mr. Jacobs

158. American Legal Thought and Institutions. (4) III.

Lecture—4 hours. Prerequisite: course 1A, 1B, or 100, or consent of instructor. Topics in the development of American legal thought and institutions: reception of the common law; church-state controversies; the role of judge and jury; federalism and individual rights; natural law and economic regulation; law and the frontier. Offered in odd-numbered years.

159. Judicial Behavior. (4) II.

Lecture—3 hours; discussion—1 hour. Pre-

requisite: course 1A. Analysis of the behavior of judges and courts in the political process. Techniques of judicial decision-making. Relationships among courts and other decision-making bodies. Offered in even-numbered years.

161. Political Behavior. (4) III.

Lecture—3 hours; conference—1 hour. Prerequisite: course 1A. The individual and group aspects of partisan behavior; political socialization, partisanship and political participation, voting behavior and group influence processes.

Mr. Owens

162. The Black Man in American Politics. (4) III.

Lecture—3 hours; term paper required. Prerequisite: junior, senior, or graduate status; or consent of instructor. A critical review of the role of the black man in American politics; the rise of the black politician in the South; his role in the civil rights revolution; campaign techniques in the urban ghetto.

163. Political Parties. (4) II.

Lecture—3 hours; discussion—1 hour. An analysis of the structure and operations of the party system in the United States; party functions and organization, nomination processes, campaigns and elections, party trends and reforms.

Mr. Owens

***164. Group Politics. (4) III.**

Lecture—3 hours; discussion—1 hour. An analysis of class, sectional, ethnic, religious, economic, and other interests in relation to constitutional government. The problem of balancing liberty and order and of reconciling claims of diversity with those of uniformity. Mr. Hardin

165A-165B. Public Opinion and Propaganda. (4-4) I-II.

Lecture—3 hours; discussion—1 hour. The nature of public opinion in America, as it is and as it should be; the distribution of opinions among different publics with emphasis on elites; opinion formation with emphasis on the role of mass media.

Mr. Costantini

166A. Public Policy and the Governmental Process. (4) I.

Lecture—3 hours; term paper. Prerequisite: courses 1A, 1B, 100, or consent of instructor. An examination of the processes of formulating public policy. Methods of policy making by executive, legislative, judicial, interest groups and parties with special emphasis upon socio-psychological approaches.

Mr. Wade

166B. Public Policy and the Governmental Process. (4) III.

Lecture—3 hours; term paper. Prerequisite: courses 1A, 1B, 100, 166A, or consent of instructor. An examination of the processes of

^a Not to be given, 1971-72.

formulating public policy. Methods of policy making through collective decision-making exchange, competition, bargaining, coalition-formation and the provision of public goods, resource transfers and social control. Mr. Wade

167. Environmental Politics and Administration.

(4) II.

Lecture—3 hours; 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. Changing role of Congress, the presidency, the bureaucracy, and the courts in environmental policy formulation and implementation. Mr. Wandesforde-Smith

***168. Policy and Politics in Agriculture and Water.**

(4) I.

Lecture—3 hours; discussion—1 hour. Agricultural and water policies and their political implications, with chief emphasis upon the United States and with special attention to water policies in California. Mr. Hardin

***171. Politics Through the Novel. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or its equivalent or consent of instructor. A comparative analysis of the use of literature as a means of sociopolitical expression, perception, and portrayal of purposes in political action. European literature, especially British, French and Italian, from the Napoleonic to the present time.

***172. Politics and Processes of Foreign Aid. (4) II.**

Lecture—3 hours; discussion—1 hour. Comparative analysis of multilateral and bilateral assistance to developing nations; perspectives of donor and recipients; politics, types, and instruments of aid. Mr. Gable

174. Political Culture and Politics. (4) III.

Lecture—4 hours. Prerequisite: courses 1A, 1B, or 2, or consent of instructor. Examination of the relationships between politically relevant attitudes, beliefs and values, on the one hand, and political behavior and governmental performance. Mr. Tuohy

175. Government and the Economy. (4) I.

Lecture—3 hours; discussion—1 hour. The legal and political environment of economic controls; types and techniques of regulating and assisting various sectors of the economy; policy alternatives and administrative processes; the search for the public interest. Mr. Gable

176. Political Development in Modernizing Societies. (4) III.

Lecture—1 hour; discussion—3 hours. Nature and sequence of political development; its eco-

nomic 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. Mr. Gable

***178. Community Politics: Power and Influence.**

(4) III.

Lecture—4 hours. Prerequisite: courses 1A, 1B or 2, or consent of instructor. Consideration of political power in local communities; emphasis on empirical bases for making judgments on the nature and location of such power, as well as ideological assumptions reflected in the literature. Offered in even-numbered years.

180. Bureaucracy in Modern Society. (4) I.

Lecture—3 hours; special assignments. Role of bureaucracy in a complex society, with emphasis upon changing relationships between government 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.

Mrs. May, Mr. Hanf

181. The American Administrative System. (4) II.

Lecture—3 hours; research assignment. Introduction to the development and organization of administrative institutions in the American federal system; focus on design and reorganization, and the relationship of structure to performance, at the national, subnational, and local levels.

The Staff

182. Administrative Decision Making and Public Policy. (4) II.

Lecture—3 hours; special assignments. Approaches to and models of administrative decision making; techniques of substantive policy analysis; problems and developments in planning, budgeting, personnel, and administrative reform.

Mrs. May

183. Administrative Behavior. (4) II.

Lecture—3 hours; discussion—1 hour. The implications for American public administration of evolving concepts about behavior in organizations.

Mr. Musolf

185A. Comparative Administration: Developing Nations. (4) II.

Lecture—2 hours; discussion—2 hours. Theories and models of comparison; the setting of administrative systems; structure and functioning of administrative systems in newly developing nations; role of bureaucracy in social development and nation-building; foreign assistance to administrative development. Mr. Gable

* Not to be given, 1971-72.

185B. Comparative Administration: Developed Nations. (4) III.

Lecture—3 hours; research assignment. Analysis of the role of public bureaucracy in Communist and non-Communist political systems.

Mr. Hanf

***186. Urban Administration. (4) III.**

Lecture—3 hours; discussion—1 hour. Role of the professional administrator in the urban political and social environment; application of modern management concepts to urban governmental organizations; and examination of persistent and emerging problems and issues.

***187. Administrative Theory. (4) III.**

Lecture—3 hours; discussion—1 hour. A 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; and examination of the role of government bureaucracies in the total society.

Mr. Hanf

190. Internship in Public Affairs. (1-4) I, II, III.

Prerequisite: consent of instructor. Supervised internship and study in political, governmental, or related organizations. May be repeated once for credit. (Passed/Not Passed grading only.)

Mr. Gable

192A-192B. International Relations. (4-4) II-III.

Seminar—4 hours. Prerequisite: consent of instructor. Selected problems of international relations evaluated in an interdisciplinary context. Readings, discussion, papers. Required of all international relations majors in their senior year.

The Staff (Mr. Zinner in charge)

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: honors status. A program of research, culminating in the writing of a senior honors thesis, under the direction of a faculty adviser.

Mr. Jones

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Gable in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Gable in charge)

Graduate Courses***202. American State and Local Government. (4) I.**

Lecture—2 hours; discussion—2 hours. Prerequisite: courses 102, 103A, 103B or consent of instructor. The analysis of American state and local government and politics. Special emphasis on community power structure, federalism, state legislatures, and state administration.

Mr. Wandesforde-Smith

203. Urban Politics. (4) III.

Seminar—4 hours. Investigate changes in the relationship between political and socioeconomic structures and policy outcomes in urban and metropolitan areas using historical as well as contemporary source materials. Develop propositions, models and theories accounting for these changes in the past, present, and future.

Mrs. May

213. Problems of Classical and Medieval Political Thought. (4) III.

Seminar—3 hours. Prerequisite: consent of instructor. Concentrated study of the political thought of selected political thinkers of classical and medieval periods.

Mr. Peterman

***215. Basic Problems of Political Theory. (4) II.**

Lecture—3 hours. Prerequisite: 4 units of political theory or consent of instructor. An examination of the fundamental assumptions underlying various approaches to an understanding of politics, emphasizing the scientific or value-free school, the historicist school, and the contributions of analytic philosophy. Offered in even-numbered years.

Mr. Zetterbaum

218. Political Theory. (4) I.

Seminar—3 hours.

Mr. Zetterbaum

223. International Relations. (4) II.

Seminar—3 hours.

Mr. Lieber

***224. International Organization. (4) I.**

Seminar—3 hours.

225. The International System. (4) II.

Seminar—3 hours. Analysis of the international system by means of theory formulation and integration; critique of research designs; use of various techniques of data generation and analysis.

Mr. Siverson

230. American Foreign Policy. (4) I.

Seminar—3 hours.

Mr. Jones

240. Democracy and Dictatorship. (4) III.

Lecture—3 hours. Prerequisite: one upper division course in comparative government, or consent of instructor. Analytical study of differences and similarities in the political process under democratic and dictatorial government. Offered in odd-numbered years.

Mr. Zinner

***241A. Communist Political Systems. (4) I.**

Seminar—3 hours. Prerequisite: course 141 or equivalent and consent of instructor. Systematic analysis of selected topics dealing with the political process of Communist political systems.

Mr. Zinner

* Not to be given, 1971-72.

***241B. Communist Political Systems. (4) II.**

Seminar—3 hours. Prerequisite: course 141 or equivalent and consent of instructor. Systematic analysis of selected topics dealing with the political process of Communist political systems.

Mr. Zinner

***242. Seminar in Comparative Politics. (4) III.**

Seminar—3 hours. Prerequisite: graduate status or consent of instructor. Systematic survey of theories and methods used in the study of Comparative Politics.

The Staff

246. Government in Africa. (4) II.

Seminar—3 hours.

Mr. Rothchild

***247A. Western European Governments. (4) I.**

Seminar—3 hours. Contemporary problems, with emphasis on France and Italy. Mr. Groth

247B. Western European Governments. (4) III.

Seminar—3 hours. Prerequisite: consent of instructor. Contemporary problems, with emphasis on Germany.

The Staff

***248. The Far East. (4) III.**

Seminar—3 hours. Selected contemporary problems of government and international relations in the Far East.

Mrs. Kallgren

261. Political Behavior. (4) III.

Seminar—3 hours.

Mr. Owens

262. Political Elites. (4) II.

Seminar—3 hours. Considers the recruitment, social background, attitudes, personality, and behavior patterns of political leaders and the relationship of these leaders to their followers.

Mr. Costantini

266. The American Political System. (4) II.

Seminar—3 hours. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics.

Mr. Wade

267. Environmental Public Policy. (4) III.

Seminar—3 hours. Analysis of the interface between the world of academic reflection about ecological and environmental problems and the world of political action. Evaluation of alternative approaches to policy analysis and recommendation. Individual research, including field research, will parallel discussion of the literature.

Mr. Wandesforde-Smith

270. National and Regional Integration. (4) I.

Lecture—3 hours. Prerequisite: one upper division course in comparative government or international relations, or consent of instructor. An examination of the means and motives of regional integration as well as the problems

involved in operating and maintaining federations. Classical federal experience and experiments in developing countries will be considered.

Mr. Rothchild

***272. Latin American Political Problems. (4) II.**

Seminar—3 hours. Prerequisite: course 143 or consent of instructor. Selected contemporary problems of government and international relations in Latin America.

Mr. Tuohy

***282. Concepts and Problems in Public Administration. (4) III.**

Discussion—3 hours. The nature of administrative processes in modern society; analysis of complex organizations; contemporary management practices and processes; and means of controlling bureaucracy. Offered in even-numbered years.

Mr. Gable

286. Administrative Values. (4) III.

Seminar—3 hours. An examination of American administrative values. Offered in odd-numbered years.

Mr. Musolf

***291. Seminar in American Constitutional Law. (4) III.**

Seminar—3 hours. Prerequisite: course 157B or consent of instructor.

Mr. Jacobs

***295. Political Parties. (4) I.**

Seminar—3 hours.

Mr. Hardin

296. Selected Problems in State and Local Government. (4) II.

Seminar—3 hours. Prerequisite: course 202 or consent of instructor. Selected topics in state and local government and politics.

Mrs. May, Mr. Sokolow

297. Internships in Political Science. (2) I, II, III.

Seminar—2 hours. Prerequisite: open only to persons who have internships or other positions in governmental 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. (1-4) I, II, III.

(Satisfactory/Unsatisfactory grading only.)
The Staff (Chairman in charge)

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)
The Staff (Chairman in charge)

299D. Directed Reading. (1-6) I, II, III.

(Satisfactory/Unsatisfactory grading only.)
The Staff (Chairman in charge)

^a Not to be given, 1971-72.

POMOLOGY

Related Undergraduate Majors.—See page 67.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Course

3. Citrus and Other Subtropical Fruits. (3) III.

Lecture—3 hours. The production of the subtropical fruits including avocados, dates, olives, and citrus with special emphasis on citrus. A study of the fundamental information relating to orchard management as applied to these fruits.

Mr. Bringhurst

Upper Division Courses

100A. Principles of Pomology. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Origin, history, distribution, and adaptation of fruit and nut plants; their structure and function in relation to environment and cultural practices.

Mr. Kester

100B. Principles of Pomology. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Development of the vegetative structure of fruit and nut plants; the physiological responses to environment and cultural modification.

Mr. Crane

100C. Principles of Pomology. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Flowering and fruiting; the nature and development of buds, flowers, and fruits in relation to the culture of fruit and nut plants and to their environment.

Mr. Griggs

PORTUGUESE—See Spanish

PSYCHIATRY—See Medicine

PSYCHOLOGY

Robert Sommer, Ph.D., *Chairman of the Department*

Department Office, 149 Young Hall

Professors:

William F. Dukes, Ph.D.

Joseph Lyons, Ph.D.

William A. Mason, Ph.D.

Robert Sommer, Ph.D.

Associate Professors:

Jarvis R. Bastian, Ph.D.

Stanley Coopersmith, Ph.D.

Dale F. Lott, Ph.D.

Thomas Natsoulas, Ph.D.

Charles T. Tart, Ph.D.

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Bringhurst in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Bringhurst in charge)

Graduate Courses

201. Biochemistry and Physiology of Fruits. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101B; Botany 111; or consent of instructor. Biochemical and physiological phenomena of growth, maturation, ripening, and senescence of fruit. (Open to qualified undergraduates.)

Mr. Maxie

210. Fruit Morphology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2. The development of flower, fruit, and seed structures of representative fruit types.

Miss Bradley

216. Physiology of Fruit Plants. (4) II.

Lecture—4 hours. Prerequisite: Botany 111 or consent of instructor. Physiological processes in the growth and development of fruit plants; metabolic relationships; influence of environment and culture. The Staff (Mr. Uriu in charge)

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff (Mr. Catlin in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Bringhurst in charge)

299. Research. (1-9) I, II, III. (Summer).

The Staff (Mr. Bringhurst in charge)

Edward D. Turner, Ph.D.

Assistant Professors:

^{3,4}Alan C. Elms, Ph.D.

Albert A. Harrison, Ph.D.

Kenneth R. Henry, Ph.D.

Neal A. Kroll, Ph.D.

Gary D. Mitchell, Ph.D.

²Robert M. Murphey, Ph.D.

¹ Absent on leave, 1971-72.

² Absent on leave, fall quarter 1971.

³ Absent on leave, winter quarter 1972.

⁴ Absent on leave, spring quarter 1972.

Karen E. Paige, Ph.D.
Theodore E. Parks, Ph.D.



Assistant Professor:

Carl C. Jorgensen, B.A. (*Psychology and Sociology; Acting*)

Lecturers:

Rosalie Lynn, Ph.D.
V. J. Polidora, Ph.D.

Departmental Major Advisers.—Mr. Bastian, Mr. Coopersmith, Mr. Elms, Mr. Harrison, Mr. Henry, Mr. Kroll, Mr. Lott, Mr. Lyons, Mr. Mitchell, Mr. Murphey, Mr. Natsoulas, Mrs. Paige, Mr. Parks, Mr. Sommer, Mr. Tart, Mr. Turner.

The Major Program

All Majors

Lower Division Courses.—Required: Psychology 1A, 1B, 1C.

Upper Division Courses.—Required: 36 units of advanced work in psychology (courses numbered above 99).

Bachelor of Arts Degree

Lower Division Courses.—Required: Mathematics 13 (must be taken prior to the junior year unless departmental permission obtained) and mathematics 15, either Biology 1 or a combination of Biology 10 and any one of the following: Anthropology 1, Physiology 10, Genetics 10.

Upper Division Courses.—Required: Two courses from one of the following groups and three courses from the other:

(Group A) Psychology 108, 130, 131, 134, 150.

(Group B) Psychology 112, 145, 147A, 168.

Before graduation, the student must complete one course in sociology or cultural anthropology and one course in philosophy. These may be taken at any time during the four years and may be either lower or upper division courses.

Bachelor of Science Degree

Lower Division Courses.—Required: Mathematics 13 (must be taken prior to the junior year unless departmental permission obtained) and Mathematics 15, 16A, 16B; Chemistry 1A, 1B; Biology 1; Physiology 2, 2L; Physics 2A, 2B, 2C.

Upper Division Courses.—Required: Genetics 100A; Zoology 106A; Psychology 108, 150; any two of the following: Psychology 112, 145, 147A, 168.

Before graduation, the student must complete 8 units of philosophy and 8 units of sociology and/or cultural anthropology. These

may be taken at any time during the four years and may be either lower or upper division courses.

Honors and Honors Program (see page 149).—The honors program comprises course 194H, which includes an honors thesis, to be taken normally during the senior year.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Any thirty units in psychology.

Subject Representative: Mr. Turner.

Lower Division Courses

1A. Introduction to Psychology: General Processes. (5) I, II, III.

Lecture—5 hours. The experimental psychology of general behavioral and mental processes treated in order of increasing complexity. Major topics include emotion, conditioning, perception, attention, human learning, memory, language and cognition. The Staff

1B. Introduction to Psychology: Biological Bases of Behavior. (5) I, II, III.

Lecture—5 hours. Prerequisite: course 1A. An analysis of behavior in terms of its evolutionary, genetic, and physiological determinants. The Staff

1C. Introduction to Psychology: Personality and Social Psychology. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 1A. The normal and abnormal personality. The influence of social factors on the individual. The Staff

10. General Psychology. (4) I, II, III.

Lecture—4 hours. Survey of the basic principles of psychology and their empirical foundations. For students who do not plan to major in psychology. The Staff

35. Altered States of Consciousness. (4) I, III.

Lecture—4 hours. Prerequisite: course 1A or 10. Characteristics, uses, and abuses of altered states of consciousness from experiential, behavioral, physiological, and methodological perspectives. Topics typically include sleep, borderline states, dreams, meditation, hypnosis, auto-hypnosis, marijuana intoxication, psychedelic drugs and mystical experiences. Mr. Tart

98. Directed Group Study. (1-5) I, II, III.

By prior arrangement with individual instructor. The Staff (Chairman in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

By prior arrangement with individual instructor. The Staff (Chairman in charge)

Upper Division Courses**103. Advanced Quantitative Description of Behavior. (5) I, II, III.**

Lecture—5 hours. Prerequisite: Mathematics 13 and 15, or consent of instructor. Summary, inference, and prediction from psychological data, with emphasis on the theoretical aspects.

Mr. Turner, Mr. Kroll

107. Psychometric Methods. (4) III.

Lecture—4 hours. Prerequisite: course 103 or consent of instructor. General principles of psychological measurement; psychophysical methods; scale, and correlational techniques in psychological measurement; reliability, validity.

Mr. Turner, Mr. Kroll

108. Physiological Psychology. (5) I, II, III.

Lecture—5 hours. Prerequisite: course 1B; or course 1A and upper division standing in a biological science. An analysis of some of the contributions of neuroanatomy, neurophysiology, and neurochemistry to a mechanistic understanding of human and animal behavior. A reductionistic approach within a behavioristic framework.

Mr. Henry, Mr. Polidora

112. Developmental Psychology. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A; not open for credit to students who have received credit for Human Development 131. An ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction.

Mr. Coopersmith, Mr. Mitchell

120. History of Psychology. (4) II.

Lecture—4 hours. Prerequisite: course 1A and upper division standing. The historical development of psychological theories and research.

Mr. Bastian

***129. Sensory Processes. (5) III.**

Lecture—5 hours. Prerequisite: course 1B; upper division standing in psychology; or consent of instructor. The sensory capabilities of man and animals. Behavioral evidence for sensory capacity and relationships to the structure and function of the sense organs.

130. Learning. (5) I, III.

Lecture—4 hours; term paper. Consideration of major theories of learning and memory with critical examination of relevant experimental data.

Mr. Kroll, Mr. Parks

131. Perception. (4) I, III.

Lecture—3 hours; independent library work. Prerequisite: course 1A. The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.

Mr. Natsoulas, Mr. Turner

132. Language and Cognition. (4) I.

Lecture—4 hours. Prerequisite: course 1A and 6 units of upper division work in psychology. Psychological examination of linguistic actions, their development and role in human conduct; analysis of their contribution to perception and thought.

Mr. Bastian

134. Motivation. (4) I, II.

Lecture—4 hours. Prerequisite: course 1A. Factors activating and directing behavior; contemporary theories of motives; pertinent data from laboratory, clinic, and field observation.

135. Psychology of Consciousness. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 1A. Consideration of major theories of consciousness, with critical examination of relevant experimental, clinical, and field data.

Mr. Natsoulas

145. Social Psychology. (5) I, II, III.

Lecture—4 hours; term paper. Prerequisite: course 1A. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction: group tensions, norm-development, attitudes, values, public opinion, status.

Mr. Harrison, Mrs. Paige

147A. Personality Theory and Assessment. (5) I, II, III.

Lecture—4 hours; independent library work. Prerequisite: course 1A and 6 units upper division work in psychology. A systematic consideration of contemporary theories of personality.

Mrs. Lynn, Mrs. Paige

147B. Personality Theory and Assessment. (4) II.

Lecture—4 hours. Prerequisite: course 3 or equivalent; course 147A. An exploration and evaluation of the principal methods in personality assessment and research.

Mr. Harrison

150. Comparative Psychology. (5) I, II, III.

Lecture—4 hours; term paper. Prerequisite: course 1B or appropriate biological training. Perspectives in animal behavior: zoological, physiological, psychological. Functional behavior categories: feeding, reproduction, communication, learning. Behavioral theory as derived from psychological and ethological contexts.

Mr. Mason, Mr. Lott

165. Introduction to Clinical Psychology. (4) II, III.

Lecture—4 hours. Prerequisite: courses 1C; 145 or 168; and 112, 134, or 147A. Psychological assessment procedures in clinical psychology; psychological methods for modifying disordered behavior—rationale, process, and outcome.

Mrs. Lynn, Mr. Lyons

168. Abnormal Psychology. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A. A descriptive and functional account of be-

* Not to be given, 1971-72.

havioral disorders, with primary considerations given to neurotic and psychotic behavior.

Mr. Murphrey, Mr. Sommer

171. Humanistic Psychology. (4) II, III.

Lecture—4 hours. Prerequisite: course 165 or equivalent and consent of instructor. A survey, including lectures and demonstrations of humanistic, existential, or "third-force" movements in contemporary psychology. Theory, data, and techniques in the work of Maslow, Rogers, and others who emphasize creativity and self-actualization.

Mr. Tart

180. Experimental Psychology. (4) I, II, III.

Lecture—2 hours; laboratory—4 hours. Prerequisite: four upper division psychology courses and consent of instructor. Laboratory investigation of selected problems. Content area will rotate among major fields of psychology from quarter to quarter. (180A. General Methodology; 180B. Physiological; 180C. Developmental; 180D. Sensory Processes; 180E. Learning; 180F. Perception; 180G. Psycholinguistics; 180H. Motivation; 180I. Social; 180J. Personality; 180K. Comparative.)

The Staff

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: 20 units in psychology and honors status. Independent investigation of an empirical problem.

The Staff

196. Advanced General Psychology. (4) II, III.

Lecture—4 hours. Prerequisite: 18 units upper division work in psychology. Exploration of the present status of systematic psychology. An integrative treatment of the major areas, problems, and methodologies.

Messrs. Bastian, Dukes, Lyons

198. Directed Group Study. (1-5) I, II, III.

By prior arrangement with individual instructor. Directed small group study on psychological topics of special interest and relevance to instructor and students.

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

By prior arrangement with individual instructor.

The Staff (Chairman in charge)

Graduate Courses

200. Current Research Topics in Psychology. (1) I.

Seminar—1 hour. Prerequisite: consent of instructor. A seminar designed to introduce students entering graduate work in the department to its ongoing research activities. (Satisfactory/Unsatisfactory grading only.)

The Staff

201. Research Preceptorship. (4) I, II, III.

Laboratory-discussion—6-9 hours. Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grading only.)

The Staff

206. Statistical Analysis of Psychological Experiments. (4) II.

Lecture—4 hours. Prerequisite: course 103 or consent of instructor. Statistical analysis of data obtained with various experimental designs; analysis of data obtained with various experimental designs; analysis of variance and covariance, factorial and repeated measures, Latin square designs, and tests of trends.

Mr. Turner, Mr. Kroll

207. Statistical Inference from Psychological Experiments. (4) III.

Lecture—4 hours. Prerequisite: course 103 or consent of instructor. The relationships between statistical models and inferences about empirical processes, with an emphasis on distribution-free models.

Mr. Turner, Mr. Kroll

208. Physiological Psychology. (4) II.

Seminar—4 hours. A conceptual analysis of the contributions of neuroanatomy, neurophysiology and neurochemistry to an understanding of animal and human behavior.

212. Developmental Psychology. (4) II.

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The original behavioral repertoire of the child and its subsequent development.

Mr. Coopersmith

230. Learning. (4) I.

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theories of learning and memory as applied to the experimental study of simple and complex behavioral processes.

Mr. Parks, Mr. Kroll

231. Perception. (4) II.

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. An analysis of the role of perception in experience and its effects on behavior.

Mr. Natsoulas

234. Motivation. (4) II.

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The origin and function of basic motivational systems as they influence behavior.

245. Social Psychology. (4) III.

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.

Mr. Harrison

247. Personality. (4) III.

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in human personality.

Mr. Coopersmith, Mr. Lyons

250. Comparative Psychology. (4) III.

Seminar—4 hours. Prerequisite: graduate

standing in psychology or consent of instructor. The study of animal behavior in an evolutionary and comparative framework.

Mr. Lott, Mr. Mason

251. Genetic Correlates of Behavior. (4) I.

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and experiment in the genetic determination of animal and human behavior.

Mr. Murphrey

252. Seminar in Psychobiology. (4) I, II, III.

Seminar—4 hours.

The Staff

255. Comparative and Physiological Psychology of Reproductive Behavior. (4) III.

Seminar—4 hours. Biological bases of reproductive behavior; neural, hormonal, and environmental controls.

264. Psycholinguistics. (4) I.

Seminar—4 hours.

Mr. Bastian

272. Experimental Study of Personality. (4) I, III.

Seminar—4 hours.

Mr. Coopersmith, Mr. Lyons

RANGE MANAGEMENT

Major Advisers.—See *Schedule and Directory* listing.

Major Program and Graduate Study.—See pages 62, 90, and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Course

1. Introduction to Range Management. (4) II.

Lecture—3 hours; discussion—1 hour. Basic principles of range management and their relationships to the management of wildlands for livestock production, wildlife, water, recreation, and timber.

Mr. Laude

Upper Division Courses

100. Range Plants. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2. Systematic relationships and identification of range grasses; legumes, forbs, and shrubs; their distribution, environmental requirements, and use. One Saturday field trip.

Mr. Crampton

103. Grassland Inventory, Analysis and Planning. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or consent of instructor.

273. Environment and Behavior. (4) II.

Seminar—4 hours. The social psychology of the environment. Research into the use of space and its design implications.

Mr. Sommer

290. Seminar. (4) I, II, III.

Seminar—4 hours. Prerequisite: consent of instructor. A seminar devoted to a highly specific research topic in any area of basic psychology. Special topic selected for a quarter will vary depending on interests of instructor and students.

The Staff

298. Group Study. (1-4) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff

299. Research. (2-9) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff

Professional Course

390. The Teaching of Psychology. (4) III.

Seminar—4 hours; practical experience in teaching. The methods and problems of teaching psychology at the undergraduate and graduate levels; curriculum design and evaluation. Practical experience in the preparation and presentation of material.

The Staff

Sampling grasslands and other vegetational types to determine species composition, forage production and utilization, carrying capacity, and changes in the plant community. Range inventory analysis and planning range use. Offered in odd-numbered years.

Mr. Raguse

105. Field Course. (2) (Summer)

Lecture—10 hours total; laboratory—30 hours total. Prerequisite: consent of instructor. Field studies of range conditions and methods of utilization in various parts of the state.

Mr. Love

133. Grassland Ecology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course in plant ecology or consent of instructor. Composition, structure, development, and habitat factors of native North American grasslands. Concepts used in vegetative measurements. Principles of grassland management for forage production. Offered in even-numbered years.

Mr. Raguse

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Knowles in charge)

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Knowles in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: senior standing and consent of instructor. The Staff (Mr. Knowles in charge)

Graduate Courses**290. Seminar. (1-2) I, II, III.**

Seminar—1-2 hours.

The Staff (Mr. Knowles in charge)

299. Research. (1-9) I, II, III.

The Staff (Mr. Knowles in charge)

RESOURCE SCIENCES

Related Undergraduate Majors. See page 67.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses**2. Concepts in Forestry. (2) II.**

Lecture—2 hours. An introduction to the concepts of forestry as illustrated by current issues in the Western United States. Mr. McKillop

10. California and the West. (2) III.

Lecture—2 hours. Recommended as an introductory course for lower division students. How population, agricultural, and industrial centers and their conflicts in environmental pollution and overcrowding develop in relation to the West's physical features. Weekly guest lectures in geology, physical geography, water, and the atmospheric, plant, and animal sciences.

Mr. Walker

10L. Aerial Study of California and the West. (1) III.

Laboratory—1 hour. Prerequisite: course 10 (must be taken concurrently). Aerial study of the natural resources of California and adjacent states. Flight route includes the Sierra, Cascade, and Coast ranges; observation of major forest, valley, and river systems and their relationship to man's living, working, and leisure. (Flight fee approximately \$50.) Mr. Walker

98. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Whittig in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

The Staff (Mr. Whittig in charge)

Upper Division Courses**100. Concepts in Renewable Natural Resources.**

(3) I.

Lecture—3 hours. Prerequisite: junior standing or consent of instructor. Survey of renew-

able natural resources, interrelationships of climate, air, soil, water, plants, animals and their impact on society. Role of man in their management, preservation, and improvement for man's environment, his recreation, and the production of food and fiber.

Mr. Snyder

100L. Discussion of Resource Concepts. (1) I.

Discussion—1 hour. Prerequisite: course 100 (may be taken concurrently). Discussion of current problems and concepts in renewable natural resources, development, and conservation. An in-depth consideration of the topics surveyed in course 100. (Passed/Not Passed grading only.)

Mr. Snyder

101. Agriculture and Wildlife. (3) II.

Lecture—3 hours; one Saturday field trip. Prerequisite: upper division standing or consent of instructor. A study of the central California Valley and the Delta region as an example of utilization for production agriculture and outdoor recreation—the conflicts and harmonies; lectures by distinguished biologists of the University, and the State Department of Fish and Game.

Mr. Love

110. Wildflowers of the Central Valley of California. (2) III.

Lecture—2 hours. A study of the resident plants in and about the central valley of California, growth forms, plant communities, identification and systematic relationships, field collections, land use and overall influence on wildflower habitats.

Mr. Crampton

119. Proseminar in Renewable Natural Resources.

(1) I, II, III.

Seminar—1 hour. Prerequisite: senior standing in resource sciences curriculum. Selected topics in renewable natural resources.

The Staff (Mr. Whittig in charge)

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Whittig in charge)

RHETORIC

¹James J. Murphy, Ph.D., *Chairman of the Department*Gerald P. Mohrmann, Ph.D., *Acting Chairman of the Department*

Department Office, 207 North Hall

¹Absent on leave, 1971-72.

Professor:

¹James J. Murphy, Ph.D.

Associate Professors:

Gerald P. Mohrmann, Ph.D.
Ralph S. Pomeroy, Ph.D.

Assistant Professor:

Harry W. Sharp, Jr., Ph.D.

**Assistant Professor:**

Michael C. Leff, M.A. (*Acting*)

Lecturers:

Gary G. Collier, M.A.
John L. Vohs, M.A.

The Major Program

Departmental Advisers.—Mr. Collier, Mr. Leff, Mr. Mohrmann, Mr. Murphy, Mr. Pomeroy, Mr. Sharp, and Mr. Vohs.

Lower Division Courses.—Required are courses 1 and 3. Recommended: Rhetoric 15.

Upper Division Courses.—Thirty-six units in rhetoric, including: (1) courses 110, 120 as early as possible in the major; (2) at least one additional course from each of the following series: 110, 120 or 160, and 150; (3) course 190 in the senior year.

Required courses outside the Department of Rhetoric.—A coherent program of twelve quarter units selected in consultation with the departmental adviser from appropriate courses outside the Department of Rhetoric. This program will ordinarily be chosen from a designated set of courses related to one of the four course series in the Department of Rhetoric (Series 110, 120, 150, or 160).

The Department will certify completion of a major program only on the basis of at least a C average in the upper division courses taken in the Department.

Teaching Major.—Same as major.

Teaching Minor.—Thirty quarter units, including Rhetoric 1, 3, 41, and eighteen upper division units including either course 110 or 120.

Optional Minor.—Twenty or more quarter units, at least one course from four of the following sets:

- a. Lower division (Rhetoric 1, 3, 41).
- b. History of rhetorical theory (Rhetoric 110, 111, 112, 113).
- c. Rhetorical criticism (Rhetoric 120, 121A, 121B, 121C).
- d. Rhetorical theory (Rhetoric 150, 151, 152, 153, 155, 156).
- e. Rhetorical analysis (Rhetoric 160, 161, 162).

Graduate Study.—The Department of Rhetoric offers programs of study and research leading to the M.A. degree in Rhetoric. Detailed information may be obtained from the Graduate Adviser, Department of Rhetoric.

Lower Division Courses**1. Introduction to Public Speaking. (4) I, II, III.**

Lecture—4 hours. Practice in the preparation and delivery of speeches with an introduction to rhetorical theory and criticism as applied to public address. The Staff

2. Oral Interpretation. (4) I, II, III.

Lecture—4 hours. Theory and practice in the oral reading of literature. The Staff

3. Group Communication. (4) I, II, III.

Lecture—4 hours. Prerequisite: consent of instructor or course 1. Study of the rhetorical process in informal situations. Topics include interaction, leadership techniques, and decision making in groups. Regular participation in discussions. (Passed/Not Passed grading only.) The Staff

15. Introduction to Rhetorical Studies. (4) III.

Lecture—4 hours. Illustration of various means available for the study of oral communication processes. Survey of the rhetorical tradition leading to exercises in rhetorical criticism and audience analysis, with extensive use of television and small-group methods. The Staff

41. Introduction to Advocacy. (4) I, II.

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. Provision for practice in intercollegiate debate. Mr. Sharp

42. Rhetoric in the News Media. (4) II.

Lecture—2 hours; discussion—2 hours. Study of rhetorical concepts and processes influencing the news function of television, radio, newspapers, and mass circulation periodicals. Discussions, lectures, and group projects on problems of media bias, objective reporting, feature writing, and editorial responsibility. Critical analysis of journalistic styles. Mr. Pomeroy

98. Directed Group Study. (1-2) I, II, III.

Lecture—1 hour; discussion—1 hour.
The Staff (Chairman in charge)

99. Special Study for Undergraduates.**(1-2) I, II, III.**

Prerequisite: consent of instructor.
The Staff (Chairman in charge)

¹ Absent on leave, 1971-72.

Upper Division Courses**110. Classical Rhetorical Theory. (4) I.**

Lecture—4 hours. Origins of Greek and Roman rhetorical theory, with emphasis upon the contributions of Isocrates, Plato, Aristotle, Cicero, and Quintilian. Mr. Leff

***111. Medieval and Renaissance Rhetorical Theory. (4) II.**

Lecture—4 hours. Development of the European rhetorical tradition to 1700 through the contributions of such writers as Augustine, Alcuin, Wilson, and other Ciceronians, with attention to the anti-Ciceronian reaction represented by Ramus, Francis Bacon, and Fenelon. Mr. Leff

112. Early Modern Rhetorical Theory. (4) II.

Lecture—4 hours. English and continental theories of rhetoric to 1900, with reference to developments in psychology, philosophy, and belles lettres. Emphasis upon the works of Ward, Priestley, Campbell, Blair, and Whately. Mr. Pomeroy

113. Contemporary Rhetorical Theory. (4) III.

Lecture—4 hours. Current approaches to rhetorical theory, from the James-Winans theory of attention to the Hovland, Janis, Kelley studies of persuasion. Mr. Sharp

120. Rhetorical Criticism. (4) I.

Lecture—4 hours. A survey of critical methods and their use in the interpretation of rhetorical discourse. Mr. Mohrmann

121A. History of Public Address to 1500. (4) II.

Lecture—4 hours. Study of major rhetorical practitioners and movements from ancient Greece to the Renaissance. Special emphasis on the development of oratorical prose in the Attic Orators, Cicero, and the Christian preachers. Mr. Leff

121B. History of Public Address from 1500 to 1800. (4) III.

Lecture—4 hours. Study of major rhetorical practitioners and movements in the Early Modern period. Special attention to England, France, and America, including: preaching during the Reformation, parliamentary debate during the English Civil War, and rhetoric of the American and French Revolutions. Mr. Collier

121C. History of Public Address from 1800 to the Present. (4) III.

Lecture—4 hours. Study of major rhetorical practitioners and movements in the nineteenth and twentieth centuries. Special attention to rhetoric in the shaping and transmitting of cultural values and institutions, including the rise of popular agitation and of the mass media. Mr. Mohrmann

150. Modes of Discourse. (4) I.

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. Mr. Vohs

151. Methods of Advocacy. (4) I.

Lecture—4 hours. Study of problems inherent in securing acceptance of ideas; consideration of logical and nonlogical means of persuasion. Mr. Pomeroy

153. Empirical Studies in Rhetoric. (4) II.

Lecture—4 hours. Prerequisite: consent of instructor. Consideration of contributions derived from sociometric and psychometric approaches to analysis of rhetorical process. Mr. Vohs

154. Forensics Laboratory. (1) I, II, III.

Laboratory—2 hours. Prerequisite: consent of instructor. Practice in the principles of forensics, including argumentation and debate. Intercollegiate and tournament forensics. May be repeated for credit up to a total of six units. Mr. Sharp

155. Mass Communication. (4) II.

Lecture—4 hours. Study of the processes and effects of mass communication, especially television. Comparison of roles of various popular media. Consideration of media theories, functions, and constraints. Mr. Vohs

156. Group Communication Processes. (4) III.

Lecture—4 hours. Examination of current theories of group formation, goals, structure, and leadership, as they relate to communication processes. Mr. Vohs

160. The Persuasive Campaigns. (4) I.

Lecture—4 hours; class project. Study of selected political and nonpolitical campaigns, illustrating prolonged organized efforts to change, maintain, or deter designated behaviors in a given audience through the use of a variety of media and influences. Mr. Sharp

***161. The Rhetoric of Formal Argument. (4) I.**

Lecture—4 hours. Study of selected examples, illustrating the characteristics and functions of rhetoric in situations placing formal or technical constraints upon argument. Special attention to legal pleading, scientific argument, and philosophical disputation. Mr. Leff

162. Deliberative Rhetoric. (4) III.

Lecture—4 hours. Study of selected examples, illustrating major trends, characteristics, and functions of rhetoric in policy-making situations, with emphasis upon speaking in legislative assemblies. Examples drawn from various historical periods and deliberative groups. Mr. Collier

* Not to be given, 1971-72.

190. Senior Proseminar. (4) II, III.

Lecture—2 hours; seminar—2 hours. Prerequisite: required of majors with senior standing. Individual research on a rhetorical topic approved by a committee of the faculty.

The Staff (Chairman in charge)

192. Internship in Rhetoric. (3–5) I, II, III.

Laboratory—3–5 hours. Prerequisite: 12 upper division units in rhetoric and consent of instructor. Work-research projects at off-campus sites under departmental supervision. (Passed/Not passed grading only.)

Mr. Sharp

197T. Tutoring in Rhetoric. (2–4) I, II, III.

Seminar—1–2 hours; laboratory—1–2 hours. Prerequisite: upper division standing with major in rhetoric and consent of Department Chairman. Tutoring in undergraduate rhetoric courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit up to six units.

The Staff (Chairman in charge)

198. Directed Group Study. (1–4) I, II, III.

Prerequisite: consent of instructor

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates. (1–5) I, II, III.

The Staff (Chairman in charge)

Graduate Courses

Seniors may take graduate courses with consent of instructor.

200. Research in Oral Discourse. (4) I.

Lecture—4 hours. Survey of traditional and current approaches to the study of human com-

RUSSIAN

Department Office, 416 Sproul Hall

Professor:

Valerie A. Tumins, Ph.D.

Associate Professor:

Alex M. Shane, Ph.D.

Assistant Professors:

Jiri Marvin, Ph.D.

Rodney L. Patterson, Ph.D.

◇ ◇ ◇

Lecturer:

Anita Charters-Rogozinskaya, B.Sc.Ag.

Departmental Major Adviser.—Mr. Patterson.

Graduate Adviser.—Miss Tumins.

The Major Program

The requirements are Russian 1 through 6 (or the equivalent); Russian 40, 41, 42; and a

munication; special attention to bibliography and methodology, with sample research projects.

Mr. Sharp

210. The Evolution of Rhetorical Concepts. (3) II.

Lecture—3 hours. Prerequisite: course 110 or consent of instructor. Analysis of a selected concept such as ethos, proof, structure, audience, or delivery. Topic selected will be traced through tradition to contemporary approaches.

Mr. Vohs

211. Study of a Major Rhetorician. (3) III.

Lecture—3 hours. Intensive study of a major theorist such as Aristotle, Cicero, Whately, or Toulmin, with emphasis upon cultural and intellectual environment.

Mr. Leff

220. Case Studies in Public Controversy. (3) II.

Lecture—3 hours. Prerequisite: one course from course 120 series or consent of instructor. Analysis of origins, development, and promulgation of conflicting views in public controversies such as slavery and temperance movement.

Mr. Mohrmann

250. Rhetoric of Non-Oratorical Works. (3) III.

Lecture—3 hours. Prerequisite: course 150 or consent of instructor. Study of rhetorical aspects of communications other than the public speech. Examination of rhetorical concepts in relation to news media, advertising, literature, with attention to nonverbal communication.

Mr. Pomeroy

298. Group Study. (3) I, II, III.

Lecture—3 hours.

The Staff (Chairman in charge)

299. Individual Study. (1–12) I, II, III.

The Staff (Chairman in charge)

minimum of 36 units of upper division course work including Russian 101A, 101B, 101C, 102 or 103, and 190.

Honors and Honors Program (see page 149).—The honors program comprises at least one quarter of study under course 194H, which will include a research paper.

The Master of Arts Degree

The Department offers two programs of study (one with emphasis on language and culture, the other with emphasis on literature) leading to the M.A. degree. Detailed information may be obtained by writing to the Graduate Adviser.

Teaching Major.—Requirements for the teaching major are the same as those for the departmental major with the addition of course 300.

Teaching Minor.—Six quarter courses in the lower division or their equivalents. Usually these will consist of Russian 1, 2, 3, 4, 5, 6. A total

of 20 upper division units is required, including courses 101A, 101B, 101C.

Subject Representative: Mr. Patterson.

Lower Division Courses

Course Placement.—Students with two years of Russian in high school normally continue in Russian 2, those with three years, Russian 3; those with four years, Russian 4.

1. Elementary Russian. (6) I.

Recitation—5 hours; language laboratory—1 hour. Mr. Patterson

2. Elementary Russian. (6) II.

Recitation—5 hours; language laboratory—1 hour. Prerequisite: course 1. Mr. Shane

2X. Intensive Elementary Russian. (16) II.

Recitation—15 hours; laboratory—1 hour; supplementary laboratory and group practice. Prerequisite: course 1. An intensive course using contemporary materials, stressing modern spoken Russian, and covering grammar fundamentals. Mrs. Charters

3. Elementary Russian. (6) III.

Recitation—5 hours; language laboratory—1 hour. Prerequisite: course 2. Mr. Marvin

4. Intermediate Russian. (6) I.

Recitation—5 hours; language laboratory—1 hour. Prerequisite: course 3. Grammar review based on a selected literary text and conversational practice with everyday topics and situations. Mrs. Charters

***4X. Intensive Intermediate Russian. (16) I.**

Recitation—15 hours; laboratory—1 hour. Prerequisite: course 3 or placement in course 4. An intensive course emphasizing spoken Russian. Contemporary linguistic and literary materials will be used to increase the students' conversational skills and to broaden their knowledge of Russian grammar. Mrs. Charters

5. Intermediate Russian. (6) II.

Recitation—5 hours; language laboratory—1 hour. Prerequisite: course 4. Composition, grammar review, and conversation on literary texts and everyday topics and situations. Mr. Patterson

6. Intermediate Russian. (6) III.

Recitation—5 hours; language laboratory—1 hour. Prerequisite: course 5. Composition, grammar review, and conversation on literary texts and everyday topics and situations. Mrs. Charters

30. Great Russian Writers. (3) I.

Lecture—3 hours. Knowledge of Russian not required. An introduction to the important prose and dramatic works of such writers as Gogol,

Turgenev, Dostoevsky, Tolstoy, Chekhov, Sholokhov, and Pasternak. Offered in even-numbered years. Miss Tumins

40. Survey of Russian Literature to 1800. (4) II.

Lecture—3 hours. Knowledge of Russian not required. An introduction to the philosophic, historic, and stylistic elements of Russian literature from the earliest period up to Russian Sentimentalism with a discussion of the major writings and major literary figures. Offered in odd-numbered years. Miss Tumins

41. Survey of Russian Literature: Nineteenth Century. (4) I.

Lecture—3 hours. Knowledge of Russian not required. An introduction to the dominant literary trends, the major literary figures and landmarks of Russian prose and poetry from the period of Sentimentalism through Romanticism and Realism to the beginnings of Modernism. Offered in odd-numbered years. Mr. Patterson

42. Survey of Russian Literature: Twentieth Century. (4) III.

Lecture—3 hours. Knowledge of Russian not required. An introduction to major literary trends such as Symbolism, Acmeism, Futurism, Neorealism, and Socialist Realism. Readings from representative writers such as Gorky, Bely, Pasternak, Solzhenitsyn, and Tertz. Offered in even-numbered years. Mr. Patterson

Upper Division Courses

101A. Advanced Grammar and Reading. (4) I.

Recitation—3 hours. Prerequisite: course 6. The study of advanced grammar with reading and discussion of literary and cultural texts. Mrs. Charters

101B. Advanced Grammar and Reading. (4) II.

Recitation—3 hours. Prerequisite: course 6. The study of advanced grammar with reading and discussion of literary and cultural texts. Miss Tumins

101C. Advanced Grammar and Reading. (4) III.

Recitation—3 hours. Prerequisite: course 6. The study of advanced grammar with reading and discussion of literary and cultural texts. Mrs. Charters

102. Russian Composition. (4) I.

Recitation—3 hours. Prerequisite: course 6. Offered in even-numbered years. Mrs. Charters

103. Literary Translation. (4) II.

Discussion—3 hours. Prerequisite: course 6. Translation of Russian literary texts into stylistically equivalent idiomatic English. Offered in odd-numbered years. Mr. Shane

105. Advanced Russian Conversation. (2) III.

Conversation—2 hours. Prerequisite: course 6. Intensive conversational practice and discus-

* Not to be given, 1971-72.

sion based on current events and contemporary texts. May be repeated for credit. Mrs. Charters

121. The Nineteenth-Century Russian Novel.

(4) II.

Lecture—3 hours. Knowledge of Russian not required. The origin and development of the novelistic tradition beginning with Pushkin, Lermontov, Gogol, and continuing with such writers as Goncharov, Turgenev, and Saltykov (excluding Tolstoy and Dostoevsky). Offered in even-numbered years. Mr. Shane

123. The Twentieth-Century Russian Novel. (4) II.

Lecture—3 hours. Knowledge of Russian not required. The examination of various trends including Critical Realism, Symbolism, Neorealism, and Socialist Realism in the development of the novel. Readings from such writers as Gorky, Zamiatin, Sholokhov, and Pasternak. Offered in odd-numbered years. Mr. Shane

125. Russian Drama to 1917. (4) III.

Lecture—3 hours. Prerequisite: course 6. The rise and development of Russian drama. Reading and analysis of Fonvizin and nineteenth-century dramatic works by authors such as Griboedov, Pushkin, Ostrovsky, A. K. Tolstoy, Leo Tolstoy, Chekhov, and Gorky. Offered in odd-numbered years. Miss Tumins

127. The Golden Age of Russian Poetry. (4) III.

Lecture—3 hours. Prerequisite: course 101A. A study of Russian versification, the historical background to the Golden Age, and readings from Derzhavin, Batishkov, Gnedich, Pushkin, Delvig, Baratynsky, Lermontov, and other poets of the first half of the nineteenth century. Offered in even-numbered years. Mr. Patterson

128. Modern Russian Poets. (4) III.

Lecture—3 hours. Knowledge of Russian not required; Russian majors fulfill readings in Russian. Readings in translation of modern poetry belonging to various "schools" (e.g., Symbolism, Acmeism, Futurism) including such poets as Blok, Esenin, Akhmatova, Maiakovskiy, Pasternak, and Evtushenko. Offered in odd-numbered years. Mr. Patterson

140. Dostoevsky. (4) I.

Lecture—3 hours. Knowledge of Russian not required. Reading and analysis of Dostoevsky's principal works such as *Crime and Punishment*, *The Idiot*, *The Brothers Karamazov*, and *The Diary*. Study of social and political views as reflected in Dostoevsky's works. Offered in even-numbered years. Miss Tumins

141. Tolstoy. (4) I.

Lecture—3 hours. Knowledge of Russian not required. A study of Leo Tolstoy's literary evolution and moral quest. Readings include his *Confession*, a major novel such as *War and Peace* or

Anna Karenina, and representative shorter fiction. Offered in odd-numbered years.

Mr. Patterson

185. Intercultural Literary Colloquim. (4) II.

Lecture—2 hours; discussion—1 hour; readings in English or Russian; term paper. Inter-departmental inquiry into such European and American themes as the anti-hero, guilt and judgment, escape, and utopia. Specific topics to be chosen by instructors. (To be given jointly with English 185 and German 185.)

Mr. Patterson

190. Senior Proseminar. (4) III.

Group conference and assigned reading in preparation for graduate study. Miss Tumins

192. Research Essay. (2) I, II, III.

Prerequisite: concurrent enrollment or previous completion of a course in Russian literature. A research essay, based on primary and secondary sources, dealing in depth with a topic arising from or related to the prerequisite literature course. May be repeated for credit.

The Staff

194H. Special Study for Honors Students.

(5) I, II, III.

Prerequisite: open only to honors students. Guided research leading to an honors paper.

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Chairman in charge)

Graduate Courses

200. Old Church Slavic. (4) I.

Lecture—3 hours; reading projects. A synchronic and diachronic analysis of Old Church Slavic.

Mr. Marvan

201. Comparative Slavic Linguistics. (4) II.

Lecture—3 hours; reading projects. Prerequisite: course 200. An introduction to comparative Slavic linguistics based on the contrastive analysis of Old Church Slavic with Old Russian.

Mr. Marvan

202. Descriptive Russian Grammar. (4) II.

Lecture—3 hours. An introduction to modern Russian phonology and morphology. Mr. Marvan

204. Historical Russian Grammar. (4) III.

Lecture—3 hours; reading projects. The evolution of the Russian phonological and grammatical systems from the eleventh to the eighteenth centuries.

Mr. Marvan

210. Style and Syntax. (4) I.

Discussion—3 hours; reading projects. An examination of stylistic differences between spoken and written Russian.

Miss Tumins

***220. Old Russian Literature. (4) III.**

Seminar—3 hours. Prerequisite: course 201. Advanced study of intellectual movements and literary styles of works such as "The Song of Igor's Campaign," "Zadonshchina," Epifany's "Lives," Ivan IV's cycle of epistles. May be repeated for credit.

Miss Tumins

221. Eighteenth-Century Russian Literature. (4) III.

Seminar—3 hours. Advanced study of literary movements and styles in prose or poetry. The works of writers such as Kantemir, Lomonosov, Sumarokov, Radishchev and Karamzin will be analyzed. May be repeated for credit.

Miss Tumins

222. Nineteenth-Century Russian Literature. (4) I.

Seminar—3 hours. Advanced study in literary movements such as Romanticism, Naturalism, and Realism, or of a major writer such as Pushkin, Gogol, Dostoevsky, or Tolstoy. May be repeated for credit.

Mr. Shane, Miss Tumins, Mr. Patterson

223. Early Twentieth-Century Russian Literature. (4) I.

Seminar—3 hours. Reading and analysis of

RUSSIAN LITERATURE AND HISTORYC. Bickford O'Brien, Ph.D., *Chairman of the Committee*

Department Office, 156 Voorhies Hall

Committee in Charge:Alexander J. Groth, Ph.D. (*Political Science*)C. Bickford O'Brien, Ph.D. (*History*)Rodney L. Patterson, Ph.D. (*Russian*)

This major is designed to give the student a better understanding of Russia through the study of its history and literature, two fields closely linked in its intellectual development.

This combined major is planned in such a way that the student will be prepared for graduate studies in either field—Russian History, Russian Literature or in a similar combined program. In either case the knowledge of Russian is a prerequisite.

Required courses for the joint Bachelor of Arts degree in Russian Language, Literature and History:

History**4A-4B-4C. History of Western Civilization. (4)**

A minimum of 12 units from the following courses:

102H. Proseminar in Russian History. (4)**137A. Russian History: Kievan and Muscovite Russia. (4)**

* Not to be given, 1971-72.

the achievements selected from the literary renaissance beginning with the Russian Symbolists and continued by such diverse groups as the Acmeists, the Futurists and the Serapion Brotherhood. May be repeated for credit.

Mr. Shane, Mr. Patterson

***224. Soviet Russian Literature. (4) III.**

Seminar—3 hours. Analysis of selected works of Russian prose and poetry with particular emphasis on works of extraordinary literary merit or of unusual importance in the development of genres, schools, styles, techniques, and various formal elements. May be repeated for credit.

Mr. Shane

298. Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

299. Research. (1-9) I, II, III.

The Staff (Chairman in charge)

Professional Course***300 The Teaching of Russian. (3) III.**

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

The Staff

137B. Russian History: The Empire to 1856. (4)**137C. Russian History: The Empire, 1856-1917. (4)****137D. Russian History: Soviet Russia. (4)**

A minimum of 8 units in another field of history (preferably Europe or East Asia).

Russian**1-2-3. Elementary Russian. (6)****4-5-6. Intermediate Russian. (6)****40. Survey of Russian Literature to 1800. (4)****41. Survey of Russian Literature: Nineteenth Century. (4)****42. Survey of Russian Literature: Twentieth Century. (4)**

A minimum of 12 units from the following courses:

101A-101B-101C. Advanced Grammar and Reading. (4)**102. Russian Composition. (4)**

103. Russian Literary Translation. (4)

A minimum of 8 units from the following courses:

121. The Russian Novel: Pushkin to Turgenev. (4)

123. The Russian Novel: Saltykov to Pasternak. (4)

125. Russian Drama to 1917. (4)

127. The Golden Age of Russian Poetry. (4)

128. Modern Russian Poets. (4)

140. Dostoevsky. (4)

141. Tolstoy. (4)

SOCIOLOGY

Leon H. Mayhew, Ph.D., *Chairman of the Department*

Department Office, 308 Voorhies Hall

Professors:

Bennett M. Berger, Ph.D.

Edwin M. Lemert, Ph. D.

Leon H. Mayhew, Ph.D.

'Julius Roth, Ph.D.

Associate Professors:

Bruce Hackett, Ph.D.

John Lofland, Ph.D.

John F. Scott, Ph.D.

Assistant Professors:

Ruth Dixon, Ph.D.

James McEvoy, Ph.D.

Arthur Lipow, Ph.D.

◇ ◇ ◇

Associate Professor:

Carl C. Jorgensen, M.A. (*Acting*)

Lecturer:

Isao Fujimoto, M.A. (*Sociology and Applied Behavioral Sciences*)

Departmental Major Advisers.—(a) Undergraduate: Mrs. Dixon, Mr. Scott, (b) Graduate: The Staff.

The Major Program

Lower Division Courses.—Required: Sociology 1, 2, 46A, 46B or their equivalent; 8 units selected from Anthropology 2, Economics 1A, 1B, and Psychology 1A, 1B and 1C. Recommended: Anthropology 1 and Philosophy 12A, 12B, 20A-20B-20C.

Upper Division Courses.—Required: 36 units of Sociology including 165A and 165B. Recommended: Anthropology 102, 119A, 119B, 124, 128A, 128B; History 101, 102; Philosophy 107C, 151, 156A; Political Science 150, 161; Psychology 145; Mathematics 105A, 105B.

Pre-Social Welfare Students

Lower Division Courses.—Required: Sociology 1, 3, 46A, 46B or their equivalent, and Psychology 1A, 1B and 1C. Recommended:

Anthropology 2, Sociology 2, Economics 1A, 1B, Philosophy 12A-12B, Political Science 1A, 1B.

Upper Division Courses.—Required: Sociology 120, 165A or 165B, 185, and Psychology 112, 147A, 147B, 165, 168; 8 additional units selected from Sociology 130, 131, 140, 150, 152, 170; Psychology 145. Recommended: Anthropology 119A, 119B, 128A, 128B; Economics 116, 130A, 130B, 150, 151, 152; Human Development 136, 140, 141; Political Science 103A, 104, 180.

Graduate Study.—The Department offers a program of study leading to the M.A. and Ph.D. degrees in sociology. Further information regarding graduate study may be obtained at the department office.

Teaching Major.—Requirements for the teaching major are the same as for the departmental degree plus Sociology 122 or 124, 130 and 140.

Teaching Minor.—Thirty units of sociology taken in consultation with the subject representative.

Subject Representative: Mr. J. Roth.

Lower Division Courses

1. Introduction to Sociology. (5) I, II, III.

Lecture—4 hours; discussion—1 hour. Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and personality.

2. Introduction to Sociology: Social Organization. (4) II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to sociological social psychology; the naturalistic study of social situations, meanings, and selves. The Staff

3. Social Problems. (4) I, III.

Lecture—3 hours; discussion—1 hour. A general sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement.

12. Introduction to Sociological Theory. (4) III.

Lecture—4 hours. An introduction to classic texts and problems in the tradition of sociological inquiry. Representative works of important figures, such as Marx, Comte, Weber, and Durkheim; the relevance of these materials for contemporary sociology.

25. Sociology of Popular Culture. (4) II.

Lecture—4 hours. The historical emergence of popular culture. "High" culture, "folk" culture and "mass" culture; the democratization of culture values; the organization of popular tastes; characteristic art forms of popular culture: literature, music, the graphic arts. The social structure of audiences.

30A-30B-30C. The Negro Experience in American Society. (4-4-4) I-II-III.

Lecture—4 hours. A historical consideration of ideological and institutional forces affecting the social status of black people in America. Among the topics considered will be the African backgrounds, slavery, racism, the Civil War, "Jim Crow," black reconstruction, and recent protest movements.

46A. Introduction to Social Research. (4) I.

Lecture—4 hours. Prerequisite: 8 units of Sociology. Examination of the methodological problems of social research. Selection and definition of problems of investigation, data-gathering techniques, and sampling.

46B. Introduction to Social Research. (4) II.

Lecture—4 hours. Prerequisite: course 46A. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association.

98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Mayhew in charge)

99. Special Study for Undergraduates. (1-5)

I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Mayhew in charge)

Upper Division Courses**104. Empirical Social Research and Social Theory. (4) III.**

Lecture—4 hours. Prerequisite: upper division standing and 8 units of sociology, or consent of instructor. An examination of important works in sociology, in the light of the ways in which theory informs and shapes actual research operations, and the ways in which the results of empirical research mold social theory.

105A-105B. Laboratory in Survey Research. (5-5)

I-II.

Lecture—4 hours; laboratory—3 hours. Pre-

requisite: one course in sociological research methods or Mathematics 13 or 15 or 29. Study design, drawing a sample from the city of Sacramento, and analysis of the data collected. Provides an introduction to survey methods, nonexperimental research, and data collection and analysis. (Deferred grading only, pending completion of sequence.) Mr. McEvoy

106. Quantitative Methods of Research. (4) III.

Lecture—4 hours. Prerequisite: course 46B. An intermediate level course in statistical analysis of social data, emphasizing the logic and use of statistical measures, procedures and mathematical models especially relevant to sociological analysis.

107. Modes of Sociological Analysis. (4) I.

Lecture—4 hours. Prerequisite: junior or senior standing and 9 units of sociology. The place of sociology among the sciences and the humanities; generalization and explanation in sociology. Styles of sociological inquiry, functional analysis, historical sociology, social criticism.

Mr. Berger

108. Advanced General Sociology. (4) III.

Lecture—4 hours. Prerequisite: junior or senior standing and 9 units of sociology. Critical analysis of basic concepts in sociology: social organization, culture, socialization, stratification, and their application to specific problems. The bearing of such analysis on problems of social order and social change.

Mr. Berger

118. Political Sociology. (4) II.

Lecture—4 hours. Prerequisite: course 1 or consent of instructor. The 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 movements; analysis of concepts of alienation, revolution, ideology, ruling class, and elite.

119. Sociology of Military Institutions. (4) II.

Lecture—4 hours. Prerequisite: course 1. The relationship of military institutions to the political, economic, and class structure of historic and contemporary societies. The impact of professionalism and bureaucratic organization. The application of social theory to the analysis of such phenomena as militarism, the *coup d'état*, revolutionary war, etc.

120. Deviation and Society. (5) I.

Lecture—4 hours. Prerequisite: course 2. Theory and studies of deviation in relation to societal reaction, group processes and social roles. Stigma and incapacity; cosmetic defect. Deviation theory applied to selected crimes, prostitution, drugs, alcohol use, and mental disorders. Creativity and society.

Mr. Lemert

122. Sociology of Adolescence. (4) III.

Lecture—4 hours. Prerequisite: 8 units of sociology. Chronological age and social status; analysis of social processes bearing upon the socialization of children and adolescents. The emergence of "youth cultures." Generational succession as a cultural problem.

123. American Society. (4) III.

Lecture—4 hours. Prerequisite: 8 units of social science or consent of instructor. The institutional structure and social organization of the United States.

124. Sociology of Education. (5) II.

Lecture—4 hours; term paper. Prerequisite: four units of sociology or consent of instructor. Education and the social structure. Class size, curriculum, and economies of scale. Relations between families and schools in socialization; familial ascription and educational achievement. Education and industrialization. Organizational and occupational structure of schools. Discussion of selected controversies. Mr. Scott

125. Sociology of Intellectual Life. (4) I.

Lecture—4 hours. Prerequisite: upper division standing and consent of instructor. Sociological analysis of the intelligentsia; types of intellectuals, theories concerning their social role; research on the social sources of intellectual work in politics, literature, art, and science; historical considerations of intellectual milieu; international comparisons of intellectuals.

Mr. Berger

126. Social Structure and Personality. (4) I.

Lecture—4 hours. Prerequisite: course 2. Exposition of concepts, theories, and research relating the disciplines of sociology and psychology. Mechanisms of social influence on behavior. Complementarity of personality and learned roles; processes of internalization of roles and norms.

130. Race Relations and Minority Groups. (4) I, III.

Lecture—4 hours. Prerequisite: 8 units of social science or consent of instructor. A study of contacts and interaction between racial and ethnic groups; sources and effects of prejudice and discrimination; programs for reducing intergroup tensions. Mr. Lipow

131. The Family. (5) I.

Lecture—4 hours. Prerequisite: course 2. Social implications of primate reproductive physiology; the nuclear family; major familial roles; normative controls on sex and reproduction; inheritance groups; status ascription; the family and stratification; marital selection; relations between the family and industrial social change. Mr. Scott

140. Social Stratification. (4) III.

Lecture—4 hours. Prerequisite: course 1. Systems of social ranking; theories of stratification; power, prestige, culture, and styles of life of various social classes; social mobility and its consequences for social structure. Mr. Hackett

141. Industrialization and Social Change. (4) II.

Lecture—4 hours. Prerequisite: 4 units of sociology. Selected technological and social factors. Preconditions of economic development and industrialization. Social, political and cultural issues at various levels of economic development. Major historical differences and major current trends. Emphasis either on highly industrialized countries or on less developed countries.

142. Comparative Institutions and Social Structures. (4) I.

Lecture—4 hours. Prerequisite: 8 units of sociology. Selected comparisons of major political and social institutions in complex societies. Patterns of institutional persistence and change in past and present societies. Particular attention will be given to nonquantitative methodological problems of comparative studies.

143. Urban Society. (4) I.

Lecture—4 hours. Prerequisite: 8 units of sociology. Urbanization as a social process; comparison of urban, suburban, metropolitan and rural phenomena; types of cities; the subcultures of cities; the urban future. Mr. Hackett

144. Rural Society. (4) II.

Lecture—4 hours. The characteristics of rural social systems in contrast to urban; the nature of peasant and folk societies; the impact of social change upon rural community life considered from the standpoint of regional differences in the United States and selected world areas. Mr. Fujimoto

145. Social Structure of the U.S.S.R. (4) II.

Lecture—4 hours. A survey of the major institutions of Soviet society, including the family, education, work, health and welfare, the arts, ethnic and national groups.

146. Sociology of Religion. (4) II.

Lecture—4 hours. Prerequisite: 8 units of sociology or consent of instructor. The relationship between social structures and religions. The social setting of the major world religions. Religious innovators and institutionalization (churches, sects, cults). Secularization in the modern world and the rise of secular ideologies.

148. Collective Dynamics and Social Movements. (4) III.

Lecture—4 hours. Prerequisite: course 1 or consent of instructor. Analysis of the characteristics, causes and consequences of noninsti-

tutionalized collective actions; fads, panics, expressive crowds, riots, social and revolutionary movements.

150. Criminology. (4) III.

Lecture—4 hours. Prerequisite: 8 units of social science or consent of instructor. The sociological analysis of criminal behavior in relation to social structure and the criminalization process.

152. Juvenile Delinquency. (4) II.

Lecture—4 hours. Prerequisite: 8 units of sociology or psychology. Study of juvenile delinquency in relation to the family, peer groups, community, and institutional structures. Consideration of processing of the delinquent by formal agencies of control, with special attention given to the juvenile court. Mr. Lemert

154. Sociology of Medicine. (4) I.

Lecture—4 hours. Prerequisite: 4 units of sociology. An overview of sociological research in medicine and health care, with emphasis on the organizational and institutional aspects.

The Staff

155. Sociology of Law. (4) III.

Lecture—4 hours. Prerequisite: 8 units of social science. Law considered as social control; relation of legal institutions to society as affecting judicial decision-making and administration of justice. Lawyers as an occupational group. Legal reform.

Mr. Lemert

159. Sociology of Occupations. (4) II.

Lecture—4 hours. Prerequisite: 8 units of sociology or consent of instructor. The natural history of occupations; the institutional matrix of occupations; colleague and client relationships; occupational social controls; career lines, and occupational-related self-definitions; occupational politics.

The Staff

160. Work and Leisure. (4) II.

Lecture—4 hours. Prerequisite: course 1. Historical and comparative analysis of problems associated with quality of work and quantity of leisure; impact of cultural and social change on occupational pattern and leisure activity.

Mr. Berger

165A. Sociological Theory. (4) I.

Lecture—4 hours. Prerequisite: 8 units of sociology. A historical introduction to sociological theory with special reference to its European origins. The development of modern sociological theory in Europe by Durkheim, Weber, Simmel, Pareto, Mosca and others. Mr. Mayhew

165B. Sociological Theory. (4) II.

Lecture—4 hours. Prerequisite: 8 units of sociology. Contemporary sociological theory with special reference to the history of American sociology and the emergence of contemporary

schools of thought in the United States. Schools discussed will include functionalism, symbolic interactionism, exchange theory, and ecology.

170. Population. (4) I.

Lecture—4 hours. Prerequisite: 8 units of social science or consent of instructor. Introduction to the study of human population, including theories and statistical measures; social causes and consequences of population trends; changes in population structure; geographical distribution; migration; socio-psychological factors affecting fertility.

Mr. Scott

172. Art and the Egalitarian Society. (4) III.

Lecture—4 hours. Art as a product of aristocratic societies. Democratization of aristocratic traditions in contemporary society. Museums and collectors: the preservation of aristocratic art in capitalist and socialist societies. Industrial money and preindustrial tastes. Can there be a democratic art?

173. Sociology through Literature. (4) II.

Lecture—4 hours. Prerequisite: 4 units of sociology. Introduction to analysis of literature as sociological data. Reading of numerous works on American and other societies by authors such as Steinbeck, Lewis, Dreiser, Schulberg, Orwell, etc.

Mr. McEvoy

174. Sociology of Language. (4) III.

Lecture—4 hours. Prerequisite: 6 units of sociology. The relation of language patterns to social patterns; "talk" as a multi-level social phenomenon; relationship of dialects to social groups; sociological analyses of stability and change in language; problems of learning and unlearning languages.

175. Sociology of Communication. (4) II.

Lecture—4 hours. Prerequisite: course 46A-46B. Studies of mass communications, media, and public opinion; theories of information flow, ideology, group and personal influence on opinion formation.

The Staff

176. Sociology of Knowledge. (4) III.

Lecture—4 hours. A critical analysis of the social foundations of knowledge in society. The history, problems, and dilemmas in classical sociology of knowledge. Contemporary applications. Natural and social sciences as social systems. The sociology of personal knowledge in everyday life.

180. Complex Social Organization. (4) II.

Lecture—4 hours. Prerequisite: course 1 or consent of instructor. Institutional analysis of administrative structures and voluntary associations; consideration of informal organization, ideologies, bureaucracy, decision-making, and morale in selected areas of government, industry, religion, and education.

Mr. Hackett

185. Sociology of Social Welfare. (4) I.

Lecture—4 hours. Prerequisite: course 3 and upper division standing. A sociological analysis of the evolution and current organization of welfare functions in modern societies.

Comparison of educational institutions among societies. Industrialization and secularization. Political control, education and occupational placement, professionalization of educators. Current trends and recent research. Mr. Scott

197T. Tutoring in Sociology. (1-4) I, II, III.

Prerequisite: upper division standing in sociology and consent of Department Chairman. The Staff (Mr. Mayhew in charge)

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Mayhew in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: open to seniors only.

The Staff (Mr. Mayhew in charge)

Graduate Courses**205. Methodological Critique of Research. (4) III.**

Lecture and discussion—3 hours. Prerequisite: course 46C or consent of instructor. Methodological analysis and criticism of empirical research exemplifying different types of research design. Examination of surveys, experiments, historical and comparative studies, and studies using biographical and demographic data.

226. Sociological Social Psychology. (4) II.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 126 or consent of instructor. Advanced study of approaches to sociological social psychology with particular attention to symbolic interactionism and ethnomethodology.

The Staff

207. Methods of Survey Analysis. (4) I.

Lecture—3 hours. Principles and procedures in the analysis of survey data. Forms of multivariate relations; typologies; scaling; panel analysis; contextual analysis.

242. Comparative Method in Historical Sociology.

(4) III.

Lecture and discussion—3 hours. Prerequisite: course 142 or consent of instructor. Comparative approaches to major historical phenomena such as nationalism, bureaucratization, feudalism, and capitalism; the relevance of psychological and sociological theories to historical interpretation; the verifiability of historically grounded hypotheses; the meaning of analogy, correspondence, and causality.

219A-219B. Behavioral Political Sociology.

(4-4) I-II.

Seminar—4 hours. Prerequisite: graduate status in sociology, political science or psychology. The development of behavioral and empirical political sociology; study of conflict, discontent, community politics, the international system, game theory and coalition formation. Empirically grounded theories. Mr. McEvoy

248. Social Movements. (4) II.

Lecture-discussion—4 hours. Prerequisite: graduate standing, undergraduates with consent of instructor. Advanced study of selected aspects of social and revolutionary movements. Particular focus upon the relations between internal organization of movements; kinds and amounts of change sought; strategies and tactics adopted; and the structure of and impact on the larger society.

Mr. Lofland

252. Sociology of Art. (4) III.

Lecture and discussion—3 hours. Prerequisite: courses 25 and 125, or consent of instructor. The relationship of social class, institutions, and value system to art. The art of primitive, aristocratic, and democratic societies. Art and political ideology. The question of art as "representative" of social values. Artists as a social type.

220. Deviance, Law, and Social Control. (4) I.

Seminar—3 hours. Prerequisite: course 120 or consent of instructor. Report and discussions of literature on selected forms of deviance in relation to law and formal social control. Agency contacts and exploratory research projects.

Mr. Lemert

222. Sociology of Youth. (4) I.

Seminar—3 hours. Adolescence as a social category which "juvenilizes" the young; its prolongation in industrial societies; adolescence and "identity"; age-graded subcultures and their relation to other minority subcultures; youth and popular culture.

Mr. Berger

224. Sociology of Education. (4) II.

Seminar—3 hours. Structural differentiation of and relationship among socializing agencies.

265. Sociological Theory. (4) II.

Lecture and discussion—3 hours. Prerequisite: courses 165A, 165B, and 165C; or consent of instructor. The emergence of sociological thinking as part of the history of ideas; the application of sociological analysis to sociological ideas. The French sociological tradition from Saint-Simon to Durkheim; the influence of Marxist thinking on subsequent sociological ideas.

274. Sociolinguistics: Contemporary Research.

(4) I.

Seminar—3 hours. Prerequisite: course 174 or consent of instructor. Evaluation of recent investigations and research in progress: position papers, variables in speech communities (eth-

nography of communication), development of communicative competence(s), role repertoires and the management of consciousness in interaction, language and stratification, stylistics in social control, multilingualism, language planning and nationhood.

Mr. Kjolseth

280. Organizations and Institutions. (4) II.

Seminar—3 hours. Prerequisite: course 180 or consent of instructor. Theory of formal organizations and bureaucracy. Methods of research in organizational and institutional studies. Historical and comparative analysis of political, religious, educational, military and economic structure.

Mr. Hackett

288. Research Preceptorship. (1-9) I, II, III.

Prerequisite: consent of instructor.

The Staff

SOIL SCIENCE

Major Advisers.—See *Schedule and Directory* listing.

Major Program and Graduate Study.—See pages 62, 67, and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Course

88. Land and Life. (2) I.

Lecture—2 hours. Earth as a life support system. Relationships between land and life crucial to man's increasing demands on land resources.

Mr. Munns

Upper Division Courses

105. Field Studies of Soil Resources. (8) (Extra Session)

On campus—1 week daily; study tour—daily 5 weeks. Recommended—course 88 or Soil and Water Science 2. *In situ* soil studies with emphasis on the interactions between soil characteristics and kinds of land use. Field identification and evaluation of soils for agricultural, range, forest, urban, and other uses.

Mr. Begg, Mr. Huntington

109. Soil Fertility and Fertilizers. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Soil and Water Science 2 or consent of instructor. The forms and availability of plant nutrient elements in soils; effects of fertilizers and soil amendments on crop and soil characteristics; soil and plant tissue analyses as diagnostic aids.

Mr. Reisenauer

120A. Soil Genesis and Morphology. (2) II.

Lecture—2 hours. Prerequisite: Soil and Water Science 2; Geology 1 or 2. Basic princi-

290. Seminar. (4) I, II, III.

Seminar—3 hours. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

292A-292B-292C. Research as a Social Process.

(4-4-4) I-II-III.

Seminar—3 hours. Prerequisite: consent of instructor. Through reading, research exercises, discussion, and field work projects developed and conducted by each student, the student will examine the work of social scientists as a process of sociological and psychological contingencies. (Satisfactory/Unsatisfactory grading only.)

Mr. J. Roth

298. Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

299. Individual Study. (1-9) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

ples of geomorphology; soil forming factors and processes as they influence the genesis and characteristics of soil properties.

Mr. Begg

120B. Soil Classification, Mapping, and Evaluation. (3) III.

Lecture—2 hours; laboratory or field—3 hours. Prerequisite: course 120A. Basic principles underlying various systems of soil classification and mapping; methods of evaluating and rating soils for land use.

Mr. Huntington

122. Salt-Affected Soils. (3) II.

Lecture—3 hours. Prerequisite: consent of instructor; a course in soil chemistry and either plant physiology or plant nutrition recommended. Soil problems in salt-prone arid zone climates; origin and encroachment of salts; chemical interactions with soil minerals under alkaline situations; salinity control in relation to environmental quality; physiological characteristics of native and crop plant species governing salt tolerance and sensitivity. Offered in even-numbered years.

Mr. Whittig, Mr. Rains

***123. Chemistry of Arid Soils. (4) II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Chemistry 5; Soil and Water Science 102. Diagnostic procedures for assessing features of soil chemistry related to plant growth, with emphasis on soils of arid regions and problems of salinity. Theoretical basis of the procedures and its bearing on the interpretation of results.

Mr. Brown

144. Advanced Instrumentation in Biology. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. The application of electronic and mechanical devices to solution of problems of measurement and control

* Not to be given, 1971-72.

in biological research; emphasis given to the synthesis and application of low current or low potential measurement equipment, vacuum techniques, optical processes, and electromagnetic transduction.

Mr. Delwiche

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Rendig in charge)

198. Directed Group Study. (1-5) I, II, III.

Directed group study in soil science for advanced undergraduates.

The Staff (Mr. Rendig in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Rendig in charge)

Graduate Courses

207. Soil Physics. (3) I.

Lecture—3 hours. Prerequisite: Mathematics 22C or consent of instructor; Soil and Water Science 101 recommended. Physical processes occurring in soils with emphasis on heat flow, diffusion of gases and solutes, the movement of soluble materials during leaching and irrigation, mechanics, and applications of physics and mathematics to soil systems. Offered in even-numbered years.

Mr. Rolston

208. Soil-Plant Interrelationships. (3) III.

Lecture—3 hours. Prerequisite: Botany 111; Soil and Water Science 104; or consent of instructor. An advanced course on the effects of soil factors on plant development; the influence of soil conditions, processes, and reactions on

SOIL AND WATER SCIENCE—See also Soil Science, Water Science

SOIL AND WATER SCIENCE

Major Advisers.—See *Schedule and Directory listing*.

Major Program and Graduate Study.—See pages 62, 91, and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses

1. Soil, Water, and Air Resources. (3) I.

Lecture—3 hours. Prerequisite: Biology 1 or consent of instructor. Interrelationships of man

metabolic reactions in plants; effects of plant root activity on the nature of the rhizosphere.

Mr. Rendig

211. Soil Microbiology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B; Soil and Water Science 102. Soil microorganism and their biochemical activities; plant residue decomposition; soil organic matter and its properties. Mr. Broadbent

***214. Soil Mineralogy. (5) I.**

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: a course in soil chemistry or consent of instructor. Nature, properties, and occurrence of the more common minerals in soils and rocks. Application of mineral analysis methods, including X-ray, thermal and chemical for characterization of mineral systems, and in the study of properties of soils and weathering of minerals. Offered in even-numbered years.

Mr. Whittig

215. Physical Chemistry of Soils. (3) I.

Lecture—3 hours. Prerequisite: Chemistry 109B or 110B, or consent of instructor. Physicochemical, colloidal, and surface aspects of the soil system. Offered in even-numbered years.

Mr. Bureau

290. Seminar. (1) I, II, III.

Seminar—1 hour. Prerequisite: graduate standing in soil science, plant physiology, or related subjects. Topics of current interest in soil science, including research recently carried out by students, will be discussed. Each student will prepare and present reports to the seminar. (Satisfactory/Unsatisfactory grading only.)

Mr. Delwiche

298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Rendig in charge)

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Rendig in charge)

and environmental factors; utilization and development of renewable natural resources; characteristics of soil, water, and air and their relation to management and planning concepts. Open to non-majors.

Mr. D. Henderson

2. Soil, Water and Air Resources. (3) II.

Lecture—3 hours. Prerequisite: course 1 or consent of instructor. Physics 2A recommended. Development and properties of soils; sources and properties of water; properties of the atmosphere; technical aspects of management,

* Not to be given, 1971-72.

development, and conservation of soil and water.
Mr. Munns

Upper Division Courses

101. Physics of Soil and Water Systems. (5) II.

Lecture—3 hours; discussion-laboratory—4 hours. Prerequisite: course 2; Physics 2B; Mathematics 16B; or consent of instructor. Factors affecting soil physical condition and irrigation; soil texture, structure, aeration, and strength. Principles of soil management; basic concepts of hydraulics, soil water storage and movement, infiltration, water potential, irrigation and drainage. Principles of irrigation practices.
Mr. Stout

102. Soil and Water Chemistry. (5) II.

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2 or consent of instructor. Chemical nature of the mineral and organic constituents of soil and of the soil solution; ion exchange and other colloidal phenomena including the effect of soil amendments and fertilizers; microbiological processes in soils.
Mr. Bureau

103. Water Quality, Salt Control, and Reclamation. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 102 or consent of instructor. Water quality, water analysis, salinity, salt and plant relations, reclamation of water and soil, infiltration problems, and soil amendments.
Mr. Biggar

104. Soil-Water-Plant Relationships. (4) III.

Lecture—4 hours. Prerequisite: courses 101,

102; Botany 2. Influence of soil properties—physical, chemical, and biological—and of soil water supply on plant growth; availability, uptake, and use of nutrients and water by plants; principles of soil structure, irrigation, and fertilizer management for crop production. Mr. Hall

130. The Soil System. (4) III.

Lecture—3 hours; laboratory or field—3 hours. Prerequisite: course 2 or equivalent, Botany 2, Physics 2B, Chemistry 1B; or consent of instructor. Properties of the solid, aqueous, gaseous, and biotic soil components. Processes involving the soil as a medium for plant growth and as a part of the environment. The soil profile in relation to the terrain.

The Staff (Mr. Reisenauer and Mr. Brown)

140. Principles of Water Science. (4) III.

Lecture—3 hours; laboratory or field—3 hours. Prerequisite: course 2 or equivalent, Botany 2, Physics 2B, Chemistry 1B; or consent of instructor. Sources, distribution, and properties of water; water in the soil-plant-atmosphere system; reclamation of soil and water; the interrelationships between water quality, use, and management, including social, political, and economic considerations.

The Staff (Mr. Scott in charge)

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Rendig in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

The Staff (Mr. Rendig in charge)

SPANISH

Homero Castillo, Ph.D., *Chairman of the Department*
Department Office, 622 Sproul Hall

Professors:

Donald G. Castanien, Ph.D.
Homero Castillo, Ph.D.
Antonio Sánchez-Romeralo, Ph.D.

Associate Professors:

Didier T. Jaén, Ph.D.
Daniel S. Keller, Ph.D.

Assistant Professors:

Reed Anderson, Ph.D.
M. Roberto Assardo, Ph.D.
Guillermo Rojas, Ph.D.
Robert M. Scari, Ph.D.

◇ ◇ ◇

Assistant Professor:

Glenn E. Lipskey, M.A. (*Acting*)

Lecturers:

Catherine G. Bellver, M.A.

Mariano Gonzalez, M.A.
Fabian A. Samaniego, M.A.

Associates:

Mary Bowen, M.A.
Santiago Rojas, M.A.

The Major Program

Lower Division Courses.—Required: Spanish 1, 2, 3, and 6 or 11 and 12 or their equivalents; 27A–27B–27C. Recommended: one year of college Latin or the equivalent.

Upper Division Courses.—Required: 36 units of upper division courses including 101A–101B–101C or 102A–102B, 180 or 181, one course in each of the following areas: literature of the Golden Age, nineteenth or twentieth-century Spanish literature, twentieth-century Spanish American literature.

Students are urged to consult with a depart-

mental adviser, especially in regard to work done or work to be done at other institutions.

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 its equivalent. Candidates will be recommended for admission to graduate studies in Spanish provided they meet the requirements of the Graduate Division and the Department of Spanish. Detailed information may be obtained by writing to the Graduate Adviser, Department of Spanish.

The Degree of Doctor of Philosophy

The Department offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Graduate Adviser.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Spanish 1, 2, 3 and 6 or 11 and 12; 27A–27B–27C, or their equivalents. At least 16 units of upper division work, including Spanish 101A–101B–101C, or 102A–102B, 134 or 135 and one of the following courses: Spanish 131A, 120A, 108A, or 108B.

Subject Representative: Mr. Keller.

Portuguese

Lower Division Courses

1. Elementary Portuguese. (4) I.

Laboratory—2 hours; recitation—3 hours. Portuguese grammar, conversation, and reading.

Mr. Assardo

2. Elementary Portuguese. (4) II.

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 1. A continuation of course 1.

Mr. Assardo

3. Elementary Portuguese. (4) III.

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 2. A continuation of course 2.

Mr. Assardo

Upper Division Courses

104. Survey of Brazilian Literature: Prose Fiction. (4) I.

Lecture—3 hours; individual and group conferences. Prerequisite: course 3. Mr. Assardo

105. Survey of Brazilian Literature: Poetry. (4) II.

Lecture—3 hours; individual and group conferences. Prerequisite: course 3. Mr. Assardo

106. Survey of Brazilian Literature: Drama and Essay. (4) III.

Lecture—3 hours; individual and group conferences. Prerequisite: course 3. Mr. Assardo

* Not to be given, 1971–72.

Spanish

Departmental Major Advisers.—Mr. Anderson, Mr. Assardo, Mr. Jaén, Mr. Keller, Mr. G. Rojas, Mr. Scari.

Graduate Adviser.—Mr. Castanien.

Lower Division Courses

1. Elementary Spanish. (6) I, II, III.

Laboratory—two $\frac{1}{2}$ -hour sessions; recitation—5 hours. The Staff

2. Elementary Spanish. (6) I, II, III.

Laboratory—two $\frac{1}{2}$ -hour sessions; recitation—5 hours. Prerequisite: course 1. A continuation of course 1. The Staff

3. Intermediate Spanish. (6) I, II, III.

Laboratory—two $\frac{1}{2}$ -hour sessions; recitation—5 hours. Prerequisite: course 2. A continuation of course 2. The Staff

***3X. Elementary Spanish. (6) II, III.**

Recitation—5 hours; two $\frac{1}{2}$ hour laboratory sessions per week. Prerequisite: course 3. The equivalent of courses 4 and 5. The Staff

6. Intermediate Spanish: Conversation and Reading. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 3. Spoken Spanish stressed through class discussion of a variety of selected readings. The Staff

11. Spanish for Native Speakers. (3) I.

Recitation—3 hours. Prerequisite: course 1 or equivalent with consent of instructor. Open for credit only to bilingual students who have completed a major part of their secondary education in an English-speaking high school. Mr. G. Rojas

12. Spanish for Native Speakers. (3) II.

Recitation—3 hours. Prerequisite: course 11; consent of instructor. Continuation of course 11. Open for credit only to bilingual students who have completed a major part of their secondary education in an English-speaking high school. (Completion of course 12 satisfies the language requirement.) Mr. G. Rojas

27A–27B–27C. Introduction to the Forms of Hispanic Literature. (3–3–3) I-II-III; II-III-I; III-I-II.

Lecture—3 hours. Prerequisite: course 6 or 12. Introductory study of the forms of Spanish and Spanish-American prose and poetry; analysis of particular works. The Staff

Upper Division Courses

101A–101B–101C. Grammar and Composition. (4–4–4) I-II; II-III; I-III.

Lecture—3 hours; instructor student conferences. Prerequisite: course 6. The Staff

102A-102B. Grammar and Composition for Native Speakers. (4-4) I-II.

Lecture—3 hours; conferences and reports. Prerequisite: open to students whose native language is Spanish or to those who are bilingual; consent of instructor. Mr. G. Rojas

106. Literature of Colonial Spanish America. (4) I.

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. A study of the most important authors and movements in the various regions of Spanish America to 1810. Mr. Castanien

107. Spanish-American Literature of the Nineteenth Century. (4) II.

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. The literary development of Spanish America between Independence and *Modernismo*. Mr. Jaén

108A. Spanish-American Prose of the Twentieth Century. (4) III.

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. Emphasis on the development of the novel. Offered in odd-numbered years. Mr. Jaén

108B. Spanish-American Prose of the Twentieth Century. (4) III.

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. Emphasis on the essay. Offered in even-numbered years. Mr. Assardo

109. Spanish Drama of the Golden Age. (4) III.

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. Offered in even-numbered years.

111. Don Quijote. (4) II.

Lecture—3 hours. Prerequisite: course 27C. Mr. Castanien

114. Spanish Romantic Literature. (4) I.

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. Readings and lectures on romantic writers of the first half of the nineteenth century with emphasis on drama and poetry. Offered in even-numbered years. Mr. Scari

115. Lyric Poetry of the Golden Age. (4) III.

Lecture—3 hours. Prerequisite: course 27C. Offered in odd-numbered years.

119. Spanish Novel of the Nineteenth Century. (4) III.

Lecture—3 hours. Prerequisite: course 27C. Offered in odd-numbered years. Mr. Scari

120A. Twentieth-Century Spanish Prose. (4) I.

Lecture—3 hours. Prerequisite: course 27C. Mr. Anderson

120B. Twentieth-Century Spanish Drama. (4) III.

Lecture—3 hours. Prerequisite: course 27C. Offered in odd-numbered years. Mr. Anderson

120C. Twentieth-Century Spanish Poetry. (4) III.

Lecture—3 hours. Prerequisite: course 27C. Offered in even-numbered years.

125A. Modernism: The Precursors. (4) I.

Lecture—3 hours. Prerequisite: course 27C. Offered in even-numbered years. Mr. Castillo

125B. Modernism: The Major Poets. (4) II.

Lecture—3 hours. Prerequisite: course 27C. Offered in even-numbered years. Mr. Castillo

127. Poetry of Post-Modernism and Vanguardism.

(4) III.

Lecture—3 hours; conferences. Prerequisite: course 27C. Offered in even-numbered years. Mr. Castillo

128. Contemporary Spanish-American Short Story Writers. (4) II.

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. Literary trends in the development of the short story in Spanish America as seen in the representative works of major contemporary authors. Offered in even-numbered years. Mr. Castillo

129. The Mexican Novel. (4) III.

Lecture—3 hours; conferences and reports. Prerequisite: course 27C; consent of instructor. Major figures in the development of the Mexican novel. Offered in odd-numbered years.

Mr. G. Rojas

131A. Modern Spanish Syntax. (4) I.

Lecture—3 hours. Prerequisite: course 101C. Mr. Keller

131B. Modern Spanish Syntax. (4) II.

Lecture—3 hours. Prerequisite: course 101C. Mr. Keller

132. Introduction to Spanish Linguistics. (3) III.

Lecture—3 hours. Prerequisite: course 101C. Principles of classical phonemics and morphemics together with more recent developments; descriptive analysis of modern Spanish sounds and forms. Theoretical and practical comparison with English and other Romance Languages. Mr. Lipskey

134. Survey of Spanish Culture. (4) I.

Lecture—3 hours. Prerequisite: course 27C. Mr. Gonzalez

135. Survey of Mexican Culture. (4) III.

Lecture—3 hours; conferences and reports. Prerequisite: course 27C; consent of instructor. Offered in even-numbered years. Mr. G. Rojas

150. Masterpieces of Spanish Literature. (4) I.

Lecture—3 hours. Reading, lectures, and discussion in English. May not be counted as part of the major in Spanish. Mr. Scari

151. Study of a Major Writer. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 27C. May be repeated for credit with consent of instructor. The Staff

175. Introduction to Literary Theory and Criticism. (4) II.

Lecture—3 hours; conferences. Prerequisite: course 27C. Basic concepts for the analysis of literature with emphasis on Spanish literary and critical theory applied to Spanish literature. Mr. Jaén

180. History of Spanish Literature. (4) III.

Lecture—3 hours. Prerequisite: open only to majors in their senior year; consent of instructor. Mr. Scari

181. History of Spanish-American Literature. (4) II.

Lecture—3 hours; conferences and reports. Prerequisite: open only to majors with senior standing; consent of instructor. Mr. Keller

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

The Staff (Mr. Castanien in charge)

Graduate Courses**200. Techniques of Literary Scholarship. (4) III.**

Lecture—3 hours. The elements of bibliography and fundamental methods of literary research. Mr. Castanien

210. Literary Criticism: Poetry. (4) I.

Seminar—3 hours. Offered in odd-numbered years. Mr. Castillo

230A. History of the Spanish Language. (4) I.

Seminar—3 hours. Prerequisite: Latin 1. Mr. Lipskey

230B. History of the Spanish Language. (4) II.

Seminar—3 hours. Prerequisite: Latin 1. Mr. Lipskey

231A. Spanish Literature of the Golden Age: Lyric Poetry. (4) I.

Seminar—3 hours. Offered in even-numbered years. —

231B. Spanish Literature of the Golden Age: The Drama. (4) II.

Seminar—3 hours. Offered in odd-numbered years. —

231C. Spanish Literature of the Golden Age: Prose. (4) III.

Seminar—3 hours. Offered in odd-numbered years. —

232. Cervantes. (4) III.

Seminar—3 hours. The major works of Cervantes and of the principal Cervantine critics. Offered in odd-numbered years. Mr. Castanien

234. Twentieth-Century Spanish Poetry. (4) I.

Seminar—3 hours. Offered in even-numbered years. —

235A. Twentieth-Century Spanish Prose. (4) I.

Seminar—3 hours. Offered in odd-numbered years. Mr. Anderson

235B. Twentieth-Century Spanish Prose. (4) II.

Seminar—3 hours. Offered in even-numbered years. Mr. Anderson

237. Spanish Romanticism. (4) I.

Seminar—3 hours. Sources and development of Romanticism in Spain, particularly in poetry and drama. Offered in odd-numbered years. Mr. Scari

238A. Spanish-American Drama: 1880–1930. (4) III.

Seminar—3 hours. Offered in odd-numbered years. Mr. Keller

238B. Spanish-American Drama: 1930 to Present. (4) III.

Seminar—3 hours. Offered in even-numbered years. Mr. Keller

239. Post-Romantic Spanish Literature of the Nineteenth Century. (4) II.

Seminar—3 hours. Offered in even-numbered years. Mr. Scari

241A. Spanish-American Novel, 1900–1920. (4) I.

Seminar—3 hours. Offered in even-numbered years. Mr. Castillo

241B. Spanish-American Novel, 1920–1940. (4) II.

Seminar—3 hours. Offered in odd-numbered years. Mr. Castillo

242. New Trends in Spanish-American Fiction from 1940 to the Present. (4) III.

Seminar—3 hours. Offered in odd-numbered years. Mr. Castillo

245. Darío and His Contemporaries. (4) II.

Seminar—3 hours. Offered in even-numbered years. Mr. Castillo

247. New Directions in Spanish-American Poetry. (4) III.

Seminar—3 hours. Offered in even-numbered years. Mr. Castillo

248. The Spanish-American Essay. (4) II.

Seminar—3 hours. Major Spanish-American essayists from Sarmiento to Octavio Paz. Offered in odd-numbered years. Mr. Jaén

251. Study of A Major Writer. (4) I, II, III.

Seminar—3 hours. The development of one major writer and his intellectual and literary milieu. May be repeated for credit with consent of instructor.

The Staff

299. Research. (2-5) I, II, III.

The Staff (Chairman in charge)

Professional Course**300. The Teaching of Spanish. (3) III.**

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in Spanish.

Mr. Samaniego

SUBJECT A

Department Office, TB-123, Room 105-106

Instruction Supervisor:

Leonard G. Homann, B.A.

TEXTILES AND CLOTHING

Major Advisers.—See *Schedule and Directory* listing.

Major Program.—See pages 62 and 67.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

6. Introduction to Textiles. (3) III.

Lecture—2 hours; laboratory—3 hours. Introduction to the structure and properties of textiles. Consumer use and fabric characteristics are emphasized.

Miss Morris

7. Clothing and the Individual. (2) I, III.

Lecture—2 hours. Prerequisite: Psychology 1A or 10. The relation of the self-concept and of the human form to elements of design as expressed through clothing.

Miss Engel

17A. Clothing Structure. (3) I, II, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 6, 7 (may be taken concurrently). The principles of clothing design through the medium of drafting and flat pattern. Construction principles are applied.

Mrs. Haines

17B. Clothing Structure. (3) I, II, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 17A. The principles of clothing design through the medium of draping in various textile fabrics.

Mrs. Haines

47. Field Study. (1) III.

Seminar—three 2-hour sessions; field trip—2 days. (Given between quarters.) To observe commercial aspects of the design, production, development, distribution and maintenance of textiles and clothing. (Advance registration required.)

Miss Engel

98. Directed Group Study for Lower Division**Students. (1-5) I, II, III.**

The Staff (Mr. Zeronian in charge)

Subject A. English Composition (no credit). I, II, III.

Lecture—2 hours; discussion—2 hours. Principles of composition, with special emphasis on precision and exactness of sentences. The Staff

99. Special Study for Lower Division Students.**(1-5) I, II, III.**

The Staff (Mr. Zeronian in charge)

Upper Division Courses**160. Textile Fibers and Finishes. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 6 and Chemistry 8B. Properties of textile fibers in relation to performance and end-use; dyeing and finishing of fabrics; textile maintenance.

Mr. Needles

161. Textile Chemistry. (3) III.

Lecture—3 hours. Prerequisite: course 160. The theory of fiber structure; the relation between chemical structure and physical properties of fibers. The principles of the application of dyes and finishes to textiles.

Mr. Zeronian

161L. Textile Chemistry Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 161 (may be taken concurrently). Laboratory methods and procedures employed in studying chemical and physical properties of textile fibers.

Mr. Zeronian

162. Textile Fabrics. (3) II.

Lecture—3 hours. Prerequisite: course 6. The properties of fabrics as related to serviceability, comfort, and appearance.

Miss Morris

162L. Textile Fabrics Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 162 (may be taken concurrently). Laboratory methods and procedures employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance.

Miss Morris

170. Experimental Problems in Clothing Structure.**(4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 6 and 17B; Design 170B. Design and construction of body coverings utilizing

technological innovations in fabrics and new techniques such as fusing and molding.

The Staff (Mrs. Haines in charge)

172. Clothing and Society. (3) II.

Lecture—3 hours. Prerequisite: Economics 1A; Psychology 1A or 10; and a course in sociology or cultural anthropology. The relation of clothing and textiles to social, psychological and economic patterns of families and cultures.

Miss Engel

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to honors students of senior standing. Independent study of selected topics under the direction of a member, or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Miss Morris in charge)

197. Introduction to Research in Textiles and Clothing. (4) III.

Lecture—1 hour; laboratory—9 hours. Pre-

VEGETABLE CROPS

Related Undergraduate Majors and Graduate Study.—See pages 67 and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Upper Division Courses

100. Principles of Vegetable Crops. (3) I.

Lecture—3 hours. Prerequisite: Plant Science 1 and 2 or consent of instructor. The vegetable industry. Fundamentals of vegetable crop production, handling, processing and utilization. Demonstrations will supplement the lecture.

Mr. Lorenz

101. Major Vegetable Crops. (4) II.

Lecture—4 hours. Prerequisite: Plant Science 1 and 2 or consent of instructor. Adaptation, growth habits and methods of culture and handling of the principal vegetable crops. The application of experimental evidence to production problems is stressed.

Mr. Smith

105. Systematic Olericulture. (2) I.

Laboratory—6 hours. Prerequisite: Botany 2. Origin, history, types, classification, nomenclature, and adaptation of the more important American vegetable varieties; minor vegetable crops; trends in development of new varieties.

Mr. Smith

118. Seed Physiology and Production. (3) II.

Lecture—3 hours. Prerequisite: Botany 111. Physiological factors affecting induction of seedling, seed development, viability and longevity of seed. Principles of seed production. One or more field trips.

Mr. Harrington

requisite: Textile Science major of senior standing. Senior thesis on independent problems.

The Staff (Mr. Needles in charge)

198. Directed Group Study. (1-5) I, II, III.

The Staff (Miss Morris in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Miss Morris in charge)

Graduate Courses

292. Seminar in Textiles. (2) I, II, III.

Seminar—2 hours. Selected topics related to the chemical and physical properties of fibers and fabrics. The Staff (Miss Morris in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Miss Morris in charge)

299. Research. (1-12) I, II, III.

The Staff (Miss Morris in charge)

150. Vegetables as World Food Crops. (3) II.

Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. A technical course concerned with historical and current aspects of production and use of vegetables as human food; ecology, economics, geography, human cultural patterns, dietary preferences, nutritional values, and use of microclimates related to commercial and subsistence production.

Mr. Yamaguchi

197. Field Study of Vegetable Industry. (1) III.

Lecture—1 hour; field study—56 hours (given between winter and spring quarters). Prerequisite: consent of instructor. A field study illustrating different aspects of California agriculture, including research institutions, farm operations, field stations, extension service, marketing, processors, equipment, etc. (Passed/Not Passed grading only.)

Mr. Flocker

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Lyons in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Lyons in charge)

Graduate Courses

212. Postharvest Physiology of Vegetables. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: consent of instructor. Comparative physiology of harvested vegetables representing diverse plant structures; emphasis on experimental studies of maturation, compositional and morphological changes, senescence, and physiological disorders; lecture stresses species re-

sponses and requirements; laboratory stresses concepts and research procedures. Offered in even-numbered years. Mr. Morris, Mr. Pratt

220. Vegetable Genetics and Improvement. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 100B; course 105 and Plant Science 113 recommended. Breeding systems of vegetable species as affected by self-incompatibility, flower structure, pollen vectors, and other reproductive factors. Problems of chromosome number and structure, heterosis, pest resistance, and species hybrids peculiar to vegetable improvement.

Mr. Rick

221. Vegetable Physiology. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 111 and consent of instructor. Physiological principles involved in the production of vegetable crop species.

Mr. Pratt, Mr. Rappaport

VETERINARY MEDICINE, School of—See page 179 for course listings

VETERINARY MICROBIOLOGY

Ernst L. Biberstein, D.V.M., Ph.D., *Chairman of the Department*

Department Office, 2004 Haring Hall

Professors:

Norman F. Baker, D.V.M., Ph.D.
Ernst L. Biberstein, D.V.M., Ph.D.
Hugh S. Cameron, D.V.M., Ph.D., LL.D.
(Emeritus)

James R. Douglas, Ph.D.
Michel M. J. Lavoipierre, M.B., Ch.B.
Delbert G. McKercher, D.V.M., Ph.D.
John W. Osebold, D.V.M., Ph.D.
Clyde Stormont, Jr., Ph.D.

Associate Professor:

Yuan C. Zee, D.V.M., Ph.D.

Assistant Professors:

Audria Matheson, Ph.D.
JaRue S. Manning, Ph.D.



Adjunct Professor:

Moshe Shifrine, Ph.D.

Assistant Adjunct Professor:

Leonard D. Pearson, D.V.M., Ph.D.

Lecturers:

Margaret E. Meyer, Ph.D.
Jerold H. Theis, D.V.M., Ph.D.

Upper Division Courses

111. Immunogenetic and Electrophoretic Techniques. (2) I.

Lecture—1 hour; laboratory—3 hours. Pre-

290. Seminar. (1) I, II, III.

Discussion—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Spurr in charge)

291. Seminar in Postharvest Physiology. (1) I, II, III.

Discussion—1 hour. Prerequisite: consent of instructor. An intensive study of selected topics in the field of postharvest physiology of fruits and vegetables. This seminar will be conducted jointly with Pomology 291. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Pratt in charge)

298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Current concepts, techniques, and procedures applicable to research and to the production of vegetables.

The Staff (Mr. Yamaguchi in charge)

299. Research. (1-9) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Lorenz in charge)

requisite: Genetics 107 (may be taken concurrently) or consent of instructor. Immunologic and electrophoretic techniques used in the exploration of heritable differences in red cell antigens, serum proteins and enzymes of domestic animals.

Mr. Stormont

120. Principles and Techniques of Bacteriology. (2) I.

Lecture—3 hours; laboratory—6 hours (completed in 4 weeks). Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. The structure and internal organization of microorganisms, nutrition, cultivation and physiology of bacteria, effects of chemical and physical agents on growth and death of bacteria and mechanisms of antibiotic sensitivity and resistance. Miss Matheson

121. Immunity and Serology. (3) I.

Lecture—3 hours; laboratory—6 hours (completed in 6 weeks). Prerequisite: course 120 or consent of instructor. The principles of immunity and serology. Mr. Osebold, Mr. Stormont

122. Bacterial and Mycotic Pathogens of Domestic Animals. (4) II.

Lecture—4 hours; laboratory—8 hours (completed in 5½ weeks). Prerequisite: course 121 or consent of instructor. The biology of infectious animal diseases caused by bacteria and fungi.

Mr. Biberstein, Mr. Osebold

123. Viral Pathogens of Animals. (3) II.

Lecture—4 hours; laboratory—8 hours (completed in 4½ weeks). Prerequisite: course 122 or consent of instructor. The biology of infectious diseases caused by viruses. Virus-host relationship with emphasis on pathogenesis, immunity and diagnosis. Mr. Zee

sent of instructor. Students contemplating careers in research will become familiar with experimental methods of investigation and with trends of current research within various fields of endeavor open to microbiologists. Students will prepare analyses of research papers in current journals.

Miss Meyer

124. Veterinary Protozoology. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. The protozoan parasites of domestic animals with emphasis on biology, life history, identification, and control. Mr. Baker

125. Veterinary Helminthology and Entomology. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. The helminth and arthropod parasites of domestic animals with emphasis on biology, life history, identification, and control. Messrs. Baker, Douglas, Lavoipierre

126. Fundamentals of Immunology. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: an introductory course in microbiology; Biochemistry 101A–101B or the equivalent. The immune response and defenses of the host against infection: antibodies, antibody-antigen reactions, hypersensitivity, the immune response and its relationship to disease processes. Miss Matheson

127. Medical Microbiology. (5) I.

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2; a working knowledge in fundamental immunology. Principles of infection and resistance; microbial pathogenicity; the bacterial and mycotic pathogens of man, with emphasis on pathogenic mechanisms and ecological aspects of infectious disease. Mr. Biberstein

128. Biology of Animal Viruses. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 101A or the equivalent. Fundamental physical and chemical properties of animal viruses; methods of propagation, purification and assay. Mechanisms of viral replication and pathogenesis of virus infections in man and animals. Immunity to virus diseases and oncogenic properties of animal viruses. Mr. Zee, Mr. Manning

129. Perspectives in Microbiological Research. (2) I.

Lecture—1 hour; discussion—1 hour. Prerequisite: senior or graduate standing, or con-

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

The Staff (Mr. Biberstein in charge)

Graduate Courses**270. Advanced Immunology. (6) III.**

Lecture—3 hours; laboratory—9 hours. Prerequisite: courses 120–123 or 127 or consent of instructor. Dynamics of infection and resistance: antibody production and manifestations of antigen-antibody reactions, immuno-chemistry, hypersensitivity. Immunological considerations of the groups of disease agents. Offered in even-numbered years. Mr. Osebold, Miss Matheson, Mr. Shifrine

***290. Seminar. (1) I, II, III.**

Seminar—1 hour.

The Staff (Mr. Biberstein in charge)

291. Seminar in Immunology. (1) I, II, III.

Seminar—1 hour. A discussion of the current topics in immunology. Mr. Shifrine

292. Seminar in Animal Virology. (1) I, II, III.

Seminar—1 hour. A discussion of the current topics in animal virology. Mr. Zee, Mr. Manning

293. Seminar in Infectious Diseases. (1) I, II, III.

Seminar—1 hour. A discussion of the current topics in infectious diseases in man and animals. Mr. Biberstein

294. Seminar in Parasitology. (1) I, II, III.

Seminar—1 hour. A discussion of the current topics in parasitology and entomology. Mr. Baker

295A–295B–295C. Clinical Microbiology. (1–1–1)

I–II–III.

Discussion—5 hours total; laboratory—6 hours total. Prerequisite: fourth-year standing in School of Veterinary Medicine. Application of laboratory methods to the diagnosis and treatment of infectious animal diseases. (Satisfactory/Unsatisfactory grading only.)

Messrs. Baker, McKercher, Biberstein

298. Group Study. (1–5) I, II, III.

The Staff (Mr. Biberstein in charge)

299. Research. (1–12) I, II, III.

The Staff (Mr. Biberstein in charge)

* Not to be given, 1971–72.

VITICULTURE AND ENOLOGY

Related Undergraduate Majors.—See page 68.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Courses

3. Introduction to Wine Making. (3) I, II, III.

Lecture—3 hours. An introduction to wine technology, including history, fermentation, production practices, wine types, and the wine industry of California and other wine producing areas.

Mr. Singleton, Mr. Amerine

98. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Berg in charge)

99. Special Study for Undergraduates. (1-5) I, II, III.

The Staff (Mr. Berg in charge)

Upper Division Courses

105. Systematic Viticulture Including Fruit

Maturation and Handling. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2 or consent of instructor. Botanical classification of the grape—the principal varieties, rootstocks, and species; environmental factors affecting maturity and quality of the fruit for raisins, wine and table grapes; raisin making; costs and returns.

Mr. Nelson, Mr. Lider

116A. General Viticulture. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2 or consent of instructor. Principles underlying pruning, training, grafting, and propagation of vines; environmental and economic factors affecting choice of vineyard type and location; establishment of vineyards.

Mr. Cook

116B. General Viticulture. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 116A. Economics and scientific principles of recommended vineyard management practices including irrigation, mineral and carbohydrate nutrition, flower development and fruit set, virus and fungal diseases, and insect control.

Mr. Cook

123. Analysis of Musts and Wines. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Chemistry 5; Food Science and Technology 103 recommended. The principles and practice of wine analysis.

Mr. Amerine, Mr. Ough

124. Wine Production. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Bacteriology 2; Chemistry 5, 8B. Recommended: Chemistry 10, 109B; Food Sci-

ence and Technology 107A, 107B, Plant Science 2; and courses 3 and 123. The principles and practice of making the various standard types of wines, with special reference to the grape varieties used and the method of vinification required for each.

Mr. Webb

125. Wine Types and Sensory Evaluation. (3) II.

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: Chemistry 8B. Recommended: Food Science and Technology 107A, 107B; and courses 3, 123, and 124. Major types of wines and the factors influencing their quality; principles of sensory evaluation.

Mr. Amerine

126. Wine Processing. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Bacteriology 2; Chemistry 5, 8B. Recommended: Chemistry 10, 109B; Plant Science 2 and courses 3, 123, 124, and 125. Principles and theory of nonbacterial disorders: metal, tartrate, protein, color, oxidation and their control by clarification, refrigeration, filtration and ion exchange.

Mr. Berg

140. Distillation Principles and Brandy Technology. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 5, 8B. Recommended: Chemistry 109B; Food Science and Technology 110A. Principles of distillation including engineering aspects and problems with emphasis upon the alcohol-water system and distillation of wines; brandy types, sensory and chemical analysis and production factors. Offered in odd-numbered years.

Mr. Guymon

190. Proseminar in Viticulture. (1) I.

Lecture—1 hour. Prerequisite: consent of instructor. Reports and discussions of recent advances in viticulture.

Mr. Olmo

191. Proseminar in Enology. (1) I, II, III.

Lecture—1 hour. Prerequisite: consent of instructor. Reports and discussion of recent advances in enology.

Messrs. Amerine, Berg, Webb

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.
The Staff (Mr. Berg in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Berg in charge)

Graduate Courses

208. Plant Hormones and Regulators. (3) I.

Lecture—3 hours. Prerequisite: Botany 111; Chemistry 8B; or consent of instructor. Open to qualified upper division students. History, oc-

currence, extraction, measurement, chemical nature, developmental and physiological effects, role, and theories of action of plant hormones and growth regulators; methods of application of growth regulators and factors altering effectiveness; application in the control of plant and fruit responses. Mr. Weaver, Mr. Addicott

208L. Plant Hormones and Regulators Laboratory.

(2) I.

Laboratory—6 hours. Prerequisite: course 208 (may be taken concurrently) or consent of instructor. Experiments in plant hormones and regulators using various bioassay methods for auxins, gibberellins, and kinins; preparation and testing of gibberellic acid; extraction and identification of naturally occurring plant hormones.

Mr. Weaver

217. Microbiology of Wine Production. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2; Biochemistry 101A; Chemistry 5, 8B. Recommended: course 3 or 124, 125, 126, and an upper division course in

WATER SCIENCE—See also Soil and Water Science, Soil Science

WATER SCIENCE

Related Undergraduate Majors.—See page 68.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Course

10. Water and Man. (3) III.

Lecture—3 hours. Water as a factor in civilization and man's environment. Water supply and utilization problems of agricultural, domestic, industrial, and other water users in developed and developing nations. A cultural and technical course providing an introduction to water science and engineering. Mr. Hagan

Upper Division Courses

106. Principles of Soil Water Movement. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Soil and Water Science 101 (may be taken concurrently or with consent of instructor). An introduction to basic mechanisms of soil water movement with emphasis on infiltration, evaporation, and redistribution within the soil profile. Laboratory measurements of the forces involved in soil water movement.

Mr. Horton

110A. Irrigation Principles and Practices. (3) II.

Lecture—3 hours. Prerequisite: Physics 2B. A general course for engineering and agricul-

Bacteriology. Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging, and spoilage of wines. Mr. Kunkee

219. Plant Phenolics. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101B or equivalent and consent of instructor. Flavonoids and other natural phenolic substances of plants; their chemistry, natural occurrence, biochemistry, relation to animal diets, and relation to properties of foods and other products.

Mr. Singleton

290. Seminar. (1) I, II, III.

Seminar—1 hour. Prerequisite: consent of instructor.

Mr. Webb

298. Group Study. (1-5) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Berg in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Berg in charge)

tural students. Principles for relating water, soil, plant and atmospheric conditions to irrigation planning and practices. Selecting lands for irrigation, water-soil-plant relations, irrigation requirements for principal crops, irrigation scheduling for maximum efficiency.

Mr. Henderson

110B. Irrigation Principles and Practices. (3) III.

Lecture—3 hours. Prerequisite: Physics 2B. A general course for engineering and agricultural students. Farm irrigation distribution systems, water measurement, farm water supply including wells and pumping plants, land preparation for irrigation, water application, and drainage requirements.

Mr. Henderson

116. Processes of Water and Soil Pollution. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor. Physical, chemical and biological processes, natural and man-made, that cause pollution of water and soil; nature of pollutants, persistence, and control.

Mr. Biggar

120. Ecology of Polluted Waters. (3) II.

Lecture—3 hours. Prerequisite: Biology 1 and junior standing. The causes and nature of various types of pollution and their effects upon the aquatic biota. Particular emphasis on biological effects of toxic compounds, inorganic compounds, suspended matter, salts and heated water on aquatic life.

Mr. Knight

122. Ecological Studies of Streams and Ponds.

(2) I, II, III.

Lecture—1 hour; group and independent research projects. Prerequisite: upper division standing. Analysis of water quality and pollution to field problems resulting from multiple use and effects of man's activities on streams and ponds with emphasis on Putah Creek and Pond. Multidisciplinary student teams will design and conduct projects leading to alternative approaches.

Mr. Knight, Mr. Biggar

ing in soil and water science or engineering, or consent of instructor. Discussions, laboratory and field exercises, including assessment of soil and water resources; irrigation methods; soil-plant-water relations; water quality and salinity; drainage; irrigation scheduling; and production economics in irrigated agriculture.

The Staff (Mr. Scott in charge)

132. Physical Hydrodynamics. (3) III.

Lecture—3 hours. Prerequisite: differential and integral calculus, mechanics. Relative effect of fluid properties; similitude. Flow visualization, streamlines. Application of impulse-momentum and work-energy relationships. Manometry. Pressure forces, flow measurement. Open-channel and conduit flows. Laminar flow; diffusion, separating turbulent mixing. Drag. Vibration. Stratified flow. Non-newtonian flow. Ocean currents.

Mr. Strelkoff

140. Farm Drainage Systems. (2) III.

Lecture—2 hours. Prerequisite: Soil and Water Science 101. Drainage principles and methods including investigation of drainage problems, types of drainage systems and layout of farm drains, and drainage requirements for land reclamation and irrigated agriculture.

Mr. Luthin

141. Hydrology. (3) II.

Lecture—3 hours. Prerequisite: consent of instructor. Principles of hydrologic analysis including consideration of precipitation, stream flow and ground water phenomena. Mr. Burgy

150. Water Law and Water Institutions. (3) I.

Lecture—3 hours. Introductory course in water law and institutions. Current problems. Basic principles, with utilization of case-study method. Water rights: kind, acquisition, adjudication, administration and loss. Water organizations and enterprises: kinds, organization, financing, public regulation. Acreage limitation. Water pollution.

Mr. Malakoff

160. Water Application Systems. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: senior standing in Soil and Water Science or Civil Engineering, or consent of instructor. Design construction and operation of water-application systems (with emphasis on farm irrigation methods) and appurtenant structures. Preparation of land for irrigation. Problem solving and field and laboratory exercises.

Mr. Pruitt

170. Irrigation and Drainage Management in the Field. (6) (Summer).

Lecture—86 hours total; laboratory and field trips—66 hours total. Prerequisite: senior stand-

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open to majors in Soil and Water Science who are honors students of senior standing. Independent study of selected topics under direction of a member of the staff. Completion will involve writing of a paper.

The Staff (Mr. Scott in charge)

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Scott in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: senior standing.

The Staff (Mr. Scott in charge)

Graduate Courses**200. Water-Soil-Plant Relationships in Irrigation Programming. (3) III.**

Lecture—3 hours. Prerequisite: Soil and Water Science 104 or consent of instructor. Selected topics including prediction of crop responses to irrigation, evapotranspiration and water requirements, production functions, strategy for using limited water supplies, and irrigation planning and operations for optimizing water use and crop production under conditions of developed and developing nations. Mr. Hagan

201. Water in Physiology and Biochemistry of Plants. (3) II.

Lecture—3 hours. Prerequisite: Botany 111; Chemistry 5. Recommended: Biochemistry 101B; Botany 120A and a course in physical chemistry. Solute-water interactions; water and the structure of biological macromolecules; cell-water relations; physiology and biophysics of water uptake, transport and dissipation by plants; physiology and biochemistry of stomata; water stress and plant metabolism.

Mr. Hsiao

202. Evapotranspiration. (2) II.

Lecture—2 hours. Prerequisite: Atmospheric Sciences 20 and 20L, or Agricultural Engineering 107, or consent of instructor. Radiation and energy balances of water, soil and vegetative surfaces and the effects of wind, temperature, humidity thereon. Lysimeter and other measurement techniques. Prediction of evapotranspiration from aerodynamic, energy balance, and empirical approaches.

Mr. Pruitt

215. Advanced Topics in Water Chemistry. (3) II.

Lecture—3 hours. Prerequisite: Soil and Water Science 102; Chemistry 110C; Soil and Water Science 103 recommended. An advanced course in water chemistry emphasizing principles governing interactions of ionic constituents in water with soils and plants. Topics include electro-kinetic properties of clays, diffusion mechanisms, hydrodynamic dispersion during leaching, and irreversible thermodynamics in soil-salt systems.

Mr. Biggar

215L. Advanced Topics in Water Chemistry Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 215 concurrently or consent of instructor. Laboratory techniques for studying the physical and chemical interactions of soil and water.

Mr. Biggar

WILDLIFE AND FISHERIES BIOLOGY

Major Advisers.—See *Schedule and Directory* listing.

Major Program and Graduate Study.—See pages 62, 68, 94, and 171.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

Lower Division Course**2. Wildlife Biology. (4) III.**

Lecture—4 hours. Prerequisite: Biology 1. Principles underlying the biology and effective management and conservation of fish, waterfowl, small mammals, upland game species. Included are effects of man-related activities on wild game species and the biological, social, economical, and political considerations involved.

Mr. Brocksen, Mr. Schwab

Upper Division Courses**101. Field Studies in Wildlife and Fish Management. (5) (Summer).**

Lecture—2 hours; laboratory—24 hours. Prerequisite: course 2. A traveling field study program into the various key wildlife resource areas of the state managed under County, State, Federal, and private jurisdiction.

The Staff (Mr. Boda in charge)

108. Comparative Nutrition of Wildlife and Fish. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B. The principles of nutrition and their application to feeding problems related to wild animals (ruminants and non-ruminants), birds and fish in their natural habitats and in captivity.

Mr. Weir

***250. Physics of Soil Water Movement. (3) II.**

Lecture—3 hours. Prerequisite: Mathematics 22C or consent of instructor; course 106 recommended. The physics of fluid flow through porous media; miscible and immiscible displacement theories; theory of capillary pressure and pore size distribution with emphasis on unsaturated flow problems; physical aspects of structure. Offered odd-numbered years.

Mr. Nielsen

290. Seminar. (1) II.

Seminar—1 hour. Required of all graduate students in Irrigation Science. Discussion of advanced problems in irrigation.

Mr. Knight

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Scott in charge)

299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Scott in charge)

110A. Principles of Wildlife Management. (3) I.

Lecture—3 hours. Prerequisite: course 2; Zoology 2; or consent of instructor. History of game management; properties of game populations and their environment, principles of game populations control, wildlife husbandry methods, wildlife resource economics and aesthetics.

Mr. Schwab

110B. Principles of Fish Management. (3) II.

Lecture—3 hours. Prerequisite: course 2; Zoology 2; or consent of instructor. History of fish management; properties of fish populations and their environment; principles of fish population control; fish husbandry methods; fish resource economics and aesthetics. Primary emphasis upon fish of inland waters.

Mr. Calhoun

110C. Biology and Management of Waterfowl and Upland Game Birds. (3) III.

Lecture—3 hours; one or more field trips (weekend) optional. Prerequisite: course 2 or consent of instructor. Phylogeny, geographical distribution, migration, reproduction, population dynamics, behavior, and physiological-ecology of waterfowl and upland game birds. Primary emphasis upon exploited species with reference to their interactions with man and man-induced environmental changes.

Mr. Raveling

130. Biology of Fish. (5) I.

Lecture—4 hours; laboratory—3 hours. Prerequisite: upper division courses in genetics, nutrition, and physiology or consent of instructor. Introductory morphology, phylogeny, physiology, growth, reproduction, behavior, adaptation, and energy relations of fish with special emphasis on *Salmonid* species.

Mr. Brocksen

* Not to be given, 1971-72.

131. Genetics of Animal Adaptation. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 100B (may be taken concurrently). Genetic principles applied to natural populations; species as plastic elements subject to genetic change through environmental influences and interaction with other species; the role of adaptation in population ecology and development. (Same course as Animal Genetics 131.)
Mr. Gall, Mr. Laben

historical, ecological, behavioral, and economical bases for regulating population levels of species of terrestrial pest vertebrates found throughout the world.
Mr. Howard

151. Wildlife Ecology. (3) II.

Lecture—3 hours. Recommended: course 2. Consideration of the ecology of wildlife species in man-disturbed environments, including ecological aspects of wild vertebrates in relation to reforestation, range management, and pollution; the relationship of wildlife to recreation and wildlands; and resource conservation in the human ecosystem.
Mr. Howard

151L. Wildlife Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 151 to be taken concurrently. Field trips to variously man-altered ecosystems to complement theoretical considerations presented in course 151 on the ecology of wildlife species in man-disturbed environments.
Mr. Howard

152. Principles of Vertebrate Control. (3) III.

Lecture—3 hours. Prerequisite: course 2; course 151 recommended. The philosophical,

190. Proseminar in Wildlife and Fisheries Biology.

(1) I, II, III.

Seminar—1 hour. Prerequisite: senior standing in Wildlife and Fisheries Biology or consent of instructor. Reports and discussions of recent advances related to wildlife and fisheries biology. (Passed/Not Passed grading only.)

The Staff (Mr. Boda in charge)

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Boda in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Boda in charge)

Graduate Courses**298. Group Study. (1-5) I, II, III.**

Lectures and/or discussions—1-5 hours.

The Staff (Mr. Boda in charge)

299. Research. (1-9) I, II, III.

The Staff (Mr. Boda in charge)

ZOOLOGY

Ronald J. Baskin, Ph.D., *Chairman of the Department*

Everett W. Jameson, Jr., Ph.D., *Vice-Chairman of the Department*

Department Office, 2320 Storer Hall

Professors:

- Charles R. Goldman, Ph.D.
- William J. Hamilton, III, Ph.D.
- Milton Hildebrand, Ph.D. (*Zoology and Applied Behavioral Sciences*)
- Everett W. Jameson, Jr., Ph.D.
- Milton A. Miller, Ph.D.
- Lauren E. Rosenberg, Ph.D.
- Robert L. Rudd, Ph.D.
- George W. Salt, Ph.D.
- Herman T. Spieth, Ph.D.
- Tracy I. Storer, Ph.D., LL.D. (*Emeritus*)
- Kenneth E. F. Watt, Ph.D.

Associate Professors:

- Ronald J. Baskin, Ph.D. (*Zoology and Physiology*)
- David W. Deamer, Ph.D.
- Stephen L. Wolfe, Ph.D. (*Zoology and Genetics*)

Assistant Professors:

- Peter B. Armstrong, Ph.D.
- Dennis Barrett, Ph.D.
- John H. Crowe, Ph.D.
- Robert D. Grey, Ph.D.
- ^{2,4}William M. Hamner, III, Ph.D.
- Ann E. Kammer, Ph.D.

◇ ◇ ◇

Professors:

Norman F. Baker, D.V.M., Ph.D.
(*Veterinary Microbiology*)

James R. Douglas, Ph.D. (*Veterinary Microbiology*)

Lecturer:

William M. Longhurst, Ph.D.

Bachelor of Arts Major Program

Lower Division Courses.—Required: Biology 1, Zoology 2, Botany 2 or Bacteriology 2, Chem-

² Absent on leave, fall quarter, 1971.

⁴ Absent on leave, spring quarter 1972.

istry 1A, 1B, and 8A-8B, Physics 2A, 2B, and 2C, Mathematics 13 or 16A and 16B.

Upper Division Courses.—Required: 1) Genetics 100A-100B, 2) 36 units in zoology which must include at least one course (or course sequence if specified) selected from each of the four following core areas.

a) Morphology: Zoology 100, 106A, 106B, 107, 110, 112, 130A.

b) Physiology with laboratory: Zoology: 121A, 121B, 121AL, 121BL, 142 and 142L, 160, 224, Physiology 110A, 110B, 111A, and 111B (all four courses).

c) Evolution: Zoology 148, Genetics 103.

d) Ecology: Zoology 114, 116, 125, 133A, 133B, 135, 136, 137, 140.

Not more than 5 units of courses in the 190 series nor more than 15 units from allied biological sciences may be counted toward this 36-unit requirement.

Recommended: Biochemistry 101A, 101B.

Bachelor of Science Major Program

Lower Division Courses.—Required: Biology 1, Zoology 2, Botany 2, Bacteriology 2, Chemistry 1A, 1B, and 8A-8B, Physics 2A, 2B, 2C, Mathematics 13 or 16A and 16B.

Upper Division Courses.—Required: 1) Biochemistry 101A, 101B; 2) Genetics 100A, 100B; 3) either Zoology 148 or Genetics 103; 4) an additional 30 units in Zoology, which must include at least one course from two of the following core areas:

a. Morphology: Zoology 100, 106A, 106B, 107, 110, 112, 130A, 130B.

b. Physiology with laboratory: Zoology 120, 121A, 121AL, 121B, 121BL, 142, 142L, 160, 224, Physiology 110A, 110B, 111A, and 111B (all four courses).

c. Ecology: Zoology 114, 116, 125, 133A, 133B, 135, 136, 137, 140.

Not more than 5 units of courses in the 190 series nor more than 15 units from allied biological sciences may be counted toward this 30-unit requirement.

Graduate Study.—The Department of Zoology offers programs of study and research leading to the M.A. and Ph.D. degrees. For detailed information regarding graduate study write to the Graduate Adviser, Department of Zoology.

Teaching Major.—Requirement for students planning to be primary or secondary teachers, with a major in zoology, are the same as for the Bachelor of Arts degree in zoology.

Teaching Minor.—Required: 30 units in biological sciences, including Biology 1, Zoology 2, and 18 units of upper division courses in zoology or closely related fields chosen in consultation with the subject representative. Recommended: an upper division course in invertebrate zoology and an upper division course in each of as many

other areas of zoology as possible (e.g., cell biology, physiology, ecology, genetics, morphology, evolution).

Students who plan to be teachers should consult the Department of Education in regard to further preparation for certification.

Subject Representative: Mr. Wolfe.

Physiology

Lower Division Courses

2. Introductory Physiology. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Biology 1. The physiology of muscular contraction, nervous integration, sensation, circulation, respiration, excretion, and digestion.

Miss Kammer

2L. Introductory Physiology Laboratory. (3) I.

Laboratory—6 hours. Prerequisite: course 2, completed or in progress. One credit for reading and report writing done outside the laboratory.

Miss Kammer

10. Elementary Physiology. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: not open for credit to students who have had Biology 1. An introductory course in physiology for nonscience majors. Mr. Deamer

Zoology

Lower Division Courses

2. General Zoology. (6) I, II, III.

Lecture—3 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: Biology 1 or consent of instructor. A survey of the diversity of animal life and the basic principles of adaptation, evolution, and integration in animals.

I. Mr. Crowe; II. Mr. Miller;
III. Mr. Jameson

99. Special Study for Lower Division Students.

(1-5) I, II, III.

Directed study of a specific topic selected by the student and the instructor.

The Staff (Chairman in charge)

Upper Division Courses

100. Embryology. (5) I, II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biology 1; Zoology 2 recommended. The events and mechanisms of embryonic development, including fertilization, morphogenesis, cell differentiation and organogenesis, with emphasis on vertebrates.

I. Mr. Grey; II. Mr. Barrett; III. Mr. Armstrong

106A. Analysis of Vertebrate Structure. (5) II.

Lecture—2 hours; laboratory—demonstration—6 hours. Prerequisite: course 2. The interpretation of vertebrate structure with emphasis on phylogeny.

Mr. Hildebrand

106B. Analysis of Vertebrate Structure. (4) III.

Lecture—2 hours; laboratory—demonstration—4 hours. Prerequisite: course 2. The interpretation of vertebrate structure with emphasis on function. The application of basic concepts of mechanics to supportive, locomotor, and feeding mechanisms.

Mr. Hildebrand

107. Microanatomy. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. The finer structure and activities of organs, tissues, and cells of vertebrates, with emphasis on those of mammals.

Mr. Rosenberg

110. Protozoology. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biology 1. Structure, life history, and ecology of the groups of protozoa with emphasis on relationships to biological problems.

Mr. Rosenberg

112. Invertebrate Zoology. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Comparative anatomy, classification, and phylogeny of the invertebrate metazoa.

Mr. Miller

114. Invertebrate Physiological Ecology. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112. Physiology, behavior, and ecology of the invertebrate metazoa.

116. Principles of Animal Resource Management. (5) I.

Lecture—3 hours; laboratory—3 hours; special projects. Prerequisite: Biology 1; Mathematics 13 and 16A. Population dynamics and management of marine, freshwater, and terrestrial animal resources; analysis and solution of problems in maximization of animal resource production.

Mr. Watt

120. Introduction to Cell Biology. (4) I.

Lecture—3 hours; extensive reading; research report. Prerequisite: Biochemistry 101A, 101B. The physicochemical aspects of cellular organization and function.

Mr. Baskin

121A. Cell Biology. (4) II.

Lecture—4 hours. Prerequisite: Biochemistry 101A, 101B. Structure and function of living systems at the molecular and subcellular level, including molecular organization of membranes, models of membrane structure, photosynthesis and respiration.

Mr. Deamer

121B. Cell Biology. (4) III.

Lecture—4 hours. Prerequisite: course 121A. Structure and function of living systems at the molecular and subcellular level, concentrating on synthetic mechanisms in the nucleus and cytoplasm, including cell division. A continuation of 121A.

Mr. Wolfe

121AL. Cell Biology Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 121A. Exercises illustrating principles of cell biology, concentrating on membranes, respiration, and photosynthesis; individual programs of research, employing one or more advanced techniques.

Mr. Deamer

121BL. Cell Biology Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 121B. Exercises illustrating principles of cell biology, concentrating on nuclear and cytoplasmic synthesis, and on processes in cell division; individual programs of research, employing one or more advanced techniques.

Mr. Wolfe

125. Animal Ecology. (3) II.

Lecture—3 hours. Prerequisite: course 2 and one course in biological science having at least part of the studies conducted in the field (e.g., courses 112, 133A, 133B, 136, 137, 140L, Botany 108 or Botany 117). Theory of relationships between animals and their environments.

Mr. Salt

130A. General Cytology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2 or Botany 2; Genetics 100B or Biochemistry 101A. An analysis of the structure and ultrastructure of cells; the relationship between structure and function at cellular and subcellular levels. Consideration of cell particulates, membranes, endoplasmic reticulum, mitochondria, plastids, the golgi zone and their relationship to the metabolic nucleus. (Same course as Botany 130A.)

Mr. R. H. Falk, Mr. Wolfe

130B. General Cytology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 130A. An analysis of the structure and function of cells during mitosis; meiosis, gametogenesis and fertilization at cellular and subcellular levels. (Same course as Botany 130B.)

Mr. Wolfe

133A. Taxonomy and Field Biology of Amphibians and Reptiles. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2. Biology, adaptive morphology, and environmental distribution of amphibians and reptiles. Offered in odd-numbered years.

Mr. Jameson

133B. Taxonomy and Field Biology of Fishes. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2. Biology, adaptive morphology, and environmental distribution of fishes. Offered in even-numbered years. Mr. Jameson

135. Ecology of Large Mammals. (4) III.

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 125; Wildlife and Fisheries Biology 110A or consent

of instructor. Emphasis on ecology and management principles of North American ungulates with other selected examples. Includes nutrition, reproduction, parasites, diseases, and population dynamics.

Mr. Longhurst

136. Mammalogy. (5) III.

Lecture—2 hours; laboratory—6 hours; weekend field trips. Prerequisite: course 125 or consent of instructor. Systematics, ecology and life history of mammals with emphasis on Western North America. Offered in even-numbered years.

Mr. Rudd

137. Ornithology. (5) III.

Lecture—2 hours; laboratory—6 hours; weekend field trips. Prerequisite: course 125 or consent of instructor. Systematics, ecology and life history of birds with emphasis on Western North America. Offered in odd-numbered years.

Mr. Rudd

140. Limnology. (4) III.

Lecture—3 hours; special projects. Prerequisite: Biology 1 and junior standing. The biology and productivity of inland waters with emphasis on the physical and chemical environment.

Mr. Goldman

140L. Limnology Laboratory. (3) III.

Laboratory—6 hours. Prerequisite: course 140 (may be taken concurrently). Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology.

Mr. Goldman

142. Invertebrate Physiology. (4) III.

Lecture—3 hours. Prerequisite: course 112, Chemistry 1A, 1B, Physics 2B. Comparative physiology of invertebrate organ systems. Extensive reading and written precis required.

Mr. Crowe

142L. Invertebrate Physiology Laboratory. (3) III.

Laboratory—8 hours. Prerequisite: course 142 (may be taken concurrently). Experiments on the physiological mechanisms of invertebrate organ systems.

Mr. Crowe

144. Oceanography. (4) II.

Lecture—3 hours; discussion—1½ hours; demonstration; term paper. Prerequisite: Biology 1. Biological, chemical, physical, and geological aspects of the marine environment. Consideration of biological communities, productivity, the distribution of currents and tides, the origin of ocean basins, and marine sedimentation.

Mr. Goldman

147. Zoogeography. (4) II.

Lecture—3 hours. Prerequisite: course 2 or Entomology 1. Movements of terrestrial animals. The role of geologic, climatic, and biologic changes in the geographic distribution of animals.

Mr. Jameson

148. Animal Phylogeny and Evolution. (5) I.

Lecture—5 hours. Prerequisite: course 2 or Entomology 1. Recommended: course 147 and Genetics 100B. The origins and relationships of the major groups of animals, with emphasis on the analysis of variation and the mechanics of evolutionary change.

Mr. Rudd

155. Animal Social Systems. (5) II.

Lecture—3 hours; discussion—1 hour; independent study of films of animal behavior. Prerequisite: course 2. Interpretations of the nature and significance of human social organizations from the perspective of comparative animal behavior. Communication, aggression, and cooperation are considered from an evolutionary perspective. Offered in odd-numbered years.

Mr. Hamilton

156. Dynamics of Animal Coloration. (5) II.

Lecture—3 hours; discussion—1 hour; special project or term paper. Prerequisite: course 2. The role of animal coloration with respect to animal behavior; predator-prey relationships, and solar and animal radiation. Particular emphasis is given to the evolution of behavior and population dynamics as exemplified by coloration. Offered in even-numbered years.

Mr. Hamilton

160. Invertebrate Neurophysiology. (5) III.

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: an upper division course in physiology or physicochemical biology or invertebrate zoology. Comparisons of the nervous systems of invertebrates with emphasis on nervous processes related to behavior.

Miss Kammer

197. Senior Colloquium in Zoology. (2) III.

Lecture-discussion—2 hours. Prerequisite: senior standing. The consideration of innovation and synthesis in broad areas of zoology. (Passed /Not Passed grading only.)

The Staff

197T. Tutoring in Zoology. (1-5) I, II, III.

Discussion—1-2 hours. Prerequisite: major in zoology; consent of instructor. Experience in teaching zoology under guidance of staff.

The Staff (Chairman in charge)

198. Directed Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

(1-5) I, II, III.

Directed study of a specific topic selected by the student and the instructor.

The Staff (Chairman in charge)

Graduate Courses

201A. Ecological Theory. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: a course in ecology. The course will focus on the ecologic community as a unit. The

major generalizations concerning structure and functioning of the community will be examined together with the generalizations relating both structure and function to the abiotic environment and its fluctuations. (Same course as Botany, Ecology and Geology 201A.)

The Staff (Mr. Salt and Mr. Major in charge)

201B. Analysis of A Selected Ecosystem. (3) II.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 201A or consent of instructor. Application of basic ecological principles to the interpretation of biotic and abiotic interrelationships of a particular ecosystem. Recent advances in theory, technique, and basic information are emphasized. Lectures will be given by specialists from several fields. May be repeated for credit. (Same course as Botany, Ecology and Geology 201B.)

The Staff (Mr. G. L. Webster in charge)

201C. The Changing Biosphere. (3) III.

Lecture—2 hours; 1 assigned problem. Prerequisite: courses 201A, 201B; or consent of instructor. Course deals with changing gas balance and weather in the biosphere and effects on plants and animals, the effects of structural, chemical and physical changes on living systems, changes in species diversity, effects of human population increase, and related topics. (Same course as Botany, Ecology and Geology 201C.)

The Staff (Mr. Myrup in charge)

202. Biomathematics. (6) II.

Lecture—4 hours; laboratory—6 hours. Prerequisite: two courses in calculus; three courses in statistics. Mathematical aspects of physiology, ecology, and epidemiology; development and testing of models, mathematical description of biological systems; measurement, analysis, simulation and optimization in biology. Mr. Watt

210. Analysis of the Elements of Effective Teaching of College Biology. (3) I.

Lecture—1 hour; discussion—1 hour; assignments and reports. Undergraduate enrollment limited. Offered in even-numbered years. (Satisfactory/Unsatisfactory grading only.)

Mr. Hildebrand

222. Mathematical Models of Ecosystems. (4) III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Mathematics 16B or 21B; Mathematics 105B or 231C; course 116 or 125. Use of mathematical models and computer simulation to discover effect of varying behavioral, physiological, population, and community parameters on energy flux in ecosystems. Offered in odd-numbered years.

Mr. Watt

223. Seminar in Fisheries Management. (4) III.

Seminar—4 hours. Prerequisite: course 116; Mathematics 16B, 105B. Analysis of fish population problems, including review of recent research. Offered in even-numbered years.

Mr. Watt

224. Developmental Biology. (5) I.

Lecture—1 hour; discussion—1 hour; laboratory—6 hours; 1 weekend laboratory trip. Prerequisite: course 100 and consent of instructor; Biochemistry 101 recommended. Introduction to research in development. Observations and experiments involving a variety of developing systems and experimental methods, with critical interpretation of the results. Open to qualified undergraduates. The first weekend of the quarter is spent at Bodega Marine Laboratory.

Mr. Barrett

225A. Advanced Developmental Biology:

Morphogenesis. (4) II.

Lecture—4 hours. Prerequisite: course 100. Development of form and structure; morphogenetic movement, differential growth, pattern formation; interaction of cells and tissues during development.

Mr. Armstrong

225B. Advanced Developmental Biology: Cell

Differentiation. (5) III.

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 100, Biochemistry 101B; Genetics 104 recommended. Current concepts of cell differentiation, principally in animal systems. Topics include properties of major differentiated cell types, and principal mechanisms of control.

Mr. Grey, Mr. Barrett

228. Experimental Animal Ecology. (3) III.

Lecture—2 hours; 3 weekend field trips, 2 written critiques. Prerequisite: course in animal ecology; selected undergraduates may be admitted with consent of instructor. Discussion of means of generating ecological hypotheses and methods of testing those hypotheses. Topics will include analysis of field observation, experimental design in both field and laboratory, and interpretation of results.

Mr. Salt

230. Advanced Cytology. (2) II.

Seminar—2 hours. Prerequisite: consent of instructor. Topics of current interest in the ultrastructure of cells. Offered in odd-numbered years.

Mr. Wolfe

231. The Ultrastructure of Self-Reproducing Systems. (3) III.

Lecture—3 hours. Recommended: courses in cytology, cell biology or cytogenetics and Genetics 100B. Structure and function of self-reproducing subcellular organelles illustrated primarily in metazoan animals. Offered in even-numbered years.

Mr. Wolfe

240. Muscle Physiology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: an upper division course in animal physiology; Mathematics 16B or 21B; or consent of instructor. The physical and chemical aspects of muscle function.

Mr. Baskin

250. Recent Developments in Zoology. (1) II.

Seminar—1 hour. Prerequisite: graduate standing in Zoology. The Staff

ogy, morphogenesis, and developmental mechanisms. Messrs. Barrett, Armstrong, Grey

287. Seminar in Animal Behavior. (2) II.

Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on the principles and recent developments in invertebrate and vertebrate animal behavior.

Mr. Hamilton, Mr. Spieth

293. Seminar in Invertebrate Zoology. (2) II.

Seminar—2 hours. Prerequisite: course 112 or consent of instructor. Critical review of the literature in selected topics and taxa in the invertebrates. Open to qualified undergraduates. Mr. Miller, Miss Kammer

288. Seminar in Physicochemical Biology. (2) III.

Seminar—2 hours. Prerequisite: consent of instructor. Discussion of recent literature on the physicochemical aspects of the organization and function of living systems. Physicochemical properties on the molecular and cellular levels will be considered.

Mr. Baskin

289. Seminar in Analysis of Vertebrate Structure.

(1) I.

Seminar—1 hour. Prerequisite: course 106A; course 106B recommended. Reports and discussion on an aspect of vertebrate morphology to be selected by the class. Offered in odd-numbered years. (Satisfactory/Unsatisfactory grading only.)

Mr. Hildebrand

291. Seminar in Protozoology. (2) I.

Seminar—2 hours. Prerequisite: consent of instructor. Readings and discussions of topics on cell structures and function in relation to protozoa. Open to qualified undergraduates.

Mr. Rosenberg

292. Seminar in Development. (2) II.

Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on embryol-

294. Seminar in Animal Ecology. (3) I.

Seminar—3 hours. Prerequisite: course 125 or consent of instructor. Readings and discussions of advanced topics in the population and community ecology of animals.

Mr. Rudd, Mr. Salt

295. Seminar in Limnology. (3) III.

Seminar—3 hours. Prerequisite: course 140 or consent of instructor. Recent developments in limnology and related advances in oceanography.

Mr. Goldman

297. Seminar in Systematic Zoology and Evolution.

(2) III.

Seminar—2 hours. Prerequisite: consent of instructor. Principles of animal classification, speciation, and the evolution of higher categories; emphasis on modern concepts and pertinent contributions from the fields of genetics and paleontology.

Mr. Rudd

298. Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

299. Research. (1-9) I, II, III.

The Staff (Chairman in charge)

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Index

Index

- Absence, leave of (*see Withdrawal*)
Academic Senate, 7
Adding or dropping courses, 24
 in Letters and Science, 146
Administration, University, 7
Administrative officers, general, 429
 College of Agricultural and Environmental Sciences, 54
 at Davis, 430
 of the colleges and schools, 431
Admission to the University, 14-23
 application procedures, 20
 by examination, 16
 change of campus, 22
 eligibility, notification of, 21
 failure to register, 22
 in advanced undergraduate standing, 22
 in freshman standing, 20
 in graduate standing, 23
 in limited status, 20
 in special status, 19
 intention to register, statement of, 22
 intercampus transfer, 22
 of applicants for second bachelor's degree, 20
 of applicants from other countries, 18
 of out-of-state applicants, 14
 preparatory high school subjects, 14
 reapplication, 22
 transcript of record for, 21
 vaccination certificate, 22
Admission requirements in the
 College of Engineering, 109
 Graduate Division, 172
 Professional schools, 160
 School of Law, 153
 School of Medicine, 156
 School of Veterinary Medicine, 165
Advanced undergraduate standing, requirements for admission, 22
Advanced placement tests, 151
Advisers, faculty (*see also* under various departments), 9
 College of Agricultural and Environmental Sciences, 56
 College of Engineering, 110
 College of Letters and Science, 147
 for international students, 47
 peer, 45, 56
Aerospace Engineering, curriculum, 120
Afro-American (Black) Studies, 184
Agrarian Studies, major in, 61
Agricultural
 Business Management, requirements for the major, (*see* Agricultural Economics)
 Chemistry, graduate group, 172, 184
 Economics, 63, 68, 184
 courses in, 184
 Economics and Business Management, major in, 61, 68
 Education, courses in, 187
 requirements for the major, 61, 69
 Engineering, Department of, 188, 250
 courses in, 188, 250
 curriculum, 121
 genetics, 61, 70, 299
 History Center, 11
 placement service, 36, 57
 policy, 63
 Practices, program, 36, 189
 processing, 121
 Science and Management
 courses in, 190
 graduate group, 172
 major in, 61, 71
 Toxicology, *see* Environmental Toxicology
Agricultural and Environmental Sciences,
 College of, 53
 administrative structure, 53
 college requirements, 58
 disqualification and probation rules, 28
 fields of interest, 63
 graduate instruction and degrees, 171
 honors, 60
 index of courses, 177
 majors and special programs, 61
 passed or no record option, 59
 peer advising, 56
 requirements for Bachelor of Science degree, 62-68
 research departments, 54
 scholarships, 61
 study-list requirements, 58
 teaching credentials, 61, 70, 175
 teaching divisions, 54
Agronomy and Range Science, (*see also* Plant Science)
 courses in, 190
 field of interest, 63
American History and Institutions, 30
American History and Literature, committee, *see* American Studies
American Studies
 courses in, 192
 major program, 192
Anatomy, Department of, 193
 courses in, 193
 graduate group, 172
Anesthesiology, 343
Animal Biochemistry, (*see* Biochemistry)

- Animal Genetics, (*see* Genetics)
 Animal Husbandry, 63
 Animal Nutrition (*see* Nutrition)
 Animal Physiology, (*see* Physiology)
 Animal Science
 courses in, 195
 requirements for the major, 62, 71
 Anthropology, Department of, 197
 courses in, 198
 major program, 197
 Application for admission, procedures, 20
 Graduate Division, 173
 Law, 154
 Medicine, 157
 Veterinary Medicine, 166
 Applied Behavioral Sciences, major in, 62, 72
 courses in, 202
 Applied Science, Engineering, Department of, 252
 courses, 252
 graduate study, 139
 Approved living quarters, 40
 Arboretum, 11
 Archaeology, courses in (*see* Anthropology)
 Architecture, courses in (*see* Art)
 Area requirements, Letters and Science, 150
 Art, Department of, 203
 courses in, 204
 major program, 203
 Asian American Studies, courses in, 208
 Assistantships, teaching and research, 175
 Associated Students, 50
 Astronomy, courses in, 372
 Athletics (*see* Physical Education)
 Atmospheric Science
 courses in, 209
 major requirements, 62, 73
 Attorney in Residence Matters, 25
 Avian Medicine (*see* Epidemiology and Preventive Medicine)
 Avian Sciences
 courses, 211
 major, 62, 65
 Awards (*see* Honors and Prizes)
 Bachelor of Arts degree, requirements (*see also* under various departments)
 College of Letters and Science, 140
 general University, 30
 Bachelor of Science degree, requirements
 College of Agricultural and Environmental Sciences, 58, 68
 College of Engineering, 113
 College of Letters and Science, 140
 general University, 30
 School of Veterinary Medicine, 166
 Bachelor's degree, applicants for a second, 20
 Bacteriology, Department of, 212
 courses in, 212
 major programs, 212
 Bee Biology, 63
 Behavioral Biology, courses in, 344
 Biochemistry
 graduate group, 214
 major requirements, 62, 74
 Biochemistry and Biophysics
 courses in, 214
 major program, 62, 74
 Biochemistry, graduate group, 214
 Biological Chemistry, 344
 Biological Control, 63
 Biological Sciences, committee, 216
 courses in 217
 major programs, 216
 Biology, courses in, 217
 fields of interest, 63
 Quantitative, 67
 Biomedical Engineering, 131
 (*see also* Chemical Engineering)
 Biometeorology, 63
 Biophysics (*see* Biochemistry and Biophysics)
 field of interest, 63
 graduate groups, 172
 (Black), Afro-American Studies, 184
 Board and room, 33
 Botany, Department of, 218
 courses in, 219
 graduate group, 172
 major programs, 218
 Breadth requirements, Letters and Science, 141
 Brewing technology, 63
 Business Administration, School of, preprofessional requirements, 62, 160
 Business Management (*see* Agricultural Economics and Business Management)
 Calendar, 4
 Campuses of the University, 7
 Candidacy for degrees, filing of announcement, 32
 Bachelors' degrees, Letters and Science, 145
 Cantonese, courses in (*see* Oriental Languages)
 Chancellors, University, 430
 Change of
 campus before registration, 22
 college, school, or major, 24
 major in Letters and Science, 144
 name, 24
 Chemical Engineering, Department of, 256
 courses in, 256
 curriculum, 125
 Chemistry, Department of, 222
 courses in, 223

- major programs, 223
- Chemistry, Agricultural, graduate group, 184**
- Child Development, courses in (*see Human Development*)**
 - major, 62
- Chinese, courses in (*see Oriental Languages*)**
- City Planning, 63**
- Civil Engineering, Department of, 258**
 - courses in, 259
 - curriculum, 128
- Classics (Department of Spanish and Classics)**
 - courses in, 227
 - major program, 226
- Clinical Pathology, Department of, 229**
 - courses in, 229
- Clinical Sciences, Department of, 230**
 - courses in, 231
- Clothing, 63**
- Comparative Biochemistry (*see Biochemistry graduate group*)**
- Comparative Pathology, graduate group, 172**
- Comparative Pharmacology, graduate group, 172**
- Composition, English, required, 30**
- Community Development, 63, 72**
- Community Nutrition, 62**
- Computer Center, 11**
- Computer Science, 131**
- Concurrent courses, 183**
- Conduct and discipline, 48**
- Conservation, 64**
- Consumer Economics**
 - courses in, 234
 - fields of interest, 64
- Consumer Food Science, 62, 77**
- Consumer Sciences, courses in, 234**
- Costume design, 64**
- Counseling Service, 45**
- Courses, classification and numbering, 181**
- Credentials, teaching, 61, 149, 175**
- Credit**
 - and scholarship, 27
 - by examination, 30, 132, 151
 - for work taken in other colleges, 17, 183
 - upon repetition of a course, 28
 - value of courses, explained, 181
- Criminal Justice, Center for Administration of, 11**
- Crocker Nuclear Laboratory, 11**
- Crop Protection, 62, 78**
- Curricula (*see also various Colleges and Schools*)**
 - preparation for University, 14, 17
 - preprofessional, 160–165
- Davis**
 - campus, 7
 - community, 9
- Deans of the colleges, schools, and graduate division, 431**
- Deficiencies**
 - disciplinary action, 28
 - of transfer students, 17
 - removal of grade deficiencies, 28
- Degree candidacy, filing for, 32**
- Bachelors' degrees, Letters and Science, 148**
- Degree**
 - Bachelor of Arts**
 - College of Letters and Science (*see also various departments*), 140
 - general University, 30
 - Bachelor of Science**
 - College of Agricultural and Environmental Sciences, 58
 - College of Engineering, 113
 - College of Letters and Science, 140
 - general University, 30
 - School of Veterinary Medicine, 169
 - dual, 111
 - Graduate degrees (*see Graduate Division, also various Colleges and Schools*)**
 - second bachelor's, 20
 - unit requirement, 32
 - Dental Hygiene, 163**
 - Dentistry, School of, preprofessional requirements, 163**
 - Departmental majors, Letters and Science, 144**
 - Design**
 - courses in, 234
 - requirements for the major, 62, 79
 - Development, Resource and Consumer Economics, 62**
 - Dietetics (*see also Nutrition*)**
 - major in, 62, 80
 - Dining Commons, 41, 51**
 - Discipline**
 - for scholastic deficiencies, 28
 - degrees of, 48
 - Discontinuance without notice (*see Withdrawal*)**
 - Dismissal (*see Disqualification*)**
 - Disqualification for scholastic deficiency, 28**
 - Dramatic Art, Department of, 236**
 - courses in, 236
 - major program, 236
 - University Theatre, 236
 - Dropping courses**
 - general regulations, 24
 - Letters and Science, 146
 - Ecology**
 - courses in, 220, 240, 306, 425
 - graduate group, 172
 - Institute of, 11

- Economics, Department of, 240
 courses in, 241
 major program, 240
- Economics, Agricultural (*see* Agricultural Economics)
- Consumer, courses in, 234
- Education, Department of, 245
 Agricultural (*see* Agricultural Education)
 courses in, 245
- Education Abroad Program, 47
- Educational Placement Service, 45
- Educational Opportunity Program, 18, 45
- Electrical Engineering, Department of, 264
 courses in, 264
 curriculum, 131
- Eligibility for admission, notification of, 21
- Employment, student, 44
- Endocrinology, graduate group, 172
- Engineering, College of, 109, 248
 courses in, 248
 admission to, 109
 college requirements, 113
 dismissal and probation rules, 28
 graduate group, 172
 graduate study, 139
 honors with bachelor's degree, 116
 humanistic-social studies, 114
 lower division program, 116
 major, choosing a, 111
 minimum scholarship requirements, 32, 113
 passed or not passed grading, 116
 passed or no record grading, 115
 requirements for Bachelor of Science degree, 113
 study-list requirements, 111
 technical electives, 113
 upper division curricula, 120
- Engineering
 aerospace, curriculum, 120
 Agricultural, Department of, 55, 250
 courses in, 188, 250
 curriculum, 121
- Applied Science, Department of, 252
 courses in, 252
- Chemical, Department of, 256
 courses in, 256
 curriculum, 125
- Civil, Department of, 258
 courses in, 259
 curriculum, 128
 core courses, 248
- Electrical, Department of, 264
 courses in, 264
 curriculum, 131
- material sciences
 curriculum, 135
- Mechanical, Department of, 268
 courses in, 268
 curriculum, 136
- English, Department of, 272
 courses in, 273
 major program, 273
- English Examination, Subject A, 30
 for foreign students, 19, 30
- English requirement
 for admission to the University, 14
 in the College of Engineering, 117
 in the College of Letters and Science, 141
- Enology (*see* Viticulture and Enology)
- Enrollment
 Davis campus, 8
 School of Veterinary Medicine, 166
- Entomology, 55
 courses in, 281
 requirements for the major, 62, 81
- Entrance examinations
 for California residents, 15
 for nonresidents, 16
- Entrance requirements (*see* Admission)
- Environment engineering specialization, 126
- Environmental Education, 64
- Environmental horticulture, 55
- Environmental Planning and Management
 major in, 62, 82
 courses in, 284
- Environmental Studies, 285
 courses in, 286
- Environmental Toxicology, 258
 courses in, 287
 field of interest, 67
- Epidemiology and Preventive Medicine
 courses in, 288
- Examinations
 advanced placement, 151
 American History and Institutions, 30, 240, 314, 383
 credit by, 30
 English composition, Subject A, 30
 entrance, 16
 final, 29
 foreign language placement, 23, 147
 in English for foreign students, 19, 30
 Law School admission, 154
 medical required, 24, 43
 Medical School admission, 158
 regulations concerning, 31
- Expenses of students (*see also* Fees), 29
- Exploratory major, 61, 62
- Extension courses, acceptability of
 approval required, 183
 in the College of Letters and Science, 141
 taken at another institution, 18
- Extension, University, 12
- Extra-session courses defined, 183

- Fabrics, 64
 Faculty advisers (*see* Advisers, faculty)
 Faculty 48 courses, 183
 Farm management (*see* Agricultural Economics)
 Fees and deposits
 application for admission, 21
 Education, 33
 Subject A course, 30
 health insurance, 33
 incidental (*see* University Registration)
 intention to register, 22
 late registration, 23
 Memorial Union, 33
 nonresident tuition, 25, 33
 parking, 34
 reapplication, 22
 registration, 33
 residence hall contract, 41
 student body membership, 33
 tuition, 28, 33
 transcript of record, 29
 University registration, 33
 Fellowships, assistantships, and loans, 174
 Fermentation Sciences, 65
 Final examinations, regulations concerning, 29
 Finance, 64
 Financial aids, 33
 application for, 34
 Fine Arts and Museology, Laboratory for Research in, 11
 Fish and game management, 65
 Flexibility, 116, 183
 Floriculture, 65
 Food biochemistry, 65
 Food processing engineering, 127
 Food Protection and Toxicology Center, 11
 Food science
 graduate group, 172
 major in, 62, 84
 Food Science and Technology
 courses in, 290
 Food service management, 65
 Food technology specialization in, 81
 Foods, courses in, 292
 requirements for major (*see* Consumer Food Science)
 Foreign language
 Letters and Science requirement, 141
 placement test, 23, 147
 professional courses in teaching (*see* under various departments)
 requirement for admission, 14
 Foreign literature in translation, courses in, 294
 Foreign students (*see* International)
 Forest engineering, 122
 Forestry (*see* Preforestry)
 Fraternities, 42
 French (Department of French and Italian)
 courses in, 295
 major program, 295
 Freshman standing, admission to, 14
 Genetics
 courses in, 299
 courses in plant genetics (*see* Plant Sciences)
 graduate group, 172
 major program, 65, 299
 Geography, Department of, 301
 courses in, 301
 major program, 301
 Geology, Department of, 304
 courses in, 305
 major programs, 304
 German (Department of German and Russian)
 courses in, 308
 major program, 308
 Government of the University, 7
 Governmental Affairs, Institute of, 11
 Grade points defined, 27
 computation of grade-point average, 28
 Grades defined, 27
 passed or not passed, 28, 59, 116, 143
 Grades, midterm, 29
 Graduate degrees offered, 171
 Graduate Division, 171
 courses, 182
 fellowships, assistantships and loans, 175
 graduate groups, list of, 172
 intercampus exchange program, 175
 majors and degrees, 171
 program of study, 174
 requirements for admission, 172
 requirements for foreign students, 174
 teacher credential program, 175
 Graduate students
 financial aids, 175
 grades of Satisfactory or Unsatisfactory, 27
 reentry, 173
 scholarship deficiencies, 28
 Graduate study
 College of Agricultural and Environmental Sciences, 171
 College of Engineering, 139
 Engineering, Applied Science, 139
 School of Veterinary Medicine, 169
 without degree objective, 174
 Graduation, University requirements for, 30-32
 Grants, 36

- Greek (Department of Spanish and Classics)
 courses in, 228
 major program, 226
- Group majors in
 College of Letters and Science, 145
 Graduate Division, 172
 Gynasium, use of, 368
- Health insurance, supplementary, 43
 fee, 35
 required for international students, 43
- Health sciences, 65
- Health Service, Students, 43
- Hematology, 347
- High-frequency phenomena and devices, 132
- High School
 preparation for engineering, 109
 preparatory subjects for University
 curricula, 15
 requirements for admission, 14
- History, Department of, 313
 courses in, 314
 major program, 314
- History and government of the University, 7
 of the Davis campus, 7
- History requirement for admission, 14
- Home economics, major in, 62, 85
- Home Economics Education, courses in, 321
- Home Management, courses in, 321
- Honor Spirit, 9
- Honors
 at graduation, 32
 College of Agricultural and Environmental
 Sciences, 63
 College of Engineering, 116
 College of Letters and Science, 149
 deans lists, 32
 prizes, 32
- Honors courses defined, 149, 182
- Honors programs, Letters and Science, 149
- Honors students
 credit by examination, 32
 passed or not passed grades, 28, 59, 116,
 143
 privileges, Letters and Science, 149
- Horticulture (*see* Environmental Horticulture)
 graduate group, 172
 field of interest, 65
- Housing, information, 40
- Human anatomy, courses in, 345
- Human development
 courses in, 321
 field of interest, 65
- Human Physiology
 courses in, 346
- Humanistic-social studies, College of
 Engineering, 114
- Humanities, Letters and Science
 breadth requirement, 141
 list of courses, 150
- Incomplete, grade of, 27
- Independent Study program, defined, 182
- Index, departments by college and school,
 177
- Individual majors
 Letters and Science, 145
 Agricultural and Environmental Sciences,
 61, 62
- Information and control, 132
- Institution Management, courses in, 323
- Insurance, health (*see* Health Insurance)
- Integrated Studies, 323
- Intention to register form, 22
- Intercampus transfer, 22
- Intercampus exchange program for graduate
 students, 175
- Interdepartmental majors, Letters and
 Science, 145
- Interior decoration, 65
- Internal Medicine, courses in, 347
- International Agricultural Center, 11
- International Agricultural Development
 courses in, 232
 graduate group, 172, 324
 major in, 62, 86
- International Relations, committee, 324
 major program, 324
- International students
 admission, undergraduate, 18
 admission to the Graduate Division, 174
 adviser for, 47
 American History and Institutions, 31
 courses in English for, 274
 examination in English for, 19, 30
 health insurance required, 43
 rules governing residence, 25
 Subject A examination, 30
- Irrigation, 65
- Italian (Department of French and Italian)
 courses in, 325
 major program, 325
- Japanese, courses in (*see* Oriental Languages)
- Kearney Research Foundation, 11
- Laboratory science, requirement for
 admission, 14
- Laboratory technician, 65
- Landscape, 65
- Landscape Horticulture, 55
- Landscape Management (*see* Environmental
 Planning and Management)

- Language requirement for admission, 14
 Late admission and registration, 23
Latin (Department of Spanish and Classics)
 courses in, 228
 major program, 227
Law, School of, 153
 agricultural, 65
 Department of, 153, 327
 courses in, 327
 residence rules for Juris Doctor candidates, 31
Leave of absence (*see* Withdrawal)
Letters and Science, College of, 140
 advanced placement examinations, 151
 area requirement lists of courses, 150
 breadth requirements, 141
 check list of requirements, 152
 college requirements, 141
 faculty advisers, 145
 honors, 149
 index of courses, 178
 individual major, 145
 interdepartmental majors, 145
 majors available, 144
 minimum scholarship requirements, 142
 planning the program, 145
 preprofessional study, 148
 probation and disqualification rules, 28
 requirements for the bachelor's degree, 140
 student services, 153
 teaching departments, 151
Library, University, 11
Limited status, requirements for, 20
Linguistics
 committee, 333
 courses in, 334
 graduate group, 172
 major program, 333
Livermore, courses in Engineering, Applied Science, 253
Living accommodations, 40
Loans, 37
 for graduate students, 175
Lower division courses defined, 181
Lower division requirements (*see under various Colleges and Schools*)
- Major, change of, 24, 144
Management, Business (*see Agricultural Economics and Business Management*)
Management, Home, courses in, 321
Management, Institution, courses in, 323
Mandarin, 361
Marketing, 66
Married students, housing for, 41
- Materials science**
 curriculum in, 135
Mathematics, Department of, 334
 courses in, 336
 major programs, 335
Mathematics
 applied, specialization, 127
 requirement for admission, 14
Meat science, 66
Meat technology, 66
Mechanical Engineering, Department of, 268
 courses in, 268
 curriculum, 136
Medical Education, courses in, 347
Medical examination, required, 24, 43
Medical Microbiology, 348
Medical Technology, preparation for postgraduate training in, 163
Medicine, School of, 156, 341
 courses in, 343
 health professions student assistance program, 39
Preprofessional requirements, 158, 162
Medicine and paramedical sciences, 66
Memorial Union
 Dining Commons, 41, 51
 fee, 33
Merchandising, 66
Meteorology, 66
Microbiology, graduate group, 272, 352
 courses in, 352
 field of interest, 66
Microbiology, Veterinary (*see Veterinary Microbiology*)
Mid-term grade standing, 29
Military Science, Department of, 352
 courses in, 353
Military training
 Army ROTC program, 46, 353
 scholarships, 40, 353
Minimum undergraduate scholarship requirements, 30
Molecular Biology, 66, 75
Music, Department of, 354
 courses in, 355
 major program, 354
- Name change, 24
Native American Studies, 66
 courses in, 357
Natural sciences, Letters and Science
 breadth requirement, 141, 150
 list of courses, 150
Nematology
 courses in, 358
 field of interest, 66
Neurology, courses in, 348

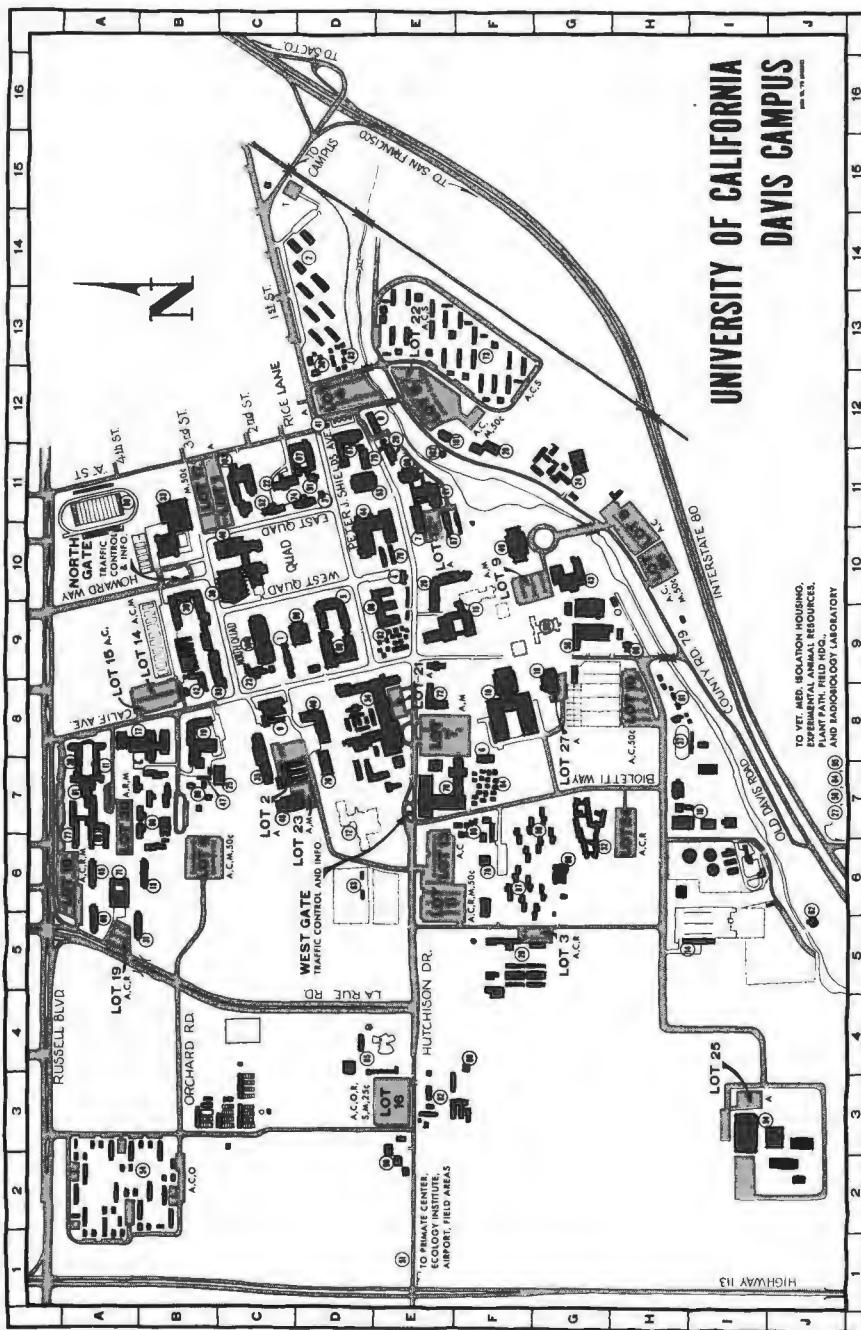
- Neurosurgery, 348
 Nonresident students
 admission requirements, 14
 rules governing residence, 25
 tuition fee for, 25, 33
 Nursery education, 66
 Nursery production or management, 66
 Nursing, School of, preprofessional requirements, 163
 Nutrition Science (*see also* Dietetics)
 courses in, 358
 field of interest, 66, 67
 graduate group, 172
 major in, 62, 86
 Off-campus living accommodations, 41
 Officers, administrative, 429
 Optometry, School of, preprofessional requirements, 163
 Oriental languages, courses in, 361
 major programs, 361
 Ornamental Horticulture, 66
 Outdoor education, 66
 Out-of-state applicants
 admission requirement, 16
 rules governing residence, 25
 Park and Recreation Administration (*see* Environmental Planning and Management)
 Parking fee, 34
 Pass or not passed grades, 28, 59, 116, 143
 Pathology, Clinical (*see* Clinical Pathology)
 Pathology (Medicine), courses in, 348
 Pathology (Veterinary Medicine),
 Department of, 362
 courses in, 363
 Pediatrics, courses in, 349
 Pharmacology, 350
 Pharmacy, School of, preprofessional requirements, 163
 Philosophy, Department of, 364
 courses in, 364
 major program, 364
 Physical Education, Department of, 368
 courses in, 368
 major program, 368
 Physical examination required, 24, 43
 Physical Medicine and Rehabilitation, 351
 Physical Sciences committee, 371
 major program, 371
 Physical Therapy, School of, preprofessional requirements, 163
 Physics, Department of, 371
 course in, 373
 major programs, 372
 Physiological Sciences, Department of, 376
 courses in, 376
 Physiology
 courses in, 378, 423
 field of interest, 66
 graduate group, 172
 major requirements, 87, 378
 Placement examination in foreign languages, 23, 147
 Placement Services, Students and Alumni, 44
 Plant disorder diagnosis, 67
 Plant genetics, courses in (*see* Plant Sciences)
 Plant Pathology
 courses in, 381
 field of interests, 67
 major in, 62
 Plant Physiology, graduate group, 172
 Plant Protection, requirements for the major,
 (*see* Crop Protection)
 Plant Science (*see also* Viticulture)
 courses in, 382
 major in, 62, 88
 Political Science, Department of, 383
 course in, 383
 major program, 383
 Pomology (*see also* Plant Science)
 courses in, 391
 field of interest, 67
 Portuguese (Department of Spanish and Classics), courses in, 411
 Poultry Husbandry (*see* Avian Sciences)
 field of interest, 67
 Power and machinery, 122
 Preforestry
 major in, 62, 65, 89, 162
 Preparation for
 College of Engineering, 109
 professional schools not at Davis, 160
 School of Law, 154, 162
 University curricula, 15
 Prerequisites, 181
 Preventive Veterinary Medicine, graduate group, 172
 Preveterinary medicine curriculum, 62, 89, 162, 165
 Primate Biology, National Center for, 11
 Prizes, 32
 medals, 32, 60, 149
 Probation, rules governing, 28
 Probe work-learning programs, 46
 Professional courses
 defined, 182
 in foreign language teaching (*see under various departments*)
 preprofessional, curriculum, 89, 160–165, 167
 Professional schools, preparation for admission, 160
 Business Administration, 162

- Dental Hygiene, 163
 Dentistry, 163
 Forestry, 89, 162
 Law, 153, 162
 Medicine, 156, 162
 Nursing, 163
 Optometry, 163
 Pharmacy, 163
 Physical Therapy, 163
 reference books, 165
 referral information, 161
 Veterinary Medicine, 89, 162, 165
- Psychiatry, courses in, 351
 Psychology, Department of, 391
 courses in, 392
 major program, 392
 Public Health (*see* Epidemiology and Preventive Medicine)
 field of interest, 67
- Quantitative Biology, field of interest, 67
 Quarter system, explanatory note, 28, 181
 Quarter units, how to convert, 28
- Radiobiology Laboratory, 11
 Ranching, 67
 Range Management
 courses in, 395
 graduate group, 172
 Range Science (*see also* Agronomy)
 major in, 62, 90
- Readmission
 after an absence, 25
 after disqualification, 28, 142
 health requirement, 24, 43
 Letters and Science, 142
 of graduate students, 173
- Reapplication for admission, 22
 Reexaminations, 27
 Regents of the University, 429
 Registration procedures, 23
 Renewable Natural Resources
 major in, 62, 90
 Reports of student grades, 27
 Requirements
 for admission, 14-23
 for graduation, 30-32
 Research
 assistantships, 175
 departments (agricultural and environmental sciences), 54
 facilities on campus, 11
 Reserve Officers' Training Corps, 46, 353
 Residence
 costs, 33-41
 halls, 40
 requirement for graduation, 31
- requirement in Letters and Science, 143
 rules governing, 25
 statement of, 25
 Resource Sciences
 courses in, 396
 field of interest, 67
 Rhetoric, Department of, 396
 courses in, 397
 major program, 397
 ROTC Army program, 46, 353
 scholarship program, 40, 353
 Russian (Department of German and Russian) 399
 courses in, 400
 major program, 399
 Russian Literature and History,
 committee in, 402
- Satisfactory and Unsatisfactory, grades of, 27
 Scholarship
 deficiencies, 28
 grades of, 27
 honors and prizes, 32
 mid-term grade standing, 29
 requirements for admission, 15
 requirements for graduation, 30
- Scholarships, 35
 in the College of Agricultural and Environmental Sciences, 61
- President's, 35
 Regents, 35
 ROTC program, 40, 353
 University, 35
- Science requirement for admission, 14
 Sculpture, courses in (*see* Art)
 Second bachelor's degree, applicants for, 20
 Selective Service, 46
 Social sciences, Letters and Science
 breadth requirement, 141
 list of courses, 150
 Social welfare, preparation for postgraduate training in, 163, 403
 Sociology, Department of, 403
 courses in, 403
 major program, 403
 Soil science
 courses in, 408
 graduate group, 172
 Soil and water engineering, 122
 Soil and water science
 courses in, 409
 major in, 62, 91
 Soils, 67
 Spanish (Department of Spanish and Classics), 410
 courses in, 411
 major program, 410

- Special admission categories, 19
 Special-study courses defined, 181
Speech (see Rhetoric)
 Statement of
 intention to register, 22
 residence, 25
 Structural engineering and mechanics
 specialization, 128
 Structures and environment, 122
 Student
 activities, 43
 conduct and discipline, 48
 employment, 39, 44
 expenses, 33
 Health Service, 43
 housing, 40
 publications, 50
 Recreational facilities, 50
 Relations Council, responsibility, 49, 55
 Student Body membership fee, 33
 Study-list regulations
 at registration, 23
 College of Agricultural and Environmental Sciences, 58
 College of Engineering, 111
 College of Letters and Science, 146
 Subject A
 at registration, 30
 department of, 414
 fee, 30
 requirements for graduation, 30
 Summer Sessions, 12
 course acceptability in Letters and Science, 141
 courses and residence requirement, 31
 credit from other institutions, 183
 Symbols, footnotes, 183
 Systems and circuits specialization, 132
 Teacher education
 courses, 182
 credentials, 61, 149, 175
 credentials in College of Agricultural and Environmental Sciences, 61
 curricula in College of Agricultural and Environmental Sciences, 67
 in College of Letters and Science, 149
 requirement (*see under various departments*)
 Teaching assistantships, 175
 Tests (*see Examinations*)
 Textiles
 major in, 62, 92
 field of interest, 67
 Textiles and Clothing, courses in, 414
 Theatre, University, 50, 236
 Wyatt Pavilion, 52
 Toxicology (*see Environmental Toxicology*)
 field of interest, 67
 Transcripts of record, 21, 29
 for admission, 21
 for intercampus transfer, 22
 from the University, 29
 Transfer students
 application for admission, 17
 American History and Institutions requirement, 30
 requirements for admission, 17
 Subject A, 30
 Transfer credits, 60
 Transfer to another campus, 22
 regulations for students dismissed or on probation, 28
 Transportation, 10
 Truck crops, 67
 Tuition, for nonresidents, 25, 33
 Turf management, 67
 Tutorial
 courses defined, 182
 services, 45
 Undeclared status, Letters and Science, 144, 146
 Units of credit, 180
 computation of grade-point average, 28
 maximum and minimum limitations, 24
 Agricultural and Environmental Sciences, 59
 Engineering, 112
 Letters and Science, 146
 University requirement for graduation, 30-32
 University Extension, 12
 course acceptability, 18, 113, 141, 183
 University of California, history and government
 the Davis campus, 7
 the statewide University, 7
 University Theatre, 50, 236
 Upper division courses defined, 182
 Vaccination certificate required, 22, 43
 Vegetable Crops (*see also Plant Science*)
 courses in, 415
 field of interest, 67
 Veterans benefits, 38
 Veterinary Medicine, School of, 165, 179
 admission to, 166
 agricultural fields of interest, 68
 graduate study, 171
 Health professions student assistance program, 39
 minimum scholarship requirements, 168, 169

- plan study, 167
requirements for D.V.M., 168
requirements for the Bachelor of Science,
 169
selection of applicants for, 166
- Veterinary Microbiology, Department of, 416
 courses in, 416
- Viticulture and Enology (*see also* Plant
 Science)
 courses in, 418
 field of interest, 68
- Vocational
 agriculture, 68
 rehabilitation services, 39
- Warning notices, mid-term, 29
- Water resources engineering specialization,
 129
- Water Science, 68
 courses in, 419
- Weed Science, 68
- Welfare Council (*see* Student Relations
 Council), 49
- Wildlife, 68
- Wildlife and Fisheries Biology
 courses in, 421
 major in, 62, 94
- Wine making, 68
- Withdrawals, 25
- Work-learn program, 46, 57
- Work-study cooperative program, 113
- Wyatt Pavilion Theatre, 52
- Zoology, Department of, 422
 courses in, 423
 major programs, 422

UNIVERSITY OF CALIFORNIA DAVIS CAMPUS



BUILDINGS and FACILITIES

1. Academic Office Building
2. Aggie Villa D-14
3. Agricultural Extension D-11
4. Agricultural Field Stations and Agriculture Practices E-10
5. Animal Science D-9
6. Architects and Engineers F-8
7. Art Building E-10
8. Art Laboratory E-12
9. Amundson Hall C-8
10. Bainer Hall F-8
11. Beckett Hall A-7
12. Briggs Hall (under construction) D-7
13. Bixby Hall B-6
14. Central Garage I-5
15. Chemistry Building F-9
16. Cole Facility I-7
17. Cowell Student Health Center B-8
18. Crocker Nuclear Laboratory G-8
19. Cruess Hall B-8
20. Dairy Cattle Research F-5
21. Dramatic Art Building E-11
22. East Hall C-11
23. Ecology Laboratory C-9
24. Environmental Horticulture G-11
25. Environmental Toxicology C-7
26. Everson Hall E-10
27. Experimental Animal Resources J-7
28. Faculty Club F-12
29. Fire House E-12
30. Freeborn Hall C-10
31. Gilmore Hall B-5
32. Graduate Residence G-6
33. Gymnasium B-10
34. Haring Hall E-8
35. Hosgland Hall C-7
36. Home Management D-12
37. Horse Arenas H-8
38. Hughes Hall A-7
39. Hunt Hall B-9
40. Hurthison Hall D-8
41. Information Booth D-12
42. Irrigation Laboratory B-8
43. King Hall G-10
44. Library D-10
45. Malcolm Hall A-6
46. Mann Laboratory C-7
47. Marine Resources Laboratory B-7
48. Memorial Union C-10
49. Mruk Hall F-10
50. Music Building E-11
51. National Center for Primate Biology E-1
52. North Hall C-11
53. Olson Hall D-11
54. Orchard Park Apartments B-2
55. Physical Plant and Storehouse G-9
56. Physics—Geology (under construction) G-9
57. Physics Shops E-10
58. Pierce Hall G-7
59. Plant Pathology Field Headquarters J-7
60. Police Department H-9
61. Primero Dining Commons A-7
62. Putah Creek Recreation Lodge J-6
63. Radiobiology Annex D-6
64. Radiobiology Laboratory J-7
65. Recreation Swimming Pool Complex E-4
66. Regan Hall B-7
67. Roadhouse Hall D-12
68. Robbins Hall D-9
69. Ryerson Hall A-5
70. School of Medicine E-7
71. Segundo Dining Commons A-6
72. Silo Snack Bar E-8
73. Solano Park Apartments F-13
74. South Hall D-11
75. Sproul Hall D-11
76. Storehouse (see No. 55)
77. Struve Hall A-7
78. Telephone Office F-6
79. Temporary Building (5-6) E-10
80. Temporary Buildings (13-16) B-7
81. Temporary Buildings (29-35) H-8
82. Temporary Buildings (98-115) E-9 includes University Extension TB 98-99
83. Temporary Buildings (116-121), 123, 124) D-13
84. Temporary Buildings (134-158) F-7
85. Temporary Buildings (161-172) F-7
86. Tercero Dining Commons G-6
87. Thile Hall F-6
88. Thus Hall A-6
89. Toomey Field A-11
90. University Extension Mini Center E-2
91. University House D-11
92. Vegetable Crops Field Headquarters E-3
93. Veihmeyer Hall B-8
94. Veterinary Medical Teaching Hospital J-3
95. Veterinary Medicine Isolation Housing J-7
96. Visual Aids, Agricultural Extension F-4
97. Vorhies Hall D-11
98. Walker Hall E-9
99. Wellman Hall D-9
100. Wickson Hall C-9
101. Wyatt Pavilion Theatre E-12
102. Wyatt Snack Bar E-11
103. Young Hall C-11

Shaded streets and parking areas are open to automobile traffic; parking by permit only; visitor parking permit (50c per day) in lots 5, 6, 10, 11, 17, and 26; (25c per day) in lot 16.

J-7