

UNIVERSITY
OF
CALIFORNIA



GENERAL
CATALOGUE

1965 - 66

DAVIS

Office of the Registrar



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FALL AND SPRING SEMESTERS 1965-66

August 1, 1965

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General Catalogue

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UNIVERSITY OF CALIFORNIA, DAVIS



Olson Hall

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University Calendar

1965-1966

Davis Campus

Fall Semester 1965-1966

July 12, Monday	Applications for admission to undergraduate standing, including applications for intercampus transfer and for graduate change of station in the fall semester, must be filed with complete credentials, with the Registrar on or before this date. Credentials received as late as this may not be evaluated in time for the enrollment of the student during the regular registration period.
Aug. 2, Monday	Credentials and applications for admission to graduate standing for fall semester 1965 must be filed with the Dean of the Graduate Division on or before this date.
Aug. 23, Monday	Applications for readmission to undergraduate and graduate status for fall semester 1965 must be filed with the Registrar on or before this date.
Sept. 6, Monday	Labor Day—academic and administrative holiday.
Sept. 11, Saturday	Fall semester begins.
Sept. 11, Saturday Sept. 18, Saturday	} Orientation and testing.
Sept. 15, Wednesday Sept. 16, Thursday	} Registration in person.
Sept. 20, Monday	Instruction begins.
Oct. 1, Friday	Candidates who expect to complete work for masters degrees to be conferred in January 1966, must file for candidacy on or before this date.
Oct. 4, Monday	Candidates who expect to complete work for A.B. and B.S. degrees to be conferred in January 1966, must file announcement of candidacy with the Registrar on or before this date.
Oct. 8, Friday	Candidates who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in January 1966 must file an application for candidacy with the Dean of the Graduate Division on or before this date. Petitions to enroll or add courses to study lists must be filed on or before this date.
Oct. 15, Friday	Petitions to drop courses without scholarship penalty must be filed with the Registrar on or before this date.
Oct. 23, Saturday	Applications to take engineering examinations required for admission in the spring semester 1966 must be filed on or before this date.
Nov. 5, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in January 1966 must be filed with the committees in charge on or before this date.
Nov 6, Saturday	Engineering examinations, lower division and upper division.
Nov. 25, Thursday Nov. 26, Friday	} Thanksgiving holiday—academic and administrative holiday.
Nov. 25, Thursday Nov. 27, Saturday	} Fall recess—academic holiday.
Dec. 15, Wednesday	Applications for admission to undergraduate standing, including applications for intercampus transfer for spring semester 1966 must be filed with complete credentials, with the Registrar on or before this date.
Dec. 17, Friday	Theses for master's degrees to be conferred in January 1966 must be filed with the committees in charge on or before this date.
Dec. 20, Monday Jan. 1, Saturday	} Christmas recess—academic holiday.

Dec. 24, Friday	} Christmas holiday—academic and administrative holiday.
Dec. 25, Saturday	
Dec. 31, Friday	} New Year's holiday—academic and administrative holiday.
Jan. 1, Saturday	

1966

Jan. 3, Monday	Credentials and applications for admission to graduate standing for spring semester 1966 must be filed with the Dean of the Graduate Division on or before this date.
Jan. 3, Monday	Instruction resumes.
Jan. 7, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in January 1966 must be filed with the Dean of the Graduate Division on or before this date.
Jan. 10, Monday	Applications for readmission to undergraduate and graduate status for spring semester 1966 must be filed with the Registrar on or before this date.
Jan. 15, Saturday	Instruction ends.
Jan. 17, Monday	} Final examinations.
Jan. 26., Wednesday	
Jan. 26, Wednesday	Fall semester ends.
Jan. 26, Wednesday	Theses for master's degrees to be conferred in January 1966 must be filed with the Dean of the Graduate Division on or before this date.
Feb. 1, Tuesday	Applications for 1966-1967 undergraduate scholarships for current students must be filed on or before this date.

Spring Semester 1966

Jan. 31, Monday	Spring semester begins.
Jan. 31, Monday	} Orientation and testing.
Feb. 5, Saturday	
Feb. 3, Thursday	} Registration.
Feb. 4, Friday	
Feb. 7, Monday	Instruction begins.
Feb. 1, Tuesday	Applications for fellowships and graduate scholarships for 1966-1967 must be filed on or before this date.
Feb. 15, Tuesday	Applications for 1966-1967 undergraduate scholarships for new students must be filed on or before this date.
Feb. 18, Friday	Candidates who expect to complete work for the master's degrees to be conferred in June 1966 must file applications for candidacy on or before this date.
Feb. 22, Tuesday	Washington's birthday—academic and administrative holiday.
Feb. 21, Monday	Candidates who expect to complete the work for A.B. and B.S. degrees in June 1966 must file announcement of candidacy on or before this date.
Feb. 25, Friday	Candidates who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1966 must file applications for candidacy on or before this date. Petitions to enroll or add courses to study lists must be filed with the Registrar on or before this date.
Feb. 28, Monday	Applications for admission to the School of Veterinary Medicine must be filed with the Registrar on or before this date.
Mar. 4, Friday	Petitions to drop courses without scholarship penalty must be filed with the Registrar on or before this date.
Mar. 11, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1966 must be filed with the committee in charge on or before this date.
Mar. 19, Saturday	Applications to take engineering examinations required for admission in the fall quarter 1966 must be filed on or before this date.
Apr. 2, Saturday	Engineering examinations—lower division and upper division.
Apr. 4, Monday	} Spring Recess—an academic holiday.
Apr. 9, Saturday	
Apr. 8, Friday	Academic and administrative holiday.
Apr. 23, Saturday	Picnic Day—academic and administrative holiday.
May 6, Friday	Theses for master's degrees to be conferred in June 1966 must be filed with the committees in charge on or before this date.

May 13, Friday Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1966 must be filed with the Dean of the Graduate Division on or before this date.

May 28, Saturday Instruction ends.

May 30, Monday Memorial Day—academic and administrative holiday.

May 31, Tuesday } Final Examinations.

June 9, Thursday }

June 9, Thursday Spring semester ends.

 Theses for master's degrees to be conferred in June 1966 must be filed with the Dean of the Graduate Division on or before this date.

First Summer Session 1966

June 20, Monday Registration and first day of instruction.

July 4, Monday Fourth of July—academic and administrative holiday.

July 29, Friday First Summer Session instruction ends.

Second Summer Session 1966

Aug. 1, Monday Registration and first day of instruction.

Sept. 5, Monday Labor Day—academic and administrative holiday.

Sept. 9, Friday Second Summer Session instruction ends.

The University of California

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11

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The University of California

Founded 1868

HISTORY

The Beginning

In 1868 the University of California was established, with the governor's signing of the Organic Act passed by the State Legislature. The following year the University opened its doors on the Oakland campus of the College of California. Five years later the University moved to Berkeley, when the first buildings were completed.

Today

The University, currently serving the State of California with nine campuses—Berkeley, Davis, Irvine, Los Angeles, Riverside, San Diego, San Francisco, Santa Barbara, and Santa Cruz—is composed of academic and professional schools and colleges, divisions, departments of instruction, museums, libraries, research institutes, bureaus, and foundations.

In addition to the educational facilities centered on its campuses, the University operates the University Extension and Agricultural Extension Service everywhere in the State where a public demand is apparent. Special instruction and research are carried on throughout the State, in other states, and in foreign countries.

Scope

The University is continuing, as in the past, to keep pace with the growth of the State. Present campuses are being expanded; new campuses are in the planning stage. The University's steady increase in quality as well as in size has won it general recognition as one of the four or five greatest universities in the country. The University of California provides a college education for all qualified students, without distinction of sex, creed, or race. It offers instruction in the arts, sciences, and literature, as well as fundamental training for many of the professions.

GOVERNMENT

The government of the University is entrusted to a corporation, The Regents of the University of California, consisting of twenty-four members. Sixteen are appointed by the Governor; the others are members *ex officio*.

The Regents select a President of the University, who becomes responsible to The Regents for the proper administration of the University on all of its campuses. The President, in turn, recommends chief administrative officers (chancellors) for the campuses of the University, state-wide vice-presidents, and administrative deans.

In line with full powers of organization and government granted by the State of California, The Regents are authorized to delegate to committees or to the faculty or to others, such authority or functions in the administration of the University as they may deem wise. Therefore, The Regents have created an academic administrative body called the Academic Senate.

The Academic Senate consists of the President, Chancellors, Vice-Chancellors, Vice-Presidents, Deans, Directors, Registrars, University Librarians, and all professors and instructors giving instruction in any curriculum under the control of the Academic Senate. The Davis Division of the

Academic Senate is the academic administrative body for the Davis campus. It determines the conditions for admission, for certificates, and for degrees (subject to the approval of The Regents).

The Senate also authorizes and supervises all courses of instruction in the academic and professional colleges and schools, and also recommends to the President all candidates for degrees.

SITE AND GROWTH OF THE DAVIS CAMPUS

Davis, a general campus of the University, continues to offer more courses each year in the letters and sciences and engineering. Davis remains the University's principal campus for teaching and research in the agricultural sciences and veterinary medicine.

The College of Agriculture and the College of Letters and Science account for over 85 per cent of the undergraduate enrollment, while the College of Engineering and the School of Veterinary Medicine make up the remainder. The Graduate Division, with nearly 25 per cent of the total enrollment, offers work to the Ph.D. in many areas, largely in the agricultural and basic sciences but increasingly in the humanities and social sciences. Davis now enrolls students aiming toward all branches of engineering and offers specialized training in agricultural, chemical, civil, electrical, and mechanical engineering. Education programs lead to credentials for elementary and secondary teaching.

The 3,710-acre Davis campus is essentially a residential campus with 2,000 single students living in new University halls, and 350 married students living in campus married-student housing facilities. Flat terrain makes bicycles a favorite mode of travel, both on campus and in town.

The city of Davis, a college town of about 15,000, lies on main rail and highway junctions 13 miles west of the State capital, Sacramento. Davis is also about 90 minutes away from metropolitan San Francisco and surrounding cities.

SCHOOL OF LAW

A School of Law has been established on the Davis Campus. It will accept its first entering class in the Fall of 1966. Only first year students will be accepted. Admission will be restricted to persons with B.A. or B.S. degrees, good academic records, and acceptable scores on the Law School Admission Test. Full information and application blanks for admission to the Fall 1966 class will be available in the Fall of 1965.

SURVEY OF CURRICULA

Instruction is offered in the College of Agriculture, the College of Letters and Science, the College of Engineering, the School of Veterinary Medicine, and the Graduate Division.

The undergraduate curricula of four years in applied science in the College of Agriculture lead to the bachelor's degree in science (B.S.). The curricula include major subject offerings in:

Agricultural Business Management
Agricultural Economics
Agricultural Education
Agricultural Science and Management
Animal Science
Animal Husbandry
Animal Physiology
Genetics
Poultry Husbandry

Entomology
Food Science
Home Economics
Child Development
Design
Dietetics
Foods
General Home Economics
Nutrition
Textile Science

International Agricultural
Development
Irrigation Science
Plant Science
Agronomy
Genetics
Landscape Horticulture
Park Administration

Plant Pathology
Pomology
Vegetable Crops
Viticulture
Preforestry
Preveterinary Science
Range Management
Soil Science

Preprofessional training in forestry and veterinary medicine is offered.

The College of Engineering offers a curriculum in engineering which permits specialization in agricultural, chemical, civil, electrical, and mechanical engineering.

The undergraduate curricula of four years in the College of Letters and Science lead to the bachelor's degree in arts (A.B.) and science (B.S.). Organized majors and professional curricula include:

American History and Literature
Anthropology
Art
Bacteriology
Biological Sciences
Botany
Chemistry
Dramatic Art
Dramatic Art and Speech
Economics
English
French
Geography
Geology
German
History

International Relations
Latin
Mathematics
Music
Philosophy
Physical Education
Physical Sciences
Physics
Political Science
Psychology
Russian
Sociology
Spanish
Zoology

The School of Veterinary Medicine offers a curriculum of four years, following two or more years of preprofessional work, leading to the degree Doctor of Veterinary Medicine (D.V.M.).

Graduate study, leading to advanced degrees, is offered to college graduates formally admitted to the Graduate Division (see page 91).

DEGREES AWARDED

Approximately 225,000 degrees and certificates have been granted by the University of California to students on its various campuses since it was established. Candidates for degrees must satisfy academic and residence requirements as set forth in the collegiate section of this bulletin and bulletins of the schools and colleges, and the Graduate Division.

The prospective student is advised to give careful attention to determining the major or subject in which he wishes to receive a degree before entering the University, and to plan his curriculum beginning with his freshman year to facilitate completion necessary to obtain the degree.

Undergraduate Degrees

The degree of Bachelor of Arts (A.B.) is offered in organized majors or programs in the College of Letters and Science. However, students are permitted to prepare programs that may not be included in the published announcements, upon approval from the Executive Committee.

The degree of Bachelor of Science (B.S.) is offered in the colleges of Agriculture, Engineering, Letters and Science, and in the School of Veterinary

Medicine. Detailed descriptions of the departmental and college and school programs will be found in later pages of this Catalogue and in the announcements of the schools and colleges.

Graduate Degrees

In the Graduate Division the degrees of Master of Arts (M.A.), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.) are conferred. Professional degrees offered are Master of Education (M.Ed.), Master of Engineering (M.Eng.), Doctor of Engineering (D.Eng.), and Doctor of Veterinary Medicine (D.V.M.).

More detailed information may be found in the specialized bulletins and publications and in the graduate announcements of the individual schools and departments, obtainable on request from the Office of the Registrar, University of California, Davis 95616.

SUMMER SESSIONS

In 1966 there will be two regular six-week Summer Sessions beginning on June 20 and on August 1. 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 to other qualified graduate students who may wish to complete requirements for teaching credentials or degrees. In addition, the courses numbered 199 for advanced undergraduates and graduate research courses numbered in the 299 series will be available for qualified students in many departments.

Summer sessions are also conducted on the Berkeley, Los Angeles, Riverside, and Santa Barbara campuses. Information about these summer sessions is available in the Summer Sessions bulletins, obtainable from the Registrar, or from the Office of the Summer Sessions on the respective campuses.

UNIVERSITY EXTENSION

University Extension makes available the resources of the University on a statewide basis to individuals and organizations. Extension programs are organized around the following education aims: (1) the intellectual and cultural development of adults; (2) the dissemination of new knowledge resulting from teaching and research activities within the University; (3) the continuing education of scientific, technical, and professional personnel; (4) the development of special educational programs for public and private organizations and agencies; and (5) public affairs education through programs designed to aid adults in meeting their responsibilities as citizens.

A variety of methods are used to implement these aims: classes, discussion groups, correspondence courses, conferences, institutes, short courses, lectures, motion picture production, broadcast educational television, and vocational counseling and testing (Los Angeles only).

Veterans' dependents may use the educational benefits available to them under Federal and State laws to enroll in University Extension classes, provided the classes are part of their prescribed and recognized objectives approved by the Veterans Administration.

For detailed information, write or telephone the University Extension office on any campus of the University or at the following additional locations: 813 South Hill Street, Los Angeles 14 (MAdison 3-6123); 1221 Fourth Avenue, San Diego 1 (BElmont 2-7321); Room 15, Buena Park High School, 10th and Magnolia, Buena Park (LAmber 6-3397); San Francisco Extension Center, 55 Laguna Street, San Francisco (UNderhill 1-6833); 3620B West 182nd Street, Torrance (DAvis 3-4773).



Hutchison Hall

Admission to the University

ADMISSION IN UNDERGRADUATE STATUS

The admission requirements of the University are based on two principles:

1. That the best assurance of success in the University is shown by high quality of scholarship in previous work.
2. That the study of certain specified subjects will give the student both good preparation for study in the University and reasonable freedom in choosing his field of specialization.

APPLICATION FOR ADMISSION

An application should be filed with the Office of Admissions, Room 25, Freeborn Hall, University of California, Davis. An application form will be supplied by the Office of Admissions on request during the periods listed below. *Applicants are urged to file early in the appropriate period.*

*Filing Periods—1965–1966**

Fall Semester 1965—October 1, 1964 through March 1, 1965

Spring Semester 1966—March 1, 1965 through October 15, 1965

Fall Quarter 1966—October 1, 1965 through March 1, 1966

Winter Quarter 1967—May 1, 1966 through November 1, 1966

Spring Quarter 1967—August 1, 1966 through February 1, 1967.

Admission requirements are uniform on all campuses of the University. Admission to the University entitles the student to attend the campus of his choice if the required facilities are available. Since applications will be processed and acted upon in only one Office of Admissions, applications should not be directed to more than one 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 the campus where he now wishes to register and the reason for his change. His records will be transferred to the campus he wishes to attend provided facilities are available there. Such requests must be received within the filing periods shown above.

APPLICATION FEE

Each applicant for admission is required to pay a nonrefundable fee of \$10 when an application is filed. Remittance by bank draft or money order payable to The Regents of the University of California must be attached to the application.

TRANSCRIPTS OF RECORD

Each applicant is responsible for requesting the graduating high school and each college attended to send promptly official transcripts of record directly to the Office of Admissions where his application is on file.

Those applying as entering freshmen should ask the high school to submit preliminary transcripts showing the complete record through the sixth semester and listing courses in progress or planned. In every case, a final transcript including a statement of graduation will be necessary.

* These filing periods apply to *all* undergraduate applicants (regular, special, second degree and intercampus transfers).

Transcripts from the last college attended should include a statement of good standing or honorable dismissal. A preliminary transcript should show work in progress.

Transcripts submitted become the property of the University and will not be returned.

NOTIFICATION OF ADMISSION

Applicants will be notified of their eligibility status on or before the dates listed below. Those who are admitted will be required to return an *Acceptance of Admission* form, together with a nonrefundable fee of \$25.00, which will be credited to the incidental fee if the student registers in the semester or quarter for which he applied.

Dates for Notification of Admission—1965-66

Fall Semester—April 15, 1965

Spring Semester—December 15, 1965

FAILURE TO REGISTER

An applicant who is not eligible for admission or one who has been admitted but does not register in the term for which he applied, and who thereafter desires to attend the University, must submit a new application for admission.

SUBJECT A: ENGLISH COMPOSITION

The University requires every student to pass an examination in English composition (the Subject A examination) or to complete in college an acceptable course of at least 3 units in English composition with a satisfactory grade. Students who enter the University with credentials showing the completion elsewhere of acceptable college-level training in composition with at least a C grade or a score of at least 600 in the College Entrance Examination Board Achievement Test in English Composition (see page 19 for dates) taken after they have completed the eleventh grade are considered to have met the Subject A requirement. All other students are required to take the examination given by the University. Although it is not required for admission, the test must be taken at the opening of the first term in attendance, if not taken previously. Students who neither pass the examination nor meet the requirement in one of the above ways will be required to take the noncredit course in English composition during the first term in residence, for which a fee of \$35 is charged.

VACCINATION CERTIFICATE

Every new student and every student returning to the University after an absence of one or more terms must present at the time of medical 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. Vaccination should be completed prior to arrival on campus.

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 was last registered in regular session*. The intercampus transfer application form and application for transcript of record form may be obtained from the Office of the Registrar and must be filed with that office within the filing periods listed on page 19 under "Application for Admission."

PREPARATION FOR UNIVERSITY CURRICULA

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 and which may be obtained from the campus Office of Admissions or the University Dean of Educational Relations, University Hall, University of California, Berkeley, California 94720.

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 FRESHMAN STANDING

An applicant for admission to freshman standing is one who has not registered in regular session in any college-level institution since graduation from high school.

If, at the time of high school graduation, the applicant does not meet the requirements given below for admission to freshman standing or does not qualify by examination, he must meet the requirements for admission to advanced standing (see page 23). An exception to this regulation will be made only if the student's deficiency was the result of his not having studied one or more required high school subjects. Such a student can sometimes remove the deficiency during the summer; he should consult the Office of Admissions in advance.

REQUIREMENTS FOR ADMISSION TO FRESHMAN STANDING

An applicant for admission to freshman standing must meet the requirements listed below. Special requirements for nonresident applicants will be found on page 25.

GRADUATION FROM HIGH SCHOOL

An applicant who has been graduated from a high school will be admitted to the University upon the completion of prescribed courses with the required scholarship average.

When a resident of California has been graduated from a high school outside California, the acceptability of the record is determined by the Office of Admissions.

SUBJECT REQUIREMENTS

a. *History*, 1 unit

This must consist 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 must consist of six semesters of English composition, literature, and oral expression.

c. *Mathematics*, 2 units

These must consist of two semesters of algebra and two semesters of plane geometry or an integrated two-year course covering the same material. Advanced algebra and trigonometry may be submitted for algebra and trigonometry, and solid geometry for plane geometry.

d. *Laboratory Science*, 1 unit.

This must consist of an 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.

f. *Advanced Course*, 1 (or 2) units

This must be chosen from the following:

Mathematics, a total of 1 unit of second-year algebra, solid geometry, trigonometry. Foreign language, either 1 additional unit in the same foreign language offered under *e* or 2 units of another foreign language. Science, 1 unit of either chemistry or physics in addition to the science offered under *d*.

ELECTIVES

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

SCHOLARSHIP REQUIREMENTS

At least a B average is required in courses taken after the ninth year 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 assigned. Grades are considered on a semester basis except from schools that give only year grades.

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 C or lower is received may be repeated to establish subject credit or to improve scholarship. Grades earned in the first repetition may be used to satisfy scholarship; grades of C or higher in additional repetitions will satisfy the subject requirement, but will not be counted higher than a C in scholarship computation.

Courses may be repeated in an amount not to exceed 2 units of the *a* to *f* pattern.

ADMISSION BY EXAMINATION

An 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 by examination.

The University does not offer entrance examinations but accepts the results of examinations given by the Educational Testing Service for the College Entrance Examination Board.

To qualify by examination, the applicant must present scores in the Scholastic Aptitude Test (S.A.T.) and three Achievement Tests. The three Achievement Tests are to include English composition and one from each of the following two groups:

1. Social Studies and Foreign Languages.
2. Mathematics and Sciences.

The tests must be taken after completion of the first half of the eleventh grade. The first repetition of a test will be accepted, but the verbal and mathematics scores on the Scholastic Aptitude Test must be from the same sitting. The total score on the Scholastic Aptitude Test must be at least 1000; the

scores on the three Achievement Tests must total at least 1650, and the score on any one Achievement Test must not be less than 500.

An applicant who has graduated from an unaccredited high school may qualify by examination under the foregoing rules. For admission of non-resident applicants by examination see page 25.

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.

Test Dates

Application Deadline

Saturday, November 6, 1965.....	October 9, 1965
(S.A.T. given in California only)	
Saturday, December 4, 1965.....	November 6, 1965
Saturday, January 8, 1966.....	December 4, 1965
Saturday, March 5, 1966.....	February 5, 1966
Saturday, May 7, 1966.....	April 9, 1966
Saturday, July 9, 1966.....	June 11, 1966

Applicants should arrange to take the tests as early as possible. *The scores of an applicant who takes the tests in March may be reported too late for consideration for admission in the fall; similarly, the scores of an applicant who takes the tests in November may be reported too late for consideration for admission in the spring.*

ADMISSION TO ADVANCED STANDING

An applicant who has registered in a junior college, a four-year college, a university, extension classes of college level, or any comparable institution since graduation from high school is subject to regulations governing admission to advanced standing. The applicant may not disregard his college record and apply for admission to freshman standing.

REQUIREMENTS FOR ADMISSION TO ADVANCED STANDING

An applicant for admission to advanced standing must meet the requirements listed below. Special requirements for nonresident applicants will be found on page 25.

The requirements for admission to advanced standing vary in accordance with the high school record of the applicant. Each applicant, however, must present from the last accredited college or university attended a statement of good standing and an academic record with a grade-point average* of C (2.0) or better. If the record established in any one accredited institution is below a C (2.0) average, an additional unit and scholarship requirement may be imposed on subsequent credit completed to offset the deficit incurred. In addition, the applicant must meet one of the following conditions:

1. An applicant who was eligible for admission to the University in freshman standing (see page 21), may be admitted at any time he has established an overall grade point average of C (2.0) or better.
2. An applicant who was ineligible for admission to the University in freshman standing, but whose only deficiency arose from not having studied

* The grade-point average is determined by dividing the total number of acceptable units attempted into the number of grade points earned on those units. Courses completed with a grade lower than C may be repeated, but the units and grade points count each time the course is taken. Scholarship standard is expressed by a system of grade points and grade-point averages in courses acceptable for advanced standing credit in the University of California. Grade points are assigned as follows: for each unit of A, 4 points; B, 3 points; C, 2 points; D, 1 point; I and F, no points.

one or more of the required high school subjects, may be admitted when the following conditions are met:

- a. He has established an overall grade-point average of C (2.0) or better.
- b. He has satisfied, by appropriate courses, with C or better grades, the subject requirements for admission to freshman standing (see page 21).

Exception: Deficiencies in subject requirements will be waived in an amount not exceeding 2 high school units if the applicant has established a minimum of 56 acceptable units passed with a grade-point average of 2.4 or better. Subject deficiencies in excess of 2 units must be satisfied.

3. An applicant who was ineligible for admission to the University in freshman standing because of low scholarship or a combination of low scholarship and incomplete subject preparation (omission, or by grades of D or lower) may be admitted when the following conditions are met:
 - a. He has established a minimum of 56 acceptable units passed with a grade-point average of 2.4 or better.
 - b. He has satisfied, by appropriate courses, subject requirements for admission to freshman standing (see page 21) except that subject deficiencies will be waived in an amount not exceeding 2 high school units.

DEFICIENCIES

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.

CREDIT FOR WORK TAKEN IN OTHER COLLEGES

The University grants unit credit for courses consistent with its curriculum that have been completed in colleges and universities accredited by appropriate accrediting agencies.

As an integral part of the system of public education of California, the University accepts, at full unit value, 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 their college course in one of the many excellent California public junior colleges. After a student has earned 70 units acceptable toward a degree, no further unit credit will be granted for courses completed at a junior college, although subject credit may still be earned.

The decision regarding the acceptability of extension courses taken at an institution other than the University rests with the Office of Admissions. The decision regarding the applicability of such course work in satisfaction of degree requirements rests with the faculty of the particular school or college in which the student plans to enroll.

ENGINEERING EXAMINATIONS

An applicant who plans to register in either the lower or the upper division of any one of most of the Engineering Colleges must take an engineering examination. It is strongly recommended, however, that all students take the examination. By doing so, an applicant who finds it necessary to transfer to a campus where the examination is required will avoid a possible delay in beginning his engineering studies. An application form will be supplied on request by the Office of Admissions.

The Lower Division Engineering Examination is an aptitude test that contains sections on technical vocabulary, mathematical reasoning, and scientific relationships. A satisfactory score on this examination is prerequisite to the standard pattern of courses in the lower division of the College of Engineering, Los Angeles. Consequently, an applicant who does not achieve

a satisfactory score will not be able to begin the usual pattern of courses and therefore will require more than four years to graduate.

The Upper Division Engineering Examination is an achievement test that includes sections on English, mathematics, chemistry, physics, and lower division engineering subjects. It is required of all applicants, including students from the lower division of the University, who seek upper division status in the College of Engineering. The score on this examination is used in conjunction with the applicant's college record to determine his placement in the upper division engineering program offered by the University.

Both examinations are given on announced dates at various test sites throughout the state.

The appropriate examination should be taken the term preceding the one in which the applicant plans to register. Formal application for admission to the University as well as the application to take the test must be filed before the date scheduled for the examination.

REQUIREMENTS FOR NONRESIDENT APPLICANTS

It has been necessary to place some limitation on enrollment of applicants who are not residents of California, and, therefore, only those of exceptional promise will be eligible for admission. The regulations below are designed to admit nonresident applicants whose standing, as measured by scholastic records, is in the upper half of those who would be eligible under the rules for California residents.

REQUIREMENTS FOR ADMISSION TO FRESHMAN STANDING

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 21).

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.

ADMISSION BY EXAMINATION

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 by examination. The requirements for a nonresident applicant are the same as those for a resident except that the total score on the Scholastic Aptitude Test must be at least 1100 and the scores on the three Achievement Tests must total at least 1725.

REQUIREMENTS FOR ADMISSION TO ADVANCED STANDING

In addition to the regular admission requirements (see page 21), a nonresident applicant for admission to advanced standing must have earned a grade-point average of 2.8 or higher in college subjects attempted and acceptable for transfer credit. If the applicant did not have at the time of high school graduation an average of 3.4 or higher in courses satisfying the required subject pattern, he must present a minimum of 56 units passed with a grade-point average of 2.8 or higher.

ADMISSION TO SPECIAL STATUS

Special students are students of mature years who have not had the opportunity to complete a satisfactory high school program or who have not completed a substantial amount of college work and who by reason of special attainments may be prepared to undertake certain courses in the University toward a definite and limited objective. No person under twenty-one years of age will be admitted as a special student, nor will an applicant be admitted directly from high school. Only cases of unusual merit will be considered. A personal interview is usually required before final action in any individual case can be taken.

Conditions for admission 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.

An applicant for special status must submit transcripts of record from all schools attended beyond the eighth grade. He may also be required to take the examination in Subject A.

The University has no special courses. A special student may be admitted to those regular courses for which, in the judgment of the instructor, he has satisfactory preparation. A special student will seldom be able to undertake the work of the 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.

ADMISSION TO 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 who by reason of special attainments may be prepared to undertake certain courses in the University toward a definite and limited objective. An applicant for limited status must submit transcripts of record from all schools attended beyond the eighth grade. The applicant may also be required to take the examination in Subject A.

Conditions for admission 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 definite period, and a prescribed scholarship average must be maintained.

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

ADMISSION OF APPLICANTS WITH BACHELORS' DEGREES

Ordinarily, an applicant with a bachelor's degree substantially equivalent to the bachelor's degree granted by the University of California should apply for admission to graduate status. An applicant with a superior record may occasionally qualify as a student in limited status or, after a complete change of objective, as an undergraduate seeking a second baccalaureate. In either case, the previous scholarship record must be such as to 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.

ADMISSION OF APPLICANTS FROM OTHER COUNTRIES

The credentials of an applicant for admission from another country in either undergraduate or graduate standing are evaluated in accordance with the general regulations governing admission. An application, official certificates, and detailed transcripts of record should be submitted to the Office of Admissions early in the appropriate application filing period (see page 19). 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 is sufficient to 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.

A student from a country where the language is not English is given college credit in his own language and literature only for courses satisfactorily 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.

A student who is outside the United States and applies for admission to the lower division of the College of Engineering must pass with satisfactory scores the College Entrance Examination Board Scholastic Aptitude Test (verbal and mathematics section) and achievement examinations in English composition, physics, and advanced mathematics. If he does not present satisfactory scores in these tests, he will not be able immediately to undertake courses in the College of Engineering even though he is admitted to the University. Arrangements to take tests in another country should be made directly with the Educational Testing Service, P. O. Box 592, Princeton, New Jersey 08540. The fee for these examinations should be sent to the Educational Testing Service, not to the University. The applicant should request that his scores in the tests be forwarded to the Office of Admissions on the campus where he plans to enroll.

General Information and Regulations

Certain general regulations govern residence and eligibility for study in the academic departments. Unless otherwise stated, these apply to both graduate and undergraduate students.

ROUTINE OF REGISTRATION

All students must register with the Registrar before undertaking any work or examination for credit toward a University degree. This registration must also be accepted by the proper faculty before the work is undertaken. *All students must register in person, not by proxy.*

Prospective students should plan to arrive early in the registration week. During that period, certain examinations, including Subject A, are scheduled for all new undergraduates. Students who fail to take required examinations at the prescribed time will be charged a \$1 fee.

Students or prospective students should consult the *Schedule and Directory* for the dates to register and begin work. Late registration privileges will be granted for a one-week period following regular registration. A \$10 fee will be assessed for extra services involved in handling late registration requests. Students should keep in mind that such requests may create scholastic difficulties and if their work is subsequently found to be deficient, late registration will not be accepted as an excuse to avoid responsibility for low scholarship.

In no event will a student be permitted to register after Friday of the first week of instruction.

STUDY-LIST REGULATIONS

At the beginning of each semester every student must file with the Registrar a detailed study list approved by a faculty adviser or other designated authority. Any changes in this program must then be made only with formal permission from the dean of the student's college. Otherwise, the student is liable to enforced withdrawal from the University or to other appropriate disciplinary action.

Each college has certain study-list limits with which the student must comply. Detailed regulations of the respective colleges are given in later pages of this Catalogue.

Every regular student must include in his study list all required work appropriate to the college and year of his work. The Committee on Study Lists of the appropriate college or school is authorized to withdraw study cards that do not comply with this regulation.

Students who do not file study lists in accordance with the published schedule will be assessed a \$10 fee for the extra services involved.

Students may take extension courses with the consent of the appropriate dean.

Authority of Instructors

An instructor may exclude from a class any student whose preparation for the course is inadequate. Instructors will report to the Registrar from time to time the names of students whose attendance or work is unsatisfactory.

An instructor, with the Chancellor's and the President's approval, may at any time exclude from his course any student guilty of unbecoming conduct toward the instructor or the class, or a student who, in his judgment, has neglected the work. A student thus excluded will be recorded as having failed in that course unless the faculty determines otherwise.

MEDICAL EVALUATION

To safeguard the health of the student and the University community, every new student, as a part of registration, must pass an examination by the University Medical Examiners. Every new student must have at the time of registration a certificate of successful vaccination against smallpox performed within the last three years. A form for this purpose is furnished 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 having physical conditions that grossly disturb the classwork of other students, should not apply for admission and will be disqualified when detected.

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. An 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 University requirements regarding smallpox vaccination and must have a health evaluation at the Student Health Service.

HEALTH INSURANCE REQUIREMENT FOR FOREIGN STUDENTS

The acquisition of health insurance is a condition of registration for all non-immigrant foreign students. At the time of registration, all non-immigrant foreign students will enroll in the Associated Students supplementary health plan.

PHYSICAL EDUCATION AND USE OF GYMNASIUM

All students may use the gymnasium, swimming pool, tennis courts, and athletic fields when these areas are not in use by classes or athletic teams. Certain equipment for games and sports is available for exercise and recreation, either with or without instruction.

MILITARY SCIENCE

The University has an Army Reserve Officers' Training Corps unit that offers courses in general military science. Enrollment in military science is on a voluntary basis.

The Reserve Officers' Training Corps, established by Act of Congress in 1916, trains junior officers and develops the qualities and attributes essential to their progressive and continued development in the United States Army Reserve and in the Regular Army. Military leadership is emphasized. Instruction includes subjects common to all branches of the Army, with special attention to tactics and techniques of the military team. The United States Government furnishes arms, equipment, uniforms, and textbooks for the use of all students enrolled in courses of the department.

The ROTC program has been divided into four phases:

1. The basic course (lower division) of 6 units within the department.
2. The advanced course (upper division) of 10 units within the department.
3. Summer camp (for upper division only) of 3 units.
4. Elective units outside the Military Science Department:
 - a. Freshman: A total of 2 units of academic subjects in the general areas of science, psychology, effective communication, or political science. The subject chosen may be one that is required in the student's normal curriculum, and must be approved by the Professor of Military Science.
 - b. Upper division: A total of 6 units as shown in paragraph 4a. One of the

dual credit units must be taken in Physical Education 10 (Physical Conditioning Activities). The 6 units may fulfill dual requirements for the bachelor's degree in the colleges as well as for commissioning in the U. S. Army Reserve.

Lower Division

The lower division (basic) course is open to all first- and second-year undergraduate male students who are citizens of the United States, meet the required physical standards, and are under twenty-three years of age at the time of initial enrollment. The instruction is of a general type that prepares the graduate for duty with any branch of the Army upon completion of additional branch schooling.

Under certain conditions, nonresident aliens are permitted to enroll. Inquiry in this regard should be made to the Professor of Military Science.

Upper Division

Application for admission to the upper division (advanced) course may be made by all students who have successfully completed the basic course or who are eligible for equivalent credit and who can complete the course prior to their twenty-eighth birthday. It is also open to veterans having over one year of military service who meet the age and physical requirements.

Application for admission to the advanced course is made early in the fourth semester of the basic course. To be accepted, an applicant must pass an entrance examination, a physical examination, be selected by the Professor of Military Science and the Chancellor, and execute an agreement with the government to complete the course which includes attendance at a six-week summer camp between the junior and senior years. Students selected for the advanced course are those who have shown potentialities for leadership and command and the promise of developing into efficient officers.

During the two-year period of the advanced course, the student will be paid a nominal retainer in an amount prescribed by the Secretary of Army (currently \$40 per month, \$50 per month for scholarship holders).

During the third semester of the upper division (advanced) course, each student is classified according to his aptitude, qualifications, and desire for a particular branch of service, and recommendations are made to the Department of the Army for commissioning in the various Arms and Services of the Army. Also, during this semester, outstanding students may be designated by the Chancellor and the Professor of Military Science as Distinguished Military Students. If their high records are maintained, they may be designated, upon graduation from the University, Distinguished Military Graduates. These cadets may then apply for direct commission in the Regular Army as Second Lieutenants.

Successful completion of the advanced ROTC course, and graduation from the University, qualifies the student for appointment as a Second Lieutenant in the United States Army Reserve.

EXPENSES OF STUDENTS

Exact figures for the budget of a student will vary according to personal tastes and the financial resources of the individual. In general, the total expense for a college year of two semesters will average about \$1,740 for residents of California and \$2,540 for nonresidents. Expenses of about \$260 for resident students and \$660 for nonresident students are necessary during the first month after entering college.

Although each student must determine his own budget in keeping with his needs and resources, the University can provide the following figures as

basic annual expenses (the starred are average figures and vary according to individual needs and preferences):

Incidental fee, student body membership and Memorial Union fee	\$240
Tuition for non-residents	800
Books and Supplies	100
Board and Room	900
Miscellaneous (transportation, clothes, snacks, laundry, etc.)	500
Necessary additional expenses for those students who have to:	
Park cars on campus—Parking fee	16
Take Subject A	35

Incidental Fee

The incidental fee is \$110 each semester for graduates and undergraduates. This fee, which must be paid at the time of registration, covers certain expenses for use of library books; for athletic and gymnasium facilities and equipment; for lockers and washrooms; for registration and graduation; for all laboratory and course fees; and for such consultation, medical advice, and hospital care or dispensary treatment as can be furnished by the Student Health Service. No part of this fee is remitted to students who do not make use of these privileges.

Student Body Membership Fee

The student body membership fee of \$7.50 each semester must be paid by all undergraduates at the time of registration. Membership privileges include participation in student affairs, a free subscription to the student newspaper, free admission to the many athletic contests, and reduced admission to others. *The student body membership fee is optional for graduate students.*

Memorial Union Fee

A Memorial Union fee of \$2.50 each semester is required of all students.

Miscellaneous Expenses

Books and stationery for a student average \$80 to \$100 a year. Books and special equipment for students in the preprofessional and professional programs cost \$50 to \$200. Exact information on these items may be obtained by writing directly to the school or department. Students who fail to pass the required examination in Subject A must pay a fee of \$35 for the course in Subject A (see page 37).

Parking Fee

A parking fee of \$16 per year is required of students who park cars on the campus.

Refunds

For students who leave before the end of any semester, part of the fees enumerated above may be refunded. A schedule of refunds and other information will be found in a separate circular, *Student Fees and Deposits*, which may be obtained from the Registrar.

TUITION

Tuition is free to every student who has been a legal resident of the State of California for a period of more than one year immediately preceding the opening day of the semester during which he proposes to enroll. Every stu-

dent who has not been a legal resident of the state for said period is classified as a nonresident and is subject to payment of a nonresident tuition fee. A student entering the University for the first time should read carefully the rules governing the determination of residence as quoted below so that he may be prepared in the event of nonresident classification to pay the required tuition fee. Every entering student and every student returning to the University after an absence is required to make a Statement as to Residence on the day of registration upon a form that will be provided for that purpose and his status with respect to residence will be determined soon after registration by the Attorney in Residence Matters.

The eligibility of a student to register as a resident may be determined only by the Attorney in Residence Matters. If the student is in doubt about his residence status, he may communicate with that officer % Office of the Registrar or at 590 University Hall, University of California, Berkeley 94720.

Students classified as nonresidents are required to pay a tuition fee of \$400 each semester. This fee is in addition to the incidental fee. (Exemption from payment of the nonresident tuition fee may be granted to an unmarried minor whose parent is in the active military service of the United States and is stationed in California on the opening day of the semester during which the minor proposes to attend the University or to an unmarried minor child or spouse of a member of the University faculty.) Graduate students may have part or all of the nonresident tuition fee waived under certain conditions set forth in the *Announcement of the Graduate Division*.

Rules Governing Residence

Residence is acquired through the combination of physical presence in California together with the intention of remaining in the state into the indefinite future. As a general rule, the residence of an unmarried minor student is determined by the residence of his father. Once acquired, residence must be maintained for at least one year immediately prior to the opening day of the semester of attendance before the student is eligible to be classified as a resident for tuition purposes.

The residence classification of each student is determined in accordance with Section 244 of the California Government Code, Sections 23054, 23055 and 23057 of the California Education Code and the Standing Orders of the Regents.

The attention of the prospective alien student is directed to the fact that he is a nonresident unless, in addition to the general residence requirements for tuition purposes, he has been admitted to the United States for permanent residence in accordance with all applicable laws of the United States. The attention of the prospective student who has not attained the age of 22 and whose parents are not California residents, and the attention of the veteran who was not a resident of California at the time of his entrance into the Armed Forces, is directed to the fact that presence in California for more than one year does not, of itself, entitle the student to classification as a resident.

Every student who is classified as a resident but who becomes a nonresident of California is obliged to notify the Attorney in Residence Matters at once. Application for a change in classification with respect to a previous semester will not be received under any circumstances.

A person incorrectly classified as a resident student is subject to reclassification as a nonresident. If the incorrect classification resulted from concealed facts or untruthful statements made by him, the student then shall be required to pay all tuition fees which would have been charged to him as a nonresident student. He shall be subject also to such discipline as the President of the University may approve.

FINANCIAL AIDS AND AWARDS

Through the generosity of alumni and other friends of the University, scholarships, fellowships, prizes, grants-in-aid, and loan funds are available to undergraduate and graduate students in accordance with the conditions laid down by the donors.

Undergraduate Scholarships

Information about scholarships for undergraduate students may be obtained from the Office of the Dean of Students—Financial Aids. Awards are made on the basis of academic achievement, financial need (except for Regents Scholarships), character, and promise. Recipients of undergraduate scholarships must enroll for a minimum of 12 units a semester. Applications for scholarships for any academic year (September—June) must be filed with the Office of the Dean of Students—Financial Aids not later than the preceding *February 1* by students already in attendance and not later than *February 15* by entering students. These dates are subject to change. Application forms are available from the Office of the Dean of Students—Financial Aids, beginning the last week in November.

Graduate Scholarships and Fellowships

Information about fellowships for graduate students may be obtained from the Dean of the Graduate Division, Room 6, Freeborn Hall. Fellowships and graduate scholarships are ordinarily awarded as a mark of honor, on the basis of scholarship and not of need. The holders of fellowships or graduate scholarships are expected to devote all their time to graduate study and research in the University. Applications for fellowships and graduate scholarships must be filed with the Dean of the Graduate Division, Davis, not later than *February 1* prior to the academic year for which the award is sought. This date may be subject to change. For the latest information, applicants should consult the Office of the Dean of the Graduate Division.

Loans and Grants-in-Aid

Loans for both graduate and undergraduate students are initiated in the Office of Dean of Students. The University administers three categories of loan funds. (1) Funds established from contributions by individuals and organizations which are administered by the University according to the wishes of the donors. These loans are not usually available during the first semester of residence and have a short term of repayment. (2) Funds established by the National Defense Education Act of 1958 for granting loans up to \$500 per semester and to a maximum of \$5,000 per undergraduate student (up to \$1,250 per semester and to a maximum of \$10,000 per graduate student). Prospective students as well as students already in attendance may apply for the NDEA loans. These loans have a maximum repayment period of eleven years from the time of graduation or withdrawal from the University. (3) Funds established by The Regents of the University for granting loans up to \$600 per year and to a maximum of \$2,400 per student. Preference for these loans will be given to students holding fellowships, scholarships or part-time jobs. The repayment schedule has a maximum time of five years.

The number and amount of all of these loans will depend on the financial need, scholarship, promise of the applicant and the amount of funds available. Loan applications should be submitted by July 1 for the following academic year.

Grants-in-aid are available to undergraduate and graduate students in accordance with the conditions laid down by the donors. These funds are administered by the Office of the Dean of Students.

Prizes

Prizes for student achievement awarded to students on the Davis Campus range from inscribed plaques to \$300 in cash. As of June 1965 there are also medals given for outstanding scholastic achievement. These prizes are administered by the Committee on Prizes appointed by the Chancellor. Further information is available through the Secretary to the Committee on Prizes, Office of the Dean of Students.

PLACEMENT SERVICES

The centralized Placement Center offers placement services at no cost to students and alumni of the Davis and other campuses of the University of California. Services offered are of three types:

Student Part-Time and Summer Employment

Many students who attend the University expect to earn a 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 semester the student should know the demands of University life and his own capabilities well enough to plan a program combining studies and work for subsequent semesters.

Placement advisers aid students in their search for part-time and summer employment. In addition 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 upon their arrival on campus.

Educational Placement Service

Placement Service is available to students, former students, and graduates who are interested in teaching. The office assembles information into confidential files giving the background, training, and professional experience in order to match qualifications of its candidates 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.

Agricultural and Industrial Placement Service

Students and alumni seeking career employment in business, industry, agriculture, and government are invited to utilize the services of the Placement Center. Placement Advisers discuss matters of job choice and methods of obtaining these jobs with registrants. In addition, they arrange employment interviews, receive job listings from employers, and refer suitable registrants to these employers. Seniors and graduate students are urged to register with the Center early in their final year of study. Alumni may use the placement services at any time in their career.

VETERANS AFFAIRS

Special Services assists students in becoming part of the life of the University and acts as liaison with certain veterans and veterans' dependents agencies, the Veterans Administration, the State Department of Veterans

Affairs, and others offering veterans educational benefits. This office is located in the Office of the Dean of Students. The San Francisco Office of the United States Veterans Administration is located at 49 Fourth Street, San Francisco, California 94103.

Veterans dependents wishing to enroll under the provisions of Public Law 361 and 634 should obtain from the United States Veterans Administration a Certificate for Education and Training and file it with the Office of Special Services upon completion of registration. These dependents must be prepared to pay all fees and educational costs at the time of registration, since education and training allowances are paid to the dependent by the Veterans Administration and the first monthly payment will normally be received 60 to 75 days after compliance with the above.

Information regarding educational benefits for veterans dependents available from the State of California (CVEI) may be obtained from the State Department of Veterans Affairs by writing to P. O. Box 1559, Sacramento, California 95807.

LIVING ACCOMMODATIONS

The University maintains residence halls and dining units for single men and women and apartments for married students. The Davis Campus currently is able to provide living accommodations and meals for slightly less than 50 per cent of the registered students. In addition, meals only are available at the Memorial Union Dining Commons and a residence hall dining room for students living off campus in private rooms or apartments.

In its residence hall program the University is mindful of two responsibilities: to assure wholesome living conditions and to make residence living contribute specifically to the educational experience of the student.

Student government functions in the residence halls: each hall maintains its own council to act on matters concerning the welfare of the individual residents.

Board and room in the University residence halls costs \$900 for the academic year. Rooms in the residence halls contain the necessary furniture, linen, blankets, and study lamps; the rent includes the weekly laundering of linen, and local telephone service.

Information about all types of housing and applications for the University residence halls and married student apartments are available in the Housing Office.

Fraternalities

There are ten national fraternities represented on the Davis campus which provide living quarters and meals for their undergraduate members and pledges. In addition to board and room, the fraternities, under their system of self government, provide programs and experiences in social, academic and business activities. To assist with the development of these programs each fraternity has a faculty member serving as its adviser.

The costs for living in a fraternity are comparable to those of the residence halls and cover such items as room, board, dues, and social assessments.

Membership in the fraternities is by invitation only. Men who are interested in fraternities should attend the Interfraternity Council Smoker during Orientation Week or correspond with the Assistant Dean of Students prior to or after arriving on campus.

STUDENT HEALTH SERVICE

The Student Health Service, by preventing and treating acute illnesses, conserves the time of students for their coursework and studies. This service is made possible, for the most part, by the incidental fee. It is not a health insurance; the service is limited by the staff and facilities available.

Each student registering in any semester and paying the incidental fee may have such medical care as the Student Health Service is staffed and equipped to provide from the first day of the semester through the last day of the semester. Additional services may be provided for seven days after the last day of the semester at the discretion of the Director of the Student Health Service. Hospitalization up to thirty days may be provided for illnesses. When, in the opinion of the Director of Student Health, serious illness or injury is of a nature as to require prolonged care and will obviously prevent continuation in college during the current semester, the patient will be returned to his community or home for definitive treatment.

It is emphasized that this service is made possible by the incidental fee of the students and accordingly is not a total health insurance plan. The services are therefore limited by the staff and facilities available. 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. Except for first aid and emergency care, the Student Health Service does not assume responsibility for dental treatment. It does not take responsibility for treatment of remedial 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.

A supplementary Health and Accident Insurance Plan for students may be purchased at the Associated Students Office. The Plan is designed to supplement the Student Health program and thus give year-round coverage. Benefits of this are explained below.

STUDENT SUPPLEMENT INSURANCE

1. 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 semesters 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 and a waiver must be signed if this insurance is not obtained.

2. Acquisition of the Supplementary Health Insurance is a condition of registration for all foreign students.

UNIVERSITY LIBRARY

The University Library on the Davis campus contains about 390,000 books and receives annually about 7,700 current periodicals and serials. These have been selected to support the teaching and research needs of the College of Agriculture, the College of Engineering, the College of Letters and Science, and the School of Veterinary Medicine. As the center for printed materials, the main library serves both students and faculty. It is supplemented by three branch libraries and several specialized departmental collections. The main library is open 99 hours a week and trained reference librarians are available for information and assistance 77 hours a week.

For further information students are referred to a series of information leaflets, copies of which are available at the Library.

SELECTIVE SERVICE

Matters relating to the registration and deferment of students eligible under Selective Service are handled by the Office of the Dean of Students. Verifications regarding enrollment, and other pertinent information will be submitted to the student's Selective Service Board when the student fills out an S.S.S. 109 form, which he will receive during registration. To be considered for deferment by Selective Service, the student must be pursuing a full-time course of instruction, which for undergraduates consists of at least 12 units. This does not include noncredit courses, such as Subject A. Students who plan to seek deferment continuously until qualified for the bachelor's degree should understand that present policies of Selective Service permit continuous deferment only through the eighth semester of college residence, including not only the period of residence at the University but also all semesters spent at junior colleges or other collegiate institutions. Students should plan course sequences for several semesters ahead so that prerequisites for all desired advanced courses can be satisfied within the eight-semester period. Under the present draft laws anyone who receives a draft deferment is eligible for the draft until age 35.

Graduate certification shall be based on the fact that the student is devoting himself primarily to graduate study and is progressing in his program at the normal rate which will permit completion of requirements for the master's degree in two calendar years and for the doctoral degree in five calendar years of graduate study beyond the bachelor's degree.

Students desiring deferment on the basis of enrollment in the University ROTC program should consult with the Professor of Military Science.

COUNSELING SERVICE

Professional counseling on an individual basis is offered to students with questions pertaining to vocational and educational planning or problems of a personal-social nature.

A choice of a major or future vocation, evaluation of scholastic aptitude as well as other personal characteristics, and improvement of academic effectiveness are common topics of consideration in the counseling interview. The counselor attempts to help the student make the best use of his own resources to achieve maximum benefit from the college experience.

Freshman orientation testing is conducted on a group basis by the counseling staff, and interpretation of test performance is made individually to students upon request.

Further information about the Counseling Service and appointments for counseling interviews are available through the Counseling Service Office.

Developmental Reading and Effective Study Habits

Short-term, noncredit classes in developmental reading and effective study habits are offered each semester. Students interested in these programs designed to aid academic efficiency may secure further information from the Counseling Service Office.

SUBJECT A: ENGLISH COMPOSITION

Every entering undergraduate (except as noted below) must, when first registering in the University, take the *Examination in Subject A*, as a test of his ability to write a coherent 500-word composition in English without gross errors in spelling, grammar, sentence structure, and punctuation.

This examination is offered at the opening of each fall and spring semester

(see *Registration Calendar*, obtainable from the Registrar). For late registrants a second examination is given (fee \$1), not later than two weeks after the beginning of the semester.

Results of the first examination are available within 72 hours. Students are graded as "passed" or "failed." Any student absent from the required examination in Subject A is treated as having failed.

Every student who fails the Subject A examination must enroll in the special *Course in Subject A* (three hours weekly for one semester), which is without unit credit toward graduation. This course is subject to the same rules of grading as other University courses. A fee of \$35, payable before the study list is filed, is required for this course; the fee is charged each time the student takes the course.

A student who has failed the examination in Subject A cannot take a second examination but must enroll in the course in Subject A. He is not permitted to enroll in English 1A, 1B or Speech 1A, 1B until he has passed Subject A with a grade of C or better.

A student must satisfy the Subject A requirement before he will be granted the bachelor's degree. A student who has received a score of at least 600 in the College Entrance Examination Board Achievement Test in English Composition taken after completion of the eleventh grade has satisfied the Subject A requirement. A student who has passed an examination in Subject A given by the University or given under the jurisdiction of the University at various centers in the State annually in April or May also has satisfied the Subject A requirement.

A student is exempt from the requirement in Subject A if he enters the University with credentials showing completion elsewhere, with a grade not lower than C, of one or more acceptable college courses in English composition (totaling at least 3 semester units, or the equivalent, of transferable college credit).

A student who maintains a grade of A in the course in Subject A and passes a special examination with a grade of A is permitted, on recommendation of the Committee on Subject A, to withdraw from the course at a date determined by that committee and is considered as having fulfilled the Subject A requirement. (Provisions for refund of fee are covered in the Subject A course section on page 371.) Should any student fail in this course, he will be required to repeat the work in the next succeeding semester of his residence in the University.

Foreign Students. Students from other countries whose native language is not English should take the special examination in English for foreign students rather than the Subject A examination. Students who subsequently complete Speech 26, the advanced course in English for foreign students, with a grade of C or higher, will be credited as having met the Subject A requirement.

AMERICAN HISTORY AND INSTITUTIONS

Every student who intends to be a candidate for the bachelor's degree must demonstrate a knowledge of American History and Institutions. He may meet the requirement in any of the following ways:

1. By passing a single examination in American History and Institutions. Students electing to satisfy the requirement by examination are requested to do so before the senior year. No unit credit will be received for completion of this requirement through examination.

2. By completing any two of the following courses, subject to the conditions noted below:† History 17A, 17B, 170A, 170B, 171, 172A, 172B, 174A, 174B,

† Students taking these courses are subject to the regular 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.

175A, 175B, 176A, 176B, 178A, 178B, 179A, 179B, 180, 183; Political Science 1A, 1B, 100, 102, 105, 106, 113, 128A, 163, 164, 166.

3. Other:

a. By the automatic equivalence granted for courses offered by collegiate institutions in California, provided an official transcript of the student's record indicates satisfaction of the requirement by such courses, or by meeting the requirement as prescribed by other branches of the University.

b. By presenting a certificate of completion of acceptable courses at other collegiate institutions. Certificates may be obtained from the Office of the Supervisor.

All foreign students attending the University on student visas who are candidates for the bachelor's degree are advised to see the Supervisor of the American History and Institutions Requirement early in their academic work at the University.

Further information concerning this requirement and the examination to meet it may be obtained from the supervisor of the Requirement of American History and Institutions, Room 227, Voorhies Hall.

CANDIDACY FOR DEGREES

Each candidate for graduation must file an Announcement of Candidacy with the Registrar at the beginning of his senior year. The candidate must also confirm his intention to graduate by reporting to the Registrar during the first two weeks of his final semester. The dates for filing and confirming are published on pages 7 through 9 of the *General Catalogue*, and in the *Schedule and Directory*.

All candidates for the bachelor's degree must have been enrolled throughout the senior or final year of residence in that college of the University in which the degree is to be taken. This applies both to students entering from other institutions and to students transferring from one college to another within the University. Of the 120-136 units required for the bachelor's degree, at least 24 must be completed at the University in resident courses of instruction during the final or senior year.

Candidates for advanced degrees will file announcement of candidacy on the dates set by the Dean of the Graduate Division.

CREDIT AND SCHOLARSHIP

The amount of the student's work is evaluated in terms of units; the quality of his scholarship, in terms of grades. For more exact evaluation of his scholarship, the University assigns a numerical value in grade points to each scholarship grade.

The value of a University course in units is one unit for three hours of work, normally one class hour plus an expected two hours of preparation, by a student per week per semester. The credit value assigned to a course is determined by the number of hours of work required of the student and not by the number of class meetings per week.

GRADES

The result of a student's work in each course (including courses in which credit is sought by examination) is reported to the Registrar in one of six scholarship grades as follows: A, excellent; B, good; C, fair; D barely passing; I and F, not passing. Grades are not otherwise defined, as, for example, by percentages or by a rule stipulating the manner in which the several grades shall be distributed among the members of a class.

Grade I (not passed) indicates a record below passing but one that may be raised, without repetition of the course, by success in a further examination or by performing other tasks the instructor requires. A student must petition for removal of Grade I. Grade F (not passed) denotes a record so poor that it may be raised to a passing grade only by repeating the course.

The instructor is required to assign, for every student, a definite grade based upon the work actually accomplished, irrespective of the circumstances that may have contributed to the results achieved. The term "incomplete" is not used in reporting the work of students.

Course reports filed by instructors at the end of each semester are final.

A student who desires a report on his scholarship grades at the end of the semester should deposit with the Registrar a self-addressed, stamped envelope.

GRADE POINTS

Grade points are assigned to the respective scholarship grades for each unit of credit as follows: A, 4 points; B, 3 points; C, 2 points; D, 1 point; I and F, no points.

To qualify for the bachelor's degree the student must obtain at least twice as many grade points as there are units in the total credit value of all courses undertaken by him in the University.

PASS OR FAIL GRADES

Subject to the approval of the Committee on Undergraduate Study and of the instructor concerned, students may choose elective courses from any department of the University. A student who has an average grade of B or better for all work undertaken in the University shall have the privilege of taking each semester one elective course in which he shall be marked "passed" or "not passed." In calculating grade-point standing, units gained in this way shall not be counted.

MINIMUM UNDERGRADUATE SCHOLARSHIP REQUIREMENTS

Colleges of Agriculture, Engineering, and Letters and Science

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

Probation

A student shall be placed on probation:

If at the close of any subsequent semester his grade-point average is less than two (a C average), computed on the total of all courses undertaken in the University including courses graded Incomplete.

Dismissal

A student shall be subject to dismissal:

1. If his grade point average falls below 1.5 for any term.
2. If after one term on probation he has not achieved a grade point average of C (2.0) or better, computed on the total of all courses undertaken in the University, including courses graded Incomplete.

School of Veterinary Medicine

The following provisions apply to all undergraduate students in the School of Veterinary Medicine.

Probation

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

Dismissal

A student shall be subject to dismissal from the School of Veterinary Medicine:

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

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

3. If at any time he has, in the judgment of the faculty of the School, proved himself to be physically, morally, or mentally unfit for the profession of veterinary medicine.

A student in the School of Veterinary Medicine who becomes subject to the provisions of this regulation shall be under the supervision of the faculty of the School. The faculty, or persons designated by it, shall have the power to dismiss from the University students under its supervision or, at its discretion, to suspend the provisions of this regulation and permit the retention in the University of students thus subject to dismissal and the return to the University of students who have been dismissed under this regulation.

Graduate students who acquire scholarship deficiencies are subject to action at the discretion of the Dean of the Graduate Division.

CREDIT BY EXAMINATION

An undergraduate student in residence and in good standing may, under certain conditions, take examinations for degree credit either:

1. In courses offered in the University without formal enrollment in them.

2. In subjects appropriate to the student's curriculum but not offered as courses by the University.

The results of all such examinations, with grades and grade points, are entered on the student's record in the same manner as are regular courses of instruction. No fees are required.

The privilege of taking an examination for credit is ordinarily granted to students who have at least a B average for all University courses undertaken.

Arrangements must be made in advance with the dean of the student's college or school; his approval and that of the instructor appointed to give the examination are necessary before an examination can be given.

The application form for examinations may be obtained from the Registrar.

FINAL EXAMINATIONS

Final examinations are obligatory in all undergraduate courses. All examinations will, as far as practicable, be conducted in writing. For each examination, a maximum time is assigned beforehand; no student is allowed to exceed this maximum time. The time for examination sessions will be not more than three hours.

Any department may examine a student at the end of the semester immediately preceding his graduation in the major subject in which the department has given instruction. A student to be examined in a major subject may, at the discretion of the department, be excused from all final examinations in courses in the department of the major subject in which he has been enrolled during the semester. Credit value may be assigned to this general examination in the major subject.

Re-examinations are permitted only for the purpose of raising grade I (not passed) to a passing grade. A student who received grade B, C, or D in any course is not allowed a re-examination for the purpose of raising the grade. Methods of raising nonpassing grades to passing grades are described under "Removal of Deficiencies," below.

REMOVAL OF DEFICIENCIES

A student who receives a grade lower than C may repeat the course. The units will count only once toward the degree; however, he will be charged with the units undertaken on each attempt. Upon repetition of the course, the student will receive the grade assigned by the instructor and grade points appropriate to that grade.

Special provision is made for students whose university work has been interrupted by one year or more of service with the armed forces of the United States and who, before such service, had undertaken one or more courses forming part of an announced sequence. Such a student may, with the approval of the dean of his college or school (or if he is a graduate student, with the approval of the Dean of the Graduate Division), be permitted to repeat any course previously undertaken in the sequence, irrespective of the grade previously assigned, and to receive the new grade assigned by the instructor and grade points appropriate thereto. However, the unit credit thereby allowed toward graduation or the satisfaction of major requirements may not exceed the difference between the full unit value of the course and the number of units, if any, that he has previously received from the same course.

For the purpose of raising an I to a passing grade the student may, with the consent of the instructor concerned and of the dean of the appropriate school or college, have the privilege of a "condition examination."

Any examination, term paper, or other exercise that the instructor may require of the student to raise an I to a passing grade in a course is a "condition examination." For every such examination a formal permit, to be obtained in advance from the Registrar, must be shown to the instructor in charge; otherwise, he will lack authority to consider and report upon the work submitted by the student. A fee of \$4 is charged for each permit. No fee is charged for a re-examination (final examination taken with the class) if the final examination is the only task required by the instructor to raise I to a passing grade and if this final examination is taken with the class not later than the close of the next succeeding semester of the student's residence during which the course is offered. The Registrar will provide a form of petition for a special examination or for admission to an examination with a class, with instructions concerning procedure. Grade I in a course in which a final examination is regularly held can be raised to a passing grade only if the student passes a satisfactory final examination.

If a student who has received a grade I in any course fails to raise it to a passing grade by the end of the next semester of his residence in which the course is regularly given, the grade shall be changed to F. But if, meanwhile, the student has repeated the course and has again received an I, his grade in the course will remain grade I, as it would be if he were taking the course for the first time. A student who fails to attain a grade D or higher in any course following a re-examination for the purpose of raising an I to a passing grade will be given a grade of F in the course.

With respect to conditioned examinations, no grade points will be assigned to a student who raises a grade I, incurred in any course (lower division, upper division, or graduate), to a passing grade by *examination* or by performing other tasks required by the instructor (short of actual repetition of the course). An exception to this rule is permitted, however, when the deficiency consists solely in the *omission* of the final examination or other required exercise because of illness or other unavoidable circumstances, or the student's performance in all other respects having been satisfactory. In such circumstances the student may petition to have the grade assigned that he would have received had the work been completed without delay, together with the appropriate number of grade points. His petition must set forth in

detail the reasons for his failure to complete the course within the usual limit of time. The petition must be endorsed by the instructor concerned and must be submitted for final approval as follows: by undergraduate students, to the Dean of his college or school; by graduate students, to the Dean of the Graduate Division.

THE HONOR SPIRIT—A CHERISHED TRADITION

Since 1922 the Davis Campus of the University of California has operated under the Honor Spirit. It embraces a code of sincerity and honesty in all activities throughout the campus. This code, common to students, faculty members, and administration alike, is the basis for cooperative relations and an atmosphere of academic and personal integrity.

The basis of the Honor Spirit in the classroom is in the pledge on the cover of the bluebooks used for examinations: "We, the students of the University of California, Davis, do not tolerate the giving or receiving of aid during examinations." Thus, there are no proctors, no policing of examinations. Each student takes pride in doing his own work.

The Honor Spirit is promoted and upheld by the Student Welfare Council, an organization whose members are elected by the Associated Students.

STUDENT CONDUCT AND DISCIPLINE

The University authorities assume that the student has an earnest purpose and that his conduct will bear out this presumption. If, however, he should be guilty of unbecoming behavior or should neglect his academic duties, the authorities will take such action as, in their opinion, his conduct warrants. Students who fail to use properly the opportunities freely given to them by the University must expect to have their privileges curtailed or withdrawn.

Administration

The President of the University through the Chancellor administers student discipline and has full power to act. This duty is accomplished through the assistance of the teaching staff, the administrative officers concerned with student welfare, and the Faculty-Administrative Committee on Student Conduct.

Degrees of Discipline

There are eight degrees of discipline: warning, censure, disciplinary probation, restitution, interim suspension, suspension, dismissal, and expulsion. Restitution involves reimbursement for damage to or misappropriation of property and may take the form of appropriate service to repair or otherwise compensate for damages. Interim suspension is exclusion from classes and other designated privileges or activities, pending final determination of an alleged violation. Suspension is exclusion from classes and other designated privileges or activities for a definite period of time. Dismissal is termination of student status for an indefinite period. The student may be readmitted to the University only with the specific approval of the Chancellor of the campus to which he applies. Expulsion is permanent termination of student status without possibility of readmission to any campus of the University.

Student Welfare Council

The Welfare Council of the Associated Students deals with student welfare, student conduct, and student-faculty relations. The Council fosters the Honor Spirit, a code creating favorable attitudes toward education and student life by placing the responsibility for good classroom and campus conduct with the individual student. With the student's accepting this responsibility, a greater respect for knowledge is gained. The Honor Spirit is a cherished tradition on the Davis campus.

LEAVE OF ABSENCE AND HONORABLE DISMISSAL

A student in good standing who needs to withdraw for a short time but wishes to retain his status in classes and resume work before the end of the current semester should notify the Office of the Dean of Students. An excuse for absence will not relieve a student from the need to complete all work in each course to the satisfaction of the instructor.

For any college exercise other than a final examination, leave to be absent or an excuse for absence should be presented to the instructor in charge.

If a student must depart suddenly, as in a family emergency, he should write the Office of the Dean of Students as soon as possible, requesting a leave.

An *honorable dismissal* or an *indefinite leave of absence* may, upon petition, be issued to any student in good standing who complies with the instructions on the petition, which may be obtained from the Registrar. Undergraduate students must have the petition approved by the dean of the school or college and the Dean of Students. Graduate students require the approval of the Dean of the Graduate Division. In addition, men who are receiving veterans benefits or who have been deferred by Selective Service because of registration in the University must immediately upon ceasing class attendance report in writing or in person to the Dean of Students.

A student is in good standing if he is entitled to enjoy the normal privileges of the status in which he is officially registered. Students dismissed for scholarship deficiencies, students on scholastic probation, students under censure, and students under suspension are not in good standing.

Discontinuance Without Notice

Students who discontinue their work without formal leave of absence do so at the risk of having their registration privileges curtailed or withdrawn.

STUDENT RESPONSIBILITY FOR MATERIALS SUBMITTED IN SATISFACTION OF COURSE REQUIREMENTS

All material of whatever nature submitted by a student in satisfaction of all or any portion of a course requirement is the property of the University and is not subject to any claim on the part of the student who has submitted it. Further, it is a condition of attendance of any student in any course that any material that he shall produce independently and not as a part of any course requirement must be removed by him from University premises not later than the last day of the semester in which he produced such material and that if he shall fail to remove it, as here provided, there shall be no obligation on the part of the University to hold or safeguard it, and all risks of its destruction, loss, or other dispositions shall rest solely upon the student.

CHANGE OF COLLEGE OR MAJOR

A student may be transferred from one college, major, or department of the University to another upon the approval of the dean or other responsible officer or committee of the college (or department) to which admission is sought. A form of petition for transfer is supplied by the Registrar.

HONORS

Honor students include those who receive honorable mention as designated by the Deans of the Colleges and Schools. Honors are granted also with the bachelor's degree. Regulations concerning honors are given with explanations of curricula in the various colleges in later pages of this Catalogue.

TRANSCRIPT OF RECORD

Each student will be provided, upon request to the Registrar, with an official transcript (copy) of his University record. A minimum of \$1 is charged for each transcript. Students who plan to seek employment after graduation should obtain one or more transcripts as official evidence of attendance at the University.

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

STUDENT ACTIVITIES

Students participate in various activities on the Davis campus, ranging from events sponsored by the Associated Students to those connected with independent student organizations. Departmental, honor, service, special interest, political, and religious organizations are included, as well as International Club which is for visiting and American students alike.

The entire undergraduate student body has membership in the Associated Students which, through its elected Executive Committee and appointed activities chairmen, is responsible for most student activities on campus. A major effort of all students is Picnic Day, the campus open house welcoming the public each spring. Other special events under the auspices of the Associated Students are Preview Day (tours and discussions for high school and junior college students), Judging Day (competition in agricultural skills and knowledge for high school students), Little International (livestock show for Aggie students), Drives Week (series of fund-raising events to finance a summer camp for youth), Homecoming Weekend, Wild West Days, and the all-important orientation for incoming students.

The University band, an orchestra, ensemble groups, chorus, dramatics, and student forums are also supported by the Associated Students in conjunction with various academic departments.

Student publications are the California Aggie, a semi-weekly paper; El Rodeo, the yearbook; and Motley, a literary magazine.

The Memorial Union Student Council, whose chairman is appointed by the Associated Students, presents in the Memorial Union a continuing educational and recreational program for students, as well as a concert series and a Spring Festival of the Arts.

The Associated Women Students, composed of all undergraduate women students, promulgates social regulations, recommends dress standards, sponsors an orientation program for new women students, and holds social events including the Coed Formal.

The University of California, Davis is a member of the Far Western Intercollegiate Athletic Conference and stresses intramural and recreational as well as intercollegiate athletics. Included are football, basketball, track, rifle, baseball, tennis, wrestling, golf, swimming, and water polo. Independent student clubs provide the opportunity to play rugby and cricket. The Women's Athletic Association sponsors sports for all women students, including intercollegiate playdays in basketball, volleyball, hockey, softball, badminton, tennis, rifle, and swimming.

Unity of student life on all campuses of the University is emphasized by the California Club, an organization of student leaders. Davis students have participated in two annual All-University Festivals which have been instituted in recent years to bring together students of all campuses in various activities and pursuits. The Art Festival has featured music, drama, dance, art, and creative writing; while the Spring Festival has included a graduate academy, undergraduate honors program, intramural sports, student publications workshop, debating and forensics, scuba, fencing, and chess.

EDUCATION ABROAD

Undergraduate students may spend a year of their college career studying outside the United States. The University conducts undergraduate programs in Bordeaux (France), Goettingen (Germany), Padua (Italy), Madrid (Spain), Tokyo (Japan), Hong Kong, Bogota (Columbia), Edinburgh, Sussex, and Birmingham (Great Britain), and a summer session in Caracas (Venezuela). The University also accepts academic credits received in certain other programs abroad.

Because of the time needed to prepare for the study as well as the senior year residence requirement, the junior year is recommended for such foreign study. Students must have completed 56 units and have a minimum overall grade point average of 3.0 to qualify. In certain countries thorough preparation in the language of the country is of great importance. Students should have completed at least four semesters of college courses in that language, or have demonstrated proficiency.

Students interested in studying abroad are encouraged to consult early in their academic career with the academic adviser for Undergraduate Study Abroad, or the International Student Adviser.

Requirements and Curricula

COLLEGE OF AGRICULTURE

It is the aim of the College of Agriculture to educate able young men and women for leadership in the knowledge and skills of agriculture. The scope of agriculture is broad, offering careers in farming and ranching, business, science, and industry. The principal center of the University's research and teaching activity in agriculture is the Davis campus.

Curricula are based on thorough training in the natural sciences combined with an integrated supporting program in the social sciences and humanities. Upon this foundation specialized study is developed leading to competence in the student's chosen field. Courses are basic in nature, emphasizing principles, and are designed to prepare the student to develop critical faculties in evaluating ideas and in solving problems.

Upon successful completion of the undergraduate requirements, the Bachelor of Science degree is awarded. Further study at the graduate level is offered to those who are qualified to conduct research involving fundamental concepts necessary for the advancement of knowledge. The success of both undergraduate instruction and advanced study is measured by the quality of men and women trained, by their achievements in the sciences of agriculture, and by their contributions to society.

The University of California enjoys world-wide recognition for its achievements in the agricultural sciences, and as a Land-Grant College for the State, functions as the center of research for agriculture and its related industries. The 3300-acre campus provides excellent classroom and laboratory facilities for instruction and research.

The special interests and abilities of the faculty, in combination with the extensive instructional and research facilities available at the University, provide an environment which is particularly conducive to the maximum development of the student's potential. The opportunities provided the students to associate with instructors engaged in the development of entirely new concepts and products, engender in them an appreciation and understanding of how new knowledge is acquired.

The curriculum in Agricultural Science and Management combines an area of specialization, i.e., animal science, food science, plant science or resource technology, with economic theory, and prepares the student for professional management responsibilities as an administrator or manager of agricultural industries, farms, ranches, or natural resources.

Curricula in agronomy, animal science, pomology, range management, vegetable crops and viticulture are oriented toward agricultural production, although the education is applicable to all areas of agricultural industry, teaching and research.

Operating in conjunction with and dependent upon the production segment of agriculture are the numerous food processing, marketing, and distribution elements of industry. Positions as food plant operators and managers are available to graduates with a major in food science and technology, foods or nutrition, agricultural economics, or business management.

Career opportunities in those activities encompassing quality control, research, product development, marketing and rendering of special services exist for students majoring in such fields as soils and plant nutrition, entomology, irrigation, forestry, veterinary medicine, plant pathology, agricultural economics, and agricultural engineering.

A large number of professional and technical service opportunities in agriculture exist for students in governmental and private organizations including foreign agriculture. Continued urbanization provides unusual opportunities for graduates trained in landscape horticulture and park administration.

Students interested in the business segment of agriculture, i.e., agricultural business management, agricultural economics, agricultural engineering or international agricultural development, will find a wide range of occupations with banks, credit agencies, cooperative organizations and manufacturers and distributors of the agricultural equipment required for food production and processing.

Graduates interested in the professional positions available in teaching or research should allow a minimum of two to three years for completion of the advanced degree requirements.

Regardless of students' special interests, goals or abilities, today's dynamic, scientific agriculture provides an impressive number of challenging and rewarding career opportunities for University graduates trained in the agricultural sciences.

OPPORTUNITIES FOR ACQUIRING AGRICULTURAL SKILLS

Many students interested in careers in agriculture are without previous agricultural experience. The Agricultural Practices program, organized as a result of a grant by the late Fred H. Bixby, provides students an opportunity to supplement their academic training with a program of supervised work experience.

Experience is provided in both agricultural production, i.e., the farming or ranching segment, and in agricultural business, which encompasses the processing and distribution elements of the industry. Laboratory instruction provides students an opportunity to learn the proper operation and care of agricultural equipment and to acquire the basic manipulative skills involved in crop and livestock production.

For the summer periods assistance is given to students in finding employment in agricultural enterprises related to their field of major interest. During the period of employment a representative of the Agricultural Practices Division makes frequent visits to the student and his instructor-employer to develop records and recommendations of value to him when he seeks permanent employment. Students frequently find that these experiences provide contacts that lead to permanent positions upon graduation.

To insure sufficient time for the development of job opportunities that best meet the requirements of training in agriculture, students with limited agricultural experience are encouraged to contact the Agricultural Practices Office soon after registration.

FACULTY ADVISERS AND STUDY-LIST REQUIREMENTS

Freshman and Sophomore Years

Each student designates a major subject upon matriculation and must consult his adviser each semester for guidance in following the requirements of the curriculum that includes the major of his choice. The student who is undecided about the exact area in which he wishes to specialize and the student admitted for Fall 1965-1966 into the Agricultural Production major may designate "Agricultural Science" in lieu of a major. He will be assigned an adviser by the Dean's Office. With the assistance of this adviser he will plan a program of study which will prepare him to choose a major prior to the junior year. Requirements are listed for each curriculum. It is desirable to plan program schedules so that all lower division requirements are taken during the first two years. Students unable to follow this schedule may take some of the requirements in the junior and senior years. However, any great

departure from the suggested schedule may delay graduation beyond the normal four-year period.

Junior and Senior Years

The schedule for the junior and senior years is determined by the major subject requirements, supplemented by optional courses selected by the student with the advice and consent of the major adviser.

Approval of Study List

The study lists of all students must be endorsed by the major-subject adviser before they may be filed with the Registrar. Students will not be permitted to enroll for fewer than 12 or more than 18 units a semester without approval of the Dean of the College of Agriculture. To this maximum there may be added a lower division course in physical education of not more than 1 unit.

Social Sciences and Humanities

This requirement may be fulfilled by courses chosen from the following list:

Anthropology. All undergraduate courses except 1, 152, 153, 195, 196.

Art. All undergraduate courses. Maximum of 4 units in performance courses.

Classics. All undergraduate courses.

Design. 6A, 6B, 8, 191, 193, 195.

Dramatic Art. All undergraduate courses. Maximum of 4 units in performance course 190.

Economics. All undergraduate courses except 11.

Education. 110

English. All undergraduate courses.

French. All undergraduate courses.

Geography. 2, 5, 119, 121, 122, 123, 124, 125, 126, 131, 141, 143, 162, 170.

German. All undergraduate courses.

Greek. All undergraduate courses.

History. All undergraduate courses.

Italian. All undergraduate courses.

Latin. All undergraduate courses.

Music. All undergraduate courses. Maximum of 4 units in performance courses.

Oriental Languages. All undergraduate courses.

Philosophy. All undergraduate courses.

Political Science. All undergraduate courses.

Psychology. All undergraduate courses except 108, 150, 165.

Russian. All undergraduate courses.

Sociology. All undergraduate courses except 185.

Spanish. All undergraduate courses.

Speech. All undergraduate courses except 25. Speech 26 will be given 3 units. Maximum of 4 units in performance courses.

HONOR STUDENTS

A list of honors students is prepared each semester by the Dean of the College and is published in the Student Directory. It includes the names of all students in the College of Agriculture the previous semester who have completed at least 12 units on the Davis campus and have a grade point average of at least 3.0 for all work undertaken in the University.

Honor students have the privilege (subject to the approval of the instructor concerned) of taking each semester one course, not submitted in satisfaction of the requirements of the major program, in which they are marked "passed" or "not passed." In calculating grade point standing, units gained in this way are not counted.

HONORS AT GRADUATION

Honors are granted to the graduating student who is completing his major with distinction and whose academic record is deemed satisfactory. Students who have done work of unusual excellence may be recommended for honors or highest honors. The list of students to whom honors and highest honors have been awarded is published in the commencement programs, and the distinction is noted on the student's transcript and on his diploma.

The minimum grade point averages for students who have earned 90 or more units at the University of California (University-wide) shall be 3.15 for honors and 3.50 for highest honors. Students who have taken 60 to 89 units must have maintained an average of 3.35 in order to be considered for honors, and have earned at least a 3.70 average in order to be awarded highest honors. For students who have taken 30 to 59 units the requirements are 3.45 and 3.80 respectively. Students who have earned less than 30 units at the University of California (University-wide) are not eligible for consideration for the award of honors.

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE

The degree of Bachelor of Science is awarded to those candidates who:

1. Satisfy the general University requirements as follows:
 - a. Subject A. See page 37.
 - b. American History and Institutions. The student may meet this requirement by the passing of an examination in American History and American Institutions or by the completion of courses prescribed by the University.
 - c. Residence in the College during the senior year and completion of at least the final 24 units in the University.
 - d. Attain at least twice as many grade points as units of credit in courses undertaken at this University.
 - e. File notice for candidacy with the Registrar on dates as prescribed by the University Calendar.
2. Satisfy the general requirements of the College of Agriculture as follows:
 - a. At least 124 units of University work. Not more than 4 units may be in lower division physical education courses.
 - b. Thirty-six units of the above total in upper division courses (courses numbered 100-199).
 - c. Nine units of mathematics. Matriculation work may be offered toward this requirement, counting each year of high school work as 3 units. Trigonometry taken in high school is recommended as partial satisfaction of this requirement.
3. Satisfy the requirements of one of the curricula in the College of Agriculture.

These curricula, except Home Economics (see page 56) are governed by minimum unit requirements in subject matter as follows:

	<i>Units</i>
a. Agriculture and closely related subjects	24
b. Natural Sciences and Physical Sciences	24
c. Social Sciences and Humanities	24
d. Unrestricted electives	16

AGRICULTURAL BUSINESS MANAGEMENT

This curriculum provides training in the management aspects of agricultural businesses. Emphasis is placed on a study of the decision-making function of management, the economic relationships within a firm and among firms within an industry, the use of management controls, the basic principles concerning the procurement of raw materials, personnel policies, and the selection of marketing methods and channels.

Graduate Study—The Department of Agricultural Economics offers programs of study and research leading to the Master of Science degree with agricultural business management as one of the fields of emphasis. Students interested in more advanced study may seek the doctorate in agricultural economics. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Agricultural Economics.

Curriculum in Agricultural Business Management

(Major: Agricultural Business Management)

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| 1. General University requirements. (see page 50) | |
| 2. College of Agriculture requirements. (see page 50) | |
| 3. Curriculum requirements. (see page 50) | <i>Units</i> |
| a. Agriculture and closely related subjects (29 units) | |
| Upper division agricultural economics, economics, or
business administration | 21 |
| Agriculture, other than agricultural economics..... | 8 |
| b. Natural Sciences (24 units) | |
| Analytic geometry, calculus and/or linear algebra | 3 |
| Chemistry | 5 |
| Physics | 3 |
| Statistical methods | 6 |
| Restricted electives: Bacteriology, botany, geology, physiology, zo-
ology; or additional chemistry, mathematics and physics (beyond
that specified above) | 7 |
| c. Social Sciences and Humanities* (30 units) | |
| English and/or Speech | 6 |
| Principles of economics | 6 |
| Accounting | 3 |
| Business law | 3 |
| Restricted electives: Anthropology, geography, history, philosophy,
political science, psychology, or sociology and social institutions. . | 12 |
| d. Unrestricted electives (16 units)... | 16 |
| 4. Additional courses chosen by the student with approval of the major
adviser. (These may be used to satisfy the requirements under 1 and
2 above) | 25 |

Total units required for the Bachelor of Science degree.....124

5. Certain courses or their equivalents are required for the major and, where applicable, may be used in partial satisfaction of 3a, 3b, 3c, above:

Agricultural Economics 100A, 100B, 106, 110, 111, 115.

Agricultural Economics 106 satisfies, in part, the statistical methods requirement and does not count toward the 21 units of upper division agricultural economics.

To graduate with a major in agricultural business management, a student must have at least a C average in all upper division courses taken in agricultural economics. Students who do not maintain such an average may be required to withdraw from the major at any time.

AGRICULTURAL ECONOMICS

This curriculum is concerned with the economics of the agricultural industry. Its basic goal is to improve the individual's understanding of economic forces and the economic environment in which the agricultural industry plays a prominent role. An equally important goal is to enable an essential specialization in some phase of agriculture, such as farm management, marketing, land economics, agriculture policy, or statistics.

* Units received in satisfaction of American History and Institutions requirement may be used to satisfy in part 3c above.

Graduate Study—The Department of Agricultural Economics offers programs of study and research leading to Master of Science and Doctor of Philosophy degrees. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Agricultural Economics.

Curriculum in Agricultural Economics

(Major: Agricultural Economics)

1. General University requirements. (see page 50)	
2. College of Agriculture requirements. (see page 50)	
3. Curriculum requirements. (see page 50)	<i>Units</i>
a. Agriculture and closely related subjects. (26 units)	
Upper division agricultural economics	18
Agriculture, other than agricultural economics.	8
b. Natural Sciences (27 units)	
Analytical geometry, calculus and/or linear algebra	6
Chemistry	5
Physics	3
Statistical methods	3
Restricted electives: Bacteriology, botany, geology, physiology, zoology; or additional chemistry, mathematics, and physics (beyond that specified above)	10
c. Social Sciences and Humanities* (30 units)	
English and/or Speech	6
Economics	9
Accounting	3
Restricted electives: Anthropology, geography, history, philosophy, political science, psychology, or sociology and social institutions	12
d. Unrestricted electives (16 units)	16
4. Additional courses chosen by the student, with approval of the major adviser. (These may be used to satisfy the course requirements under 1 and 2 above)	25
Total units required for the Bachelor of Science degree	124
5. Certain courses or their equivalents are required for the major and, where applicable, may be used in partial satisfaction of 3a and 3c above:	
Agricultural Economics 100A, 100B, 106, and an upper division course in macro-economic theory.	

To graduate with a major in agricultural economics, a student must have at least a C average in all upper division courses taken in agricultural economics. Students who do not maintain such an average may be required to withdraw from the major at any time.

AGRICULTURAL EDUCATION

This curriculum provides training for students planning to teach agriculture in the high schools and junior colleges of the State and has also proven to be an excellent preparation for work in agricultural extension, general farming, and for positions with federal and state departments of agriculture.

Graduate Study—The Department of Agricultural Education offers programs of study and research leading to the Master of Education Degree. The department also offers programs of study leading to the secondary teaching credentials with majors in agriculture and home economics, including the credentials required for teaching classes reimbursed under the National Vocational Acts. Detailed information regarding graduate study for credentials and degrees may be obtained by writing to the Graduate Adviser, Department of Agricultural Education.

* Units received in satisfaction of American History and Institutions requirement may be used to satisfy in part 3c above.

Curriculum in Agricultural Education

(Major: Agricultural Education)

1. General University requirements. (see page 50)	
2. College of Agriculture requirements. (see page 50)	
3. Curriculum requirements. (see page 50)	<i>Units</i>
a. Agriculture and closely related subjects. (39 units)	
Agricultural Economics	6
Agricultural Engineering	9
Animal Science	12
Plant and Soil Science	12
b. Natural Sciences (33 units)	
Botany and Zoology (laboratory courses)	9
Chemistry (including organic)	8
Entomology	4
Genetics	4
Physics	4
Plant Pathology	4
c. Social Sciences and Humanities* (24 units)	
Economics	3
Education	3
English and/or Speech	6
Psychology	3
Electives	9
d. Unrestricted electives (16 units) . . .	16
4. Additional courses chosen by the student with the approval of the major adviser. (These may be used to satisfy course requirements under 1 and 2 above or the requirements for the major.)	12
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Total units required for the Bachelor of Science degree	124
5. Certain courses are required for the major and where applicable may be used in partial satisfaction of 3a, 3b, and 3c above:	
Animal Husbandry 103; Chemistry 1A, 8; Agricultural Education 160 or 187, 320A; Entomology 124; Water Science 110; Plant Pathology 120; Soil Science 1.	

AGRICULTURAL SCIENCE AND MANAGEMENT (See page 64)**ANIMAL SCIENCE**

The animal science curriculum provides education in the fields of nutrition, physiology and genetics with special attention to the application of these disciplines to animal production. The student may specialize in any of the following majors: animal husbandry (including dairy husbandry), animal physiology, genetics, and poultry husbandry.

An animal science emphasis is also available under the curriculum in Agricultural Science and Management. (See page 64.)

Graduate Study—The student may pursue graduate work leading to the degree of Master of Science in the following animal science majors and related fields: animal husbandry, animal physiology, genetics, nutrition, and poultry science. Graduate work leading to the doctorate may be undertaken in animal physiology, comparative biochemistry, genetics, and nutrition. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser within the field of interest.

Curriculum in Animal Science

(Majors: Animal Husbandry, Animal Physiology, Genetics, Poultry Husbandry)

* Units received in satisfaction of American History and Institutions requirement may be used to satisfy in part 3c above.

1. General University requirements. (see page 50)	
2. College of Agriculture requirements. (see page 50)	
3. Curriculum requirements. (see page 50)	<i>Units</i>
a. Agriculture and closely related subjects..... (27 units)	
Animal nutrition	3
Animal Pathology, parasitology, or additional zoology.....	3
Animal Physiology	5
Genetics	4
Upper division courses in major or closely related subjects.....	12
b. Natural Sciences	(34 units)
Bacteriology or botany.....	4
Chemistry and/or biochemistry.....	16
Physics	6
Zoology	8
c. Social Sciences and Humanities*..... (24 units)	
Economics	3
English and/or Speech.....	6
Electives	15
d. Unrestricted electives	(16 units) 16
4. Additional courses chosen by the student with the approval of the major adviser. (These may be used to satisfy course requirements under 1 and 2 above or the requirements for the major).....	23
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Total units required for Bachelor of Science degree.....	124
5. Certain courses are required for the following majors and where applicable may be used in partial satisfaction of 3a, 3b, and 3c above:	

Animal Husbandry

Animal Husbandry 7, 7L, 105L, 110; Bacteriology 1; Botany 1; Veterinary Microbiology 111. Animal Husbandry 105 satisfies the animal nutrition requirement and Veterinary Microbiology 111 satisfies the animal pathology requirement under 3a. Genetics 100, and in addition Genetics 100L or Animal Husbandry 107, will satisfy the genetics requirement. Chemistry 1A, 1B, 8 are included in the 16 units of required chemistry.

For students primarily interested in dairy husbandry the following elective courses are highly recommended: Animal Husbandry 107, 111, 114, 121; Food Science and Technology 118A, 130.

Students in this major must spend the last two semesters (before the degree) in residence as bona fide animal husbandry majors.

Animal Physiology

Majors in this subject must take Biology 1; Chemistry 1A, 1B, 5, and 8; Zoology 2 or Animal Physiology 101, 101L, and at least one of the following courses: Zoology 100 and 100L, 106, 107 or 112. Animal Husbandry 105 or Poultry Husbandry 105 satisfies the animal nutrition requirement. In addition to animal science curriculum requirements, students must include in their program additional physics (Physics 3A, 3B) and calculus (Mathematics 16A, 16B or equivalent). The 12 units of upper division major requirements include biochemistry lecture and laboratory.

Genetics

Biology 1; Chemistry 1A, 1B, 8, 101 or Biochemistry 101; Botany 1; Zoology 2, 100, 100L; Physiology 1, 1L; Mathematics 13, 105A, 105B. Recommended: Botany 130; Mathematics 16A, 16B, 108; German 1, 2; Zoology 103, 103L, 126.

* Units received in satisfaction of American History and Institutions requirement may be used to satisfy in part 3c above.

Poultry Husbandry

Bacteriology 1; Chemistry 1A, 1B, 8 and Biochemistry 101; Avian Medicine 112 which satisfies the pathology requirement. Poultry Husbandry 105 satisfies the nutrition requirement. Zoology 100 and 100L are additional requirements in the major. Poultry Husbandry 10, 11, and 12 are recommended.

ENTOMOLOGY

The curriculum in this department is designed to furnish basic training in the sciences and to give an introduction to the many branches of entomology.

Graduate Study—The Department of Entomology offers programs of study and research leading to a Master of Science degree and Doctor of Philosophy in Entomology. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Entomology.

Curriculum in Entomology

(Major: Entomology)

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| 1. General University requirements. (see page 50) | |
| 2. College of Agriculture requirements. (see page 50) | |
| 3. Curriculum requirements. (see page 50) | <i>Units</i> |
| a. Agriculture and closely related subjects..... (24 units) | |
| Entomology | 15 |
| Electives | 9 |
| b. Natural Sciences* | (44 units) |
| Botany and Zoology..... | 15 |
| Chemistry (including organic)..... | 13 |
| Genetics | 3 |
| Microbiology | 4 |
| Physics and/or Mathematics..... | 6 |
| Plant or Animal Physiology, Nutrition or Biochemistry..... | 3 |
| c. Social Sciences and Humanities**..... (24 units) | |
| English and/or Speech..... | 6 |
| Electives | 18 |
| d. Unrestricted electives | (16 units) ... 16 |
| 4. Additional courses chosen by the student with the approval of the major adviser. (These may be used to satisfy course requirements under 1 and 2 above or the requirements for the major.)..... | 16 |

Total units required for Bachelor of Science degree.....124

5. Certain courses are required for the major and where applicable may be used in partial satisfaction of 3a, 3b, and 3c above:
 Entomology 1, 106, 112, 127 and 49 (summer practice course—no credit).
 The microbiology requirement can be satisfied by a basic course in bacteriology or protozoology.

FOOD SCIENCE

The food science curriculum prepares students to meet the professional opportunities offered by the food and allied industries, careers in plant operation, plant management, quality control, research and teaching. The student may plan a program directed toward one of the following areas of interest: general food technology, preparation for graduate study, brewing technology, dairy products technology, enology, fruit and vegetable products technology, and meat and poultry products technology.

A food processing emphasis is also available under the curriculum in Agricultural Science and Management. (See page 64.)

* Mathematics beyond trigonometry.

** Units received in satisfaction of American History and Institutions requirement may be used to satisfy in part 3c above.

Graduate Study—Graduate instruction leading to the Master of Science degree is offered in food science and the Doctor of Philosophy degree in related fields of agricultural chemistry, microbiology, comparative biochemistry, nutrition, engineering, animal physiology and plant physiology.

Curriculum in Food Science

(Major: Food Science)

- | | |
|--|--------------|
| 1. General University requirements. (see page 50) | |
| 2. College of Agriculture requirements. (see page 50) | |
| 3. Curriculum requirements. (see page 50) | <i>Units</i> |
| a. Agriculture and closely related subjects (24 units) | |
| Food science and technology or closely related courses in the field of food science | 20 |
| Electives | 4 |
| b. Natural Sciences (49-51 units) | |
| Bacteriology | 4 |
| Biochemistry | 6 |
| Botany or zoology | 5 or 3 |
| Chemistry | 19 |
| Mathematics (including calculus)* | 9 |
| Physics (including laboratory) | 8 |
| c. Social Sciences and Humanities** (24 units) | |
| English and/or Speech | 6 |
| Electives | 18 |
| d. Unrestricted electives (16 units) | 16 |
| 4. Additional courses chosen by the student with the approval of the major adviser. (These may be used to satisfy course requirements under 1 and 2 above or requirements for the major) | 9 or 11 |

Total units required for the Bachelor of Science degree 124

5. Certain courses are required for the major and where applicable may be used in partial satisfaction of 3a, 3b, and 3c above:

Chemistry 109, Food Science and Technology 1, 103, 105, 105L and 110.

In addition students following the enology area of interest in the Food Science major will take the following Viticulture and Enology courses: 3, 124, 125, 140.

HOME ECONOMICS

The curriculum in home economics provides a good general education for all majors and preparation for a variety of professional careers. Considerable latitude in the course of study is encouraged for honor students.

Graduate Study—The Department of Home Economics offers advanced work at the Master of Science level in child development, consumer economics, foods, nutrition, and textile science. Professors of home economics are also in charge of Ph.D. programs in nutrition and various aspects of food quality. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Home Economics.

Curriculum in Home Economics

(Majors: Child Development, Design, Dietetics, Foods, General Home Economics, Nutrition, Textile Science)

1. General University requirements. (see page 50)
2. College of Agriculture requirements. (see page 50)
3. Curriculum requirements. (see page 50)

* Mathematics beyond trigonometry.

** Units received in satisfaction of American History and Institutions requirement may be used to satisfy in part 3c above.

	<i>Units</i>
a. Home Economics and closely related fields	
Lower division	6-12
Upper division	19-27
b. Natural Sciences	18
Chemistry	1 course
Physics	1 course
Statistics or other mathematics	1 course*
One course in each of two areas of the biological sciences: Physiology, bacteriology, zoology or botany	
c. Social Sciences	18
One course in two areas of Group I and Group II Group I (Psychology, sociology, cultural anthropology) Group II (Political science, history, economics)**	
d. Humanities	18
English (6 units) One course in Design and Color One course in Group I and Group II Group I (Literature, foreign language, philosophy) Group II (Art, dramatic art, speech, music)	
4. Additional courses chosen by the student with approval of the major adviser, some of which may be required in satisfaction of the major requirements under 5. These may also be used to satisfy the course requirements under 1 and 2.	45-31

Total units required for the Bachelor of Science degree.....124

- 5. Certain courses are required for the following majors and where applicable may be used in partial satisfaction of 3a, 3b, 3c, and 3d above:**

Child Development

Home Economics 112A-112B, 113A-113B, 114, 131, 133, 136, 137, 138, 139; Anthropology 1 or 2; Biochemistry 101; Chemistry 1A, 8; English 1A, 1B; Genetics 10; Mathematics 13; Physiology 1; Psychology 1, 2; Sociology 1, 2, 126.

Design

Art 16, two courses in painting and/or sculpture, two courses in history of art; Design 6A, 6B, 8, 191, 192A-192B or 196A-196B, 193 or 195, 197; Anthropology 2; English 1A, 1B; Philosophy 123 or 126; Psychology 1 or 2. A total of 20 upper division design units or closely related subjects.

Dietetics

Home Economics 100A-100B, 101A-101B, 112A-112B, 113A-113B, 116, 121, 122, 141 or Agricultural Economics 130; Bacteriology 1; Chemistry 1A, 1B, 8; Biochemistry 101; Economics 1A, 1B, 11; Education 110; English 1A, 1B; Mathematics 13; Physiology 1, 1L; Psychology 1.

Foods

Home Economics 100A-100B, 101A-101B, 104A-104B, 112A-112B, 113A-113B, 141; Food Science and Technology 107; Bacteriology 1; Biochemistry 101; Chemistry 1A, 1B, 5, 8; Economics 1A, 1B; English 1A, 1B; Mathematics 13; Physics 2A, 2B; Physiology 1; Psychology 1.

General Home Economics (Teaching and Agricultural Extension)†

Design 130, 150; Home Economics 6, 7, 100A-100B, 112A-112B, 131, 133, 137, 140, 142; Bacteriology 1; Chemistry 1A, 8; Economics 1A, 1B; English 1A, 1B; Mathematics 13; Physiology 1; Psychology 1.

* Mathematics beyond trigonometry.

** Units received in satisfaction of American History and Institutions requirement may be used to satisfy in part 3c (Group II) above.

† Majors planning to meet the secondary teaching credential requirements or to qualify for agricultural extension positions should complete the laboratory courses: 6L, 7L, 101A-101B, 113A-113B, 140L, 175, and Design 130L.

Nutrition

Home Economics 100A-100B, 101A-101B, 112A-112B, 113A-113B, 117, 141; Bacteriology 1; Chemistry 1A, 1B, 5, 8; Biochemistry 101 and 101L; Economics 1A, 1B; English 1A, 1B; Mathematics 13; Physiology 1, 1L; Psychology 1.

Textile Science

Home Economics 6, 6L, 7, 141, 142, 160, 162; Bacteriology 1; Chemistry 1A, 1B, 5, 8; Economics 1A, 1B; English 1A, 1B; Mathematics 13; Physics 2A, 2B; Psychology 1.

INTERNATIONAL AGRICULTURAL DEVELOPMENT

This curriculum provides coordinated training in Agriculture, the natural and physical sciences, and the social sciences and humanities for students who wish to enter into the field of agricultural development, either at home or abroad, or upon some phase of international agriculture. It represents a sufficiently broad and thorough program in which students will readily be able to prepare for advanced study in two or more phases of agriculture. Those considering foreign service, international trade, technical assistance responsibilities, and other vocational or professional fields involving foreign aspects of agriculture should find this curriculum particularly useful. It also will provide effective training for those students who are interested in developmental activities involving agriculture in the United States. This curriculum also will provide valuable background training for those considering graduate work as a means of preparing for careers in international agriculture.

Curriculum in International Agricultural Development

(Major: International Agricultural Development)

1. General University requirements. (see page 50)
2. College of Agriculture requirements. (see page 50)
3. Curriculum requirements. (see page 50)

	<i>Units</i>
a. Agriculture and closely related subjects (24 units)	
Primary field of interest: Animal Science or Plant Science	12
Secondary field of interest: Agricultural Economics, Agricultural Engineering, Animal Science, Plant Science, or Soil and Water Science	9
Electives	3
b. Natural Sciences (32 units)	
Bacteriology, Plant or Animal Physiology, and/or Zoology	7
Botany	5
Chemistry	8
Genetics	3
Physics	3
Statistics	3
Mathematics and/or additional Sciences*	3
c. Social Sciences and Humanities (42 units)	
Agricultural Economics and/or Economics	9
Anthropology, Geography and/or Sociology	9
English and/or Speech	6
Foreign Language**	12
History and/or Political Science***	6
d. Unrestricted electives (16 units)	16

* Mathematics beyond trigonometry.

** High school languages accepted with one year in high school equivalent to 3 units. The objective in this requirement is to include a minimum of 12 units or their equivalent in a single language. Students meeting this requirement in part with foreign language

Units

4. Additional courses chosen by the student with the approval of the major adviser. (These may be used to satisfy course requirements under 1 and 2 above or the requirements for the major) 10

Total units required for the Bachelor of Science degree..... 124

IRRIGATION SCIENCE

The irrigation science curriculum provides instruction in the basic sciences and agriculture with irrigation courses in surface and groundwater supply, hydraulics, wells and pumps, water rights, water quality and salinity, irrigation systems, plant-soil-water relationships and crop water requirements, irrigation management and water conservation, and drainage.

Graduate Study—The Department of Irrigation offers graduate instruction and research in water quality and salinity, physics of soil water, water relations of plants, and engineering problems. Programs of study leading to a Master of Science degree in irrigation are available. Ph.D. programs of study may also be pursued in engineering, soil science, and plant physiology with emphasis in irrigation under the guidance of the Department of Water Science staff.

Students wishing to emphasize the engineering aspects of irrigation, drainage, and water resources should refer to the College of Engineering section of this catalogue.

Curriculum in Irrigation Science

(Major: Irrigation)

- | | |
|--|-------|
| 1. General University requirements. (see page 50) | |
| 2. College of Agriculture requirements. (see page 50) | |
| 3. Curriculum requirements. (see page 50) | Units |
| a. Agriculture and closely related subjects (37 units) | |
| Crops and Soil Science and/or Plant Nutrition..... | 14 |
| Engineering and/or Agricultural Engineering..... | 8 |
| Water Science | 15 |
| b. Natural Sciences* (40 units) | |
| Botany | 9 |
| Chemistry | 13 |
| Geology | 4 |
| Mathematics | 6 |
| Physics | 8 |
| c. Social Sciences and Humanities** (24 units) | |
| Economics | 3 |
| English and/or Speech..... | 6 |
| Electives | 15 |
| d. Unrestricted electives (16 units) ... | 16 |
| 4. Additional courses chosen by the student with the approval of the major adviser. (These may be used to satisfy course requirements under 1 and 2 above or requirements for the major.)..... | 7 |

Total units required for the Bachelor of Science degree..... 124

credits earned in high school, will be required to take a corresponding number of units to meet the requirement of 124 units for the Bachelor of Science degree.

*** History and/or Political Science requirement under 3c may be satisfied by completing two of the following courses:

History: 176A, 176B, 178A, 178B, 179A, 179B, 180.

Political Science: 102, 105, 113, 128A, 163, 166

These courses may also be used to satisfy the University requirement of American History and Institutions.

* Mathematics beyond trigonometry.

** Units received in satisfaction of American History and Institutions requirement may be used to satisfy in part 3c above.

5. Certain courses are required by the major and where applicable may be used in partial satisfaction of 3a, 3b, and 3c above:

Irrigation 100, 118, 160; Botany 1, 111; Engineering 1A or 3, and 142; Mathematics 9A, 9B or 16A, 16B; Physics 2A, 2B, 3A, 3B; Soil Science 107. A knowledge of mechanical drawing is required of all students. This requirement may be satisfied by a high school or University Extension course or by demonstrating proficiency.

PLANT SCIENCE

The curriculum in plant science provides opportunity to specialize in fields of specific interest according to the student's objectives. These fields of specialization include agronomy (field crops), vegetable crops, pomology (fruit crops), viticulture, landscape horticulture, park administration, plant pathology, and genetics.

A plant science emphasis is also available under the curriculum in Agricultural Science and Management. (See page 64.)

Graduate Study—Programs of study and research leading to a Master of Science degree are offered in the following plant science fields: agronomy, genetics, horticulture (landscape horticulture, pomology and/or viticulture) plant pathology, and vegetable crops. Students may prepare for research and teaching careers in plant science by seeking a doctorate in agricultural chemistry, botany, comparative biochemistry, genetics, plant pathology, plant physiology, or soil science. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser within the field of interest.

Curriculum in Plant Science

(Majors: Agronomy, Genetics, Landscape Horticulture, Park Administration, Plant Pathology, Pomology, Vegetable Crops, Viticulture)

1. General University requirements. (see page 50)
2. College of Agriculture requirements. (see page 50)
3. Curriculum requirements. (see page 50)
 - a. **Agriculture and closely related subjects** (24 units)

Entomology	4
Water Science, Plant Nutrition or Soils	3
Plant Pathology	4
Courses in the major or closely related field including 12 units of upper division	13
 - b. **Natural Sciences** (29 units)

Botany and Plant Physiology	9
Chemistry	13
Genetics	4
Physics	3
 - c. **Social Sciences and Humanities*** (24 units)

Economics	3
English and/or Speech	6
Electives	15
 - d. **Unrestricted electives** (16 units) . . . 16
4. Additional courses chosen by the student with the approval of the major adviser. (These may be used to satisfy course requirements under 1 and 2 above or the requirements for the major.) 31

Total units required for the Bachelor of Science degree 124

5. Certain courses are required for the following majors and where applicable may be used in partial satisfaction of 3a, 3b, and 3c above:

* Units received in satisfaction of American History and Institutions requirement may be used to satisfy in part 3c above.

Agronomy

Agronomy 1; Botany 1, 111; Chemistry 1A, 1B, 8; Mathematics 13; Soil Science 1; Plant Pathology 120; Water Science 100 or 110; a course in zoology.

Agronomy

(Science Specialization): In addition to the above: 13 units selected from Biochemistry, Botany, Chemistry, Mathematics, Physics or Bacteriology and 4 units of a foreign language.

Genetics

Biology 1; Chemistry 1A, 1B, 8; Mathematics 13, 105A. Recommended: Botany 130; Biochemistry 101; German 1, 2; Mathematics 16A, 16B, 108.

Landscape Horticulture

Botany 1, 111; Chemistry 1A, 1B, 8; Landscape Horticulture 1, 105A, 105B; Pomology 9. Recommended: Agricultural Economics 18; Art 2A; Botany 108 and 117; Economics 11; Engineering 1A; Pomology 1.

Park Administration

Botany 1, 111; Chemistry 1A, 8; Landscape Horticulture 1, 105A, 105B, 120, 128; Park Administration 110, 134, 140; Engineering 1A; Physical Education 140; Public Administration (6 units). Recommended: Agricultural Economics 18; Botany 107; Soil Science 1.

Plant Pathology

Bacteriology 1; Botany 119; Chemistry 1A, 1B, 5, 8; Entomology 124; Nematology 100; Plant Pathology 122; Zoology 10. Recommended: Biochemistry 101 and 101L; Water Science 100 or 110; Mathematics 13; German 1 and 2.

Pomology

Bacteriology 1; Botany 1, 111 (or 120A, 120B, 121A, 121B); Chemistry 1A, 1B, 8; Water Science 110; Physics 2A, 2B; Pomology 100 and 101; Soil Science 1.

Vegetable Crops

Botany 1, 111; Chemistry 1A, 1B, 8; Vegetable Crops 101, 190. Recommended: Agricultural Economics 140; Botany 107; Water Science 110; Physics 2B.

Viticulture

Botany 1, 111; Chemistry 1A, 1B, 8; Viticulture 1, 3, 105, 116. Recommended: Agricultural Economics 140; Agricultural Engineering 103; Water Science 110; Viticulture 124, 125 or one 3-unit upper division course in pomology.

PREFORESTRY

The preforestry curriculum is designed to offer training that will prepare the candidate for courses in the School of Forestry. For admission to the School of Forestry, which is located on the Berkeley campus, a student must have at least 56 units of credit including essentially the prescribed subjects as listed in the preforestry curriculum and a grade average of C or higher. The summer field program, Forestry 46, 47, 48, is prerequisite to all required forestry courses.

Graduate Study—The Department of Forestry, Berkeley campus, offers programs of study and research leading to the Master of Science, Master of Forestry, and Doctor of Philosophy degrees. Detailed information regarding

graduate study may be obtained by writing to the Graduate Adviser, School of Forestry, University of California, Berkeley, California.

Curriculum in Preforestry

1. General University requirements. (see page 50)	
2. College of Agriculture requirements. (see page 50)	
3. Curriculum requirements. (see page 50)	<i>Units</i>
a. General	
Botany (general botany).....	5
Chemistry (general inorganic and organic).....	8
Economics (elements of economics).....	6
Engineering (plane surveying).....	3
English and/or Speech.....	6
Geology (structural).....	3
Mathematics (beyond trigonometry).....	3
Physics (general physics).....	6
Statistical methods.....	3
Zoology (general biology).....	3
b. Forestry	
Summer field program.....	10
4. Additional courses chosen by the student with approval of the major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.).....	14
	<hr/> 70

PREVETERINARY MEDICINE

The preveterinary curriculum is designed to offer the preparation necessary for courses in the School of Veterinary Medicine. At least 60 units of credit including the prescribed subjects listed in the preveterinary curriculum are prerequisite to admission to the School of Veterinary Medicine. Minor shortages may be waived by the Admissions Committee of the School of Veterinary Medicine.

The School of Veterinary Medicine offers instruction leading to the Bachelor of Science and Doctor of Veterinary Medicine degrees. Further information regarding veterinary medicine may be obtained on page 87.

Curriculum in Preveterinary Medicine

1. American History and Institutions; mathematics, 6 units†, and Subject A, as required.	
2. Curriculum requirements:	<i>Units</i>
a. General	
Animal Husbandry*.....	3
Chemistry (general, inorganic, organic, and analytical).....	16
English (composition and additional English or speech).....	6
Physics (mechanics, heat, light, electricity).....	6
Social sciences, foreign languages, philosophy, psychology, fine arts, literature, and/or additional English, speech, and mathematics**..	12
Zoology.....	8
3. Additional courses chosen by the student with approval of the major adviser.....	9
	<hr/> 60

RANGE MANAGEMENT

The curriculum in range management is designed to provide training to qualify students as farm advisers, range technicians in state and federal agen-

† May be completed in high school. Trigonometry is prerequisite to physics at the University.

* Requirement may be waived if the course is not available at the school where preveterinary work is done

** Mathematics beyond trigonometry.

cies, as managers of commercial operations, and for graduate studies leading to positions in teaching, research, and management. The curriculum is administered by a committee whose membership is drawn from the Departments of Agronomy and Animal Husbandry and the School of Forestry at Berkeley.

Graduate Study—The Range Management Group offers programs of study and research leading to a Master of Science in range management. Students seeking a doctorate should plan to specialize in botany, ecology, plant physiology, soil science or zoology. The dissertation problem is normally drawn from range science. Students interested in advanced work in range economics may seek the doctorate in agricultural economics. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Range Management, in the Department of Agronomy.

Curriculum in Range Management

(Major: Range Management)

1. General University requirements. (see page 50)	
2. College of Agriculture requirements. (see page 50)	
3. Curriculum requirements. (see page 50)	<i>Units</i>
a. Agriculture and closely related subjects..... (29 units)	
Agronomy and Range Management	16
Animal Husbandry	10
Soil Science	3
b. Natural Sciences and Physical Sciences..... (50 units)	
Botany	15
Chemistry	8
Engineering	3
Geology	4
Physics	6
Zoology	8
Electives (restricted)*	6
c. Social Sciences and Humanities**..... (24 units)	
Economics	3
English and/or Speech.....	6
Electives	15
d. Unrestricted electives..... (16 units) ...	16
4. Additional courses chosen by the student with the approval of the major adviser. (These may be used to satisfy course requirements under 1 and 2 above or requirements for the major)	5
Total units required for the Bachelor of Science degree.....	124
5. Certain courses are required for the major and where applicable may be used in partial satisfaction of 3a, 3b, and 3c above:	
Economics 1A; a course in surveying, plant physiology, plant taxonomy, and plant ecology; Agronomy 112; Range Management 100, 103, 105, 133.	

RESOURCE TECHNOLOGY

A resource technology emphasis is available under the curriculum in Agricultural Science and Management. (See page 64)

SOIL SCIENCE

The soil science curriculum is designed to train students for positions with governmental and private organizations where technical knowledge is required in order to solve problems associated with soils. Special areas of study are soil

* Additional units in botany, chemistry, genetics, geology, statistical methods, and zoology.

** Units received in satisfaction of American History and Institutions requirement may be used to satisfy in part 3c above.

physics, soil chemistry, soil microbiology, soil fertility, soil management, soil conservation, soil survey and plant nutrition.

Graduate Study—The Department of Soils and Plant Nutrition offers programs of study and research leading to the Master of Science and Doctor of Philosophy degrees. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Soils and Plant Nutrition.

Curriculum in Soil Science

(Major: Soil Science)

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|--|--------------|
| 1. General University requirements. (see page 50) | |
| 2. College of Agriculture requirements. (see page 50) | |
| 3. Curriculum requirements. (see page 50) | <i>Units</i> |
| a. Agriculture and closely related subjects. (24 units) | |
| Crop science (agronomy, pomology, vegetable crops, viticulture) or plant ecology | 3 |
| Introduction to soil science. | 3 |
| Soil science, upper division courses. | 12 |
| Electives | 6 |
| b. Natural Sciences (31 units) | |
| Bacteriology | 4 |
| Botany and plant physiology. | 9 |
| Chemistry | 10 |
| Geology | 4 |
| Physics | 4 |
| c. Social Sciences and Humanities* (24 units) | |
| English and/or Speech. | 6 |
| Electives | 18 |
| d. Unrestricted electives (16 units) . . . | 16 |
| 4. Additional courses chosen by the student with the approval of the major adviser. (These may be used to satisfy course requirements under 1 and 2 above or requirements for the major) | 29 |

Total units required for the Bachelor of Science degree. 124

5. A minimum of 30 units of technical electives must be devoted to an organized program of study selected by the student with the approval of his adviser. Suggested electives for the area of specialization in addition to the upper division courses offered in soil science are: Agricultural Engineering 12, 106, 107; Agricultural Economics 1, 18, 100A, 100B; Agronomy 131; Biochemistry 101, 101L; Botany 107, 117, 120A, 120B; Chemistry 5, 8, 109, 110A, 110B, 112A; Engineering 1A, 3; Entomology 124; Geography 1, 3, 105, 131, 161; Geology 6, 104A, 104B, 112, 116, 117; Water Science 100, 110, 115, 135, 150, 160; Mathematics 9A, 9B, 9C, 13, 16A, 16B, 109; Physics 2B, 3B, 4A, 4B, 4C, 104, 105A, 105B; Plant Nutrition 116; Plant Pathology 120.

AGRICULTURAL SCIENCE AND MANAGEMENT

This curriculum provides professional preparation for employment and leadership in the agricultural and related industries and leads to a Bachelor of Science or a Master of Science degree through course work in the natural sciences, social sciences, humanities, and general agriculture.

The student enters the program as an Agricultural Science and Management major. Upon completion of his junior year (approximately 90 units) he must submit an application for admission to either the one-year program leading to the Bachelor of Science degree, or the professional two-year pro-

* Units received in satisfaction of American History and Institutions requirement may be used to satisfy in part 3c above.

gram leading to the Master of Science degree. The Master of Science program requires admission to the Graduate Division. Students who hold a Bachelor of Science degree from a college or university of acceptable standing and who have been admitted to the Graduate Division may be admitted directly to the Master of Science program.

Students will be admitted to the professional program at the beginning of each semester. Application forms may be obtained from the Registrar. Students currently enrolled must file completed applications by April 15 for the fall semester and December 1 for the spring semester. Students who are not attending the University must file completed application along with application for admission or readmission by the dates specified in the General Catalogue for such applications. All the requirements need not be completed at the time of application, but the student must supply a transcript showing work in progress.

Curriculum in Agricultural Science and Management

(Major: Agricultural Science and Management)

1. General University requirements. (see page 50)	
2. College of Agriculture requirements. (see page 50)	
3. Preprofessional curriculum requirements.	<i>Units</i>
Introductory Agricultural Science, including at least four of the following: Agricultural Economics, Animal Science, Food Science, Plant Science, Soil and Water Science	14
Biological Sciences	12
Chemistry (including organic)	8
Economics	6
English or Speech	6
Mathematics (calculus, statistics and/or linear algebra)	6
Physics	6
Social Sciences and Humanities electives*	12
Unrestricted electives	20
Total units required in the Preprofessional curriculum	90
4. Major requirements (see [Professional] Program below)	34
Total units required for the Bachelor of Science degree	124

Admission to the (Professional) Program:

Upon application, students will be interviewed at the end of their junior year and accepted into either a one-year program leading to the Bachelor of Science degree, or a two-year program leading to the Master of Science degree.

One-Year Program leading to the Bachelor of Science degree:

Requirements beyond the completion of the preprofessional curriculum:	
Agricultural Economics, including 100A	<i>Units</i> 7
Animal Science, Food Science, Plant Science, or Resource Technology*	12
Electives approved by adviser	15
	34

* Units received in satisfaction of the University requirement of American History and Institutions may be used in partial satisfaction of this requirement.

Two-Year Program leading to the Master of Science degree:

Requirements beyond the completion of the preprofessional curriculum:

	<i>Units</i>
1) Complete two major fields of specialization:	
Agricultural Economics, including 100A	7
Animal Science, Food Science, Plant Science, or Resource Technology*	12
Electives approved by adviser	15
	34
2) Complete the Graduate Division requirements of one year of graduate residence and 24 units in addition to the requirements for a Bachelor of Science degree, including 12 graduate units, as follows:	
Seminar	2
Special Problems or Research	4
Fields of Specialization:	
Agricultural Economics	4
Animal Science, Food Science, Plant Science, or Resource Technology	4
Electives (upper division or graduate)	10
	24
3) A comprehensive oral examination in the two fields of specialization	00
	148

Major Field of Specialization Requirements (which may, in part, be satisfied by requirements for the Bachelor of Science degree):

Economics of Agricultural Management: Agricultural Economics 18 units including 100A, 106, 111, 3 units from 160, 165, 170, 176, and 6 units from 250, 253, 257, and 260; Economics 1B, 11; Mathematics 13, 16A. Recommended: Agricultural Economics 100B.

Animal Science: Animal Science 16 units including Physiology 5 units, Nutrition 4 units, Breeding 3 units and a production course; Biological Sciences 18 units including Bacteriology, Botany, Genetics, and Zoology. Recommended: Chemistry 1B.

Food Science: Biochemistry 101L; Biological Sciences 12 units including Bacteriology 4 units; Chemistry 1B; Food Science 14 units including 103, 105, 105L.

Plant Science: Biological Sciences 19 units including Botany, Entomology Genetics, and Plant Pathology; Plant Science 16 units including Plant Physiology, Plant Breeding, and Plant Ecology; Water Science 3 units.

Resource Technology: Agricultural Engineering 107; Biological Sciences 12 units including Botany and Plant Physiology; Plant Production 3 units; Economics 1B; Mathematics 16A; Regional Planning 3 units; Soils 109, 118; Summer Field course 5 units; Water Science 110. Recommended: Geography 3, 161; Political Science 181; Water Science 115.

* To permit specialization in a selected subject area, the adviser may recommend concentration of these courses in Animal or Poultry Husbandry, Agronomy, Food Science, Landscape Horticulture, Pomology, Vegetable Crops, Viticulture, or other special area of emphasis.

COLLEGE OF ENGINEERING

The University's curricula in engineering emphasize design, development, and research. Mathematical analysis, the basic sciences, and design are stressed in preparing the student for a professional engineering career.

Engineering curricula on the Davis campus include aerospace, agricultural, chemical, civil, electrical, and mechanical engineering. Each curriculum is a four-year undergraduate program leading to the Bachelor of Science degree. Graduate programs leading to the degrees Master of Engineering, Doctor of Engineering, Master of Science, and Doctor of Philosophy are offered.

Admission in Freshman Standing

As a general rule the Colleges of Engineering in the University will admit students only as beginning freshmen or in advanced standing at the junior or senior level. All applicants must satisfy the general requirements for admission to the University (see pages 19-27) and must take an engineering examination (see page 24). Students who attend a California junior college or other educational institution for one semester to make up high school subject deficiencies or prerequisites for the beginning engineering courses at the University will be considered for admission in freshman standing.

It is important that high school students who plan to study engineering at the University include the following subjects in their high school programs:

<i>Subject</i>	<i>Units</i>
Algebra†	2
Plane geometry†	1
Trigonometry†	$\frac{1}{2}$
Chemistry or physics (both are desirable)....	1
Mechanical drawing	1

These subjects are prerequisite to certain basic courses in the freshman engineering program. A student who is admitted without all this preparation will be required to make up equivalent work while in college. As a result, he probably will be delayed in advancement to upper division status and in graduation.

Admission to Upper Division.

The requirements for admission to the upper division in the College of Engineering are as follows:

1. A satisfactory combined average based on the score in the Upper Division Engineering Examination and grades in science, mathematics, and engineering subjects undertaken in college.
2. Completion of at least 60 units, including the following minimum subject requirements, with satisfactory grades:

	<i>Minimum number of units</i>
a. Analytic geometry and calculus	12
b. Chemistry (for engineering and science students)	8
c. Physics (for engineering and science students)	10
d. Engineering (subjects such as graphics, properties of materials, surveying, engineering measurements, statics, and circuit theory)	10

† Or equivalent integrated courses covering the same subject material.

	<i>Minimum number of units</i>
e. Humanistic-social studies (Must be selected from the list of courses approved by the Committee on Undergraduate Study)	6
f. Unspecified subjects (6 units may be in humanistic-social subjects; the remaining units should be in engineering, science, and mathematics subjects, and 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	14
	60

The student admitted on this basis will not be required to take additional lower division courses except those which are prerequisite to upper division courses in his curriculum or are specified requirements for the B. S. degree.

The above subject requirements are minimum. Students who enter with only 60 units will probably require more than four semesters to complete the upper division engineering curricula in the University. The University will accept a maximum of 70 units of advanced standing credit for college courses completed at a junior college.

The requirements for admission to the upper division are the same for continuing students in the College of Engineering and for students transferring from other colleges in the University or from other educational institutions.

Students in the College of Engineering are not permitted to enroll in upper division engineering courses until they have been admitted to the upper division.

Engineering Examinations

Information regarding these examinations may be found on page 24.

Requirements for the Degree of Bachelor of Science

The degree of Bachelor of Science in the College of Engineering is awarded to those candidates who:

1. Satisfy the general University requirements in regard to Subject A, American History and Institutions, and scholarship.
2. Satisfy the senior residence requirement. Students in the College of Engineering are required to take the final 30 units of work in residence in the College of Engineering, rather than the minimum required by the University.
3. Satisfactorily complete the subjects and units prescribed in one of the engineering fields of study.
4. Satisfy the requirement in English (see page 75).
5. Attain a grade C average in all courses of upper division level taken in satisfaction of required technical subjects and technical electives in the program of study.

Honors with the Bachelor's Degree

Honors at graduation may be awarded to students who achieve distinguished scholarship records in all work undertaken after admission to the upper division as attested by recommendation of the Committee on Undergraduate Study of the College of Engineering. Students who display marked superiority may receive Highest Honors.

Faculty Advisers and Study-List Requirements

Upon admission to the College, each student is assigned to a faculty adviser and is under the guidance of the Dean of the College of Engineering

and the Committee on Undergraduate Study. All study programs are arranged in conference with the adviser and must be approved by him. However, *the student is held responsible for planning his program and for the satisfactory completion of graduation requirements.* Questions regarding irregularities should be discussed with the adviser and settled at the earliest possible date.

A student who gives full time to University responsibilities is expected to enroll for the number of units required in his program of study. Students may not enroll for more than 19 units or less than 14 units exclusive of physical education without special approval by the Dean of the College of Engineering.

LOWER DIVISION PROGRAM

The following two-year program is prescribed for all lower division students in the College of Engineering, with the *exception* of those students planning to enroll in the upper division program in Chemical Engineering. Its purpose is to provide the beginning students with the fundamentals in science, mathematics, and engineering essential as preparation for the professional studies of the upper division.

Freshman Year

<i>Fall</i>	<i>Spring</i>
Chemistry 1A 5	Chemistry 1B ¹ 5
Engineering 3 (or 4) 4	Engineering 4 (or 3) 3
(or 3)	(or 4)
Mathematics 9A 4	Mathematics 9B 4
Humanistic-Social Studies 3	Physics 4A 4
16	16

Sophomore Year

Engineering 45 (or 35) 3	Engineering 35 (or 45) 3
Mathematics 9C 4	Mathematics 109 4
Physics 4B 4	Physics 4C 4
Humanistic-Social Studies 3	Humanistic-Social Studies ² 3
Elective 3	Elective 3
17	17

LOWER DIVISION PROGRAM IN CHEMICAL ENGINEERING

(for students planning to enroll in the Upper Division Program in Chemical Engineering)

Freshman Year

<i>Fall</i>	<i>Spring</i>
Chemistry 1A 5	Chemistry 1B 5
Engineering 3 4	Mathematics 9B 4
Mathematics 9A 4	Physics 4A 4
Humanistic-Social Studies 3	Humanistic-Social Studies 3
16	16

¹ Students in agricultural engineering are encouraged to substitute for Chemistry 1B the following: Chemistry 8 (3 units) and at least 2 additional units of technical electives (Agronomy 1 or Soil Science 1 is suggested).

² It is recommended that students in water resources take Soil Science 1 or Irrigation 1 in the lower division, deferring 3 units of humanistic-social studies to the upper division.

Sophomore Year

Engineering 35	3	Engineering 104	3
Mathematics 9C	4	Mathematics 109	4
Physics 4B	4	Physics 4C	4
Humanistic-Social Studies	3	Chemistry 5	3
Elective	3	Elective	3
	<hr/>		<hr/>
	17		17

UPPER DIVISION CURRICULA

The upper division curricula in the several engineering areas (Aerospace, Agricultural, Chemical, Civil, Electrical and Mechanical) are described in the following pages. With the exception of Chemical Engineering, it will be noted that the subjects required in the first semester of the junior year are the same in most of the programs. The total undergraduate curriculum normally requires eight semesters of study and leads to the Bachelor of Science degree. Graduate programs leading to the Master of Engineering and Doctor of Engineering degrees, or Master of Science and Doctor of Philosophy degrees are offered.

Aerospace Engineering (133 units)

Aerospace engineering is concerned with the problems of flight in the atmosphere and beyond. It consists of the design, development, and manufacture of airplanes, helicopters, missiles, rockets, satellites, and space stations. The undergraduate curriculum combines the basic engineering courses and specific courses in aerodynamics, guidance and control, propulsion and structures. A range of technical elective courses are available from which the student may select subjects of a more specialized nature such as aeronautics, aero structures, and astronautics.

The curriculum is aimed at developing the student's ability to synthesize these various basic components into engineering systems. This training should enable the student to handle unforeseen problems in the rapidly expanding engineering field.

Junior Year

<i>Fall</i>		<i>Spring</i>	
Engineering 100A	3	Engineering 103	3
Engineering 101	2	Electrical Engineering 100B ...	3
Engineering 102	3	Technical electives	9
Engineering 104	3		<hr/>
Engineering 105	3		
Humanistic-Social Studies	3		
	<hr/>		
	17		15

Senior Year

Mechanical Engineering 123 ...	3	Engineering 106	3
Mechanical Engineering 127 ...	3	Mechanical Engineering 117 ...	3
Chemical Engineering 186	3	Engineering 190	2
Technical electives	6	Technical electives	6
Humanistic-Social Studies	3	Humanistic-Social Studies	3
	<hr/>		<hr/>
	18		17

Suggested technical electives are:

Civil Engineering 131, 135, 183; Electrical Engineering 180, 182, 187; Mechanical Engineering 121, 122, 125, 184, 185, 188.

Agricultural Engineering (132 Units)

The program of study in agricultural engineering prepares the student to apply engineering principles to the problems of agriculture and related industries. Agricultural engineering involves extensive utilization of basic knowledge and techniques from several other fields of engineering; it is unique in that it also requires a general understanding of, and appreciation for, biological and soil-management aspects of agriculture.

The technical electives in the program permit specialization in the areas of farm power and machinery, farm structures, agricultural processing, or some combination of these. Soil and water management is included in the civil engineering program.

The *power and machinery* area involves the design, development, and application of field machines and power units utilized in crop production and related activities. Economic aspects and the effects of machines on soils and crops are considered. Procedures for developing machine components and synthesizing them into an engineering system are treated.

Engineering in *farm structures* involves analysis of space and labor utilization of the structure in relation to an over-all enterprise, determination of the economic value to the enterprise, and consideration of basic design features. The structure is also considered as a device for providing an optimum environment for animal production, product storage and conditioning, or crop production in greenhouses. Thus, the biological aspects and the various meteorological factors are recognized in the basic analysis and design of structures.

Agricultural processing deals with the transformation of raw agricultural products into different, more usable, or more valuable forms, usually at the farm level. The basic aspects of drying, sorting, cleaning, handling, storage, size reduction, and heat and energy transfer, as well as the biological characteristics of the materials, are considered in the design of processing systems.

Junior Year	
<i>Fall</i>	<i>Spring</i>
Engineering 100A	3 Electrical Engineering 100B
Engineering 101	2 Engineering 103
Engineering 102	3 Mechanical Engineering 118 or
Engineering 104	3 Civil Engineering 131
Engineering 105	3 Technical Electives*
Humanistic-Social Studies	3
—	—
17	15
Senior Year	
Agricultural Engineering 114 ...	3 Engineering 106
Agricultural Engineering 115 ...	3 Agricultural Engineering 112 ...
Chemical Engineering 186	3 Engineering 190
Technical Electives*	5 Technical Electives*
Humanistic-Social Studies	3 Humanistic-Social Studies
—	—
17	17

Suggested technical electives are:**

Agronomy 1 (or equivalent); Agricultural Engineering 116; Civil Engineering 132A, 133; Electrical Engineering 168, 180; Mechanical Engineering 119, 120, 121, 122, 123, 124, 125, 184, 185; Soil Science 1.

* The technical electives must include at least 9 units in engineering courses and 3 units in agricultural science (animal science, plant science, water science).

** Appropriate courses in other engineering areas or in science or mathematics may be taken in partial satisfaction of the technical electives requirement upon approval of the adviser.

Chemical Engineering (133 Units)

Chemical engineering is concerned with the conversion of raw materials into useful products vital in modern civilization. The products of the chemical and process industries range from antibiotics to zirconium, from petroleum to plutonium, from agricultural chemicals and foods to synthetic plastics. Preparation for careers in chemical engineering requires an understanding of both engineering and chemical principles to develop proficiency in conceiving, designing, and operating new processes.

The chemical engineering curriculum has been planned to give the student a sound treatment of the engineering and chemical sciences so that he may achieve competence in treating not only current technical problems but those that will arise in the new technologies of the future. In the upper division attention is focused upon 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 and plant design. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

The curriculum includes several technical electives which allow for special training in an area of particular interest.

		Junior Year	
		Fall	Spring
Chemistry 110A	.....	3	Chemistry 110B 3
Chemistry 112A	.....	5	Chemistry 112C 3
Engineering 102	.....	3	Chemical Engineering 152 4
Engineering 103	.....	3	Chemical Engineering 186 3
Engineering 105	.....	3	Humanistic-Social Studies 3
		—	—
		17	16
Senior Year			
Engineering 100A	.....	3	Engineering 106 3
Engineering 101	.....	2	Chemical Engineering 155B 2
Chemical Engineering 154	.....	3	Chemical Engineering 156 3
Chemical Engineering 155A	....	1	Chemical Engineering 158 3
Engineering 190	.....	2	Technical elective 3
Technical elective	.....	3	Humanistic-Social Studies 3
Humanistic-Social Studies	.....	3	—
		—	—
		17	17

Suggested technical electives are:**

Bacteriology 1, 106; Biochemistry 101, 101L; Food Science and Technology 101, 103, 105, 105L, 106; Electrical Engineering 100B, 180, 181; Mathematics 128A, 185; Physics 121.

Civil Engineering (134 Units)

Areas of specialization in civil engineering are environment engineering, structural engineering and mechanics, and water resources engineering.

Environment Engineering is concerned with improving and maintaining the qualities of the air, land, and water environment that effect the health and well being of man. The program is based on a firm basic science and civil engineering foundation and emphasizes the design of waterborne, solid,

** Appropriate courses in other engineering areas or in science or mathematics may be taken in partial satisfaction of the technical electives requirement upon approval of the adviser.

and airborne waste management systems, the design of potable water supplies and environment monitoring.

Structural Engineering and Mechanics is concerned with the design, construction, and performance of all types of structures, including buildings, bridges, and aircraft and space vehicles. Consideration is given to earthquake, wind, and blast loading of stationary structures and to dynamic and aerodynamic loads on flight structures. Studies in the economics of the construction industry and in current construction techniques are included.

Water Resources Engineering includes programs in Hydraulics, Irrigation and Drainage, and Water Resources System 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 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, 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.

Junior Year

<i>Fall</i>		<i>Spring</i>	
Engineering 100A	3	Engineering 103	3
Engineering 101	2	Civil Engineering 131	3
Engineering 102	3	Engineering Geology 150	3
Engineering 104	3	Civil Engineering 132A	2
Engineering 105	3	Civil Engineering 132B	3
Humanistic-Social Studies	3	Technical Elective	3
	17		17

Senior Year

Civil Engineering 133	3	Engineering 106	3
Civil Engineering 142	3	Engineering 190	2
Technical Electives	8	Technical Electives	9
Humanistic-Social Studies	3	Humanistic-Social Studies	3
	17		17

Suggested technical electives are:**

Environment Engineering

Agricultural Engineering 106; Bacteriology 1; Biochemistry 101; Chemistry 8, 110A-110B; Civil Engineering 145, 146, 147, 148; Geography 3; Mechanical Engineering 185; Park Administration 110.

Structural Engineering and Mechanics

Agricultural Engineering 115; Civil Engineering 134, 135, 137, 183; Electrical Engineering 180; Mechanical Engineering 184, 188.

Water Resources Engineering

Civil Engineering 143, 144, 145, 146, 147, 148; Electrical Engineering 180; Mechanical Engineering 125, 185; Water Science 100, 160, 170.

** Appropriate courses in other engineering areas or in science or mathematics may be taken in partial satisfaction of the technical electives requirement upon approval of the adviser.

Electrical Engineering (134 Units)

Present day electrical engineering embraces a broad spectrum of disciplines based upon the physical and mathematical sciences. For example, the marvels of electronics are being applied to such diversified fields as automation and control, information processing and computers, micro-miniaturization of circuits and components, biomedical applications, communications and micro-waves, and stimulated energy emission by means of quantum effects (masers and lasers).

The course of study in electrical engineering allows the student a maximum of freedom to develop himself in special technical areas of his choice while required courses insure his attainment of a broad background in basic electrical engineering. The common engineering core courses of the lower division provide a strong foundation for the specialized topics to follow. In addition, a specified group of upper division courses in network theory, field theory, systems, electronics, and communications theory prepare the student for the technical electives of his senior year.

Technical electives are a substantial part of the program of the senior year. 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 information and data processing, control theory, computers, communications, electronics, biomedical engineering, system theory, solid state, and high frequency phenomena and devices.

The variety of course offering permits the student to prepare himself for graduate study in electrical engineering, or to terminate at the bachelor level with a sound background in his chosen specialty. Of particular interest is the emphasis on close correlation between theory and experiment in the electrical engineering curriculum.

Junior Year

<i>Fall</i>		<i>Spring</i>	
Engineering 100A	3	Electrical Engineering 100B	3
Engineering 101	2	Engineering 103	3
Engineering 102	3	Electrical Engineering 161	2
Engineering 104	3	Electrical Engineering 181	3
Engineering 105	3	Electrical Engineering 182	3
Physics 121	3	Humanistic-Social Studies	3
	<hr/> 17		<hr/> 17

Senior Year

<i>Fall</i>		<i>Spring</i>	
Electrical Engineering 160	3	Engineering 106	3
Electrical Engineering 162	2	Electrical Engineering 170	3
Technical Electives	9	Engineering 190	2
Humanistic-Social Studies	3	Technical Electives	6
		Humanistic-Social Studies	3
	<hr/> 17		<hr/> 17

Suggested technical electives are:

Chemical Engineering 186; Electrical Engineering 163, 164, 165A-165B, 167, 168, 171A-171B, 180, 187; Mechanical Engineering 124, 185; Mathematics 128A-128B, 131A-131B, 185.

Mechanical Engineering (133 Units)

Mechanical engineering is concerned with the design, development, and manufacture of machines and equipment of many different types. The mechanical engineer must have a thorough understanding of thermodynamics, fluid mechanics, dynamics and mechanics of materials.

The curriculum is aimed at developing the student's ability to synthesize these various basic components into engineering systems. This training should enable the student to handle unforeseen problems in the rapidly expanding engineering field.

The third year is spent in further study of the fundamental courses and in the fourth year, the student has the option of selecting a limited number of courses in the fields of heat transfer-fluid mechanics-thermodynamics or mechanical design.

		Junior Year	
		<i>Fall</i>	<i>Spring</i>
Engineering 100A	.....	3	Electrical Engineering 100B 3
Engineering 101	.....	2	Engineering 103 3
Engineering 102	.....	3	Mechanical Engineering 118 3
Engineering 104	.....	3	Technical Electives 6
Engineering 105	.....	3	
Humanistic-Social Studies	.....	3	
		17	15
Senior Year			
Mechanical Engineering 123	....	3	Engineering 106 3
Chemical Engineering 186	....	3	Engineering 190 2
Technical Electives	.....	9	Technical Electives 9
Humanistic-Social Studies	....	3	Humanistic-Social Studies 3
		18	17

Suggested technical electives are:**

Heat-Fluid-Power

Agricultural Engineering 116; Chemical Engineering 154; Electrical Engineering 180, 181, 182; Mechanical Engineering 124, 125, 185.

Mechanical Design

Civil Engineering 183; Electrical Engineering 168, 180, 182, 187; Mechanical Engineering 119, 120, 121, 122, 124, 184, 188.

Requirement in English

Proficiency in written English is a requirement of the College of Engineering. Any student who does not receive a satisfactory score on the English portion of the Upper Division Engineering Examination—or whose instructors report that his use of English in subsequent course work is unsatisfactory—will be required to take remedial work in English composition. This supplementary course work will be assigned by the Associate Dean of the College of Engineering and will be in addition to the normal program of study.

Humanistic-Social Studies

This curriculum, in conformance with the general policies of the Colleges of Engineering, includes 18 units of study in the humanities and social sciences (exclusive of military science, physical education, Subject A, and any

** Appropriate courses in other engineering areas or in science or mathematics may be taken in partial satisfaction of the technical electives requirement upon approval of the adviser.

matriculation subjects). These studies are intended to help the student gain an understanding and appreciation of the importance of human relations in our society. At least 6 units must be completed while the student is in the lower division and at least 6 units of upper division courses must be completed after the student has been advanced to upper division status in the College of Engineering. The courses must be selected from an approved list that is reviewed annually by the College. The list will include courses from such fields as history, economics, government, literature, sociology, and fine arts; it will not include such courses as accounting, hygiene, industrial management, finance, and personnel administration.

Technical Electives

The student who wishes to combine two or more areas of interest or include other approved technical electives may arrange a suitable program with the assistance of his adviser. Students who expect to undertake graduate study should elect additional courses in mathematics, the sciences, and basic engineering as early as possible in their undergraduate program. The student's entire upper division program should be planned, at least tentatively, early in the junior year. Careful attention should be given to course sequences so that prerequisite courses will be taken in proper sequence.

Graduate Study

Students who are qualified scholastically and who expect to engage in teaching, research, or analytical design during their professional careers are encouraged to undertake graduate work. Programs leading to advanced degrees (M.S., Ph.D., M.Eng., D.Eng.) can be arranged in the following areas of study:

Applied chemical kinetics	Thermodynamics
Fluid mechanics	Agricultural processing, structures or power and machinery
Heat and mass transfer	Water resources engineering
Hydrology	Electromagnetic fields and waves
Solid and structural mechanics	Computer sciences
Control and communications systems	
Solid state and quantum electronics	

The graduate courses offered in Engineering are described in the several department listings in this catalogue (page 204).

For admission and degree requirements write to the Dean of the Graduate Division, University of California, Davis.

Graduate Study in Applied Science

The Department of Applied Science in the College of Engineering at the University of California, Davis, provides instruction at the graduate level leading to the degrees Master of Science in Engineering and Doctor of Philosophy in Engineering. The curriculum integrates studies in physics, chemistry, mathematics and engineering. Courses are offered both on the Davis campus and at the Livermore site of the University of California Lawrence Radiation Laboratory. The exceptional facilities of the Livermore site are used for study and research in such fields as reactor engineering, plasma physics, the behavior of materials, and computing technology. Much of the research necessary for the doctorate is conducted at the Livermore Laboratory.

The graduate courses offered by the Department of Applied Science are described in a later section of this catalogue (page 208).

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 whereby he becomes aware of man's achievements, responsibilities, and environment. Such a liberal education is not without vocational value, since various worth-while career opportunities are open to letters and science graduates, but the emphasis is more upon the ends of living rather than the means. With a well-balanced cultural education including specialized knowledge in his major field, the graduate is prepared for a satisfying life whatever his chosen career.

To safeguard the liberal character of its instruction, each College of Letters and Science on the several campuses of the University publishes annually a Letters and Science List of Courses based on essentially uniform criteria of acceptability. See page 84).

To achieve its educational objectives, the college prescribes a breadth requirement and a major requirement. The breadth requirement is designed to provide a background of general information and culture. The major requirement enables the student to gain further intellectual depth and additional competence in his chosen field. Detailed information regarding these requirements is presented below.

The College offers the undergraduate degrees of Bachelor of Arts and Bachelor of Science. These degrees are conferred upon the completion of the general University and College requirements detailed below. They serve as a foundation for graduate studies leading toward graduate degrees and toward teaching credentials obtainable on this campus or elsewhere.

Faculty Advisers and Study-List Regulations

At registration every undergraduate student will report to a faculty adviser, by whom his study list must be approved. The study list may total 12 units or more a semester without special permission in respect to quantity of work, but the maximum is 16 units for a freshman and for a transfer student in his first semester of residence at this University. Subject A (no degree credit) is considered as 3 units of work in calculating the student's course load. Any request to take fewer than 12 units must be approved by the Dean of the College. Changes in study lists must be made on or before the dates specified in the University Calendar for adding or dropping courses.

In addition to these study-list limits, two lower division courses in physical education, with degree credit totaling not more than 1 unit, may be included in a student's program in any semester or session. Not more than 4 units of credit in physical education activity courses (Physical Education 1 and 26) may be counted toward graduation.

A student should designate his major program as early as possible, but not later than the beginning of his junior year. As soon as he has designated it and has been accepted to pursue it, he will be assigned to a major adviser for that program.

The major may be changed only by permission of the Dean of the College and of the department to which the student petitions to transfer. When the change has been authorized, the Registrar will notify the departments concerned.

Candidates for a degree must attain at least a C average in upper division courses required for the major program, together with a C average for all courses completed in the University. Students who fail to attain an average of two grade points for each unit of work undertaken in a department may, at the option of the department, be denied the privilege of pursuing a major

program in that department. A similar option may be exercised by committees in charge of interdepartmental and individual group majors.

No student is permitted to transfer from one major program to another or from B.S. to A.B. or vice versa within a given major, *after the start of the senior year* or to elect an individual group major after the third week of the third semester before graduation.

A sophomore student accepted to pursue a major program may, with the approval of his adviser, enroll in upper division courses required for that program if he has completed the prerequisites for such courses.

Students admitted to senior standing in the College of Letters and Science on the basis of credit from other institutions, or other Colleges within the University of California, must complete in residence on this campus, subsequent to such admissions, 24 units of which at least 18 units of work are in upper division courses on the Letters and Science List, including at least 12 units in their major program. Certain exceptions may be made for any student in this category who enters immediately after a period of active service in the armed forces. These regulations apply to students participating in overseas study programs who plan to obtain a bachelor's degree from this College. Waivers are granted only in exceptional cases and must be arranged prior to departure from this campus. Before leaving to study abroad, students must report to the Dean's Office, College of Letters and Science, for consultation.

Only the following courses may be counted in satisfaction of a major program: 1. Courses in resident instruction at the University of California or at another university (this includes summer session courses). 2. With the written permission of the Dean, courses in University Extension, University of California, with numbers having the prefix X in any form. Permission to enroll for credit in University Extension courses will not normally be granted students in residence.

Students who desire to satisfy the specific subject requirements for the degree of Bachelor of Arts or Bachelor of Science in the Summer Sessions or in University Extension, University of California, may use only those courses equivalent in subject matter and unit credit to courses offered in fall and spring sessions and listed as acceptable in meeting requirements for those degrees. No grade points are assigned for courses taken in University Extension.

The Bachelor of Arts Degree

The Bachelor of Arts degree will be granted upon the completion of certain specific requirements. *Each student is responsible for seeing that he meets the University, College, and departmental requirements for graduation.* The specific requirements are as follows:

UNIT REQUIREMENT

The candidate must complete at least 120 units, of which 105 must be in courses chosen from the Letters and Science List of Courses, including 36 units in upper division courses from that list. Not more than 6 units in the 300 and 400 courses or, except for honor students, more than 30 units in the upper division courses of any one department will be counted toward the A.B. degree. Not more than 66 units of transfer credit will be counted toward the degree for students transferring from junior colleges. Credit will not be allowed for work taken at a junior college after the completion of 66 units of credit from any collegiate institution. The final 24 units must be taken in resident courses in the college from which the degree is to be granted. A 2.0 grade-point average is required for all work undertaken.

GENERAL UNIVERSITY REQUIREMENTS

The candidate must satisfy the general University requirements: Subject A; American History and Institutions.

BREADTH REQUIREMENTS

The candidate must satisfy the following breadth requirements and no course offered by him in partial satisfaction of any one of these may be applied toward the satisfaction of any other.

English Reading and Composition

The candidate must complete, normally in his freshman year, English 1A, 1B. A student admitted to the College with advanced standing will be required to complete such a course unless his transcript indicates the previous completion of equivalent college level work.

Foreign Language

The candidate must complete, normally before the beginning of his junior year, the equivalent of 12 units in one foreign language, that is, course 3. A student who can present, by petition to the Dean, a valid reason for fulfilling this requirement in more than one language may be authorized to offer the equivalent of 8 units in each of two languages instead of 12 units in one language. The circumstances under which the Dean will approve this exception are rare. A student should not anticipate approval but should plan his program to include the equivalent of 12 units in one foreign language. A student electing to satisfy this requirement in a language previously studied in high school will be required to take, after his admission to the College, a placement examination, his achievement in which will determine the amount of additional course work, if any, he will be required to take to satisfy this requirement in that language. Retroactive to September 1, 1961, students placed below the course they normally would enter on the basis of their high school preparation will receive the following credit and grade points: course 1, no credit and no grade points; course 2, two units and grade points earned; courses 3 and 4, four units and grade points earned.

Humanities, Social Science, and Natural Science

The candidate must complete 12 units in each of the following fields: humanities, including at least 6 units elected from Group I; social science; and natural science. The requirement in natural science must include at least one course of not fewer than 3 units in a biological science, at least one course of not fewer than 3 units in a physical science, and at least one laboratory science course that either requires more than 1 unit of laboratory or has as its prerequisite a course requiring at least 1 unit of laboratory. The requirement of a laboratory science course will, however, be waived for any student who has had an advanced (eleventh or twelfth grade) high school year course with laboratory in chemistry, physics, or biology; however, this waiver will not reduce the requirement of 12 units of college courses in natural science.

The requirements may be fulfilled by courses chosen from the following list. No courses marked with an H or numbered 198 or 199 may be included. Any combination of courses in history and political science used to satisfy the American History and Institutions requirement shall be counted as 3 units of social science and 3 units of humanities toward the breadth requirement.†

Humanities**Group I (at least 6 units)**

Art. All undergraduate courses except 16. Performance courses*: 2A, 2B, 3A-3B, 12, 14A, 14B, 101A-101B, 102A-102B, 103, 107, 129, 141, 142, 143.

Classics. All undergraduate courses.

Dramatic Art. All undergraduate courses except 124. Performance courses*: 180.

English. All undergraduate courses except 1A, 1B.

† American History and Institutions examination for which 3 units of credit is granted will not constitute credit toward the breadth requirements.

* A total of not more than 4 units in performance courses may be counted.

- French. All undergraduate courses except 1, 2, 3.
 German. All undergraduate courses except 1, 2, 3.
 Greek. All undergraduate courses except 1 and 2.
 Italian. All undergraduate courses except 1, 2, 3.
 Latin. All undergraduate courses except 1, 2, 3.
 Music. All undergraduate courses. Performance courses*: 41, 42, 43, 44, 46A, 46B, 141, 142, 143, 144.
 Philosophy. All undergraduate courses.
 Russian. All undergraduate courses except 1, 2, 3.
 Spanish. All undergraduate courses except 1, 2, 3.
 Speech. All undergraduate courses except 25, 26. Performance course: 141.
 Group II**
 History. 4A, 4B, 131, 137A, 137B, 175A, 175B, 178A, 178B.
 Political Science. 118A, 118B, 119.

Social Sciences

- Anthropology. All undergraduate courses except 1, 152, 153, 154, 155, 195, 196.
 Economics. All undergraduate courses except 11, 12.
 Education. 110.
 Geography. All undergraduate courses except 1, 3, 105, 161.
 History. All undergraduate courses except 4A, 4B, 131, 137A, 137B, 175A, 175B, 178A, 178B.
 Political Science. All undergraduate courses except 118A, 118B, 119.
 Psychology. All undergraduate courses except 3, 108, 150B, 165.
 Sociology. All undergraduate courses except 18, 185.

Natural Sciences

The following courses or sequences of courses satisfy the laboratory science requirement: Botany 1, Entomology 1, Physiology 1L, Biology 1. Chemistry 1A; sequence Geology 1A, 1B; sequence Physics 3A, 3B; sequence Physics 4A, 4B; sequence Physics 4A, 4C.

Biological Sciences (at least 3 units)

- Anthropology. 1, 152, 153, 154, 155.
 Bacteriology. All undergraduate courses except 105A, 105B.
 Botany. All undergraduate courses except 8, 107, 131, 155.
 Entomology. 1.
 Genetics. 100.
 Geology. 111, 112.
 Physiology. 1, 1L.
 Psychology. 108, 150B.
 Zoology. All undergraduate courses except 104, 116.

Physical Sciences (at least 3 units)

- Chemistry. All undergraduate courses.
 Geography. 1, 3.
 Geology. All undergraduate courses except 102A, 102B (formerly 102), 111, 112.
 Mathematics. All undergraduate courses except C, D, 129.
 Physics. All undergraduate courses.

THE MAJOR REQUIREMENT

The candidate must complete a major program that is a planned effort to explore a subject systematically, to assure that all students pursuing the major program acquire certain knowledge in common, and to encourage the student in independent study. Each major program must include not fewer

* A total of not more than 4 units of performance courses may be counted.

** No more than 6 units in this group may be counted toward fulfilling the breadth requirement in humanities.

than 30 or more than 60 units and must include at least 24 units in upper division courses. A student who fulfills the requirements of two major programs in the College of Letters and Science may, when filing for a degree, elect to receive a bachelor's degree in both fields. The type of major programs are the following:

Departmental Major

Departmental major programs consist of not fewer than 24 or more than 30 units of upper division courses together with such lower division courses as the department deems necessary for a coordinated program. A department may prescribe comprehensive examinations for students majoring in that department, and unit credit may be given for passing the examination. Such unit credit will not, however, count toward the 24 units required in upper division courses.

Interdepartmental Major

Interdepartmental major programs are programs established by two or more departments. Such programs involving courses in three or more departments may require a maximum of 36 units in upper division courses.

Individual Group Major

Individual group majors may be established on petition of individual students. Such programs require 30 to 36 units in upper division courses.

The Bachelor of Science Degree

The Bachelor of Science degree will be granted upon the completion of certain specific requirements. *Each student is responsible for seeing that he meets the University, College, and departmental requirements for graduation.* The specific requirements are as follows:

UNIT REQUIREMENT

The candidate must complete not fewer than 120 units, of which 105 must be in courses chosen from the College of Letters and Science List of Courses (see page 84), including not fewer than 36 units in upper division courses from that list. The candidate must also complete not fewer than 60 units in natural science and numbered mathematics courses. Not more than 66 units of transfer credit will be counted toward the degree for students transferring from junior colleges. Credit will not be allowed for work taken at a junior college after the completion of 66 units of credit from any collegiate institution. The final 24 units must be taken in resident courses in the college from which the degree is to be granted. A 2.0 grade-point average is required for all work undertaken.

GENERAL UNIVERSITY REQUIREMENTS

The candidate must satisfy the general University requirements: Subject A; American History and Institutions.

BREADTH REQUIREMENTS

The candidate must satisfy the following breadth requirements and no course offered by him in partial satisfaction of any one of these may be applied toward the satisfaction of any other:

English Requirement

The candidate must complete English 1A, 1B.

Foreign Language Requirement

The candidate must complete course 3 of a foreign language or 8 units of one foreign language taken in college, which does not duplicate high school credit.

Humanities and Social Science Requirement

The candidate must complete 15 units of work chosen from the courses in these fields listed under the A.B. degree requirements above.

MAJOR REQUIREMENT

The candidate must complete a departmental, an interdepartmental, or an individual group major program.

Organized Majors

To fulfill the major requirement for a degree, a student may select one of the organized programs listed below. However, other suitable programs are possible; a student may present an alternate plan for a major program to the Executive Committee of the College. If the plan is approved, the committee will designate a member of the faculty to take charge of the student's special major and to approve his study lists and the completion of the major.

Departmental programs are described in detail under "Courses of Instruction" beginning on page 97.

American History and Literature	Economics	Philosophy
Anthropology	English	Physical Education
Art	French	Physical Sciences
Bacteriology	Geography	Physics
Biological Sciences	Geology	Political Science
Botany	German	Psychology
Chemistry	History	Russian
Dramatic Art	International Relations	Sociology
Dramatic Art and Speech	Latin	Spanish
	Mathematics	Zoology
	Music	

Students who are interested in obtaining teaching credentials are referred to page 93 of this bulletin and to the Department of Education.

AMERICAN HISTORY AND LITERATURE

Major Adviser: See Schedule and Directory.

The subject matter of this major is confined to materials within the history and literature of the United States. Its focus is upon that area of investigation where the departments of English and History share a common interest in method and interpretation. Literary texts are subjected to a descriptive, analytical, and evaluative examination within the intellectual and cultural context of the history of the United States.

Preparation for the major

Required: History 17A, 17B, English 30A and 30B. In addition History 4A, 4B is required for students electing History in Group 3. Recommended: English 46A, 46B for those electing History in Group 3. History 4A, 4B for those electing literature in Group 3.

The Major Program

A total of 36 units in upper division courses distributed as follows:

Group 1: Twelve units of history selected from among the following courses:

- History 170A, 170B
- History 172B
- History 174A, 174B
- History 176A, 176B
- History 178A, 178B

Group 2: Twelve units of literature selected from among the following courses:

- English 117J (required for those electing literature in Group 3)
- English 125E
- English 131
- English 132
- English 133
- English 134
- English 135
- Dramatic Art 150

Group 3: In consultation with his advisor the student must select twelve additional units in *either* English *or* History. Those students who elect History in this group must take six units of History 101 and European History.

The Honors Program

Students admitted to the Honors Program will take American History and Literature 194H and 197H in the senior year. These courses will count in Group 3.

INTERNATIONAL RELATIONS

Major Adviser: See *Schedule and Directory*.

International relations embraces those 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 world economics, as well as the main problems and policies of organized states in their relations with one another in the twentieth century. Because these problems and policies must be dealt with and determined by governments, the major is built around courses dealing with inter-governmental diplomatic and economic relations. This major 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

Lower Division Courses

Required: Economics 1A, 1B; History 4A, 4B, 17A, 17B; Political Science 1A-1B, 2, 3; course 4 or the equivalent in a foreign language (French, German, or Spanish).

Upper Division Courses

Additional 3 units in the foreign language offered in preparation for the major; Economics 160A, 160B; Political Science 124, 128A, 128B; 6 units of history exclusive of United States history; 6 additional units in related courses selected in consultation with the adviser.

Attention is directed to the following courses as useful in the study of certain aspects of this field: Agricultural Economics 125 (Comparative Agriculture); Anthropology 139 (Peoples of Africa); Economics 116 (Comparative Economic Systems); Geography 123 (Geography of Europe); Geography 143 (Political Geography); History 146 (Europe since 1870); History 190B (Far Eastern Civilization); Political Science 149 (International Communism).

The student should also prepare himself for history of the arts, literature, and philosophy.

PHYSICAL SCIENCES

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 require-

ments are similar to those of the major in chemistry or physics. The requirements for the Bachelor of Arts or the Bachelor of Science degree may be satisfied.

The Major Program

Lower Division Courses

Required: Chemistry 1A, 1B, 5 or 7A-7B; Physics 4A, 4B, 4C; Geology 1A or 6; Mathematics 9A, 9B, 9C.

Upper Division Courses

A total of 24 units of upper division courses in the physical sciences, of which not less than 15 units must be taken in a single subject; e.g., chemistry, physics, or geology.

INDIVIDUAL GROUP MAJORS

A student desiring to elect other than an established departmental or inter-departmental major or a professional curriculum may petition for an individual group major adapted to his particular interests. The petition must be presented to the Dean for submission to the Executive Committee of the College for approval *not later* than the third week of the third semester before graduation. To insure proper breadth and depth, an individual group major involving two or more departments must consist of not fewer than 30 upper division units or more than 36. This plan should be prepared in consultation with a member of the Department in which the student will do most of his work. It should describe the special educational aims of the major and indicate that it meets the University standards with respect to majors. On approval of the plan, an appropriate adviser will be designated to supervise the major program.

Preparation for Admission to Undergraduate Professional Schools

The Schools of *Dentistry*, *Nursing*, *Optometry* and *Pharmacy* require 57-60 units of credit, including certain courses, for admission. The School of *Medicine* and the curriculum in *Physical Therapy* require 90 units of credit. While a student is enrolled in the College he must select programs of study that will satisfy College requirements, but courses can be selected that will also satisfy prerequisites for admission to a school. However, if transfer to a school is not made at the end of the sophomore year (upon completion of 55 units of credit), the student must apply for and be accepted in a major for the A.B. or B.S. degree in the College, and all subsequent programs in the College must apply toward completion of that major. The specific requirements for admission to each school are set forth in the announcement of the school, which may be obtained from the Registrar. The dean of the school in which a student is interested may be consulted for further information.

Students interested in pursuing the following preprofessional curricula are referred to the following departments: *Prelegal*—Political Science; *Pre-social Welfare*—Sociology; *Preurban and Regional Planning*—Geography.

Preparation for post-graduate training in *Medical Technology* may be accomplished by completing the regular undergraduate major program in Biological Sciences or Bacteriology.

Letters and Science List of Courses

Of the 120 units required for bachelor degrees at least 105 units must be in courses chosen from the Letters and Science List of Courses. Of the 15 units permitted from courses not on the Letters and Science List, not more than 6 units may be counted from courses numbered from 300 through 499, and not more than 4 units in physical education activity courses 1 and 26.

Any course not included in the Letters and Science List of Courses, but required, or accepted, as part of a major program or as a prerequisite therefor, shall for students offering that major at graduation, be treated as if it were in the Letters and Science List of Courses. In addition any course accepted in partial satisfaction of the breadth requirement shall be similarly treated.

Thirty-six units in upper division courses (numbered 100-199) must be selected from the list given below.

The following list refers to the courses as given in the departmental offerings for the fall and spring semesters, 1965-1966.

- American History and Literature. All undergraduate courses.
- Anthropology. All undergraduate courses.
- Art. All undergraduate courses. Performance courses*: 2A, 2B, 3A, 3B, 12, 14A, 14B, 16, 101A, 101B, 103, 121, 128, 128B, 141, 142, 143.
- Bacteriology. All undergraduate courses except 106.
- Biochemistry and Biophysics. All upper division courses.
- Biological Sciences. 194H, 195H.
- Botany. All undergraduate courses except 8, 107, 155, 180.
- Chemistry. All undergraduate courses.
- Classics. All undergraduate courses.
- Dramatic Art. All undergraduate courses. Performance course*: 180.
- Economics. All undergraduate courses.
- Education. 110.
- English. All undergraduate courses.
- French. All undergraduate courses.
- Genetics. All upper division courses.
- Geography. All undergraduate courses.
- Geology. All undergraduate courses.
- German. All undergraduate courses.
- Greek. All undergraduate courses.
- History. All undergraduate courses.
- Latin. All undergraduate courses.
- Mathematics. All undergraduate courses.
- Military Science. 1A, 1B, 20A, 20B.
- Music. All undergraduate courses. Performance courses*: 41, 42, 43, 44, 46A, 46B, 141, 142, 143, 144.
- Oriental Languages. All undergraduate courses.
- Philosophy. All undergraduate courses.
- Physical Education. 103, 104, 110.
- Physics. All undergraduate courses.
- Physiology. 1, 1L.
- Political Science. All undergraduate courses.
- Psychology. All undergraduate courses.
- Russian. All undergraduate courses.
- Sociology. All undergraduate courses.
- Spanish. All undergraduate courses.
- Speech. All undergraduate courses. Performance course*: 141.
- Zoology. All undergraduate courses except 104.

The Honor List

An honor list is prepared each semester and is made public. It includes the names of students who have completed at least 12 units and have a grade average of at least B for all work undertaken in the College, and additionally, in the case of students transferring to the College from any other unit of the University, an over-all average of B in all work undertaken in the University. Students transferring to the College from other collegiate institutions outside

* A total of not more than 8 units in performance courses may be counted.

the University shall be eligible for inclusion only upon completion of 12 units in the College with an average grade of B and provided that their over-all average is B in all courses for which University credit is given. To qualify for the honor list, transfer students must have a B average in all work taken in the University as well as an over-all B average. Students on the honor list of the College may take special courses of Honors Programs subject to the approval of the instructor. Other students may take such courses only by special permission of the Dean of the College.

At the discretion of the Dean, a student on the honor list of the College may make study-list changes involving special courses of Honors Programs under suspension of the regulations fixing the time during which such changes are ordinarily permissible and under suspension of the rules requiring fees for such changes. He is expected to report promptly to the Dean concerning proposed changes.

Students on the honor list of the College who have completed at least one year's work in the College shall have the privilege (subject to the approval of the instructor concerned) of taking each semester one course not submitted in satisfaction of the requirement of the major program nor in satisfaction of College breadth requirements in which they shall be marked "passed" or "not passed." *Petitions to enroll in courses under these circumstances must be filed with the Office of the Registrar not later than the last day to add courses to the study list, and this commitment may not be reversed after that date.* In calculating grade-point standing, units gained in this way shall not be counted.

Students on the honor list of the College who have senior standing and have attained at least a B average in the junior year at the University of California shall have the following additional privileges:

1. The study-list total may be less than 12 units.
2. The number of upper division units which may be taken in one department may exceed 30.
3. With the consent of the department or committee supervising the major program, requirements concerning specific courses or sequences in the major program may be set aside.

Honors with the Bachelor's Degree

Students may qualify for Honors, High Honors, or Highest Honors with the bachelor's degree by recommendation of the department or committee supervising the major program, the Committee on Honors, and the Executive Committee of the College of Letters and Science.

A list of students graduating with distinction is published in the annual Commencement Program.

SCHOOL OF VETERINARY MEDICINE

A minimum of 6 years is required to complete the requirements for the degree Doctor of Veterinary Medicine. The sequence of events is as follows:

Preveterinary Medical Requirements

Students must complete at least 60 semester units (90 quarter credits) of college work including the required courses listed below in the preveterinary medical curriculum. This normally requires a minimum of 2 years of study, and satisfies the course requirements for admission to the School of Veterinary Medicine. Only students with excellent scholastic achievement will be admitted at the end of two years of study. Others will be encouraged to continue their preparation in order to demonstrate their scholastic ability. Those students who can afford the time are encouraged to broaden their educational experience by completing the B.S. or B.A. degree prior to making application.

Admission to the School of Veterinary Medicine

Upon completing the preveterinary medical requirements, the candidate may apply for 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 chemistry, physics and zoology. In addition, candidates should have sufficient experience with animals to serve as a basis for the study of the professional curriculum and to justify their desire to develop a career in one of the many challenging fields of Veterinary Medicine.

Personal qualifications also receive consideration in the final selection. A personal interview may be required to enable the Committee on Admissions to make the most accurate judgment possible. Decisions on admission will not be made until after the final date for filing of applications.

The student should plan his program in such a way that if he fails to enter the School of Veterinary Medicine, he can complete the requirements for the bachelor's degree in some other curriculum.

The Western Interstate Commission for Higher Education was established to provide a greater measure of educational opportunity in the health science fields for students in the western states. Students from Alaska, Arizona, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming should contact the commission in their state as soon as they consider applying to the School of Veterinary Medicine. Candidates from anywhere in the world will be considered for admission.

Application

Application blanks may be obtained from the Registrar, University of California, Davis after October 1 and must be completed and returned to his office *before February 28*. The requirements need not be completed at the time of application, however, the student must submit a list of courses currently in progress, and he must indicate his intention to complete all required courses by June 15 of the year in which he wishes to be considered. *Applications lacking this information will not be processed.*

After Admission

After admission to the School of Veterinary Medicine, the candidate completes a 4-year professional curriculum leading to the degree Doctor of Veterinary Medicine. At the end of the first 2 years of the professional curriculum students who do not hold a baccalaureate are eligible to receive a Bachelor of Science degree in Veterinary Science.

Admission in Advanced Standing

An applicant for 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 semester 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 semester or semesters 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.

PLAN OF STUDY

Preveterinary Medical Curriculum

Applicants for admission to the School of Veterinary Medicine must complete:

1. Mathematics including trigonometry, 6 units**; Subject A; and American History and Institutions, as required.
2. At least 60 semester or 90 quarter units of credit in the University of California or other accredited institutions including the prescribed subjects listed in the preveterinary curriculum below (except that minor shortages may be waived by the Admissions Committee of the School of Veterinary Medicine).

<i>Preveterinary Curriculum</i>	<i>Units</i>
Chemistry (general, inorganic, organic, and quantitative analysis)	16
English composition and additional English or speech	6
Physics (mechanics, heat, light, electricity)	6
Social sciences, foreign languages, philosophy, psychology, fine arts, literature, and/or additional English, speech, and mathematics†	12
Animal Husbandry*	3
Zoology (can include some biology)	9
Additional courses chosen by the student with approval of the major adviser	8
	<hr/> 60

The following schedule of study need not be rigidly adhered to but it satisfies the requirements without conflict. This schedule also satisfies most of the requirements of the first two years of the animal science curriculum. For details of other curricula, including animal science, the student should consult the College of Agriculture section of this bulletin.

FRESHMAN YEAR			SOPHOMORE YEAR		
<i>Course</i>	<i>Fall Units</i>	<i>Spring Units</i>	<i>Course</i>	<i>Fall Units</i>	<i>Spring Units</i>
English 1A, 1B	3	3	Biology 1, Zoology 2	4	5
Chemistry 1A, 1B	5	5	Chemistry 8, 5	3	3
* Animal Husbandry 7	3	..	Physics 2A, 2B	3	3
Elective	4	7	Elective	5	4
	<hr/> 15	<hr/> 15		<hr/> 15	<hr/> 15

Requirements for the Degree of Doctor of Veterinary Medicine

1. The candidate for the degree Doctor of Veterinary Medicine must have completed the requirements for the bachelor's degree in one of the colleges

** May be completed in high school.

* May be waived if not available.

† Mathematics beyond trigonometry.

or schools of the University of California or at another college or university of approved standing.

2. He must give satisfactory evidence of possessing good moral character.

3. He must have studied veterinary medicine for the equivalent of eight semesters of sixteen weeks each. The last two years must have been spent in the University of California School of Veterinary Medicine.

4. He must have completed the required work, have fulfilled satisfactorily all special requirements, and have received throughout the entire veterinary course a satisfactory grade as determined by the Faculty of the School and by the Graduate Council.

Veterinary Medical Curriculum

FIRST YEAR			SECOND YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Anatomy 120	10	..	Botany 8	..	2
Genetics 100	..	3	Pathology 122A, 122B	5	5
Physiological Sciences 101	..	5	Physiological Sciences 123, 124	..	4
Physiological Sciences 101L	..	2	Veterinary Microbiology 121, 124	10	6
Physiological Sciences 140	..	6	Veterinary Microbiology 125	..	1
Physiological Sciences 140L	..	3			
Veterinary Medicine 100	0	..			
Veterinary Medicine 110	1	..			
Zoology 107	4	..			
*Zoology 100	2	..			
	17	19		19	18

THIRD YEAR			FOURTH YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Anatomy 220	..	4	Avian Medicine 251A-251B	½	½
Avian Medicine 208	3	..	Clinical Pathology 251A-251B	½	½
Clinical Pathology 201, 202	3	3	Pathology 251A-251B	½	½
Veterinary Medicine 203, 205	4	5	Public Health 240	..	5
Veterinary Medicine 206	..	3	Veterinary Medicine 204	..	5
Veterinary Medicine 210, 220	2	4	Veterinary Medicine 207	4	..
Veterinary Medicine 230, 250	4	1	Veterinary Medicine 223	4	..
Veterinary Medicine 254	..	..	Veterinary Medicine 224	2	..
Veterinary Medicine 260	2	..	Veterinary Medicine 225	1	..
			Veterinary Medicine 245	2	..
			Veterinary Medicine 251A-251B	5	5
			Veterinary Medicine 256A-256B	1	1
			Veterinary Medicine 270A-270B	..	..
	18	20		20½	17½

Requirements for the Degree of Bachelor of Science

The degree of Bachelor of Science with a major in Veterinary Science is granted, upon the recommendation of the Faculty of the School of Veterinary Medicine, to students who:

1. Satisfy the general University requirements as follows:

- (a) Subject A.
- (b) American History and Institutions.
- (c) Residence at Davis during the final undergraduate year in the School of Veterinary Medicine.
- (d) Attainment of at least twice as many grade points as units of credit in courses undertaken at this University.
- (e) At least 124 units of University work.
- (f) 36 units of the 124 units in upper division work.

* Students are encouraged to take the laboratory course in embryology, Zoology 100L.

2. Complete, in the School of Veterinary Medicine, the following 73 units of prescribed courses. This total may be reduced in the case of students with advanced standing.

	<i>Units</i>
(a) Botany	2
(b) Embryology	2
(c) Genetics	3
(d) Histology	4
Courses in the School of Veterinary Medicine	62
	<hr style="width: 10%; margin-left: auto; margin-right: 0;"/> 73

Upon completion of the requirements for the degree of Bachelor of Science, the student must file application for admission to the Graduate Division through the Dean of the Graduate Division. Further information is given in the *Announcement of the Graduate Division, Davis*, which may be obtained from the Dean of the Graduate Division, Room 5, Freeborn Hall.

Graduate Study

The graduate study program of the School of Veterinary Medicine provides varied opportunity to launch careers in research.

Information on graduate degrees beyond the D.V.M. will be found in the *Announcement of the Graduate Division, Davis*, which may be obtained from the Dean of the Graduate Division, Room 5, Freeborn Hall, Davis, California.

GRADUATE DIVISION

The University of California offers opportunities for graduate study in academic and professional fields on its campuses at Davis, Berkeley, San Francisco, Los Angeles, La Jolla, Riverside, and Santa Barbara. Graduate study and research is administered by a Graduate Council on each campus and by a statewide Coordinating Committee on Graduate Affairs. The office of the Dean of the Graduate Division is located in Room 6, Freeborn Hall.

Admission to Graduate Standing

Admission to the Graduate Division may be accorded holders of the bachelor's degree from institutions of acceptable standing on presentation of official transcripts showing all college or university work completed to date together with official evidence of the degree conferred, provided the undergraduate program represents the usual college course of four years, the scholarship record is satisfactory, and the student can be accommodated in the field in which he wishes to pursue study. The University may deny admission to graduate standing in cases where the scholarship record has not been satisfactory or where the undergraduate program has not furnished an adequate basis for advanced work leading to academic or professional higher degrees or certificates. This proviso applies to graduates of the University as well as to graduates of other institutions. *In the absence of official records and official evidence of graduation or receipt of degree, registration will not in any case be permitted.*

Transcripts of students' records and all other official credentials furnished for admission are retained permanently in the files of the Graduate Division. *In addition to the record sent for admission, the student must furnish an additional set of his official transcripts for conference with departmental advisers and for his own reference in planning a program of study. The Graduate Division office copies may not be borrowed for any purpose.* Admission to the Graduate Division does not necessarily carry with it the privilege of proceeding to candidacy for a higher degree on the basis of minimum residence and subject requirements.

A formal application is required of all persons seeking admission to the Graduate Division. The application blank may be obtained from the Office of the Dean of the Graduate Division, Room 5, Freeborn Hall, and must be filed, preferably twelve weeks before the date of registration, and in no case later than August 2 for the fall semester and January 3 for the spring semester. It should be accompanied by a money order or bank draft for payment of the \$5 application fee.† *The application fee is chargeable to every person who files an application and is not returnable under any circumstances.* (For readmission of former graduate students, see below). If applications and complete records are filed later than twelve weeks before the date of registration, the student's registration may be delayed and he must pay the \$10 late registration fee.

Every new student and every student returning to the University after an absence must present, at the time of appointment for a medical examination by the University Medical Examiner, a certificate establishing the fact that he has been successfully vaccinated against smallpox within three years. A form for this purpose will be furnished by the University. Vaccination should be completed prior to registration.

The level of work to which graduate students are assigned and their standing as candidates for degrees depend upon the extent and character of their

† Veterans' dependents who expect to enroll under the provisions of Public Law 361 or Public Law 634 are not required to remit this fee with their applications.

undergraduate courses. If in the opinion of any department the preliminary training of an applicant has not qualified him for graduate work, he may be assigned to such undergraduate courses as are suited to his needs.

Readmission

An application for readmission is required of persons formerly registered in a regular session as graduate students who wish to return after an absence. The form for this purpose is obtainable from the Registrar, and no fee is charged. Each applicant is required, however, to file official evidence that he has been satisfactorily vaccinated as explained in the above paragraph for new students.

Intercampus Exchange Program for Graduate Students

A graduate student registered on any campus of the University may become an Intercampus Exchange Student with the approval of his graduate adviser and the Dean of the Graduate Division on both the home and host campus. The Intercampus Exchange Student will have library, infirmary, and other student privileges on the host campus but will be considered as a graduate student in residence on his home campus. The grades obtained in courses on the host campus will be 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.

Foreign Students

Applicants for admission to the Graduate Division on credentials from universities and colleges in foreign countries must take the Examination in English for Foreign Students described in the preceding section, to demonstrate whether their command of English will enable them to profit by instruction in the University.

For further information concerning the Graduate Division see the *Announcement of the Graduate Division*, Davis, obtainable from the Registrar or the Dean of the Graduate Division.

The University endeavors to publish full information for the guidance of graduate students. Failure of students to acquaint themselves fully with the organization and regulations of the University may cause complications for which the student is expected to assume the responsibility. For information concerning all matters pertaining to the Graduate Division, including the list of available fellowships and the requirements for higher degrees, see the *Announcement of the Graduate Division*, Davis, which may be obtained from the Dean of the Graduate Division. Special announcements for the information and guidance of graduate students are published from time to time in the *University Calendar* and on the bulletin boards. Students should consult the bulletin boards regularly.

Graduate Scholarships and Fellowships

Information about fellowships for graduate students may be obtained from the Dean of the Graduate Division, Room 6, Freeborn Hall. Fellowships and graduate scholarships are ordinarily awarded as a mark of honor, on the basis of scholarship and not of need. The holders of fellowships or graduate scholarships are expected to devote all their time to graduate study and research in the University. Applications for fellowships and graduate scholarships must be filed with the Dean of the Graduate Division, Davis, not later than *February 1* prior to the academic year for which the award is sought. This date may be subject to change. For the latest information, applicants should consult the Office of the Dean of the Graduate Division.

Requests for information affecting the status of graduate students, not contained in the official University bulletins, should be addressed to the Office of the Graduate Division, Room 6, Freeborn Hall.

Organization of Graduate Study and Research

Graduate study and research is offered at Davis in:

Agricultural Chemistry (Ph.D.)	Genetics (M.S., Ph.D.)
Agricultural Economics (M.S., Ph.D.)	Geology (M.S., Ph.D.)
Agricultural Education (M.Ed.)	German (M.A.)
Agricultural Science and Management (M.S.)	History (M.A., Ph.D.)
Agronomy (M.S.)	Home Economics (M.S.)
Animal Husbandry (M.S.)	Horticulture (M.S.)
Animal Physiology (M.S., Ph.D.)	International Agricultural Development (M.S.)
Anthropology (M.A., Ph.D.)	Irrigation (M.S., Ph.D.)
Art (M.A.)	Linguistics (M.A.)
Biophysics (Ph.D.)	Mathematics (M.A., Ph.D.)
Botany (M.A., Ph.D.)	Microbiology (M.A., Ph.D.)
Chemistry (M.S., Ph.D.)	Music (M.A.)
Comparative Biochemistry (M.A., Ph.D.)	Nutrition (M.S., Ph.D.)
Comparative Pathology (M.S., Ph.D.)	Philosophy (M.A.)
Comparative Pharmacology and Toxicology (M.S., Ph.D.)	Physics (M.A., Ph.D.)
Dramatic Art (M.A.)	Plant Pathology (M.S., Ph.D.)
Economics (M.A., Ph.D.)	Plant Physiology (M.S., Ph.D.)
Education (Teaching Credential)	Political Science (M.A., Ph.D.)
Engineering (M.Eng., D.Eng., M.S., Ph.D.)	Poultry Science (M.S.)
English (M.A., Ph.D.)	Psychology (M.A.)
Entomology (M.S., Ph.D.)	Range Management (M.S.)
Food Science (M.S.)	Sociology (M.A.)
French (M.A., Ph.D.)	Soil Science (M.S., Ph.D.)
	Spanish (M.A.)
	Vegetable Crops (M.S.)
	Veterinary Medicine (D.V.M.)
	Zoology (M.A., Ph.D.)

The School of Veterinary Medicine offers a curriculum leading to the degree Doctor of Veterinary Medicine (see page 88).

For complete information concerning opportunities for graduate study and research, students should confer with the department concerned.

Curricula for Teacher Education

Curricula are offered which lead to the Standard Teaching Credential with a Specialization in (1) Elementary Teaching and (2) Secondary Teaching. Curricula are also offered for the secondary credentials required for teaching classes reimbursed under the National Vocational 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). The elementary and secondary intern programs entail enrollment in a preservice summer session involving some student teaching, a year of full-time teaching under University supervision in an approved school, and in some cases attendance at a post-service summer session. Students interested in either route should consult with members of the Department of Education as early as possible in their senior year to insure completion of the requirements. They are advised to consult with the appropriate subject-matter representatives and members of the Department of Education or the Department of Agricultural Education, as appropriate, as early as possible in their undergraduate careers. This planning should insure completion of credential requirements in general, as well as the specific ones in general education, in a teaching major and a teaching minor, and in professional education.

GENERAL REQUIREMENTS

Upon completion of the Davis credential programs, those students recommended to the State Department of Education by the Department of Education or by the Department of Agricultural Education for credentials will be assisted in satisfying certain requirements of the State of California. These include the submission of a health certificate dated within the 12 months preceding the date of application for the credential, the submission of duplicate personal identification cards, and the enclosure of certain fees. But students are advised to be aware at an earlier date of other requirements by the State.

In scholarship the State of California requires that "In courses above high school grade offered toward fulfillment of requirements for a credential, the applicant shall have a scholarship record of C or better on a five-point scale, or a scholarship that is required by an approved educational institution for granting a degree." Moreover, "Each assignment in directed teaching shall be completed with a grade of C or better on a five-point scale."

Each applicant for a credential must take a course in the United States Constitution. He must have attained the age of 18 years, and he must be a citizen of the United States (or present evidence of declaration of intent).

Davis requires of all candidates for credentials a bachelor's degree from Davis or from another acceptable institution, a scholarship record of 2.5 or better in upper division work and 2.75 or better in all graduate work, and admission to graduate standing in the Graduate Division. Application information for the latter, including final filing dates and forms, is available at the Graduate Office.

In addition to letters of recommendation as a part of the procedure for admission to a credential program, Davis requires a report to the Department of Education reflecting the consensus of the department on the student's mastery of his subject matter area. Students on a limited status cannot enter the teaching internship programs.

Davis also requires that when a 300-level course is available in the department of a student's major or "in the area" of a student's major, such course will be required as a part of the student's program for the teaching credential "in addition to the state credential requirements and the student's teaching major requirements."

SPECIFIC REQUIREMENTS**In General Education**

In satisfying the breadth requirements for the baccalaureate degree, most applicants for teaching credentials will have completed the State's requirements in general education. But each is responsible for so planning his courses that he can furnish proof of having completed at least forty-five semester hours of course work in an approved institution in the required number of areas of those listed.

The candidate for the secondary school credential must include course work in *four* of the areas listed; for the elementary school credential, work in *five*. Both must include the English and competency requirements described under "Humanities." "The English and the demonstrated competency shall fulfill the humanities area, but the applicant may offer additional course work in the humanities area as part of the 45 semester hours. (Not more than six semester hours of course work taken to satisfy this requirement shall apply toward the fulfillment of the requirements for either a major or a minor.)"

The areas of general education are as follows:

(1) Humanities, excluding foreign languages for the purposes of this requirement but including a year of English. (In addition, the applicant shall

demonstrate competence in composition either by passing a course in composition or by passing an examination given by the institution in lieu thereof.)

(2) Social sciences. (The course work taken to satisfy Education Code Section 13132 may be counted toward this requirement.)

(3) Natural sciences.

(4) Mathematics requiring as a prerequisite an understanding and knowledge of high school algebra and geometry. (Applicants for the elementary credential should choose a course which satisfies both this requirement and section g. of 6130, requiring as a part of "professional preparation": "Three semester hours of course work in the theory of the structure, arithmetic, and algebra of the real number system or three semester hours of course work in calculus.")

(5) Fine arts.

(6) A foreign language. (The successful completion in an approved institution of an examination covering the speaking, reading, writing, and understanding of a foreign language shall be accepted in lieu of course work in a foreign language but shall not count toward the 45 semester hours specified.) For any credential issued prior to September 1, 1967, this foreign language requirement is waived for students who have completed successfully in a high school two full school years in a single foreign language.

In Professional Education

In addition to satisfying the general education requirements, the applicant for the credential must complete his "professional preparation." The Davis programs differ, as do the state requirements, in the number of courses in professional education; the secondary program requiring 16 to 17 semester hours; the elementary, 22.

With a Specialization in Secondary Teaching

The student preparing to teach in secondary schools who goes the student-teaching route would probably take Education 320A, Introduction to Teaching in Secondary Schools (1) as early as his junior year. The teaching intern student would take this course in the spring term of his senior year, and it might be recommended rather than required for some transfer students in the intern program. The student then takes the following courses in his junior, senior, or graduate years:

Education 110. Introduction to Educational Psychology (3)

Education 120. Educational Sociology (3)

Education 320E. Methods of Teaching in Secondary Schools (2)

Education 320C. Supervised Teaching in Secondary Schools (8)

With a Specialization in Elementary Teaching

The student preparing to teach in elementary schools would take the following courses:

Education 330A. Introduction to Teaching in Elementary Schools (2)

Education 110. Introduction to Educational Psychology (3)

Education 120. Educational Sociology (3)

Education 300. Language Arts in the Elementary School (2)

Education 302. Elementary School Curriculum: Social Studies and Science (2)

Education 330E. Methods of Teaching in Elementary Schools (2)

Education 330C. Supervised Teaching in Elementary Schools (8)

In Teaching Majors and Minors

In many instances the departmental major fulfills subject matter requirements for the teaching major. Prospective teachers are advised to consult counselors in the Department of Education or of Agricultural Education and the authorized subject representatives of the proposed teaching fields as early as possible after undertaking University work. The beginning of the

freshman year in undergraduate status is not too early for such consultations.

In the program for the bachelor's degree, the student is permitted a number of electives. A wise selection insures an adequate background of preparation for teaching. A graduate year of work permits further selection of courses for completion of teaching majors and minors. Helpful guidance may be obtained from the subject representatives.

Teaching majors and teaching minors, as well as subject representatives, have been designated by the departments and approved by the Non-Vocational Teacher Training Committee of the Academic Senate. Teaching majors and minors are of two types: (1) "Single Subject Teaching Majors and Minors" and (2) "Teaching Major in Subject Constituting Part of an 'Interdepartmental Major' (Secondary) or 'Diversified Major' (Elementary)." For a list of the teaching majors and minors, the requirements for each, and the subject representatives, inquiry should be made to the appropriate departmental offices or to the offices of the Department of Education, the Department of Agricultural Education, the Graduate Division, or of the Registrar.

Courses of Instruction

The course offerings listed in this bulletin are subject to change without notice

EXPLANATORY NOTE

The credit value of each course in semester units is indicated for each semester by a number in parentheses following the title. A semester unit is one hour of the student's time at the University, weekly, during one semester, in lecture or recitation, together with the time necessary in preparation therefor; or a longer time in laboratory or other exercises not requiring preparation. The semester in which the course is given is shown as follows: I, first semester (September to January); II, second semester (February to June); Yr., throughout the first and second semesters. Information concerning class hours will be found in the SCHEDULE AND DIRECTORY.

Year courses.—A course designated by a double number (for example, Home Economics 1A-1B) is continued through two successive semesters, ordinarily from September to June; occasionally, however, the first part of a year course may begin in February. The student should use the first number in registering for the course during its first semester, and the second number during its second semester. The first half of such a course is prerequisite to the second half unless there is an explicit statement to the contrary. The instructor makes a final report on the student's work at the end of each semester. Unless otherwise noted, the student may take the first half only and receive final credit for it.

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 included in the prerequisite listing for the B course.

CLASSIFICATION AND NUMBERING

Courses are classified and numbered as follows:

(1) *Undergraduate courses.* These are of two kinds, lower division and upper division.

(a) *Lower division courses* (numbered 1-49, or sometimes indicated by letters if in subjects usually given in a high school). A lower division course is one normally taken by freshmen and sophomores; such courses do not count as upper division work in any department.

(b) *Upper division courses* (numbered 100-199). An upper division course is one normally taken by juniors and seniors. Students will not be permitted to register in upper division courses unless they have completed the courses named as prerequisites. Accepted professional training, however, will be regarded as sufficient preparation for upper division courses in the field in which the student has been trained.

Special study courses for groups of undergraduates (numbered 198) and for individual undergraduates (numbered 199) should be restricted to senior students having an adequate background in the subject proposed for special study. This would normally require a sound background in upper division courses in the field of 198 or 199 course study.

The maximum number of units per student in any and all 199 courses in any one semester shall be limited to five.

Departments may offer special *honors courses* (marked H) in reading and research, with credit to be determined by the instructors in charge, according to the performance of the individual students, subject to such general restrictions as may be imposed by the department, the College, or the Committee on Courses of Instruction of the Academic Senate. The work of the student in an honors course may consist of additional work in connection with other courses of instruction, or may be independent of such courses.

(2) *Graduate courses* (numbered 200-299). As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation normally consists of the completion of at least 12 units of upper division work basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed.

(3) *Professional teacher-training courses* in the Department of Education and courses in other departments that are specially intended for teachers or prospective teachers (numbered 300-399).

(4) *Certain professional courses* in departments other than the Department of Education (numbered 400-499).

Courses are further classified as follows:

Resident courses.—Courses of resident instruction are given either during regular sessions or summer sessions or (by special arrangement) as 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. All such work is in the form of upper division or graduate extra-session courses, and these courses must be approved in advance by the Committee on Courses of Instruction. Moreover, in pursuance of existing regulations, students must register in advance for all such work, and this registration must be approved by the proper faculty before the work is undertaken.

University Extension courses.—In the curricula leading to the A.B. and B.S. degrees, credit is allowed for courses in University of California Extension that bear numbers prefixed by X, XB, XD, XL, XR, XSB, or XSF. Such courses are rated, with respect to the general and specific requirements for the bachelor's degree, on the same basis as courses taken in residence at collegiate institutions of approved standing.

For information concerning University Extension courses, apply to the Director, University Extension, University of California, Berkeley, California 94720.

SYMBOLS

The following symbols and their accompanying footnotes are used throughout the course section:

† Absent on leave, 1965-1966.

‡ Absent on leave, fall semester 1965-1966.

§ Absent on leave, spring semester 1966.

¹ Sabbatical leave in residence, 1965-1966.

² Sabbatical leave in residence, fall semester 1965-1966.

³ Sabbatical leave in residence, spring semester 1966.

* Not to be given, 1965-1966.

⁴ Not to be given, fall semester 1965-1966.

⁵ Not to be given, spring semester 1966.

To be given if a sufficient number of students enroll.

AGRICULTURAL CHEMISTRY

Walter G. Jennings, Ph.D., *Chairman of the Executive Committee.*
Committee Office, 106 Roadhouse Hall

Committee in Charge:

- Maynard A. Amerine, Ph.D., *Professor of Enology.*
Lawrence J. Andrews, Ph.D., *Professor of Chemistry.*
Richard A. Bernhard, Ph.D., *Associate Professor of Food Science and Technology.*
Clinton O. Chichester, Ph.D., *Professor of Food Science and Technology.*
Edwin B. Collins, Ph.D., *Professor of Food Science and Technology.*
†Eric E. Conn, Ph.D., *Professor of Plant Biochemistry.*
Donald G. Crosby, Ph.D., *Lecturer in Food Science and Technology.*
Luther D. Davis, Ph.D., *Professor of Pomology, Emeritus.*
Walter L. Dunkley, Ph.D., *Professor of Food Science and Technology.*
Robert E. Feeney, Ph.D., *Professor of Food Science and Technology.*
Charles R. Grau, Ph.D., *Professor of Poultry Husbandry.*
James F. Guymon, Ph.D., *Professor of Enology.*
Raymond C. Huffaker, Ph.D., *Lecturer in Agronomy.*
†John L. Ingraham, Ph.D., *Associate Professor of Bacteriology.*
Lloyd L. Ingraham, Ph.D., *Associate Professor of Biophysics.*
Eugene L. Jack, Ph.D., *Professor of Food Science and Technology, Emeritus.*
Walter G. Jennings, Ph.D., *Associate Professor of Food Science and Technology.*
†Jerome J. Jurinak, Ph.D., *Lecturer in Soil Chemistry.*
Raymond M. Keefer, Ph.D., *Professor of Chemistry.*
Richard E. Kepner, Ph.D., *Professor of Chemistry.*
Max Kleiber, Sc.D., *Professor of Animal Husbandry, Emeritus.*
Bor S. Luh, Ph.D., *Lecturer in Food Science and Technology.*
George L. Marsh, M.S., *Professor of Food Science and Technology.*
Mendel Mazelis, Ph.D., *Lecturer in Food Science and Technology.*
Emil M. Mrak, Ph.D., *Professor of Food Science and Technology.*
Thomas A. Nickerson, Ph.D., *Associate Professor of Food Science and Technology.*
Edgar P. Painter, Ph.D., *Professor of Chemistry.*
Pauline C. Paul, Ph.D., *Professor of Home Economics.*
Daniel W. Peterson, Ph.D., *Associate Professor of Poultry Husbandry.*
Herman J. Phaff, Ph.D., *Professor of Food Science and Technology.*
Harlan K. Pratt, Ph.D., *Professor of Vegetable Crops.*
Harold G. Reiber, Ph.D., *Professor of Chemistry.*
Vernon L. Singleton, Ph.D., *Lecturer in Enology.*
Lloyd M. Smith, Ph.D., *Associate Professor of Food Science and Technology.*
Clarence Sterling, Ph.D., *Professor of Food Science and Technology.*
George F. Stewart, Ph.D., *Professor of Food Science and Technology.*
Perry R. Stout, Ph.D., *Professor of Soil Science.*
Paul K. Stumpf, Ph.D., *Professor of Plant Biochemistry.*
†Aloys L. Tappel, Ph.D., *Professor of Food Science and Technology.*
Nikita P. Tarassuk, Ph.D., *Professor of Food Science and Technology.*
William E. Theissen, Ph.D., *Assistant Professor of Chemistry.*
David H. Volman, Ph.D., *Professor of Chemistry.*
A. Dinsmoor Webb, Ph.D., *Professor of Enology.*

† Absent on leave, 1965-1966.

John R. Whitaker, Ph.D., *Associate Professor of Food Science and Technology.*

Masatoshi Yamaguchi, Ph.D., *Lecturer in Vegetable Crops.*

Frederick P. Zscheile, Jr., Ph.D., *Professor of Agronomy.*

GRADUATE COURSES

290. Seminar. (1) II.

Mr. Jennings

One seminar is offered during the semester. One weekly meeting is held.

299. Research. (1-6) I and II.

The Staff

The research work will ordinarily be under the direction of a member of the group who is in the field in which the student's preparation has been found to be adequate.

AGRICULTURAL ECONOMICS

Loy L. Sammet, Ph.D., *Chairman of the Department, Berkeley-Davis.*
Benjamin C. French, Ph.D., *Vice-Chairman of the Department.*
Department Office, 118 Voorhies Hall

Daniel B. DeLoach, Ph.D., *Professor of Agricultural Economics.*
Benjamin C. French, Ph.D., *Professor of Agricultural Economics.*
Trimble R. Hedges, Ph.D., *Professor of Agricultural Economics.*
Gordon A. King, Ph.D., *Professor of Agricultural Economics.*
Chester O. McCorkle, Jr., Ph.D., *Professor of Agricultural Economics.*
Loy L. Sammet, Ph.D., *Professor of Agricultural Economics (Berkeley Campus).*

James M. Tinley, Ph.D., *Professor of Agricultural Economics, Emeritus.*
Edwin C. Voorhies, B.S., LL.D., *Professor of Agricultural Economics, Emeritus.*

—Harold O. Carter, Ph.D., *Associate Professor of Agricultural Economics.*
Gerald W. Dean, Ph.D., *Associate Professor of Agricultural Economics.*
J. Edwin Faris, Jr., Ph.D., *Associate Professor of Agricultural Economics.*
†Jerry Foytik, Ph.D., *Associate Professor of Agricultural Economics.*
J. Herbert Snyder, Ph.D., *Associate Professor of Agricultural Economics.*
Stephen H. Sosnick, Ph.D., *Associate Professor of Agricultural Economics.*
Warren E. Johnston, Ph.D., *Assistant Professor of Agricultural Economics.*
Samuel H. Logan, Ph.D., *Assistant Professor of Agricultural Economics.*
———, *Assistant Professor of Agricultural Economics.*
———, *Assistant Professor of Agricultural Economics.*



Alice R. Taylor, LL.B., *Lecturer in Business Law.*

Departmental Major Advisers.—Mr. Faris, Mr. Johnston, Mr. King, Mr. Logan, Mr. Sosnick.

Graduate Advisers.—Mr. Carter, Mr. Dean, Mr. Snyder.

Bachelor of Science Major Program and Graduate Study. See page 50.

LOWER DIVISION COURSES

1. **Agricultural Industry.** (3) II. Mr. Voorhies
Lecture—2 hours; discussion—1 hour.

Comparison of agriculture with other industries: population, production, improvements, trends, etc. Historical sketch of the development of agriculture. Types of farming and their geographical distribution. Movements of agricultural products. Institutional aids to agriculture.

Occasional field trips included.

18. **Business Law: Introduction.** (3) I. Mrs. Taylor
Lecture—3 hours.

Prerequisite: sophomore standing. Not open to students with credit for Business Administration 18.

Introduction to law, contracts, sales, and agency.

49. **Field Practice.** (1) II. Mr. French

Field trip during Spring Recess to observe aspects of the production, processing, handling, and distribution of agricultural products.

† Absent on leave, 1965–1966.

UPPER DIVISION COURSES

To graduate with a major in agricultural economics or agricultural business management a student must have at least a C average in all upper division courses taken in the major field.

100A. Economic Analysis in Agriculture. (3) I. Mr. Faris

Lecture—3 hours.

Prerequisite: Economics 1A, 1B.

The application of economic principles to problems of agriculture: economic structure and aspects of American agriculture; analysis of demand, supply, and production of agricultural products, with particular reference to the individual firm.

100B. Economic Analysis in Agriculture. (3) II. Mr. Logan

Lecture—3 hours.

Prerequisite: course 100A or equivalent.

The application of economic principles to problems of agriculture; economic pricing of agricultural output and productive services, including multiple products, multiple markets and multiple time periods; regional specialization, location and trade; determinants of economic change; effects of economic organization.

106. Analysis of Agricultural Economic Data. (3) II. Mr. Johnston

Lecture—2 hours; laboratory—3 hours.

Prerequisite: Mathematics 13 or equivalent, Mathematics 16A or equivalent, or consent of the instructor.

Evaluation and treatment of economic data in agriculture with emphasis on methods of analyzing relations among economic variables.

110. Agricultural Finance. (3) I. Mr. Voorhies

Lecture—2 hours; discussion—1 hour.

Prerequisite: Economics 1A or 1B.

Agricultural credit needs; methods of financing the agricultural industry and the agencies supplying agricultural credit.

Occasional field trips included.

111. Managerial Accounting. (3) II. Mr. Hedges

Lecture—3 hours.

Prerequisite: Economics 11 or equivalent.

Study of the use of accounting techniques in the management of agricultural businesses. Techniques covered include budgeting, systematic data, processing, normal and standard cost accounting, analysis of financial statements, and quantitative analysis of alternative courses of action.

115. Agricultural Business Management. (3) I. Mr. DeLoach

Lecture—3 hours.

Prerequisite: Economics 1A or 1B or consent of the instructor.

Application of management principles and practices to agricultural business; economic and institutional aspects of organization and management; planning, control, and decision-making processes.

***120. Agricultural Policy. (3) I.** _____

Lecture—3 hours.

Prerequisite: Economics 1A, 1B.

Analytical and historical treatment of economic problems and of governmental policies and programs affecting American agriculture.

* Not to be given, 1965-1966.

125. **Comparative Agriculture.** (3) II. Mr. Hedges
Lecture—3 hours.

Prerequisite: Economics 1A or 1B.

The agriculture of the principal countries of the world, with special reference to the influence of food supply upon the development of man.

130. **Agricultural Marketing.** (3) I. Mr. French
Lecture—3 hours.

Prerequisite: Economics 1A or 1B.

The nature and function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing.

135. **Cooperation in Agriculture.** (3) II. Mr. DeLoach
Lecture—3 hours.

Types of cooperative agencies; scope and objectives of agricultural cooperation; functions, supply, services, insurance, irrigation, production, consumption, marketing; problems of organization, pooling management, member relations, financing, taxation, market control, demand creation, cost control; economic effects; legal, political, and social aspects.

140. **Farm Management.** (4) II. Mr. McCorkle
Lecture—3 hours; laboratory—3 hours.

Prerequisite: junior standing.

Farm organization and resources; applying economic and technological principles in decision-making; analytical techniques and management control; problems in organizing and managing the farm business.

145. **Land Economics and Farm Appraisal.** (3) II. Mr. Johnston
Lecture—2 hours; laboratory—3 hours.

Prerequisite: Economics 1A or 1B.

Appraisal of agricultural land, land utilization in relation to problems of development and valuation, use and appraisal of land and water resources, land, and water policies.

One field trip is required.



Courses 160 to 180 are senior courses designed for those who have completed courses 100A, 100B, 106 and the appropriate survey course in the 120-145 series. A student not having this preparation but who desires a course in the 160-180 series may be admitted with the consent of the course instructor.

160. **Economic Analysis in Agricultural Marketing.** (3) II. Mr. King
Lecture—3 hours.

An analytical treatment of agricultural marketing: the marketing firm in its economic context; location of agricultural production, processing, and trade; demand analysis; economic analysis of market organization; government in marketing; the marketing system and the general economy.

165. **Economic Analysis in Agricultural Business Management.** (3) I. Mr. Carter
Lecture—3 hours.

An analytical treatment of agricultural business management: procurement; production; processing; costing and pricing; planning and control; business analysis.

- 170. Economic Analysis in Farm Management.** (3) I. Mr. Dean
Lecture—3 hours.

An analytical treatment of farm management: farm organization, administration and management; costs and returns; combination of resources; enterprise combination; problems and principles of size; financial analysis; capital structure; relation of nonfarm influences to farm management.

- 176. Economic Analysis in Resource Development and Use.** (3) II. Mr. Snyder
Lecture—3 hours.

An analytical treatment of resource use problems: economic productivity; rent and distribution theory; land use patterns; determinants of intensities and types of land use; resource conservation; land valuation; land tenure problems and policies.

- 198. Directed Group Study.** (1-5) I and II.
Prerequisite: consent of the instructor. The Staff (Mr. French in charge)
Directed group study of selected topics in agricultural economics for advanced undergraduates.

- 199. Special Study for Advanced Undergraduates.** (1-5) I and II.
The Staff (Mr. French in charge)
Prerequisite: senior standing and approval of the department.
Limited to majors in agricultural economics with a B average or higher.

GRADUATE COURSES

- 200A-200B. Economics of Agricultural Production, Consumption and Trade.** (3-3) Yr. I. Mr. Dean; II. Mr. Sosnick
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.

- 210. Econometric Methods.** (3) II. ———
Lecture—3 hours.

Prerequisite: Mathematics 131A or the equivalent.
Statistical models and their use in estimation of economic relationships; single and multiple equation systems.

- 220. Agricultural Policy.** (3) I. Mr. Snyder
Lecture—3 hours.

Welfare considerations and efficiency criteria as related to agricultural policy; an appraisal of agricultural policy in a changing economy.

- 250. Institutional Setting for Agricultural Business.** (3) II. Mr. Sosnick
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. Quantitative Analysis of Operational Problems.** (3) I. Mr. Faris
Lecture—3 hours.

Introduction to quantitative techniques used in analyzing operational problems of the business firm: statistical quality control; inventory control; waiting line problems; programming techniques as applied to transportation, product mix, and related production problems.

257. Production Planning and Market Forecasting. (3) II. Mr. Logan
Lecture—3 hours.

Quantitative analysis of production systems by statistical, economic, and engineering methods; methods of forecasting prices and sales for the individual firm; problems of investment, location, scale of operations, and pricing.

260. Administrative Organization and Policy Formation. (3) I. Mr. DeLoach
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.

280A-280B. Analysis of Research in the Economics of Agriculture.
(3-3) Yr. I. Mr. Carter; II. Mr. King

Lecture—3 hours.

Current research problems and methods of analysis in agricultural economics. A comprehensive approach to economic problems of agriculture, including analysis of production, supply, and demand for firm and industry; regional economics and interregional trade.

299. Individual Study. (1-4) I and II. The Staff (Mr. Dean in charge)

Any properly qualified graduate student who wishes to pursue a special field of study may do so if his proposed program of study is acceptable to the members of the staff with whom he works.

299D. Dissertation Research. (1-9) I and II. The Staff (Mr. Dean in charge)

AGRICULTURAL EDUCATION

Orville E. Thompson, Ph.D., *Chairman of the Department.*
Department Office, 274 Voorhies Hall

Frederick L. Griffin, M.S., *Professor of Agricultural Education, Emeritus.*
Sidney S. Sutherland, M.S., *Professor of Agricultural Education, Emeritus.*
Elwood M. Juergenson, Ph.D., *Associate Professor of Agricultural Education and Coordinator of Vocational Teacher Education.*
Orville E. Thompson, Ph.D., *Associate Professor of Agricultural Education.*
Mary C. Regan, Ph.D., *Assistant Professor of Agricultural Education.*

Arline Johnson, M.S., *Lecturer in Agricultural Education, Supervisor of Teacher Training—Home Economics.*

Departmental Major Advisers.—Mr. Juergenson, Mr. Thompson.

Credentials Counselors:

Secondary Credentials—Agriculture.—Mr. Juergenson.

Secondary Credentials—Home Economics.—Miss Johnson.

Bachelor of Science Major Program and Graduate Study. See page 52.

Requirements for Teaching Majors and Minors. See page 52.

LOWER DIVISION COURSE

10. Introduction to Agricultural Education. (2) I. Mr. Thompson

Lecture—2 hours.

Survey of entire field of education in agriculture. Vocational surveys, occupational analysis. The role and relationship of agriculture in California and the nation to occupational opportunities. Study of professions relating to agriculture.

UPPER DIVISION COURSES

160. Vocational Education. (2) II. Mr. Thompson

Lecture—2 hours.

Philosophy and organization of vocational education of less than college grade, with particular reference to educational principles for agriculture, commerce, homemaking, and industry.

165. Principles of Supervision. (3) II. Mr. Thompson

Lecture—3 hours.

Prerequisite: Education 110 or consent of instructor.

Principles and functions of supervision with emphasis upon the role of the supervisor of adult, vocational, technical and extension education.

186. Research Design and Analysis. (3) II. Miss Regan

Lecture—2 hours; laboratory—3 hours.

Prerequisite: Mathematics 13 or consent of instructor.

Research methodology, instrument development, and design for descriptive and experimental studies in adult education; application of appropriate mathematical procedures.

187. Extension Education in Agriculture and Home Economics. (2) II.

Lecture—1 hour; laboratory or field trip—3 hours.

Miss Regan

Prerequisite: junior or senior standing.

A study of the techniques of teaching agriculture and home economics as developed in the United States through the Agricultural Extension Service. Laboratory practice in extension methods such as program planning, demonstrations, discussions, use of bulletins, the press, visual aids. Field study of organization and programs.

- 188. Technical Journalism.** (3) I. Miss Regan
 Lecture—2 hours; laboratory—3 hours.
 Prerequisite: junior or senior standing.
 Principles and techniques of presenting and interpreting technical information in agriculture and home economics to lay groups. Preparation and use of news and feature articles, circulars, radio and television scripts, and feature exhibits.
- 189. Adult Education.** (2) I and II. _____
 Lecture—2 hours.
 Prerequisite: Education 110 (may be taken concurrently).
 Principles of adult education. Application of the principles of group leadership and group dynamics to the teaching of adults and to extension education in agriculture and home economics.
- 198. Directed Group Study.** (1-5) I and II.
The Staff (Mr. Thompson in charge)
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II.
The Staff (Mr. Thompson in charge)

GRADUATE COURSES

- 290. Seminar.** (1) I and II. Mr. Thompson
 Seminar—1 hour.
 Reports and discussions of topics of interest in the fields of agricultural education and agricultural extension.
- 299. Research.** (1-6) I and II. The Staff
 Research in agricultural education, vocational education, or agricultural extension.

SUPERVISED TEACHING COURSES

- 320A. Introduction to Teaching.** (1) I and II. Mr. Juergenson
 Lecture—1 hour.
 A limited number of juniors and seniors will be admitted. Lectures, conferences, and field work. Observations and participation in some form of public school work.
- 320B. Audio-Visual, Radio, and Other Instructional Resources.** (2) II. Mr. Juergenson
 Lecture—1 hour; laboratory—3 hours.
 Lectures, conferences, demonstrations, and school experience. Introduction to the materials and methods of audio-visual-radio education. Preparation of teaching materials; collecting, organizing, processing, and evaluating audio-visual materials.
- ‡320C. Supervised Teaching.** (3) I and II.
 Prerequisite: course 320A. Course 320E must be taken concurrently.
 Sec. 1. Agriculture. Mr. Juergenson
 Sec. 2. Home Economics. Miss Johnson
 Directed teaching for candidates for the special credentials in agriculture and homemaking and for the general secondary and general elementary credentials.

‡ Open only to apprentice teachers and graduate students. Courses 320C, 320E and 323 are scheduled as extra-session courses, to begin with the opening of the public schools and to end with the closing of the semester in the public schools. Thus teaching assignments in the fall semester, 1965, will begin on or about September 1 and end January 29. For the spring semester, 1966, they will begin on or about February 1 and end June 8. Students should make arrangements accordingly.

‡320E. Methods of Teaching. (2) I and II.

Lecture—2 hours and conferences.

All students enrolled in 320E must enroll in 320C concurrently.

Sec. 1. Agriculture. Mr. Juergenson

The principles and methods of teaching agriculture in the secondary schools of California in accordance with the provisions of the Federal and State Vocational Education Acts.

Sec. 2. Home Economics. Miss Johnson

Planning for teaching; basis for selection and organization of materials, their use and evaluation; teaching methods and classroom aids. Practices in class and department management. Relation of department programs to school and community.

‡323. Practicum in Supervised Teaching. (4) I and II.

Prerequisite: concurrent enrollment in course 320E; course 320C (may be taken concurrently) or experience as a teacher and consent of the instructor.

Sec. 1. Agriculture. Mr. Juergenson

Sec. 2. Home Economics. Miss Johnson

Extended and varied teaching experience under supervision.

‡ Open only to apprentice teachers and graduate students. Courses 320C, 320E and 323 are scheduled as extra-session courses, to begin with the opening of the public schools and to end with the closing of the semester in the public schools. Thus teaching assignments in the fall semester, 1965, will begin on or about September 1 and end January 29. For the spring semester, 1966, they will begin on or about February 1 and end June 8. Students should make arrangements accordingly.

AGRICULTURAL ENGINEERING

Coby Lorenzen, Jr., M.S., *Chairman of the Department.*
Department Office, 207 Walker Engineering Building

- Norman B. Akesson, M.S., *Professor of Agricultural Engineering.*
Roy Bainer, M.S., *Professor of Agricultural Engineering and Professor of Engineering.*
Kinsell L. Coulson, Ph.D., *Professor of Agricultural Engineering.*
S. Milton Henderson, M.S., *Professor of Agricultural Engineering.*
Clarence F. Kelly, M.S., *Professor of Agricultural Engineering.*
Robert A. Kepner, B.S., *Professor of Agricultural Engineering.*
Coby Lorenzen, Jr., M.S., *Professor of Agricultural Engineering.*
Loren W. Neubauer, Ph.D., *Professor of Agricultural Engineering.*
Frederick A. Brooks, Sc.D., *Professor of Agricultural Engineering, Emeritus.*
William J. Chancellor, Ph.D., *Associate Professor of Agricultural Engineering.*
John R. Goss, M.S., *Associate Professor of Agricultural Engineering.*
John C. Harper, D.Sc., *Associate Professor of Agricultural Engineering.*
Samuel A. Hart, Ph.D., *Associate Professor of Agricultural Engineering.*
Herbert B. Schultz, Ph.D., *Associate Professor of Agricultural Engineering and Lecturer in Geography.*
Wesley E. Yates, M.S., *Associate Professor of Agricultural Engineering.*
Robert B. Fridley, B.S., *Assistant Professor of Agricultural Engineering.*
Stanton R. Morrison, Ph.D., *Assistant Professor of Agricultural Engineering.*
Errol D. Rodda, Ph.D., *Assistant Professor of Agricultural Engineering.*
Cletus E. Schertz, Ph.D., *Assistant Professor of Agricultural Engineering.*



- John B. Dobie, M.S., *Lecturer in Agricultural Engineering.*
Roger E. Garrett, M.S., *Lecturer in Agricultural Engineering.*
Joseph P. Gentry, M.S., *Lecturer in Agricultural Engineering.*
Charles R. Kaupke, M.S., *Lecturer in Agricultural Engineering.*
Michael O'Brien, Ph.D., *Lecturer in Agricultural Engineering.*

LOWER DIVISION COURSE

12. Survey and Problems in Agricultural Engineering. (2) I.

Lecture—2 hours.

Mr. Bainer, Mr. Dobie

The development and the application and use of farm machinery; the utilization of power on the farm; elements of hydrology in relation to agricultural engineering; the economics of farm buildings; elementary problems in the mechanics of agriculture.

UPPER DIVISION COURSES

103. Agricultural Power. (3) II.

Mr. Kaupke

Lecture—2 hours; laboratory—3 hours.

Prerequisite: Physics 2B or 4B.

Principles of operation, construction, and utilization of internal-combustion engines, tractors and electric motors. Open to qualified lower division students by permission.

104. Agricultural Machinery. (3) I.

Mr. Yates

Lecture—2 hours; laboratory—3 hours.

Prerequisite: Physics 2A or 4A.

Principles of construction, operation, selection, and utilization of equipment for tillage, planting, harvesting, and the application of agricultural chemicals.

- 105. Farm Structures.** (3) II. Mr. Rodda
Lecture—2 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.
- 106. Micrometeorology in Agriculture.** (2) I and II. Mr. Coulson
Lecture—2 hours.
Prerequisite: Mathematics 16B or consent of the instructor.
Energy balance at earth's surface; solar and terrestrial radiation; turbulent transfers of momentum, heat, principles and practical applications to agriculture and air pollution.
- 107. Agricultural Meteorology.** (2) I. Mr. Schultz
Lecture—2 hours.
Prerequisite: recommended, Geography 1 or 3.
Daytime radiation intensities, nocturnal heat losses, climatic elements over different ground covers and terrain. Modification of micro-climate by sheltering, frost-protection devices, and windbreaks. Probabilities of temperatures, rainfall, and climatic hazards to agriculture (risk figures).
- 198. Directed Group Study.** (1-5) I and II. The Staff
Prerequisite: consent of the instructor.
Group study of selected topics in agricultural engineering.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

GRADUATE COURSE

- 299. Research.** (1-6) I and II. The Staff

PROFESSIONAL COURSES

- 314A. Agricultural Engineering Problems and Techniques for Teachers.**
(2) I. Mr. Gentry
Laboratory—6 hours.
Prerequisite: agricultural education major or consent of the 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.
- 314B. Agricultural Engineering Problems and Techniques for Teachers.**
(2) I. Mr. Garrett
Laboratory—6 hours.
Prerequisite: agricultural education major or consent of the instructor.
Course 314A is not prerequisite to 314B.
A continuation of course 314A. Offered in odd-numbered years.
- 317. Problems in Teaching Farm Mechanics.** (3) II. Mr. O'Brien
Lecture—1 hour; laboratory—6 hours.
Prerequisite: 8 units in agricultural engineering, including course 314A, 314B; Physics 2B or 4B. Limited to graduate students in agricultural education.
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.

AGRICULTURAL PRACTICES

Harry O. Walker, Ed.D., *Chairman of the Department.*
Department Office, 3 TB 6

Harry O. Walker, Ed.D., *Lecturer in Agricultural Practices.*
Departmental Major Adviser.—Mr. Walker.

LOWER DIVISION COURSE

49. **Field Practice in Agriculture.** (No credit) I and II. Mr. Walker
Laboratory—3 hours.

Practice in basic farm operations. Includes the operation and maintenance of farm machinery, soil tillage, irrigation, cultivation and harvesting operations. Recommended for the student whose experience in agriculture is inadequate for his occupational objectives.

AGRICULTURAL PRODUCTION

See "Agricultural Science and Management," pages 64 and 112.

AGRICULTURAL SCIENCE AND MANAGEMENT

G. Eric Bradford, Ph.D., *Chairman of the Executive Committee.*
Committee Office, 205 Old Horticulture Building

Committee in Charge:

G. Eric Bradford, Ph.D., *Associate Professor of Animal Husbandry.*

Gerald W. Dean, Ph.D., *Associate Professor of Agricultural Economics.*

C. C. Delwiche, Ph.D., *Professor of Soil Science.*

Walter L. Dunkley, Ph.D., *Professor of Food Science and Technology.*

Thomas A. Nickerson, Ph.D., *Associate Professor of Food Science and Technology.*

Lawrence Rappaport, Ph.D., *Lecturer in Vegetable Crops.*

Harry O. Walker, Ed.D., *Lecturer in Agricultural Practices.*

William A. Williams, Ph.D., *Professor of Agronomy.*

Major Advisers.—Mr. Bradford, Mr. Dean, Mr. Delwiche, Mr. Dunkley, Mr. Williams.

Bachelor of Science and Master of Science Programs.—See page 64.

AGRICULTURAL TOXICOLOGY

Donald G. Crosby, Ph.D., *Chairman of the Executive Committee*
Committee Office, 111 Agricultural Toxicology Building.

Committee in Charge:

Herman F. Beckman, Ph.D., *Lecturer in Entomology.*

Donald G. Crosby, Ph.D., *Lecturer in Food Science and Technology.*

Wendell W. Kilgore, Ph.D., *Lecturer in Food Science and Technology.*

Eugene M. Stafford, Ph.D., *Professor of Entomology.*

George F. Stewart, Ph.D., *Professor of Food Science and Technology.*

Gunter Zweig, Ph.D., *Lecturer in Entomology.*

GRADUATE COURSES

290. Seminar. (1) I and II.

The Staff

Seminar—1 hour.

Current topics in Agricultural Toxicology.

298. Directed Group Study. (1-3) I and II. The Staff (Mr. Crosby in charge)

Prerequisite: consent of instructor.

Topics such as natural toxicants, new pesticides, and trace analysis of toxicants.

AGRONOMY

R. Merton Love, Ph.D., *Chairman of the Department.*
Department Office, 131 Hunt Hall

§Fredrick T. Addicott, Ph.D., *Professor of Agronomy.*
Robert W. Allard, Ph.D., *Professor of Agronomy and Professor of Genetics.*
Paulden F. Knowles, Ph.D., *Professor of Agronomy.*
Horton M. Laude, Ph.D., *Professor of Agronomy.*
R. Merton Love, Ph.D., *Professor of Agronomy.*
Duane S. Mikkelsen, Ph.D., *Professor of Agronomy.*
Maurice L. Peterson, Ph.D., *Professor of Agronomy. (Berkeley campus).*
Charles W. Schaller, Ph.D., *Professor of Agronomy.*
Francis L. Smith, Ph.D., *Professor of Agronomy.*
Ernest H. Stanford, Ph.D., *Professor of Agronomy.*
§William A. Williams, Ph.D., *Professor of Agronomy.*
Frederick P. Zscheile, Jr., Ph.D., *Professor of Agronomy.*
Fred N Briggs, Ph.D., *Professor of Agronomy, Emeritus.*
John P. Conrad, Ph.D., *Professor of Agronomy, Emeritus.*
Ben A. Madson, B.S.A., *Professor of Agronomy, Emeritus.*
Ray C. Huffaker, Ph.D., *Associate Professor of Agronomy.*
Robert S. Loomis, Ph.D., *Associate Professor of Agronomy.*



Beecher Crampton, M.S., *Lecturer in Agronomy.*
Albert A. Holland, Ph.D., *Lecturer in Agronomy.*
Subodh K. Jain, Ph.D., *Lecturer in Agronomy.*
Charles A. Raguse, Ph.D., *Lecturer in Agronomy.*
Franklin C. Raney, Ph.D., *Lecturer in Agronomy.*
Dale G. Smeltzer, Ph.D., *Lecturer in Agronomy.*
C. H. E. Werkhoven, Ph.D., *Lecturer in Agronomy.*
J. Caswell Williams, Jr., Ph.D., *Lecturer in Agronomy.*

Departmental Major Advisers.—Mr. Laude, Mr. Schaller, Mr. Smeltzer.
Bachelor of Science Major Program and Graduate Study. See page 60.

LOWER DIVISION COURSE

1. Introduction to Agronomy. (3) I.

Mr. Smeltzer, Mr. Smith, Mr. W. A. Wililams

Lecture—2 hours; laboratory—3 hours.

The principles and practices of field crop production and soil management; a survey of the production and uses of field crops including pastures and other forages, cereals, edible legumes, oil, fiber, sugar, and green manure crops; laboratories and field trips to familiarize the student with production methods, plants and seeds, processing, and quality of field crops.

UPPER DIVISION COURSES

111. Small Grains, Corn, Sorghum, and Beans. (3) II.

Mr. Schaller

Lecture—2 hours; laboratory—3 hours.

Prerequisite: course 1 or consent of the instructor.

Adaptation, distribution, culture, utilization, processing and factors determining quality of wheat, oats, barley, rye, rice, corn, sorghum, and field beans.

§ Absent on leave, spring semester 1966.

- 112. Forage Crops.** (3) II. Mr. Raguse, Mr. Raney
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 1 or consent of the instructor.
Crop-ecological principles in the establishment and management of such forages as irrigated pasture, hay, range, and silage; aspects of forage quality which affect feeding value to livestock. Multiple use capabilities of grasslands are stressed.
- 113. Cotton, Sugar Beets and Miscellaneous Crops.** (3) I. Mr. Mikkelsen
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 1 or consent of the instructor.
Adaptation, distribution, culture, utilization, processing and other factors determining quality of cotton and other fiber crops, sugar crops, oil crops, and miscellaneous crops.
- 121. Principles of Plant Breeding.** (3) II. Mr. Knowles
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Genetics 100.
An introduction to plant breeding with emphasis on the genetic and cytological basis for plant improvement.
- 131. Physiology of Crop Plants.** (3) I. Mr. Loomis
Lecture—3 hours.
Prerequisite: course 1 or consent of instructor; Botany 111.
Physiological processes of agronomic plants and their modification by environment. Selected aspects of vegetative and reproductive growth of crop plants and factors affecting the quality of crop products.
- 198. Directed Group Study.** (1-5) I and II. The Staff
Prerequisite: consent of the instructor.
Directed group study of selected topics in agronomy for advanced undergraduates.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff
Prerequisite: 6 upper division units of agronomy.

GRADUATE COURSES

- 205. Design of Field Experiments.** (2) I. Mr. J. C. Williams
Lecture—1 hour; laboratory—3 hours.
Prerequisite: Mathematics 105A.
The planning and analysis of field and related experiments with emphasis on the biological interpretation of results.
- 206. Chemical and Physical Methods in Biological Research.** (3) I. Mr. Huffaker, Mr. Zscheile
Lecture—1 hour; laboratory—6 hours.
Prerequisite: Chemistry 5 and 9 or their equivalents.
Advanced laboratory techniques and instrumental methods of analytical chemistry in biological research. Includes an introduction to laboratory research methods, preparation of samples, principles and operation of research instruments and laboratory practice in methods of plant analysis.
- 221. Advanced Plant Breeding.** (3) II. Mr. Stanford
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 121 or equivalent.
Advanced topics in plant breeding. Genetic diversity and centers of origin of cultivated plants, mating systems in plants, polyploidy, host-pathogen relationships, role of mutagenesis in plant breeding and other topics of current interest.

- 222. Quantitative Genetics and Plant Improvement.** (3) I. Mr. Allard
Lecture—2 hours; laboratory—2 hours.
Prerequisite: course 121 or consent of the instructor; Mathematics 105A.
A survey of the genetic forces affecting populations. Formulation of breeding plans based on principles of population and quantitative genetics.
- 290. Seminar.** (1) I and II. Mr. Laude
Seminar—1 hour.
Technical topics of current interest in agronomy will be discussed. Students will prepare and present reports to the seminar.
- 298. Group Study** (1-3) I and II. The Staff
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.
- 299. Research.** (1-9) I and II. The Staff
Original research involving plant physiology, plant genetics, plant biochemistry, agricultural chemistry, or soil-plant relationships of field crops or range and pasture plants.

RELATED COURSES

- Weed Control** (Botany 107)
Tropical Crop Production (International Agricultural Development 101)
Water-Soil-Plant Relationships (Water Science 100)
Irrigation Principles and Practices (Water Science 110)
Elementary Statistics (Mathematics 13)
Applied Statistical Methods (Mathematics 105A-105B)
Diseases of Crop Plants (Plant Pathology 125-126)
Range Plants (Range Management 100)
Grassland Ecology (Range Management 133)
Introduction to Soil Science (Soil Science 1)
Soil and Plant Relations (Soil Science 108)
Soil Fertility (Soil Science 109)
Plant Hormones and Regulators (Viticulture 108)

Other courses related to agronomy are given in the departments of Agricultural Economics, Agricultural Engineering, Animal Husbandry, Botany, Genetics, and Soils and Plant Nutrition.

AMERICAN HISTORY AND LITERATURE

‡C. Bickford O'Brien, Ph.D., *Chairman of the Committee.*
David L. Jacobson, Ph.D., *Acting Chairman of the Committee*
(fall semester, 1965-1966)
Committee Office, 222 Sproul Hall.

Committee in Charge:

Herbert Bogart, Ph.D., *Assistant Professor of English.*
John F. Gallagher, Ph.D., *Assistant Professor of Political Science.*
Henry P. Gates, A.B., *Acting Assistant Professor of Classics and Sanskrit.*
‡C. Bickford O'Brien, Ph.D., *Professor of History.*
David L. Jacobson, Ph.D., *Associate Professor of History.*
Kenneth Kammeyer, Ph.D., *Assistant Professor of Sociology.*
John L. Magnus, Jr., Ph.D., *Assistant Professor of English.*
Alan A. Stambusky, Ph.D., *Assistant Professor of Dramatic Art.*
†Irwin Unger, Ph.D., *Associate Professor of History.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

Group Major Adviser. I. Mr. Jacobson, II. Mr. O'Brien.

The Major Program.—See description, page 82.

The Major with Honors.—See description, page 85.

UPPER DIVISION COURSES

194H. Special Study for Honors Students. (3) I and II. The Staff

Lecture and discussion—3 hours.

Prerequisite: enrollment limited to honors students in American History and Literature.

197H. Special Study for the Comprehensive Examination for Honors Students. (3) I and II. The Staff

Prerequisite: completion of all other major requirements for the A.B. degree in American History and Literature.

Study for a written and oral examination given by an interdepartmental committee, the members to be chosen from the student's instructors in American History and Literature.

199. Special Study for Advanced Undergraduates. (1-3) I and II. The Staff

‡ Absent on leave, fall semester 1965.

† Absent on leave, 1965-1966.

ANATOMY

———, *Chairman of the Department.*
Department Office, 1042 Haring Hall

Logan M. Julian, D.V.M., Ph.D., *Professor of Anatomy.*
Walter S. Tyler, D.V.M., Ph.D., *Associate Professor of Anatomy.*
Leslie J. Faulkin, Jr., Ph.D., *Assistant Professor of Anatomy.*
Benjamin L. Hart, D.V.M., Ph.D., *Assistant Professor of Anatomy and Psychology.*
Larry Z. McFarland, D.V.M., Ph.D., *Assistant Professor of Anatomy.*



Marjan Merala, M.S., *Lecturer in Medical Bibliography.*

UPPER DIVISION COURSES

***100. Systematic Anatomy. (2) II.** The Staff
Lecture—2 hours.

Prerequisite: Zoology 2 and consent of the instructor. Course 100L should be taken concurrently.

Lectures emphasizing the typical structure of the major anatomical systems of the ruminant, carnivore, and fowl.

***100L. Systematic Anatomy Dissection. (2) II.** The Staff
Laboratory—6 hours.

Prerequisite: course 100 (should be taken concurrently).

Dissection and demonstration of the major anatomical systems of the sheep, dog, and chicken with comparisons to related species.

120. Functional Comparative Anatomy of Domestic Animals. (10) I.

Mr. Julian, Mr. Faulkin, Mr. Hart, Mr. Tyler

Lecture—4 hours; laboratory—18 hours.

Prerequisite: first-year standing in the School of Veterinary Medicine.

Systematic presentation of the gross and subgross anatomy of domesticated species.

199. Special Study for Advanced Undergraduates. (1-5) I and II.

Laboratory.

The Staff

Prerequisite: course 120 or consent of the instructor.

GRADUATE COURSES

200. Functional Comparative Neuroanatomy. (3) II.

Lecture—2 hours; laboratory—3 hours.

Mr. Hart, Mr. McFarland

Prerequisite: one of the following or equivalent; course 100; Animal Husbandry 110; Animal Physiology 120B, Anthropology 155; Poultry Husbandry 104, or 107; Psychology 108; Zoology 106 or 107.

A comparative gross and microscopic study of the nervous system of birds and mammals with strong emphasis on function. Animals to be studied include the chicken and pigeon, rat, dog and cat, rabbit, cow and sheep, subhuman primates and human.

* Not to be given, 1965-1966.

220. Surgical Anatomy. (4) II.

Mr. McFarland

Lecture—1 hour; laboratory—9 hours.

Prerequisite: course 120 or equivalent.

Topographical, radiological, and regional anatomy as it applies to the clinical sciences.

290. Seminar. (1) I and II.

The Staff

Seminar—1 hour.

299. Research. (1-6) I and II.

The Staff

ANIMAL HUSBANDRY

Hubert Heitman, Jr., Ph.D., *Chairman of the Department.*

Department Office, 130 Animal Science Building

James M. Boda, Ph.D., *Professor of Animal Husbandry and Professor of Physiology.*

Floyd D. Carroll, Ph.D., *Professor of Animal Husbandry.*

Perry T. Cupps, Ph.D., *Professor of Animal Husbandry.*

Hubert Heitman, Jr., Ph.D., *Professor of Animal Husbandry.*

Robert C. Laben, Ph.D., *Professor of Animal Husbandry.*

†Glen P. Lofgreen, Ph.D., *Professor of Animal Husbandry.*

James H. Meyer, Ph.D., *Professor of Animal Husbandry.*

Wade C. Rollins, Ph.D., *Professor of Animal Husbandry.*

†William C. Weir, Ph.D., *Professor of Animal Husbandry.*

Harold H. Cole, Ph.D., LL.D., *Professor of Animal Husbandry, Emeritus.*

Harold Goss, Ph.D., *Professor of Animal Husbandry, Emeritus.*

Paul W. Gregory, Sc.D., *Professor of Animal Husbandry, Emeritus.*

Carroll E. Howell, M.S., *Professor of Animal Husbandry, Emeritus.*

Max Kleiber, Sc.D., *Professor of Animal Husbandry, Emeritus.*

Sylvester W. Mead, M.S., *Professor of Animal Husbandry, Emeritus.*

James F. Wilson, M.A., LL.D., *Professor of Animal Husbandry, Emeritus.*

G. Eric Bradford, Ph.D., *Associate Professor of Animal Husbandry.*

Moses T. Clegg, Ph.D., *Associate Professor of Animal Husbandry and Associate Professor of Physiology.*

William N. Garrett, Ph.D., *Associate Professor of Animal Husbandry.*

Irving I. Geschwind, Ph.D., *Associate Professor of Animal Husbandry.*

Magnar Ronning, Ph.D., *Associate Professor of Animal Husbandry.*

Ransom L. Baldwin, Jr., Ph.D., *Assistant Professor of Animal Husbandry.*

Harold F. Hintz, Ph.D., *Assistant Professor of Animal Husbandry.*

Robert G. Loy, Ph.D., *Assistant Professor of Animal Husbandry.*



Glenwood M. Spurlock, Ph.D., *Lecturer in Animal Husbandry.*

Departmental Major Advisers.—Mr. Laben, Mr. Cupps, Mr. Baldwin, Mr. Ronning, Mr. Loy.

Bachelor of Science Major Program and Graduate Study. See page 53.

LOWER DIVISION COURSES

7. Introduction to Animal Husbandry. (3) I.

Mr. Cole

Lecture—3 hours.

A survey of the sources of the world's supply of animal products, the distribution of domestic animals in the United States and factors influencing this; the origin, characteristics, and adaptation of the more important breeds and the influence of environment upon their development.

7L. Introduction to Animal Husbandry Laboratory. (1) I.

Laboratory—3 hours.

Mr. Spurlock, Mr. Bradford

Prerequisite: course 7 (may be taken concurrently) or consent of the instructor.

Introduction to husbandry of the station flocks and herds. Studies of animal experiments in progress. Live animal and carcass evaluation. Dairy and beef cattle, sheep, swine, and horses.

† Absent on leave, 1965-1966.

11. **Livestock and Dairy Cattle Judging.** (2) II. Mr. Hintz, Mr. Laben
Laboratory—6 hours.
Prerequisite: course 7L.
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.

UPPER DIVISION COURSES

102. **Animal Biochemistry Laboratory.** (3) I. Mr. Carroll
Lecture—1 hour; laboratory—6 hours.
Prerequisite: Biochemistry 101 (may be taken concurrently).
103. **Feeds and Feeding.** (3) II. Mr. Garrett
Lecture—3 hours.
Prerequisite: Chemistry 8.
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; the balancing of rations. Not open for credit to animal husbandry majors.
105. **Elements of Animal Nutrition.** (3) II. Mr. Hintz
Lecture—3 hours.
Prerequisite: Biochemistry 101.
A study of the fundamental principles of animal nutrition. Includes a survey of the role of carbohydrates, proteins, lipids, minerals, vitamins and water in nutrition; methods used in evaluation of feeds; nutrient requirements for productive function.
- 105L. **Elements of Animal Nutrition Laboratory.** (1) II. Mr. Hintz
Laboratory—3 hours.
Prerequisite: course 105 (may be taken concurrently).
Laboratory studies and demonstrations of nutritional principles and their relation to the evaluation of feeds for productive functions. Nutrient composition of feedstuffs.
107. **The Genetics of Animal Breeding.** (3) I. Mr. Rollins
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Genetics 100.
The application of modern genetics to livestock improvement; the principles underlying inbreeding, outbreeding, assortative mating, mass selection, progeny testing, and family selection.
110. **Physiology of Domestic Animals.** (5) I. Mr. Boda, Mr. Loy
Lecture—4 hours; laboratory—3 hours.
Prerequisite: Chemistry 8; Zoology 1B.
The physiology of the neuromuscular, central nervous, circulatory, respiratory, digestive, endocrine, reproductive, and excretory systems.
111. **Type Evaluation in Livestock and Dairy Cattle.** (2) I. Mr. Garrett
Laboratory—6 hours.
Prerequisite: course 11.
Studies of recognized type evaluation in livestock and dairy cattle. Critical evaluation of the bases for the criteria used in establishing these standards. Intercollegiate judging teams selected from this course. Given the first six weeks of the semester.

- 112. Milk Production.** (2) II. Mr. Laben
Lecture—2 hours.
Prerequisite: course 103 or 105, Genetics 100.
The basic principles of breeding, feeding, and management of dairy cattle, and a survey of dairying in California. Not open for credit to animal husbandry majors.
- 114. Advanced Dairy Cattle Production.** (4) II. Mr. Laben, Mr. Ronning
Lecture—3 hours; laboratory—3 hours.
Prerequisite: courses 103 or 105, 107 and 110.
The principles of milk production and sources of variation in milk yield and composition. Current knowledge in ruminant nutrition, feeds and feeding practices, breeding and genetics, milk secretion, reproductive physiology, and herd management considered in relation to production.
- 115. Horse Production.** (3) II. Mr. Loy
Lecture—2 hours; laboratory—3 hours.
Prerequisite: courses 103 or 105, and 110; Genetics 100.
Feeding, breeding, and management of horses; application of the principles of basic animal sciences to problems of production of all classes of horses.
- 116. Meat Animal Production.** (4) II. Mr. Bradford, Mr. Garrett
Lecture—3 hours; laboratory—3 hours.
Prerequisite: courses 103 or 105, 107 and 110.
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.
- 118. Meat Production.** (3) II. Mr. Carroll
Lecture—3 hours.
Prerequisite: courses 7, 7L, 103 or 105 (may be taken concurrently); Genetics 100.
Improvement of meat type through selection for heritable traits; comparative reproductive and feed efficiency; environmental adaptability and distribution; management for growth and fattening for meat. Not open for credit to animal husbandry majors.
- 120. Metabolism and Food Utilization.** (3) I. Mr. Ronning
Lecture—3 hours.
Prerequisite: course 105 or equivalent.
Physical, chemical and physiological principles in animal nutrition, especially bioenergetics and biokinetics. Energy transformations (chemical energy, work and heat) in animals. Metabolic paths, pools, turnover rates and precursor-product relationships involved in the formation of animal products.
- 121. Physiology of Reproduction.** (3) II. Mr. Cupps
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 110.
The physiological mechanisms related to reproduction, breeding efficiency and fertility with special reference to domestic animals.
- 125. Nutritional Principles of Livestock Feeding.** (2) I. Mr. Garrett
Lecture—2 hours.
Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor.
The application of principles of nutrition to the solution of problems in animal feeding. Nutritive requirements for maintenance and productive functions, nutritional disorders, composition and use of feedstuffs.

- 130. Physiology of the Endocrine Glands.** (3) II. Mr. Clegg
Lecture—3 hours.
Prerequisite: course 110 or equivalent.
Control of endocrine secretion and the physiological effects of the hormones with emphasis on endocrine problems relating to domestic animals.
- 190. Proseminar in Animal Husbandry.** (1) II. Mr. Heitman, Mr. Rollins
Lecture—1 hour.
Prerequisite: senior standing in Animal Husbandry or consent of the instructor.
Reports and discussions of recent advances in animal husbandry.
- 198. Directed Group Study.** (1-3) I and II.
Prerequisite: consent of the instructor. The Staff (Mr. Heitman in charge)
Group study of selected topics relating to livestock production.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II.
The Staff (Mr. Heitman in charge)

GRADUATE COURSES

- 201. Protein Biochemistry.** (3) I. Mr. Geschwind
Lecture—3 hours.
Prerequisite: Biochemistry 101; Chemistry 109.
Introduction to the 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.
- *206. **Advanced Animal Nutrition Laboratory.** (3) II. Mr. Lofgreen
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 105L or consent of the instructor.
A study of nutrition through laboratory animal experimentation, including studies of deficiency symptoms, nutritional balances and measures of the usefulness of feeds.
- 214. Physiology of Lactation.** (2) II. Mr. Baldwin
Lecture—2 hours.
Prerequisite: course 110; Biochemistry 101.
The chemistry and biochemistry of milk formation, with special reference to the metabolic pathways leading to the synthesis of milk in various species of mammals.
- *230. **Biochemical Aspects of Endocrinology.** (2) II. Mr. Geschwind
Lecture—2 hours.
Prerequisite: course 110 or equivalent; Biochemistry 101.
The chemistry and 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.
- 290. Seminar.** (1) I and II. The Staff (Mr. Heitman in charge)
Seminar—1 hour.
Reports and discussions of topics of interest in the fields of animal husbandry, animal nutrition, animal physiology or animal genetics.

* Not to be given, 1965-1966.

298. Group Study. (1-3) I and II. The Staff (Mr. Heitman in charge)
Lecture—1-3 hours.

Directed study in areas of animal husbandry, animal biochemistry, animal physiology, animal genetics, animal nutrition, and endocrinology.

299. Research. (1-9) I and II. The Staff (Mr. Heitman in charge)

Research may be undertaken in the fields of animal husbandry, animal nutrition, animal physiology, or animal genetics.

RELATED COURSE

Animal Hygiene (Veterinary Microbiology 111)

ANIMAL PHYSIOLOGY

Frederick W. Lorenz, Ph.D., *Chairman of the Department*
Departmental Office, 1093 Haring Hall

- James M. Boda, Ph.D., *Professor of Physiology and Professor of Animal Husbandry.*
Frederick W. Lorenz, Ph.D., *Professor of Physiology.*
Edward A. Rhode, Jr., D.V.M., *Professor of Veterinary Medicine and Professor of Physiology.*
Arthur H. Smith, Ph.D., *Professor of Physiology.*
Irving H. Wagman, Ph.D., *Professor of Physiology.*
Ray E. Burger, Ph.D., *Associate Professor of Poultry Husbandry and Associate Professor of Physiology.*
Moses T. Clegg, Ph.D., *Associate Professor of Animal Husbandry and Associate Professor of Physiology.*
Harry W. Colvin, Jr., Ph.D., *Assistant Professor of Physiology.*
Frank X. Ogasawara, Ph.D., *Assistant Professor of Poultry Husbandry and Assistant Professor of Physiology.*
Barry W. Wilson, Ph.D., *Assistant Professor of Poultry Husbandry and Assistant Professor of Physiology.*



- Emerson L. Besch, Ph.D., *Lecturer in Animal Physiology.*
† Emanuel Epstein, Ph.D., *Professor of Plant Nutrition.*
Jiro J. Kaneko, D.V.M., *Associate Professor of Clinical Pathology.*
Edward C. Maxie, Ph.D., *Lecturer in Pomology.*
Stanton R. Morrison, Ph.D., *Assistant Professor of Agricultural Engineering.*
Charles Winget, Ph.D., *Lecturer in Physiology.*
Dorothy E. Woolley, Ph.D., *Lecturer in Physiology.*

Graduate Group in Animal Physiology

- Ursula K. Abbott, Ph.D., *Associate Professor of Poultry Husbandry.*
Hans Abplanalp, Ph.D., *Associate Professor of Poultry Husbandry.*
Norman F. Baker, D.V.M., Ph.D., *Associate Professor of Parasitology.*
Ransom L. Baldwin, Jr., Ph.D., *Assistant Professor of Animal Husbandry.*
Ronald J. Baskin, Ph.D., *Assistant Professor of Zoology.*
Arthur L. Black, Ph.D., *Professor of Physiological Chemistry.*
James M. Boda, Ph.D., *Professor of Physiology and Professor of Animal Husbandry.*
Ray E. Burger, Ph.D., *Associate Professor of Poultry Husbandry and Associate Professor of Physiology.*
Moses T. Clegg, Ph.D., *Associate Professor of Animal Husbandry and Associate Professor of Physiology.*
Harold H. Cole, Ph.D., *Professor of Animal Husbandry, Emeritus, Chairman of the Group.*
Harry W. Colvin, Jr., Ph.D., *Assistant Professor of Physiology.*
Charles E. Cornelius, D.V.M., Ph.D., *Associate Professor of Clinical Pathology.*
Perry T. Cupps, Ph.D., *Professor of Animal Husbandry.*
Richard A. Freedland, Ph.D., *Associate Professor of Physiological Chemistry.*
Irving I. Geschwind, Ph.D., *Associate Professor of Animal Husbandry.*
Fredric W. Hill, Ph.D., *Professor of Poultry Husbandry.*
Louis W. Holm, Ph.D., *Professor of Physiology.*
Donald E. Jasper, D.V.M., Ph.D., *Professor of Clinical Pathology.*
Charles L. Judson, Ph.D., *Assistant Professor of Entomology.*

† Absent on leave, 1965-1966.

- Logan M. Julian, D.V.M., Ph.D., *Professor of Anatomy.*
 Jiro J. Kaneko, D.V.M., Ph.D., *Associate Professor of Clinical Pathology.*
 Clarence F. Kelly, M.S., LL.B., *Professor of Agricultural Engineering.*
 Max Kleiber, Sc.D., *Professor of Animal Husbandry, Emeritus.*
 Frederick W. Lorenz, Ph.D., *Professor of Physiology.*
 Robert G. Loy, Ph.D., *Assistant Professor of Animal Husbandry.*
 Larry Z. McFarland, D.V.M., Ph.D., *Assistant Professor of Anatomy.*
 Frank X. Ogasawara, Ph.D., *Assistant Professor of Poultry Husbandry and Assistant Professor of Physiology.*
 Harold R. Parker, D.V.M., Ph.D., *Assistant Professor of Physiology.*
 Stuart A. Peoples, M.D., *Professor of Comparative Pharmacology.*
 Edward A. Rhode, Jr., D.V.M., *Professor of Veterinary Medicine and Professor of Physiology.*
 Arthur H. Smith, Ph.D., *Professor of Physiology.*
 Walter S. Tyler, D.V.M., Ph.D., *Associate Professor of Anatomy.*
 Irving H. Wagman, Ph.D., *Professor of Physiology.*
 Barry W. Wilson, Ph.D., *Assistant Professor of Poultry Husbandry and Assistant Professor of Physiology.*
 Wilbor O. Wilson, Ph.D., *Professor of Poultry Husbandry.*

Departmental Major Advisers—Mr. Colvin, Mr. Lorenz.

Bachelor of Science Major Program and Graduate Study. See page 53.

UPPER DIVISION COURSES

- 100. General Physiology. (3) I.** Mr. Colvin
 Lecture—3 hours.
 Prerequisite: Chemistry 1B, 8; Physics 2B; Physiology 1, 1L, or Zoology 1B, or Botany 1. Recommended: biochemistry; mammalian physiology; Mathematics 16B.
 The physical and chemical processes of cells and tissues.
- 100L. General Physiology Laboratory. (1) I.** Mr. Colvin
 Laboratory—3 hours.
 Prerequisite: course 100 (may be taken concurrently).
 Laboratory in the physical and chemical processes of cells and tissues. Offered in odd-numbered years.
- 101. Functions of Organ Systems. (2) II.** _____
 Lecture—2 hours.
 Prerequisite: Biology 1.
 Physiology of organ systems; concepts of integrative and homeostatic mechanisms, especially in adaptation, growth, and reproduction.
- 101L. Organ Function Laboratory. (1) II.** _____
 Laboratory—3 hours.
 Prerequisite: course 101 (which should be taken concurrently).
 Dissections, primarily of domestic animals, and selected experiments to illustrate functional relationships.
- 102. Physiology of Growth. (2) II.** Mr. Smith
 Lecture—2 hours.
 Prerequisite: Animal Husbandry 110. Recommended: course 100; Biochemistry 101; Mathematics 13.
 Biological, physical, and chemical aspects of the growth of organisms.

- 103. Physiology of Animal Cells.** (2) II. Mr. B. W. Wilson
Lecture—2 hours.
Prerequisite: course 100. Recommended: Biochemistry 101, Zoology 121.
Organization of metazoan systems at the cellular level; cell and tissue culture; tissue regulation; embryonic development.
- 108. Biodynamics.** (3) II. Mr. Besch, Mr. Morrison
Lecture—3 hours.
Prerequisite: Animal Husbandry 110; Mathematics 16B; Physics 2B.
A study of rates and dynamics of physiological processes.
- *120A. Comparative Physiology.** (2) II. Mr. Smith, Mr. Rhode
Lecture—2 hours.
Prerequisite: Animal Husbandry 110 or Physiological Sciences 140 or the equivalent (may be taken concurrently).
Comparisons of physiological functions in the animal kingdom: respiration and circulation.
Offered in odd-numbered years.
- 120B. Comparative Physiology.** (2) I. Mrs. Woolley, Mr. Lorenz
Lecture—2 hours.
Prerequisite: Animal Husbandry 110 or Physiological Sciences 140 or the equivalent (may be taken concurrently). Course 120A is not prerequisite to 120B.
Integrative mechanisms (neural and humoral).
Offered in odd-numbered years.
- 120C. Comparative Physiology.** (2) II. Mr. Boda, Mr. Kaneko
Lecture—2 hours.
Prerequisite: Animal Husbandry 110 or Physiological Sciences 140 or the equivalent (may be taken concurrently). Courses 120A and 120B are not prerequisite to 120C.
Digestion and excretion.
Offered in even-numbered years.
- 198. Directed Group Study.** (1-3) I and II. The Staff
Prerequisite: Consent of the instructor.
Lectures and group discussions of special topics in physiology.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. Mr. Lorenz

GRADUATE COURSES

- 214. Electroneurophysiology.** (4) I. Mr. Wagman, Mr. Burger
Lecture—2 hours; laboratory—6 hours.
Prerequisite: Animal Husbandry 110 or the equivalent; Biochemistry 101.
Recommended: course 100.
Electrical activity of neurons and neuro-effector junctions; physiology of the neurons as studied by their electrical activity.
- 290. Seminar.** (1) I and II. The Staff (Mr. Lorenz in charge)
Seminar—1 hour.
Discussion and critical evaluation of advanced topics and current trends in research.

291. Seminar in General Physiology. (1) II.

Seminar—1 hour.

Mr. Clegg, Mr. Epstein, Mr. Maxie, Mr. Smith

Discussion of selected topics concerning the physical and chemical processes of cells and tissues.

298. Group Study (1-3) I and II.

The Staff

Lectures and group discussions of advanced physiological subjects.

299. Research (1-9) I and II.

The Staff

RELATED COURSES**Mammalian Physiology** (Animal Husbandry 110, Physiological Sciences 140, 140L)**Metabolism and Food Utilization** (Nutrition 250)**Physiology of Reproduction** (Animal Husbandry 121, 214)**Physiology of the Endocrine Glands** (Animal Husbandry 130)**Biochemical Aspects of Endocrinology** (Animal Husbandry 230)**Physiology of Muscular Activity** (Physical Education 104)**Physiological Chemistry** (Physiological Sciences 101, 101L)**Intermediary Metabolism of Animals** (Physiological Sciences 205, Biochemistry 150A, 150B, Clinical Pathology 203)**Physiology of Drug Action** (Physiological Sciences 123)**Radiation Biology** (Physiological Sciences 225)**Experimental Physiology** (Physiological Sciences 265)**Introductory Physiology** (Physiology 1, 1L, see Zoology)**Avian Physiology** (Poultry Husbandry 107, 108)**Environmental Physiology of Domestic Animals** (Poultry Husbandry 149)**Cell Biology** (Zoology 121, 121L)**Invertebrate Physiology** (Zoology 142 and 142L)**Muscle Physiology** (Zoology 150)**Biokinetics** (Physiological Sciences 243, 243L)

ANTHROPOLOGY

Martin A. Baumhoff, Ph.D., *Chairman of the Department.*

Department Office, 331 Voorhies Hall

David L. Olmsted, Ph.D., *Professor of Anthropology.*

Martin A. Baumhoff, Ph.D., *Associate Professor of Anthropology.*

Yehudi A. Cohen, Ph.D., *Associate Professor of Anthropology.*

Daniel J. Crowley, Ph.D., *Associate Professor of Anthropology and Associate Professor of Art.*

Phyllis C. Jay, Ph.D., *Assistant Professor of Anthropology.*

Warren G. Kinzey, Ph.D., *Assistant Professor of Anthropology and Assistant Professor of Zoology.*

William C. Smith, Ph.D., *Assistant Professor of Anthropology.*

Stephen A. Tyler, Ph.D., *Assistant Professor of Anthropology.*

Denise O'Brien, A.B., *Acting Assistant Professor of Anthropology.*

Jay W. Ruby M.A., *Lecturer in Anthropology.*

ANTHROPOLOGY

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

Departmental Major Advisers.—Mr. Olmsted, Mr. Tyler.

The Major Program

(A) Lower Division Courses.—Required: Anthropology 1, 2, Geography 1, Psychology 1, and either Mathematics 13 or Sociology 18. Recommended: Geology 1A, 1B or Biology 1.

(B) Upper Division Courses.—Required: courses 102, 103A–103B, 110A–110B, or 110A, 120, 128, 195 and 7 units drawn from other upper division courses in anthropology or from Art 150, 154A, 154B; Genetics 100 or 115; Geology 111.

Graduate Study.—The department offers a program of study and research leading to the M.A. and Ph.D. degrees in anthropology. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Anthropology.

LOWER DIVISION COURSES

1. **Physical Anthropology.** (3) I and II. Mr. Kinzey, Mrs. Jay
Lecture—2 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.

2. **Cultural Anthropology.** (3) I and II. Mr. Cohen, Mr. Smith
Lecture—3 hours.

Prehistory and growth of culture; diversity of cultures considered from the aspects of language, economics, kinship, art, magic, and religion.

UPPER DIVISION COURSES

102. **Ethnology.** (3) I. Mr. Smith
Lecture—3 hours.

Prerequisite: course 2 or consent of the instructor.

Major theories of culture; survey of principal culture types and their distribution; discussion of ethnological problems.

- 103A. Culture Growth. (3) I.** Mr. Ruby
Lecture—3 hours.
Prerequisite: consent of the instructor.
Comparative prehistory and archaeology. Old World.
- 103B. Culture Growth. (3) II.** Mr. Baumhoff
Lecture—3 hours.
Prerequisite: consent of the instructor.
Comparative prehistory and archaeology. New World.
- 105. The American Indian. (3) II.** Mr. Ruby
Lecture—3 hours.
Prerequisite: course 2 or consent of the instructor.
An introductory survey of the Indians of North and South America; origins, languages, civilizations, and history.
- 110A. Elementary Linguistic Analysis. (3) I.** Mr. Olmsted
Lecture—3 hours.
Phonetics, phonemics, morphophonemics, morphemics, tactics.
- 110B. Comparative Linguistics. (3) II.** Mr. Olmsted
Lecture—3 hours.
Prerequisite: course 110A.
Linguistic prehistory, historical linguistics and reconstruction; dialect geography.
- *119. Culture and Personality. (3) I.** Mr. Cohen
Lecture—3 hours.
Prerequisite: course 2 or consent of the instructor.
Interrelationships of culture, society, and personality; personality in various societies; techniques of culture and personality studies.
- 120. Language and Culture. (3) I.** Mr. Tyler
Lecture—3 hours.
Prerequisites: course 110A.
Language and thought; classification of languages; linguistic aspects of culture; language, nation, and state.
- 121. Folklore. (3) II.** Mr. Crowley
Lecture—3 hours.
Prerequisite: course 2 or literary preparation acceptable to the instructor.
Theory and method in the study of folktales, myths, legends, proverbs, riddles, songs, and other forms of verbal tradition.
- 122. Economic Anthropology. (3) I.** Miss O'Brien
Lecture—3 hours.
Prerequisite: Consent of the instructor.
Economic behavior in non-industrial societies; its social and cultural setting, and its modern changes.
- 124. Comparative Religion. (3) II.** Mr. Cohen
Lecture—3 hours.
Prerequisite: course 2 or consent of the instructor.
An anthropological analysis of the origins, elements, forms, and symbolism of religion; functional interpretation with stress on ethnographic materials.
- 128. Kinship and Social Organization. (3) II.** Mr. Tyler
Lecture—3 hours.
Prerequisite: course 2.
Kinship systems and their significance in the organization of social life. Theories of kinship, marriage regulations, and kinship role patterns.

- *139. Peoples of Africa (3) I.** Mr. Crowley
 Lecture—3 hours.
 Prerequisite: course 2 or consent of the instructor.
 Peoples and cultures of Africa: survey and comparative analysis of representative societies and cultures in the area.
- 140. Peoples of Afroamerica. (3) I.** Mr. Crowley
 Lecture—3 hours.
 A study of the cultural implications of slavery and the contribution of Africans to the national cultures of the Americas.
- *143. Peoples of India. (3) I.** Mr. Tyler
 Lecture—3 hours.
 Prerequisite: course 2 or consent of the instructor.
 Development of Indian cultural traditions; social organization and social trends.
- 147. Peoples of the Pacific. (3) II.** Miss O'Brien
 Lecture—3 hours.
 The aboriginal civilizations of Australia, Malaysia, Melanesia, Micronesia, and Polynesia in prehistoric and modern times; changes arising from European contact and colonization.
- *152. Human Evolution and Fossil Man. (3) II.** _____
 Lecture—3 hours.
 Prerequisite: course 1 or equivalent.
 Nature and results of the evolutionary processes involved in the formation and differentiation of mankind.
 Offered in odd-numbered years.
- *153. Living Races of Man. (3) I.** _____
 Lecture—3 hours.
 Prerequisite: course 1 or equivalent.
 Physical characters, distribution, and relationships.
 Offered in even-numbered years.
- 154. Primate Social Behavior. (3) II.** Mrs. Jay
 Lecture—3 hours.
 Prerequisite: course 1 or the equivalent.
 Survey of the social behavior, organization, and ecology of monkeys and apes; their relevance to the evolution of human behavior and social groups.
- 155. Primate Anatomy and Evolution. (3) I.** Mr. Kinzey
 Lecture—3 hours.
 Prerequisite: course 1 or Zoology 2 or 25.
 Survey of the major groups of living and fossil Primates with emphasis on the anatomical evidence for their interrelationships.
- *160. Contemporary Civilization. (3) I.** Mr. Cohen
 Lecture—3 hours.
 An application of anthropological principles of analysis and interpretation to contemporary civilization.
- *162. Peasant Society and Culture. (3) I.** Mr. Smith
 Lecture—3 hours.
 Prerequisite: consent of the instructor.
 Comparative study of peasant communities, utilizing historical and ethnographic sources; analysis of urban rural relations; problems of economic development and culture change.

* Not to be given, 1965-1966.

165. **Culture Change.** (3) I. Miss O'Brien
Lecture—3 hours.
Prerequisite: course 2 or consent of the instructor.
Introduction to the analysis of sociocultural stability and change; theories of innovation, diffusion, acculturation, and cultural evolution; problems of social planning.
195. **Field Course in Archaeological Method.** (2) I and II. Mr. Ruby
Laboratory—8 hours.
Prerequisite: consent of the instructor.
Lectures, museum preparation, and week-end excavations. Enrollment limited to twenty students. With consent of the instructor, may be repeated without duplication of credit.
196. **Archaeological Method.** (2) II. Mr. Ruby
Laboratory—4 hours.
Prerequisite: course 195 and consent of the instructor.
Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. Enrollment limited to eighteen students. With consent of the instructor, may be repeated without duplication of credit.
198. **Directed Group Study.** (3) II. Mr. Smith
Discussion—3 hours.
Prerequisite: consent of the instructor.
Directed reading and group discussion of selected anthropological problems.
199. **Special Study for Advanced Undergraduates.** (1-3) I and II.
Investigation of special problems. The Staff (Mr. Olmsted in charge)

GRADUATE COURSES

- *210. **Aspects of Culture Structure.** (2) II. _____
Lecture—2 hours.
Prerequisite: consent of the instructor.
Analysis of various phases of culture, such as religion, economics, law, and folklore.
- *216. **Problems in Archaeological Method.** (2) II. Mr. Baumhoff
Lecture—2 hours.
Prerequisite: consent of the instructor.
Techniques for analyzing archaeological data; application to various pre-historic cultures.
219. **Culture and Personality.** (2) II. Mr. Cohen
Seminar—2 hours.
220. **Field Course in Linguistics.** (3) II. Mr. Olmsted
Lecture—1 hour. Laboratory—2 hours.
Prerequisite: course 110A or equivalent.
Techniques of eliciting, recording, and analyzing; work with a native speaker.
225. **Kinship and Social Structure.** (2) II. Mr. Tyler
Seminar—2 hours.
Prerequisite: consent of the instructor.
Systematic treatment of ethnological data and concepts concerned with kinship and the social structuring of human societies.

* Not to be given, 1965-1966.

- 226. Evolution of Social Organization.** (2) I. Mr. Cohen
Seminar—2 hours.
Prerequisite: consent of the instructor.
Diachronic and synchronic analyses of social organization.
- *239. Problems in African Society and Culture.** (2) II. Mr. Crowley
Lecture—2 hours.
Prerequisite: consent of the instructor.
Diachronic analyses of traditional institutions in sub-Saharan Africa.
- 242. Problems in African Prehistory.** (2) II. Mr. Baumhoff
Seminar—2 hours.
Prerequisite: consent of the instructor.
- 245. Ethnology of Northern and Central Asia.** (3) I. Mr. Olmsted
Lecture—1 hour; seminar—2 hours.
Prerequisite: Reading knowledge of one of the following:
Russian, Chinese, Japanese, German.
Lectures on the cultures aboriginally found north of the Caucasus-Korea line. Supervised study of the primary and secondary sources. Work with informants when available.
- 247. Problems in the Peoples and Cultures of Oceania.** (2) II. Miss O'Brien
Seminar—2 hours.
- 250. Theory and Method of Anthropology.** (2) I. Mr. Baumhoff
Seminar—2 hours.
- *253. Concepts and Problems in Physical Anthropology.** (2) I. Mr. Kinzey
Lecture—2 hours.
Prerequisite: consent of the instructor.
Concepts in historical perspective; continuing and new problems in human biology as it concerns physical anthropology.
- *254. Primate Social Behavior.** (3) II. Mrs. Jay
Seminar—2 hours.
Analysis of primate social behavior, with particular emphasis on field studies.
- 265. Concepts and Problems in Applied Anthropology.** (2) I. Mr. Smith
Seminar—2 hours.
Prerequisite: consent of the instructor.
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.
- *292. Seminar in Anthropological Linguistics.** (2) I. Mr. Olmsted
Seminar—2 hours.
- 299. Research.** (2-6) I and II. Mr. Olmsted

* Not to be given, 1965-1966.

ART

Richard L. Nelson, M.A., *Chairman of the Department.*

Department Office, 101 East Hall

_____, *Professor of Art.*

Richard L. Nelson, M.A., *Professor of Art.*

Richard D. Cramer, M.F.A. (Architecture), *Associate Professor of Design.*

Daniel J. Crowley, Ph.D., *Associate Professor of Art and Associate Professor of Anthropology.*

Tio L. Giambruni, M.A., *Associate Professor of Art.*

Seymour Howard, Ph.D., *Associate Professor of Art.*

Ralph M. Johnson, M.A., *Associate Professor of Art.*

Roland C. Petersen, M.A., *Associate Professor of Art.*

†Daniel Shapiro, *Associate Professor of Art.*

Wayne Thiebaud, M.A., *Associate Professor of Art.*

_____, *Associate Professor of Art.*

Robert C. Arneson, M.F.A., *Assistant Professor of Art and Assistant Professor of Design.*

†Ruth J. Horsting, M.A., *Assistant Professor of Art and Assistant Professor of Design.*



Joseph A. Baird, Jr., Ph.D., *Lecturer in Art.*

Susan R. McKillop, M.A., *Acting Assistant Professor of Art.*

Jane B. Garritson, M.A., *Associate in Art.*

Charles M. Muskavitch, H.D., F.I.L.C., *Lecturer in Art.*

William T. Wiley, M.F.A., *Assistant Professor of Art.*

_____, *Lecturer in Art.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

Departmental Major Advisers.—Mr. Giambruni, Mr. Howard, Mr. Johnson, Mr. Nelson, Mr. Petersen, Mr. Thiebaud, Mr. Wiley.

Preparation for Art Major.—Practice of Art: courses 2A-2B, 3A-3B, and 6 units chosen from courses 1A, 1B, 1C, and 1D. History of Art: 2 units each of (1) black and white, (2) color, and (3) sculpture or ceramics; 9 units from Art 1A, 1D, and 1B or 1C.

The Major.—A student may elect a major emphasizing Appreciation and Practice of Art or History of Art.

I. Appreciation and Practice of Art. Twelve units of Group A courses under two different artists, course 148, 4 units of Group C, and 6 units chosen from Group A, B, or C.

II. History of Art. Required: two Art history sequences (e.g. 154A-154B), plus Art 148, Art 189, 3 additional units from Group C, and 4 units of any courses in Group A, B, or C. Students planning to do advanced work in History of Art are urged to develop their knowledge of foreign languages (especially French and German) as early as possible.

Transfer Students.—Transfer students who have fulfilled unit requirements elsewhere are: (a) required to take an examination in order to qualify for Group A courses, and (b) are requested to present examples of their work done in other institutions before being admitted to classes and before credit can be given toward the major for work done elsewhere.

† Absent on leave, 1965-1966.

Students who qualify will be advised to take course 195 in order to acquaint themselves with the methods expected for this department's advanced courses. The department will recommend for graduation only students with at least a grade C average in the major.

Graduate Study.—The Department of Art offers a program of study and research leading to the M.A. degree in art practice. Detailed information regarding graduate study may be obtained from the bulletin of the Graduate Division, or write to the Graduate Adviser, Department of Art.

LOWER DIVISION COURSES

- 1A. History of Ancient Mediterranean Art. (3) I.** Mr. Howard
Lecture—3 hours.
From the Stone Age to the end of the Roman Empire.
Field trips are included.
- 1B. History of Medieval, Renaissance, and Modern Art: Painting. (3) I and II.** _____, Mrs. McKillop
Lecture—3 hours.
Field trips are included.
- 1C. History of Medieval, Renaissance, and Modern Art: Architecture and Sculpture. (3) II.** Mr. Cramer
Lecture—3 hours.
Field trips are included.
- 1D. History of Oriental Art. (3) I.** Mr. Crowley
Lecture—3 hours.
The art of India, China, and Japan.
Field trips are included.
- 2A. Elementary Form and Color. (2) I and II.**
Mr. Johnson, Mr. Petersen, Mr. Wiley, Mr. Giambruni, Mr. Thiebaud
Laboratory—6 hours.
Form in composition using black and white media.
Field trips are included.
- 2B. Elementary Form and Color. (2) I and II.**
Laboratory—6 hours. Mr. Wiley, Mr. Johnson, Mr. Petersen, Mr. Thiebaud
Introduction to color in composition.
Field trips are included.
- 3A. Intermediate Form and Color. (2) I and II.**
Laboratory—6 hours. Mr. Wiley, Mr. Johnson, Mr. Petersen, Mr. Thiebaud
Prerequisite: courses 2A and 2B.
Color and form in composition.
Field trips are included.
- 3B. Intermediate Form and Color. (2) I and II.** _____
Laboratory—6 hours.
Prerequisite: course 2A-2B.
Form in composition using the human figure as subject.
Field trips are included.
- 10. Introduction to Art. (2) I and II.** Mr. Nelson
Lecture—2 hours.
Open to nonmajors.
The understanding and appreciation of painting, sculpture, architecture, and industrial art. Consists of illustrated lectures.

- 12. Ceramics. (2) I and II.** Mr. Arneson
 Laboratory—6 hours.
 An introduction to ceramic forms and ceramic sculpture.
- 14A. Sculpture. (2) I and II.** Mr. Giambruni, ——
 Laboratory—6 hours.
 Introduction to basic elements of three-dimensional construction and relief in clay and plaster.
- 14B. Sculpture. (2) I and II.** Mr. Giambruni
 Laboratory—6 hours.
 Prerequisite: course 14A.
 Introduction to space design, using the human figure as a motif, with construction in clay, plaster, wood and stone.
- 16. Descriptive Drawing and Rendering. (2) I.** Mr. Nelson
 Lecture—1 hour; laboratory—3 hours.
 Methods of objective drawing and of space description; rendering in various media.
 Field trips are included.

UPPER DIVISION COURSES

Group A: Appreciation and Practice

Prerequisite: courses 2A, 2B, 3A and 3B.

The various courses in Group A differ in content, use of materials, type of subject matter, etc., depending upon the individual aims of the artists in charge. All courses in this group may be repeated indefinitely without duplication of credit, and part A is not prerequisite to part B.

The subject matter will range from still-life and landscape to life classes, figure and mural compositions.

The materials used will range from charcoal and *sumi* to water color, gouache, egg tempera, oil, mixed technique, and fresco painting.

101A. Advanced Drawing and Painting. (2) I.

Laboratory—6 hours. Mr. Johnson, Mr. Petersen, Mr. Wiley, Mr. Thiebaud
 Prerequisite: courses 2A, 2B, 3A and 3B.

Representational composition based upon out-of-door subjects in any medium. Composition with the human figure as a basic motif. Painting in various media including oil, tempera, gouache, and wax. May be repeated for credit.

Field trips are included.

101B. Advanced Drawing and Painting. (2) II.

Laboratory—6 hours. Mr. Johnson, Mr. Wiley, Mr. Petersen, Mr. Thiebaud
 Prerequisite: courses 2A, 2B, 3A and 3B.

Representational composition based upon out-of-door subjects in any medium. Composition with the human figure as a basic motif. Painting in various media including oil, tempera, gouache, and wax. May be repeated for credit.

Field trips are included.

103. Advanced Form and Figure Composition. (2) I and II.

Laboratory—6 hours.

Prerequisite: course 3B.

Problems of light, color, and space that involve the human figure and its environment.

- 121A-121B. Architectural Design.** (2-2) Yr. Mr. Cramer
 Laboratory—6 hours.
 Prerequisite: 2 semesters in art practice or design or consent of instructor.
 Studio projects in architectural design.
- 128A. Graphic Arts.** (2) I and II. ———
 Laboratory—6 hours.
 Prerequisite: two semesters of art practice or design.
 Experimental methods in relief and intaglio printmaking; etching, engraving, aquatint, woodcut, and related media.
- 128B. Advanced Graphic Arts.** (2) I and II. ———
 Laboratory—6 hours.
 Prerequisite: course 128A.
 Advanced experimental methods in relief and intaglio printmaking, etching, engraving, aquatint, woodcut and related media.
- 141. Sculpture: Methods and Materials.** (2) I. Mr. Giambruni
 Laboratory—6 hours.
 Prerequisite: course 14B or consent of the instructor.
 Advanced three-dimensional design featuring the use of stone, wood, metal, and plaster.
- 142. The Human Figure in Sculpture.** (2) II. ———
 Laboratory—6 hours.
 Prerequisite: courses 3B, 14B; or consent of the instructor. Recommended: course 141.
 Design exercises in three dimensions and relief, featuring the human figure as subject matter.
- 143. Casting Techniques and Theory of Cast Sculpture.** (2) II.
 Laboratory—6 hours. Mr. Giambruni
 Prerequisite: course 14B or consent of the instructor. Recommended: courses 141, 142.
 Advanced sculpture projects in varied casting techniques and media. Emphasis on bronze and "lost wax" technique.
- 144A. Advanced Sculpture.** (2) I. ———
 Laboratory—6 hours.
 Prerequisite: course 14B.
 Advanced problems dealing with relationship of volumes in the round and in relief, specifically considering problems as related to the demands of materials used. Discussions of the aesthetics involved in sculpture.
- 144B. Advanced Sculpture.** (2) II. Mr. Giambruni
 Laboratory—6 hours.
 Prerequisite: course 144A.
 Advanced aesthetic sculpture problems.
- 145. Advanced Relief Sculpture.** (2) I. Mr. Giambruni
 Laboratory—6 hours.
 Prerequisite: course 14A.
 Drawing for sculpture and creating sculpture reliefs using plaster, wood, ceramics, wax, and aluminum.

- 146A. **Ceramic Sculpture.** (2) I. Mr. Arneson
 Laboratory—6 hours.
 Prerequisite: course 12 or consent of the instructor.
 Use of clay as material for sculpture in round and relief.
- 146B. **Advanced Ceramic Sculpture.** (2) II. Mr. Arneson
 Laboratory—6 hours.
 Prerequisite: course 12.
 Advanced problems in large scale ceramic sculpture.

Group B: Theory and Criticism

148. **Art Theory and Criticism.** (2) II. Mr. Nelson
 Lecture—2 hours.
 Prerequisite: course 2A or 14A and one art lecture course.
 Study of forms and symbols in historic and contemporary works of art.

Group C: History of Art

Open to nonmajors. General prerequisite: upper division standing and consent of the instructor.

150. **The Art of Primitive Peoples.** (3) II. Mr. Crowley
 Lecture—3 hours.
 The arts of prehistoric peoples, and of the peoples of Africa, Oceania, Australia, and the Indians of the Americas.
- 154A. **Greek Art.** (3) I. Mr. Howard
 Lecture—3 hours.
 1000-400 B.C.
- 154B. **Greek Art.** (3) II. Mr. Howard
 Lecture—3 hours.
 400-20 B.C.
155. **Roman Art.** (3) II. Mr. Howard
 Lecture—3 hours.
 From the Republic through the beginning of the Christian Era.
160. **History of Minor Arts.** (3) I. _____
 History of the minor arts following the Renaissance times.
162. **History of Graphic Arts.** (3) II. _____
 Lecture—3 hours.
 History of prints and drawings from the fifteenth century.
168. **Golden Ages of Great Cities.** (3) II. Mr. Baird
 Lecture—3 hours.
 An historical investigation of town planning as a guide to modern urban development. Analysis of key cities, from ancient Rome to New York City, and the creative personalities which shaped them.
- *176A. **Medieval Art.** (3) I. _____
 Lecture—3 hours.
 Early Christian to Romanesque art.
- *176B. **Medieval Art.** (3) II. _____
 Lecture—3 hours.
 Romanesque through Gothic art.

* Not to be given, 1965-1966.

177. **Northern Renaissance Painting.** (3) I. Mrs. McKillop
Lecture—3 hours.
Painting north of the Danube in the 15th and 16th centuries.
- 178A. **Renaissance Art.** (3) I. Mrs. McKillop
Lecture—3 hours.
European art of the fourteenth and fifteenth centuries.
Field trips are included.
- 178B. **Renaissance Art.** (3) II. Mrs. McKillop
Lecture—3 hours.
European art of the sixteenth century.
Field trips are included.
179. **Baroque Art.** (3) I. Mr. Baird
Lecture—3 hours.
Painting, sculpture, architecture, and the art of the garden from the formative stages of the Baroque style to the Rococo.
Field trips are included.
180. **Readings in Art Historical Methods.** (3) II. _____
Lecture—3 hours.
Theory, method, and criticism in art historical writing from Vasari to the present.
- 183A. **European Painting in the Nineteenth Century.** (3) I. _____
Lecture—3 hours.
Field trips are included.
- 183B. **European Painting in the Twentieth Century.** (3) II. _____
Lecture—3 hours.
Field trips are included.
184. **Architecture in the Twentieth Century.** (3) I. Mr. Cramer
Lecture—3 hours.
The forms and sub-styles of modern architecture with emphasis on the development of organicism in the work of Frank Lloyd Wright and of the international style in the work of Le Corbusier and Van der Rohe.
- *188A. **The Art of Latin America.** (3) I. _____
Lecture—3 hours.
Emphasis on the architecture, sculpture, and painting of Mexico from pre-conquest to contemporary times. The arts of the American southwest, Inca and colonial architecture of Peru, and the modern architecture of Brazil.
- 188B. **The Art of the United States.** (3) I. Mr. Baird
Lecture—3 hours.
A survey of three centuries of American art, with emphasis on colonial, nineteenth-century, and modern architecture, and on painting and sculpture from 1850 to the present in the United States.
Field trips are included.
189. **Museum Methods and Connoisseurship.** (3) II.
Lecture—2 hours; laboratory—3 hours. Mr. Baird, Mr. Muskavitch
Prerequisite: one semester art history or consent of the instructor.
An introduction to problems of media and connoisseurship; methods of preservation and authentication in the graphic arts (drawing, etching, engraving and lithography); museum trips; visiting lecturers.

* Not to be given, 1965-1966.

190. **The Role of Artists in Culture.** (3) I. Mr. Baxter
Lecture—3 hours.
Prerequisite: non-majors may be admitted only with the consent of the instructor.
Comparative analysis of selection, training, functions, roles, and evaluations of artists in various cultures. Written and oral reports.

Special Study Courses

195. **Special Study in Appreciation and Practice of Art.** (2) I and II.
Laboratory—6 hours. The Staff
Prerequisite: 8 units of appreciation and practice work, or the equivalent; consent of the instructor. May not be repeated for credit.
198. **Directed Group Study.** (1-5) I and II. The Staff (Mr. Nelson in charge)
199. **Special Study for Advanced Undergraduates.** (1-5) I and II.
The Staff, Mr. Nelson in charge

GRADUATE COURSES

201. **Advanced Practice in Selected Painting and Drawing Techniques.**
(3) I and II. The Staff
Lecture—3 hours.
Original works produced for group discussion and criticism. May be repeated for credit.
290. **Seminar.** (3) I and II. The Staff
Seminar—3 hours.
The practice of painting and drawing; original works produced for group discussion and criticism; topics of a contemporary and historical nature. May be repeated for credit.
299. **Individual Study.** (1-6) I and II. The Staff

PROFESSIONAL COURSE

300. **Practice and Principles of Art Education.** (2) I and II. Mrs. Garritson
Lecture—2 hours.
Prerequisite: senior or graduate standing, or consent of the instructor.
Art education and practice of techniques used in elementary and secondary schools.

AVIAN MEDICINE

H. E. Adler, D.V.M., Ph.D., *Chairman of the Department.*
Department Office, 2079 Haring Hall

Henry E. Adler, D.V.M., Ph.D., *Professor of Veterinary Medicine.*
Raymond A. Bankowski, D.V.M., Ph.D., *Professor of Veterinary Medicine.*
Livio G. Raggi, D.V.M., Ph.D., *Associate Professor of Veterinary Medicine.*



Richard Yamamoto, Ph.D., *Lecturer in Avian Medicine.*

UPPER DIVISION COURSES

112. **Principles of Poultry Diseases.** (3) II. Mr. Adler
Lecture—3 hours.
Prerequisite: Biology 1; Bacteriology 1; junior standing or consent of the instructor.
Principles in the control of poultry diseases.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

GRADUATE COURSES

208. **Poultry Diseases.** (3) I. Mr. Adler, Mr. Bankowski, Mr. Raggi
Lecture—3 hours.
Prerequisite: third-year standing in the School of Veterinary Medicine.
Other qualified students admitted with consent of the instructor.
The etiology, diagnosis, and control of the diseases of poultry.
- *208L. **Avian Medicine Laboratory** (1) I. The Staff
Laboratory—3 hours.
Prerequisite: third year standing in the school of Veterinary Medicine.
Diagnosis of avian diseases by necropsy and laboratory procedures. Selected diseases of major importance to the poultry industry will be reproduced for class use including those of bacterial, viral, and chemical origin.
- 251A-251B. **Avian Medicine Laboratory.** (½-½) Yr. The Staff
Lecture—5 hours; laboratory—15 hours (per semester).
Prerequisite: 4th year standing in Veterinary Curriculum.
Application of avian medicine knowledge to diagnosis of poultry diseases.
290. **Seminar in Avian Medicine.** (1) I and II. Mr. Yamamoto
Seminar—1 hour.
299. **Research.** (1-6) I and II. The Staff

* Not to be given, 1965-1966.

BACTERIOLOGY

John L. Ingraham, Ph.D., *Chairman of the Department.*
Allen G. Marr, Ph.D., *Acting Chairman of the Department*
Department Office, 156 Hutchison Hall

Robert E. Hungate, Ph.D., *Professor of Bacteriology.*

†John L. Ingraham, Ph.D., *Professor of Bacteriology.*

Allen G. Marr, Ph.D., *Professor of Bacteriology.*

Herman J. Phaff, Ph.D., *Professor of Bacteriology and Professor of Food Science and Technology.*

Mortimer P. Starr, Ph.D., *Professor of Bacteriology.*

Donald M. Reynolds, Ph.D., *Associate Professor of Bacteriology.*

Monica Riley, Ph.D., *Assistant Professor of Bacteriology.*



Ralph Kunkee, Ph.D., *Assistant Professor of Enology.*

Herman J. Phaff, Ph.D., *Professor of Food Science and Technology.*

Letters and Science List.—All undergraduate courses in bacteriology except course 106 are included in the Letters and Science List of Courses (see page 85).

Major Advisers.—Mr. Hungate, Mr. Reynolds.

The Major Program. The undergraduate major programs are designed to provide a proper balance of studies in the biology of bacteria and other microorganisms together with appropriate courses in mathematics and physical science. Although 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, the Bachelor of Science program offers greater emphasis in mathematics and physical science.

Both majors are appropriate for students contemplating a career in Medical Technology. Such students are advised to take Veterinary Microbiology 127 and Physics 3A-3B in addition to the courses required for either the Bachelor of Science or the Bachelor of Arts major.

Bachelor of Arts major program

(A) Lower Division Courses.—Bacteriology 1; Biology 1; Chemistry 1A-1B, 8; Mathematics 16A and either 13, 16B, or 36; Physics 2A-2B.

(B) Upper Division Courses.—Bacteriology 100, 103, 104; Biochemistry 101, 101L; Chemistry 5; Genetics 100; and one course from the following group: Botany 118, 119; Zoology 110; Veterinary Microbiology 127.

Bachelor of Science major program

(A) Lower Division Courses.—Required: Bacteriology 1; Botany 1 or Zoology 1A; Chemistry 1A-1B, 5; Mathematics 13, 16A-16B; Physics 2A-2B. Recommended: Elementary Courses in French and German.

(B) Upper Division Courses.—Bacteriology 100, 103, 104; Biochemistry 101, 101L; Chemistry 109 or 110A-110B, 112A-112C; Genetics 100; and one course from the following group: Botany 118, 119; Zoology 110; Veterinary Microbiology 127.

Honors and Honors Program (see page 85).—The honors program consists of course 194H.

Graduate Study. (see page 299)—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 Depart-

† Absent on leave, 1965-1966.

ment of Bacteriology are augmented by courses and personnel of the Departments of Biochemistry, Botany, Food Science and Technology, and Viticulture and Enology, and the School of Veterinary Medicine. For detailed information regarding graduate study in microbiology, address the Graduate Adviser in Microbiology, Department of Bacteriology.

BACTERIOLOGY

LOWER DIVISION COURSE

1. Introduction to Microbiology. (4) I and II. ———, Mr. Reynolds
Lecture—2 hours; laboratory—6 hours.

Prerequisite: Chemistry 1A; one course in biology, botany, zoology, or physiology.

A general introduction to microbiology.

UPPER DIVISION COURSES

A grade of C or higher in introductory bacteriology is required for admission to upper division courses.

100. The Physiology of Bacteria. (5) I. Mr. Marr
Lecture—3 hours; laboratory—6 hours.

Prerequisite: course 1; Chemistry 8 or 112A, Physics 2B.

Microscopy, cytology, and growth of microorganisms; effects of the physico-chemical environment; microbial genetics.

103. Microbial Metabolism. (2) I. Mr. Hungate
Lecture—2 hours.

Prerequisite: course 1; Biochemistry 101.

A survey of the metabolic activities of microbes.

103L. Microbial Metabolism Laboratory. (2) I. Mr. Hungate
Laboratory—6 hours.

Prerequisite: course 103 (may be taken concurrently); a course in quantitative chemical analysis.

Quantitative experiments in microbial metabolism, using selected methods of microchemical analysis, manometry, liquid and gas phase chromatography, spectrophotometry, and isotopic tracers.

104. Bacterial Ecology and Diversity. (4) II. Mr. Starr
Lecture—2 hours; laboratory—6 hours.

Prerequisite: course 1; Chemistry 8.

Principles of bacterial ecology and bacterial diversity. Survey of the major systematic groups of bacteria, with intensive study of selected microorganisms and habitats.

106. Industrial Fermentations. (2) II. Mr. Kunkee, Mr. Phaff, Mr. Reynolds
Lecture—2 hours.

Prerequisite: course 1, Chemistry 1A-1B, 8.

Microorganisms and their activity in relation to industrial processes such as baking, brewing, and the production of industrial solvents, vitamins, enzymes, and drugs. For laboratory experience in this field, students may register in Food Science and Technology 106.

194H. Special Study for Honors Students. (1-3) I and II. The Staff
Laboratory.

Prerequisite: course 100 and at least one additional upper division course in microbiology; consent of instructor.

Open to honors students. Designed to provide experience in preparation of an honors thesis.

199. Special Study for Advanced Undergraduates. (1-5) I and II.

The Staff

Prerequisite: consent of the instructor based on adequate preparation of the student in allied fields.

Investigation of special problems.

GRADUATE COURSES**203. Microbial Biochemistry. (3) II. Mr. Ingraham, Mr. Marr, Mrs. Riley**

Lecture—3 hours.

Prerequisite: Biochemistry 150A and 150B, Chemistry 110B or 109.

Protein synthesis; mechanisms of regulation; biochemical genetics; metabolic pathways.

205. Bacterial Taxonomy. (2) II.

Mr. Starr

Lecture—2 hours.

Principles of classification; nomenclatural systems and codes; evolution and phylogeny of bacteria and other microorganisms; determinative and taxonomic methods, manuals and schemes.

207. Bacterial Genetics. (3) II.

Mrs. Riley

Lecture—3 hours.

Prerequisite: course 1; Biochemistry 101. Recommended: Genetics 100.

The mechanisms for transmission of hereditary traits, with emphasis on bacteria and bacteriophage.

207L. Laboratory in Bacterial Genetics. (2) II.

Mrs. Riley

Laboratory—6 hours.

Prerequisite: course 207 (may be taken concurrently).

Genetic analyses of bacteria and bacteriophages.

290. Seminar. (1) I and II.

The Staff

Seminar—1 hour.

299. Research. (1-6) I and II.

The Staff

BIOLOGY**1. Principles of Biology. (4) I and II.**

Mr. Hungate,

Lecture—3 hours; laboratory—3 hours.

Mr. Ketellapper, Mr. Wolfe

Prerequisite: Chemistry 1A or a passing score in a qualifying examination in chemistry.

An interdisciplinary course designed for majors in the biological sciences. Emphasis will be given to the unity of basic biological principles as related to cell structure and function, reproduction, genetics, growth and differentiation, evolution, ecology, and taxonomy.

***2. Biological Diversity. (4) II.**

The Staff from Bacteriology,

Lecture—2 hours; laboratory—6 hours.

Botany, Zoology.

Prerequisite: course 1.

A survey of representative microorganisms, plants, and animals stressing diversity, classification, structure, and function.

RELATED COURSES

Biochemical Control Mechanisms (Biochemistry 208)

Intermediary Metabolism (Biochemistry 150A-150B)

Biochemical Mechanisms (Biochemistry 205)

Algology (Botany 118)

Mycology (Botany 119)

Food and Industrial Microbiology Laboratory (Food Science and Technology 106)

Microbiology of Milk and Dairy Products (Food Science and Technology 105, 105L)

Yeasts and Related Organisms (Food Science and Technology 216)

Medical Microbiology (Veterinary Microbiology 127)

Advanced Immunology (Veterinary Microbiology 270)

Soil Microbiology and Soil Biochemistry (Soils and Plant Nutrition 111)

Protozoology (Zoology 110)

* Not to be given, 1965-1966.

BIOCHEMISTRY AND BIOPHYSICS

Paul K. Stumpf, Ph.D., *Chairman of the Department*
Department Office, 554 Hutchison Hall

†Eric E. Conn, Ph.D., *Professor of Biochemistry.*
Lloyd L. Ingraham, Ph.D., *Professor of Biophysics.*
Paul K. Stumpf, Ph.D., *Professor of Biochemistry.*
Sterling Chaykin, Ph.D., *Associate Professor of Biochemistry.*
Mendel Mazelis, Ph.D., *Associate Professor of Food Science and Technology.*
Jack Preiss, Ph.D., *Associate Professor of Biochemistry.*
Richard S. Criddle, Ph.D., *Assistant Professor of Biophysics.*
Roy H. Doi, Ph.D., *Assistant Professor of Biochemistry.*
Jerry L. Hedrick, Ph.D., *Assistant Professor of Biochemistry.*
Gunther Kreil, Ph.D., *Assistant Professor of Biochemistry.*
Irwin H. Segel, Ph.D., *Assistant Professor of Biochemistry.*

Jack Edelman, Ph.D., *Visiting Professor of Biochemistry.*
Tsune Kosuge, Ph.D., *Lecturer in Plant Pathology.*
Eric I. Mercer, Ph.D., *Visiting Professor of Biochemistry.*

The department does not offer an undergraduate major in these subjects. For graduate study the Department of Biochemistry and Biophysics cooperates with the Group in Comparative Biochemistry for work leading to the M.S. degree and Ph.D. degree in comparative biochemistry. The department cooperates with the Group in Biophysics for work leading to the Ph.D. degree in biophysics.

UPPER DIVISION COURSES

101. General Biochemistry. (3) I and II. Mr. Mercer, Mr. Segel
Lecture—3 hours.

Prerequisite: Chemistry 1B; Chemistry 8 or 112A. Recommended: an 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.

101L. General Biochemistry Laboratory. (3) I and II.

I. Mr. Criddle, Mr. Mazelis; II. Mr. Kosuge, Mr. Preiss

Lecture—1 hour; laboratory—6 hours.

Prerequisite: course 101 (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.

150A. Intermediary Metabolism. (3) I. Mr. Hedrick, Mr. Preiss, Mr. Stumpf
Lecture—3 hours.

Prerequisite: course 101 or equivalent. Recommended: Chemistry 150A.

Comparative biochemistry of respiration, oxidative phosphorylation, and metabolism of carbohydrates and lipids.

***150B. Intermediary Metabolism.** (3) II.

Lecture—3 hours.

Prerequisite: course 101 or equivalent. Recommended: Chemistry 150B.

Comparative metabolism of amino acids, proteins, porphyrins, and nucleic acids.

* Not to be given, 1965–1966.

† Absent on leave, 1965–1966.

GRADUATE COURSES

201A. Advanced General Biochemistry. (3) I. Mr. Criddle, Mr. Hedrick,
Lecture—3 hours. Mr. Ingraham

Prerequisite: course 101 or consent of instructor; Chemistry 109 or 110B, 112B.

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.

201B. Advanced General Biochemistry. (3) II. Mr. Doi, Mr. Preiss,
Lecture—3 hours. Mr. Hedrick, Mr. Stumpf

Prerequisite: course 201A.
A continuation of 201A.

201L. General Biochemistry Laboratory. (5) II. Mr. Chaykin, Mr. Hedrick
Lecture—1 hour; laboratory—12 hours.

Prerequisite: course 101 (may be taken concurrently); Chemistry 5.

Laboratory methods and procedures in biochemistry. Designed for graduate students who desire an intensive and comprehensive training in modern biochemical techniques.

***203. Carbohydrates.** (2) I. Mr. Preiss
Lecture—2 hours.

Prerequisite: course 201B 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.

***204. Nucleic Acids.** (2) II. Mr. Doi
Lecture—2 hours.

Prerequisite: course 201B 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 RMA and DMA to heredity, coding and protein synthesis.

205. Biochemical Mechanisms. (2) I. Mr. Ingraham
Lecture—2 hours.

Prerequisite: course 101; Chemistry 109 or 110B or equivalent, 131.

Bond structures of biochemical interests. Application of modern organic and inorganic chemical principles to a study of the mechanisms of biochemical reactions.

***206. Physical Biochemistry of Macromolecules.** (2) I. Mr. Criddle
Lecture—2 hours.

Prerequisite: course 101; Chemistry 110B.

Application of modern physical concepts and experimental methods to the problems of large molecules of biological interest.

***207. Lipids.** (2) I. Mr. Stumpf
Lecture—2 hours.

Prerequisite: course 201B or consent of instructor.

A discussion of the chemistry, metabolism and experimental methodology unique to fatty acids, triglycerides, phospholipids, plasmalogens, sphingolipids, carotenoids, steroids.

- *208. Biochemical Control Mechanisms.** (2) II. Mr. Doi, Mr. Segel
Lecture—2 hours.
Prerequisite: course 201B or consent of instructor.
The mechanisms by which metabolism is regulated in living cells. The role of variations in the intracellular levels of intermediates, activators, and inhibitors; enzyme induction and repression; and multiple forms of enzymes.
- 222. Plant Biochemistry.** (2) II. Mr. Edelman, Mr. Stumpf
Lecture—2 hours.
Prerequisite: course 101 or equivalent.
The chemistry of important plant constituents, and processes such as photosynthesis and respiration; carbohydrate, fat, and nitrogen metabolism.
- *240. Selected Topics in Biochemistry.** (2) II. The Staff
Prerequisite: course 201B or consent of instructor.
- 250. Biochemical Literature.** (1) I and II. The Staff
Seminar—1 hour.
Prerequisite: course 201B or consent of instructor.
Critical reading and evaluation of the current biochemical literature. Selected papers will be presented and discussed in detail.
- 260. Current Progress in Biochemistry.** (1) I and II. The Staff
Seminar—1 hour.
Prerequisite: course 201B or consent of instructor.
Seminars presented by guest lecturers on the subject of their own research activities.
- 270. Advanced Research Conference.** (1) I and II. The Staff
Seminar—1 hour.
Prerequisite: course 201B or consent of instructor.
Presentation and critical discussions of the research activities of various members of the local biochemical community.
- 290. Seminar.** (1) I and II. The Staff
Seminar—1 hour.
- 299. Research.** (1-6) I and II. The Staff

RELATED COURSES

- Metabolism and Food Utilization** (Animal Husbandry 120)
Protein Biochemistry (Animal Husbandry 201)
Biochemical Aspects of Endocrinology (Animal Husbandry 230)
Use of Isotopes as Tracers in Biological Research (Physiological Sciences 243)
Microbial Metabolism (Bacteriology 103)
Microbial Biochemistry (Bacteriology 203)
Bacterial Genetics (Bacteriology 207)
General Cytology (Botany 130)
Plant Cell Metabolism (Botany 211)
Proteins—Their Functional Activities and Interactions (Food Science and Technology 210)
Intermediary Metabolism of Animals (Physiological Sciences 205)

* Not to be given, 1965-1966.

BIOLOGICAL SCIENCES

Monica Riley, Ph.D., *Chairman of the Committee.*

Committee Office, 280 Hutchison Hall

Committee in Charge:

Hendrik J. Ketellapper, Ph.D., *Associate Professor of Botany.*

Monica Riley, Ph.D., *Assistant Professor of Bacteriology.*

Robert L. Rudd, Ph.D., *Associate Professor of Zoology.*

Mortimer P. Starr, Ph.D., *Professor of Bacteriology.*

Stephen L. Wolfe, Ph.D., *Assistant Professor of Zoology.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

Major Advisers.—(see *Schedule and Directory*).

The Major in Biological Sciences.—A biological sciences major may serve as a general education in the broad field of biology, or as a basis for graduate study leading to advanced degrees preparatory for academic and professional careers in teaching, research, medicine, medical technology, dentistry and other professional fields. It can incorporate most of the life sciences major for the general secondary teaching credential.

The degree programs are designed for students desiring a basic understanding of the living world. They permit a wider choice of courses than is possible with most departmental majors. A student can arrange a program dealing chiefly with the structural, taxonomic, functional and evolutionary aspects of biology, Plan I, or one in which these are less extensively studied and more attention is given to physicochemical phenomena and a description of living material on a molecular basis, Plan II. A Bachelor of Arts or a Bachelor of Science degree can be obtained under either plan. Within each major program, special interests of the student can be met with elective courses.

Advisers will be available whose experience and interests are most relevant to the phase of biology in which the student is interested. If the student has decided on the area of his special interest at the time he makes application for admission, he should so indicate on the admission form in order to be directed to the appropriate adviser. Other students may select a field of interest at a later time. In addition to the general advisers in biological sciences, advisers in each of the following specialties will be available: Botany, Zoology, Bacteriology, Genetics, Entomology, Physiology, Biochemistry and Biophysics, Physical Anthropology.

The Major Program.

Plan I.

Bachelor of Arts.

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Bacteriology 2. Chemistry 1A, and either 1B or 8. Recommended: Entomology 1; other introductory courses in life sciences; Geography 1; Geology 1A-1B; Mathematics 13; Physics 2A-2B, 3A-3B.

Upper Division Courses.—A total of 24 units of upper division work in botany, zoology and closely related fields. The program must include a course dealing with invertebrate animals; one with vertebrates; a course in systematic botany; a course in plant morphology; and one course in each of the two following fields: genetics and/or evolution (Genetics 10 does not satisfy this requirement), and physiology.

Bachelor of Science.

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2. Chemistry 1A, and either 1B or 8; Bacteriology 2; Physics 2A-2B; Mathematics 13. Recommended: other introductory courses in natural sciences and mathematics; Anthropology 1; Entomology 1; Geography 1, 3; Geology 1A-1B; Psychology 1, 2.

Upper Division Courses.—A total of 30 units in biological sciences, including at least one course in each of the following four categories: plant morphology and taxonomy, animal morphology and taxonomy, physiology, genetics and/or evolution.

Not less than two courses in botany and two in zoology will be required. To complete the 30 unit requirement, the students may elect additional upper division courses in the above-mentioned groups and/or in other biological fields, such as microanatomy, biochemistry, ecology, paleontology, microtechnique, microbiology, bacteriology and parasitology.

Plan II.

Bachelor of Arts.

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Bacteriology 2; Chemistry 7A-7B, or 1A-1B and 5; Physics 2A-2B; Mathematics 16A-16B.

Upper Division Courses.—Required: Chemistry 112A-112C; Biochemistry 101; Genetics 100, ten units selected from the Biological Sciences Plan II Course List (below).

Bachelor of Science.

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Bacteriology 2; Chemistry 7A-7B or 1A-1B and 5; Physics 2A-2B; Mathematics 13, 16A-16B.

Upper Division Courses.—Required: Chemistry 112A-112C, 110A-110B; Biochemistry 101, 101L; Physics 121 or 112; Genetics 100; ten units selected from the Biological Sciences Plan II Course List (below).

Biological Sciences Plan II Required Course List.—Upper Division Courses in Botany; Zoology; Bacteriology; Biochemistry and Biophysics; Genetics; other biology courses upon approval of the adviser.

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 85).

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 10 must be included in the program.

Minor.—A minimum of 20 units of Biology including the undergraduate core: Biology 1, Botany 2, Zoology 2, and Bacteriology 1.

LOWER DIVISION COURSES

Students are referred to Biology 1, Principles of Biology, multiple-listed under Bacteriology, Botany, and Zoology. This offering, cooperatively taught by the three Departments, constitutes the first course in the Biological Sciences curricula.

Another course, Biology 2, Biological Diversity, is also listed in this way, and is intended primarily for those, not majoring in biology, who wish to

approach biological diversity broadly in one course rather than in more specialized botany, microbiology, and zoology courses.

UPPER DIVISION COURSES

189. Integration of Biological Concepts. (2) II. _____

Lecture—2 hours.

Prerequisite: fifteen 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.

194H. Special Study for Honors Students. (2-4) I and II.

The Staff (Mrs. Riley in charge)

Prerequisite: enrollment limited to honors students.

Independent research and/or reading on selected topics.

195H. Honors Thesis. (1) I and II.

The Staff (Mrs. Riley in charge)

Prerequisite: course 194H.

Preparation of comprehensive thesis incorporating studies undertaken in course 194H.

BOTANY

Ernest M. Gifford, Jr., *Chairman of the Department.*

Department Office, 143 Robbins Hall

Alden S. Crafts, Ph.D., *Professor of Botany, Emeritus.*
Herbert B. Currier, Ph.D., *Professor of Botany.*
Ernest M. Gifford, Jr., Ph.D., *Professor of Botany.*
C. Ralph Stocking, Ph.D., *Professor of Botany.*
John M. Tucker, Ph.D., *Professor of Botany.*
T. Elliot Weier, Ph.D., *Professor of Botany.*
Floyd M. Ashton, Ph.D., *Associate Professor of Botany.*
Paul A. Castelfranco, Ph.D., *Associate Professor of Botany.*
Elizabeth G. Cutter, Ph.D., D.Sc., *Associate Professor of Botany.*
Chester L. Foy, Ph.D., *Associate Professor of Botany.*
Hendrik J. Ketellapper, Ph.D., *Associate Professor of Botany.*
Jack Major, Ph.D., *Associate Professor of Botany.*
Kenneth Wells, Ph.D., *Associate Professor of Botany.*
Bruce A. Bonner, Ph.D., *Assistant Professor of Botany.*
Norma J. Lang, Ph.D., *Assistant Professor of Botany.*



David E. Bayer, Ph.D., *Lecturer in Botany.*
†Oliver A. Leonard, Ph.D., *Lecturer in Botany.*
Donald E. Seaman, Ph.D., *Lecturer in Botany.*

Letters and Science List.—All undergraduate courses except Botany 8, 107, 155, and 180 are included in the Letters and Science List of Courses (see page 85).

Departmental Major Adviser.—Mr. Wells.

The Major Program

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, e.g., seed analysts. Students who wish a less intensive program in botany, but one which acquaints the student with plant life and its importance, should elect the Bachelor of Arts major program.

Bachelor of Science Major Program

(A) Lower Division Courses.—Biology 1*; Botany 2*; Zoology 2*; Chemistry 1A, 8; Physics 2A-2B; plus 13 units in related natural science subjects; German or French is the required language; Bacteriology 2 and Chemistry 1B, are recommended.

(B) Upper Division Courses.—Botany 108, 111, 116, 118 or 119; Genetics 100; 6 additional units in botany, plus 7 units in related natural science courses.

Bachelor of Arts Major Program

(A) Lower Division Courses.—Biology 1**; Botany 2**; Zoology 2**; Chemistry 1A. Chemistry 8 and Bacteriology 2 are recommended.

(B) Upper Division Courses.—Twenty-four units in botany and allied areas; 9 upper division units from the humanities or the social sciences, in addition to the college breadth requirements, are also required.

† Absent on leave, 1965-1966.

* Botany 1 will be accepted in lieu of Biology 1; Botany 2; and Zoology 2 during 1965-1966.

** Botany 1 and Zoology 10 will be accepted in lieu of Biology 1; Botany 2; and Zoology 2 during 1965-1966.

Honors and Honors Program (see page 90).—The Honors Program comprises 8 units of the following: courses 105, 117, 119, 120A, 120B, 121A, 121B, or 130; course 194H, to be taken during the senior year.

Teaching Major and Minor.—Elementary and Secondary Credential.

Subject Representative: Mr. Wells.

Major: Teaching major same as undergraduate major for degree (A.B. or B.S.)

Minor: Botany 1: and a minimum of 15 units in botany or closely related subject. Student must consult with subject representative.

Graduate Study.—Graduate programs leading to M.A., M.S., and Ph.D. degrees are offered in cytology, plant physiology, anatomy, morphology, taxonomy, ecology, mycology, and allied areas. The resources of the department are augmented by appropriate courses in related departments.

BIOLOGY

LOWER DIVISION COURSES

1. **Principles of Biology.** (4) I and II. Mr. Wolfe,
Lecture—3 hours; laboratory—3 hours. Mr. Hungate, Mr. Ketellapper
Prerequisite: Chemistry 1A or a passing score in qualifying examination in chemistry.

An interdisciplinary course designed for majors in the biological sciences. Emphasis will be given to the unity of basic biological principles as related to cell structure and function, reproduction, genetics, growth and differentiation, evolution, ecology, and taxonomy.

- *2. **Biological Diversity.** (4) II. The Staff from Bacteriology,
Lecture—2 hours; laboratory—6 hours. Botany, Zoology.
Prerequisite: course 1.

A survey of representative microorganisms, plants and animals stressing diversity, classification, structure, and function.

BOTANY

LOWER DIVISION COURSES

- †1. **General Botany.** (5) I. Mr. Stocking, Miss Lang
Lecture—3 hours; laboratory—6 hours.

An introduction to the morphology, physiology, and genetics of flowering plants; brief survey of the plant kingdom including fungi causing plant diseases.

2. **General Botany.** (4) II. Mr. Wells, Mr. Weier
Lecture—2 hours; laboratory—6 hours.
Prerequisite: Biology 1.

Structure, physiology, and taxonomy of plants, with special emphasis on seed plants.

8. **Poisonous Plants.** (2) II. _____
Lecture—1 hour; laboratory—3 hours.
Identification, distribution, toxic principles, nature of injury and animals affected, and plant control measures.

UPPER DIVISION COURSES

In addition to requirements specifically noted, the prerequisite for all upper division courses is Botany 1 (applicable for 1965–1966 only).

† Last semester this course will be taught.

* Not to be given, 1965–1966.

105. **Plant Anatomy.** (4) II. Miss Cutter
Lecture—2 hours; laboratory—6 hours.
Structure and growth of meristems; development and structure of cells, tissues, and tissue systems; comparative anatomy of stem, root, and leaf.
107. **Weed Control.** (4) II. Mr. Foy
Lecture—2 hours; laboratory—6 hours.
Prerequisite: Chemistry 1B or 8.
Introduction to the physiological and chemical principles underlying control of weeds; principles of preventive, cultural, and biological weed control; identification of common weeds.
108. **Systematic Botany of Flowering Plants.** (3) II. Mr. Tucker
Lecture—1 hour; laboratory—6 hours.
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.** (4) II. Mr. Stocking
Lecture—4 hours.
Prerequisite: course 1; Chemistry 8 (may be taken concurrently).
The fundamental activities of plants, such as absorption, transpiration, synthesis of foods, respiration, growth, and reproduction.
116. **Comparative Morphology of Vascular Plants.** (4) I. Mr. Gifford
Lecture—2 hours; laboratory—6 hours.
Introduction to structure, reproduction, and evolution of the major groups of living and extinct vascular plants; special emphasis given to seed plants.
117. **Plant Ecology.** (3) II. Mr. Major
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 111. Recommended: course 108 and a course in soil science.
Study of individual plants, species, and vegetation in relation to environment, and of modification of the environment by vegetation.
118. **Phycology.** (4) II. Miss Lang
Lecture—2 hours; laboratory—6 hours.
Morphology, physiology, genetics, evolution, distribution, cultivation, and economic importance of freshwater and marine algae; field trips.
119. **Mycology.** (4) I. Mr. Wells
Lecture—2 hours; laboratory—6 hours.
Introduction to structure, relationships, life cycles, and genetics of selected species of fungi.
- 120A. **Plant Physiology.** (3) I. Mr. Currier
Lecture—3 hours.
Prerequisite: course 111; Biochemistry 101 (may be taken concurrently).
The cell as a physicochemical system; plant-water relations; translocation; mineral nutrition.
- 120B. **Plant Physiology.** (3) II. Mr. Bonner
Lecture—3 hours.
Prerequisite: course 111 or consent of the instructor; Biochemistry 101. Recommended: course 120A.
Plant metabolism, including photosynthesis and respiration; various aspects of growth.

- 121A. Plant Physiology Laboratory. (2) I.** Mr. Currier
 Laboratory—6 hours.
 Prerequisite: course 120A (may be taken concurrently).
 Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 120A.
- 121B. Plant Physiology Laboratory. (2) II.** Mr. Bonner
 Laboratory—6 hours.
 Prerequisite: course 120B (may be taken concurrently).
 Laboratory procedure in plant physiology. Experiments selected to follow subject-matter sequence of course 120B.
- 130. General Cytology. (4) I.** Mr. Weier
 Lecture—2 hours; laboratory—6 hours.
 Prerequisite: Genetics 100, or Biochemistry 101.
 Structure and function of the plant and animal cell as a unit: cytoplasm and cytoplasmic inclusions, the somatic nucleus, chromosome structure and activity during mitosis and meiosis, development of gametes and their activity during fertilization.
- *155. Plant Microtechnique. (3) I.** _____
 Lecture—1 hour; laboratory—6 hours.
 Prerequisite: course 116 or 105, or equivalent.
 Introduction to theory and 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.
- *180. Biological Evaluation of Herbicides. (3) I.** Mr. Bayer
 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 on biological assays and interpretation of biological data.
- 194H. Special Study for Honors Students. (3) I and II.** The Staff
 Laboratory—9 hours.
 Prerequisite: open only to majors of senior standing in the honors program.
 Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a thesis.
- 199. Special Study for Advanced Undergraduates. (1-5) I and II.** The Staff

GRADUATE COURSES

All graduate courses are open to qualified undergraduates.

- 210. Cell Physiology-Protoplasmatics. (3) II.** Mr. Currier
 Lecture—2 hours; laboratory—3 hours.
 Prerequisite: courses 120A, 120B, 121A, 121B. Recommended: course 105 and/or course 130.
 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.
- 211. Plant Cell Metabolism. (3) I.** Mr. Stocking
 Lecture—1 hour; laboratory—6 hours.
 Prerequisite: consent of the instructor.

* Not to be given, 1965-1966.

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.

- 212. Physiology of Herbicidal Action.** (3) I. Mr. Ashton
Lecture—2 hours; laboratory—3 hours.
Prerequisite: courses 107, 120A, 120B, 121A, 121B.
Lectures and laboratory exercises on the fundamental processes of absorption, translocation, and physiological action of herbicides. Greenhouse studies on toxicants applied through the soil and applied to foliage. Greenhouse culture, toxicity rating, autoradiography, and chromatography.
- *214. Mechanisms of Toxic Action.** (3) I. Mr. Castelfranco
Lecture—2 hours.
Prerequisite: courses 107, 120B; Biochemistry 101, or consent of the instructor.
Physiological and biochemical mechanisms underlying toxicity and detoxification reactions.
- *215. Light and Plant Growth.** (2) I. Mr. Bonner
Lecture—2 hours.
Prerequisites: courses 120A, 120B; Physics 2B or equivalent.
Mechanisms and phenomena involved in the control of plant growth by light. Photoperiodism, photomorphogenesis, phototropism, and certain aspects of photosynthesis.
- *216A. Advanced Morphology of Vascular Plants.** (3) II. Mr. Gifford
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 116 or the equivalent.
Evolution of form, structure, and reproduction of fossil and extant types through Cycadophytes.
- 221. Selected Topics in Plant Physiology.** (2) I, II. The Staff
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.
- 231. Advanced Microtechnique.** (3) II. Mr. Weier
Lecture—1 hour; laboratory—6 hours.
Prerequisite: one of the following: course 105, 116, 130; Zoology 107.
Recommended: course 155 or Zoology 104.
Autoradiography, thin sectioning, freeze drying, micrurgy, Feulgen staining, cytospectrophotometry, and similar techniques. Laboratory work involving techniques of special interest to the student.
- 255. Principles of Plant Taxonomy.** (3) I. Mr. Maze
Lecture—1 hour; discussion—1 hour; laboratory—3 hours.
Prerequisite: course 108. Recommended: courses 105 and 116; Genetics 103.
Evaluation of different approaches to biological classification; theory of evolutionary classification; examples of how various disciplines—*anatomy, embryology, biochemistry, paleontology, ecology*—contribute to the elucidation of problems of taxonomic relationships, mainly of genera and higher categories.

* Not to be given, 1965–1966.

- *256. Experimental Plant Taxonomy.** (3) II. Mr. Tucker
Lecture—1 hour; discussion—1 hour; laboratory—3 hours.
Prerequisite: course 108. Recommended: course 117, Genetics 103.
The study of variation in natural populations in relation to taxonomy; the application of population-sample analysis, cytogenetics, transplant studies, and other experimental techniques to the elucidation of taxonomic problems.
- 291. Seminar in Plant Morphology.** (1) I and II. Miss Cutter, Miss Lang
Seminar—1 hour.
Survey and discussion of recent developments in the field of plant morphology.
- 292. Seminar in Plant Physiology.** (1) I and II. Mr. Bonner, Mr. Bayer
Seminar—1 hour.
Survey and discussion of recent developments in the field of plant physiology at the graduate level.
- 293. Seminar in Weed Science.** (1) I. Mr. Ashton
Prerequisite: consent of instructor.
Survey and discussion of recent developments in the field of weed science.
- 294. Seminar in Cytology and Cytobiochemistry.** (1) II. Mr. Castelfranco
Prerequisite: consent of instructor.
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.
- 297. Problems in Plant Ecology.** (1) I. Mr. Major
Seminar—1 hour.
Prerequisite: courses 108 and 117, or the equivalent. Recommended: courses in soils and mathematical statistics.
Orientation lectures by the instructor; reports and discussions by the students on limited subjects of current interest.
- 299. Research.** (1-6) I and II. The Staff

RELATED COURSES

- Cytogenetics** (Genetics 101, 101L)
Organic Evolution (Genetics 103)
Pathogenic Fungi (Plant Pathology 224)
Fruit Morphology (Pomology 110)
Cell Biology (Zoology 121, 121L)
Limnology (Zoology 140, 140L)
Use of Isotopes as Tracers in Biological Research
(Physiological Sciences 243, 243L)
Physiology of Crop Plants (Agronomy 131)
Chemical and Physical Methods in Biological Research (Agronomy 206)
The Physiology of Bacteria (Bacteriology 100)
Plant Biochemistry (Biochemistry 222)
Water-Soil-Plant Relationships (Water Science 100)
Physiology of Fruit Plants (Pomology 116)
Principles of Plant Nutrition (Plant Nutrition 116)
Vegetable Physiology (Vegetable Crops 221)
Plant Regulators in Horticulture (Viticulture and Enology 108)

* Not to be given, 1965-1966.

CHEMISTRY

Raymond M. Keefer, Ph.D., *Chairman of the Department.*
Department Office, 108 Chemistry Building

Thomas L. Allen, Ph.D., *Professor of Chemistry.*
Lawrence J. Andrews, Ph.D., *Professor of Chemistry.*
Robert K. Brinton, Ph.D., *Professor of Chemistry.*
Raymond M. Keefer, Ph.D., *Professor of Chemistry.*
Richard E. Kepner, Ph.D., *Professor of Chemistry.*
Edgar P. Painter, Ph.D., *Professor of Chemistry.*
Harold G. Reiber, Ph.D., *Professor of Chemistry.*
Leo H. Sommer, Ph.D., *Professor of Chemistry.*
David H. Volman, Ph.D., *Professor of Chemistry.*
Albert T. Bottini, Ph.D., *Associate Professor of Chemistry.*
Charles P. Nash, Ph.D., *Associate Professor of Chemistry.*
Edwin C. Friedrich, Ph.D., *Assistant Professor of Chemistry.*
George A. Gerhold, Ph.D., *Assistant Professor of Chemistry.*
Rodney E. Harrington, Ph.D., *Assistant Professor of Chemistry.*
George S. Zweifel, Sc.D., *Associate Professor of Chemistry.*
Hakon Hope, Cand. Real., *Assistant Professor of Chemistry.*
Gary E. Maciel, Ph.D., *Assistant Professor of Chemistry.*
W. Kenneth Musker, Ph.D., *Assistant Professor of Chemistry.*
Peter A. Rock, Ph.D., *Assistant Professor of Chemistry.*
James H. Swinehart, Ph.D., *Assistant Professor of Chemistry.*
William E. Thiessen, Ph.D., *Assistant Professor of Chemistry.*
James S. Vincent, Ph.D., *Assistant Professor of Chemistry.*
John E. Warren, Ph.D., *Assistant Professor of Chemistry.*

Letters and Science List.—All undergraduate courses in chemistry are included in the Letters and Science List of Courses (see page 85).

Major Subject Advisers.—Mr. Bottini, Mr. Kepner, Mr. Maciel, Mr. Swinehart.

CHEMISTRY MAJOR PROGRAMS

Students who are interested in chemistry as a profession should elect the program leading to the Bachelor of Science degree which meets the standards recommended by the American Chemical Society for professional training in chemistry. Those students desiring a less intensive program in chemistry or wishing to emphasize biochemistry 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.

Candidates for the bachelor's 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

(A) Lower Division Courses.—Chemistry 1A–1B, 5 or 7A, 7B; Physics 4A, 4B, 4C; Mathematics 9A, 9B, 9C; and a reading knowledge of German.

(B) Upper Division Courses.—Chemistry 105, 110A–110B, 111, 112A–112B and 6 units of any additional courses in chemistry (one of which must include laboratory work) except Chemistry 109.

Bachelor of Arts Major Program

(A) Lower Division Courses.—Chemistry 1A–1B, 5 or 7A, 7B; Physics 2A, 2B, 3A, 3B; Mathematics 16A–16B.

(B) Upper Division Courses.—Twenty-four units in chemistry, biochemistry, or physics, including Chemistry 110A–110B, 112A, and 112B or 112C.

Honors and Honors Program (see page 89).—The honors program comprises 4 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.

LOWER DIVISION COURSES

1A. General Chemistry. (5) I and II.

The Staff (I. Mr. Keefer in charge; II. Mr. Harrington in charge)

Lecture—3 hours; laboratory—6 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-semester standing. Admission will be determined (when necessary) on the basis of the student's high school grades and his proficiency in arithmetic and first-year algebra.

1B. General Chemistry (Qualitative Analysis). (5) I and II.

The Staff (I. Mr. Brinton in charge; II. Mr. Volman and Mr. Musker in charge)

Lecture—3 hours; laboratory—6 hours.

Prerequisite: course 1A.

5. Quantitative Analysis. (3) I and II.

I. Mr. Vincent; II. Mr. Nash

Lecture—1 hour; laboratory—6 hours.

Prerequisite: course 1B with grade of C or higher. Not open to students who have credit for Chemistry 7B.

A short course dealing with the principles and methods of quantitative analysis.

7A. General Chemistry. (5) I.

Mr. Nash

Lecture—3 hours; laboratory—6 hours.

Prerequisite: high school chemistry, Mathematics 9A or 16A (may be taken concurrently), and superior performance on an examination to be given during the week of registration. Enrollment to be limited.

The fundamental principles of chemistry with emphasis in the laboratory on quantitative work. Courses 7A and 7B are equivalent to the sequence Chemistry 1A–1B–5 as a prerequisite for further courses in chemistry.

7B. General Chemistry. (5) II.

Mr. Hope

Lecture—3 hours; laboratory—6 hours.

Prerequisite: course 7A.

Continuation of course 7A.

8. Short Survey of Organic Chemistry. (3) I and II.

Lecture—3 hours.

I. Mr. Reiber; II. Mr. Sommer

Prerequisite: course 1A or 1B with a grade of C or higher.

An introductory study of the compounds of carbon.

9. Methods of Organic Chemistry (3) I and II.

Lecture—1 hour; laboratory—6 hours.

I. Mr. Thiessen; II. Mr. Friedrich

Prerequisite: course 1B with a grade of C or higher and course 8, which should be taken concurrently.

An experimental study of the physical properties and chemical reactions of the common classes of organic substances.

UPPER DIVISION COURSES

- 105. Advanced Quantitative Analysis.** (3) II. Mr. Swinehart
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 109 or 110B (may be taken concurrently).
Advanced theory and practice of modern analytical chemistry. Instrumental methods emphasizing electrochemical techniques are applied to analytical procedures.
- 109. Physical Chemistry, Brief Course.** (3) II. Mr. Gerhold
Lecture—3 hours.
Prerequisite: course 5 or 7B; one year of college physics; Mathematics 16B or equivalent.
Graduate students of high standing may, under exceptional circumstances, be admitted without the prerequisite in chemistry.
Special topics in physical chemistry.
- 110A. Physical Chemistry.** (3) I and II. I. Mr. Rock; II. Mr. Brinton
Lecture—3 hours.
Prerequisite: course 5 or 7B; Mathematics 9C or 16B; one year of college physics.
The general principles of physical chemistry and elementary thermodynamics.
- 110B. Physical Chemistry.** (3) I and II. I. Mr. Gerhold; II. Mr. Vincent
Lecture—3 hours.
Prerequisite: course 110A.
A continuation of course 110A.
- 111. Physical Chemistry.** (3) I and II. I. Mr. Warren; II. Mr. Rock
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 110B (may be taken concurrently) or course 109; Mathematics 16B.
Physicochemical measurements and laboratory experiments illustrating some of the important principles of physical chemistry.
- 112A. General Organic Chemistry.** (5) I and II.
Lecture—3 hours; laboratory—6 hours. I. Mr. Zweifel; II. Mr. Reiber
Prerequisite: course 1B with a grade of C or higher.
A course with some emphasis on modern theoretical concepts designed primarily for majors in chemistry. With course 112B, a broader coverage of organic chemistry than courses 8 and 9.
- 112B. General Organic Chemistry.** (5) I and II.
Lecture—3 hours; laboratory—6 hours. I. Mr. Friedrich; II. Mr. Kepner
Prerequisite: course 112A or 8 and 9.
A continuation of course 112A.
- 112C. General Organic Chemistry.** (3) I and II.
Lecture—3 hours. I. Mr. Friedrich; II. Mr. Kepner
Prerequisite: course 112A or 8 and 9; and consent of instructor.
Equivalent to the lecture part of 112B. Intended primarily for graduate students in fields other than chemistry. Except in very unusual circumstances undergraduates will enroll in 112B rather than 112C.
- 121. Introduction to Molecular Structure and Spectra.** (3) II. Mr. Maciel
Lecture—3 hours.
Prerequisite: course 110B.
Modern theoretical and experimental methods used to study problems of molecular structure and binding; emphasis on spectroscopic techniques.

- 124. Advanced Inorganic Chemistry. (3) I.** Mr. Musker
Lecture—3 hours.
Prerequisite: course 109 or 110B; 112B or 112C.
Modern interpretations of bonding, structure, and reactivity of inorganic compounds; emphasis on the chemistry of the first- and second-row elements, organometallic compounds, and transition metals.
- 124L. Advanced Inorganic Chemistry Laboratory. (2) I.** Mr. Musker
Laboratory—6 hours.
Prerequisite: course 124 (may be taken concurrently).
Synthesis and characterization of inorganic compounds.
- 126. Nuclear Chemistry. (3) II.** Mr. Warren
Lecture—3 hours.
Prerequisite: course 110B.
Natural and artificial radioactivity; nuclear structure and transformations; interaction of nuclear radiations with matter; distribution of nuclei in nature.
- 126L. Nuclear Chemistry Laboratory. (1) II.** Mr. Warren
Laboratory—3 hours.
Prerequisite: course 126 (may be taken concurrently).
Application of chemical techniques in the study of nuclear reactions.
- 130. Qualitative Organic Analysis. (3) II.** Mr. Zweifel
Lecture—1 hour; laboratory—6 hours.
Prerequisite: courses 5 or 7B and 112B or 112C.
The application of physical and chemical techniques to the qualitative identification of organic compounds.
- 131. Advanced Organic Chemistry. (3) I.** Mr. Sommer
Lecture—3 hours.
Prerequisite: course 109 or 110A; 112B or 112C.
Selected topics of preparative organic chemistry including enolate condensations and reactions of organometallic compounds. Application of current knowledge of reaction mechanisms, bond energies, and molecular structure to problems of organic synthesis.
- 150A. Chemistry of Natural Products. (2) I.** Mr. Painter
Lecture—2 hours.
Prerequisite: courses 109 and 112B or consent of the instructor.
Structure, reactions, and physical properties of carbohydrates, lipids and related compounds. Mechanisms of type reactions involving the major functional groups.
- 150B. Chemistry of Natural Products. (2) II.** Mr. Painter
Lecture—2 hours.
Prerequisite: courses 109 and 112B or consent of the instructor. Course 150A is not a prerequisite to 150B.
Structure, reactions, and physical properties of proteins, amino acids, nucleic acids, and related nitrogen compounds.
- 194H. Undergraduate Research. (2-5) I and II.** The Staff
Prerequisite: course 110B (may be taken concurrently).
Original research and a written report of the investigation. Unit value to be determined by instructor supervising the research.

199. Special Study for Advanced Undergraduates. (1-5) I and II.

The Staff

Prerequisite: consent of the instructor based upon adequate preparation in chemistry, mathematics, and physics.

Investigation of special problems to be selected according to the preparation and needs of the individual.

GRADUATE COURSES

204. Chemical Kinetics. (3) I.

Mr. Swinehart

Lecture—3 hours.

A consideration of important classes of chemical reactions in gaseous and condensed phases. Experimental methods, and application of theory.

***205. Quantum Chemistry. (3) I.**

Mr. Allen

Lecture—3 hours.

The quantum theory and its chemical applications.

Offered in even-numbered years.

214. Physical Chemistry—Thermodynamics. (3) I.

Mr. Volman

Lecture—3 hours.

Prerequisite: open to graduate students who have satisfactory foundation in physical chemistry, physics, and mathematics.

The principles of thermodynamics, with examples of their application to chemistry.

***215. Statistical Thermodynamics. (3) II.**

Mr. Nash

Lecture—3 hours.

Prerequisite: course 214.

A development of statistical thermodynamics with applications to selected topics of chemical interest.

Offered in odd-numbered years.

220A. Organic Chemistry. (3) II.

Mr. Thiessen

Lecture—3 hours.

Selected topics of current interest concerning the structure and synthesis of the more complex organic compounds with emphasis on heterocyclic systems.

Offered in odd-numbered years.

***220B. Organic Chemistry. (3) II.**

Mr. Bottini

Lecture—3 hours.

Selected topics of current interest concerning the structure and synthesis of the more complex organic compounds with emphasis on acyclic and homocyclic systems.

Offered in even-numbered years.

***223. Organometallic Compounds. (2) I.**

Mr. Zweifel

Lecture—2 hours.

Selected topics concerning the preparation and utilization of organometallic compounds in organic synthesis, including the application of metal hydrides as reducing agents.

Offered in even-numbered years.

***224. Inorganic Chemistry. (3) II.**

Mr. Musker, Mr. Swinehart

Lecture—3 hours.

Prerequisite: course 124 or consent of the instructor.

An analysis of theoretical and experimental work regarding the chemistry of the light and heavy elements with emphasis on stability of compounds, complexes in various oxidation states, stereochemistry, kinetics and mechanism of substitution and oxidation-reduction reactions, and spectral properties.

* Not to be given, 1965-1966.

233. Physical Organic Chemistry. (3) I.

Mr. Andrews

Lecture—3 hours.

Modern concepts of substitution, elimination, and addition reactions, rearrangements and stereochemistry.

290. Seminar. (1) I and II.

Mr. Swinehart, Mr. Bottini

Seminar—1 hour.

Prerequisite: consent of instructor.

The subjects covered will vary from year to year and will be announced at the beginning of each semester.

***298. Group Study. (1) II.**

Lecture—1 hour.

Lectures and group discussion of special topics in advanced physical chemistry.

299. Research. (2-9) I and II.

The Staff

The laboratory is open to qualified graduate students who wish to pursue original investigation. Students desiring to enroll in this course should communicate with the department well in advance of the opening of the semester in which the work is to be undertaken. Such work will be under the direction of some member of the instructing staff, who will determine the credit value.

* Not to be given, 1965-1966.

CLASSICS

Richard E. Grimm, Ph.D., *Assistant Professor of Classics.*
Wesley E. Thompson, Ph.D., *Assistant Professor of Classics.*



H. Phelps Gates, Jr., A.B., *Acting Assistant Professor of Classics and Sanskrit.*

CLASSICS

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 85.

LOWER DIVISION COURSES

- 39A. Greek Literature in Translation. (3) I.** Mr. Grimm
Lecture—3 hours.
Prerequisite: English 1A.
The Homeric epic and fifth-century drama. Reading of the *Iliad*, *Odyssey*, and selected plays of Aeschylus, Sophocles, Euripides, and Aristophanes. Lectures on early Greek epic and classical Athenian drama.
- 39B. Greek Literature in Translation. (3) II.** Mr. Thompson
Lecture—3 hours.
Prerequisite: English 1A or consent of the instructor.
Readings in Pindar, Herodotus, Thucydides, Plato, Menander, and the Hellenistic writers. Lectures on literary trends from the fifth century to the end of the Hellenistic period.
Offered in even-numbered years.
- *40. Roman Literature in Translation. (3) II.** Mr. Grimm
Lecture—3 hours.
Prerequisite: English 1A or consent of the instructor.
Readings in Plautus, Terence, Lucretius, Roman lyric poets, Vergil, Livy, Seneca, Petronius, Tacitus, and Juvenal. Lectures on Roman literary history from Ennius to the late Empire.
Offered in odd-numbered years.

GREEK

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 85.

LOWER DIVISION COURSES

- 1. Elementary Greek—Beginning. (4) I.** Mr. Thompson
Recitation—4 hours.
No credit will be allowed if the student has completed two or more years of high school Greek.
- 2. Elementary Greek—Continued. (4) II.** Mr. Thompson
Recitation—4 hours.
Prerequisite: course 1 or the equivalent. Only two units of credit will be allowed if the student has completed three or more years of high school Greek.

* Not to be given, 1965–1966.

UPPER DIVISION COURSES

Prerequisite for all courses: course 2 or its equivalent.

101. **Plato.** (3) I. Mr. Grimm
 Lecture—3 hours.
 Prerequisite: course 2 or the equivalent.
 Reading of Plato's *Apology* and *Crito*, and of selected passages from the *Phaedo*.
102. **Homer.** (3) II. Mr. Gates
 Lecture—3 hours.
 Prerequisite: course 2 or the equivalent.
 Reading from selected books of Homer's *Iliad*.
103. **Sophocles.** (3) I. Mr. Grimm
 Lecture—3 hours.
 Prerequisite: course 101 or the equivalent.
 Reading of selected Trojan or Theban plays; lectures on Sophocles' role in the development of Attic tragedy.
104. **Thucydides.** (3) II. Mr. Thompson
 Lecture—3 hours.
 Prerequisite: course 101 or the equivalent.
 Historical and philological study of the text.

LATIN

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 85.

Departmental Major Adviser.—Mr. Grimm

The Major Program

(A) Lower Division Courses.—Latin 1, 2, and 3 or their equivalents.
 Recommended: Classics 39A-39B; Greek 1, 2.

(B) Upper Division Courses.—Required: 24 units of upper division courses, including 120. Two courses may be chosen from related courses in other fields. Students majoring in Latin must maintain at least a C average in upper division courses.

LOWER DIVISION COURSES

1. **Elementary Latin—Beginning.** (4) I. Mr. Gates
 Recitation—4 hours.
 No credit will be allowed if the student has completed two or more years of high school Latin.
2. **Elementary Latin—Continued.** (4) II. Mr. Gates
 Recitation—4 hours.
 Prerequisite: course 1 or two years of high school Latin or consent of the instructor. Only two units of credit will be allowed if the student has completed three or more years of high school Latin.
3. **Intermediate Latin.** (4) I. The Staff
 Recitation—4 hours.
 Prerequisite: course 2 or the equivalent.

UPPER DIVISION COURSES

Prerequisite for all courses: course 3 or its equivalent.

101. **Vergil: Aeneid.** (3) II. Mr. Thompson
Lecture—3 hours.
Prerequisite: course 3 or the equivalent.
Reading of selected books of the *Aeneid*.
102. **Livy.** (3) I. Mr. Thompson
Lecture—3 hours.
Prerequisite: course 3 or the equivalent.
Book I and other selections from the history; study of Livy's prose style and narrative technique.
Offered in odd-numbered years.
- *103. **Catullus and Horace.** (3) II. Mr. Grimm
Lecture—3 hours.
Prerequisite: course 3 or the equivalent.
Selected personal and Alexandrian lyrics of Catullus; selected odes of Horace.
Offered in odd-numbered years.
104. **Roman Comedy: Plautus and Terence.** (3) I. Mr. Thompson
Lecture—3 hours.
Prerequisite: course 3 or the equivalent.
Survey of the early Roman theater; selected comedies of Plautus and Terence.
Offered in even-numbered years.
- *105. **Vergil: Eclogues and Georgics.** (3) II. Mr. Grimm
Lecture—3 hours.
Prerequisite: course 3 or the equivalent.
Selected readings in the earlier poetic works of Vergil.
Offered in odd-numbered years.
106. **Pliny and Martial.** (3) II. Mr. Grimm
Lecture—3 hours.
Prerequisite: course 3 or the equivalent.
Selected letters of Pliny and epigrams of Martial; literary and historical trends in Rome during the first and early second century A.D.
Offered in even-numbered years.
107. **Lucretius.** (3) I. Mr. Gates
Lecture—3 hours.
Prerequisite: course 3 or the equivalent.
Reading of selected books of the *De Rerum Natura*. Study of Lucretius as a didactic poet and of his role in the development of Epicurean thought.
108. **Horace: Satire and Epistles.** (3) II. Mr. Grimm
Lecture—3 hours.
Prerequisite: course 3 or equivalent.
Reading of selections from Horace's non-lyric work. Lectures on Horace's role in the development of Roman satire.
120. **Latin Composition.** (3) II. Mr. Grimm
Lecture—3 hours.
Prerequisite: course 3 or the equivalent.
Survey of classical Latin syntax; extensive practice in prose composition.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

* Not to be given, 1965-1966.

CLINICAL PATHOLOGY

Oscar W. Schalm, D.V.M., Ph.D., *Chairman of the Department.*
Department Office, 1163 Haring Hall

Donald E. Jasper, D.V.M., Ph.D., *Professor of Clinical Pathology.*
Oscar W. Schalm, D.V.M., Ph.D., *Professor of Clinical Pathology.*
Charles E. Cornelius, D.V.M., Ph.D., *Associate Professor of Clinical Pathology.*
Jiro J. Kaneko, D.V.M., Ph.D., *Associate Professor of Clinical Pathology.*

UPPER DIVISION COURSES

199. **Special Study for Advanced Undergraduates.** (1-4) I and II. The Staff

GRADUATE COURSES

201. **Clinical Hematology and Bacteriology.** (3) I. Mr. Schalm,
Laboratory—9 hours. Mr. Cornelius, Mr. Kaneko

Prerequisite: third-year standing in the School of Veterinary Medicine or consent of the instructor.

Hematologic techniques and interpretation as applied to the study of disease in animals: morphologic and chemical characteristics of milk and bacteriologic techniques as applied to mastitis diagnosis.

202. **Clinical Biochemistry.** (3) II. Mr. Jasper, Mr. Cornelius, Mr. Kaneko
Lecture—2 hours; laboratory—3 hours.

Prerequisite: third-year standing in the School of Veterinary Medicine or consent of the 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.

203. **Biochemistry of Metabolic Diseases.** (3) I. Mr. Cornelius, Mr. Kaneko
Lecture—3 hours.

Prerequisite: biochemistry and physiology or consent of the instructor.
The biochemistry of inborn and acquired errors of metabolism in animals and man.

Offered in even-numbered years.

204. **Morphologic Hematology.** (2) II. Mr. Schalm
Lecture—1 hour; laboratory—3 hours.

Selected lectures and laboratory exercises; with emphasis on the gross and microscopic structure of blood and bone marrow in healthy and diseased domestic animals.

251A. **Clinical Pathology Laboratory.** ($\frac{1}{2}$) I. The Staff
Discussion—10 hours; laboratory—13 hours. (Hours per semester)

Prerequisite: fourth-year standing in the School of Veterinary Medicine.
Application of laboratory methods to the diagnosis of animal disease.

251B. **Clinical Pathology Laboratory.** ($\frac{1}{2}$) II. The Staff
Discussion—10 hours; laboratory—13 hours. (Hours per semester)

Prerequisite: fourth-year standing in the School of Veterinary Medicine.
Application of laboratory methods to the diagnosis of animal disease.

CLINICAL SCIENCES

R. M. Cello, D.V.M., *Chairman of the Department.*
Department Office, 1315 Haring Hall

- Robert M. Cello, D.V.M., *Professor of Veterinary Medicine.*
John F. Christensen, D.V.M., Ph.D., *Professor of Veterinary Medicine.*
†John W. Kendrick, D.V.M., M.S., *Professor of Veterinary Medicine.*
Blaine McGowan, Jr., D.V.M., *Professor of Veterinary Medicine.*
William R. Pritchard, D.V.M., Ph.D., J.D., *Professor of Veterinary Medicine.*
Edward A. Rhode, Jr., D.V.M., *Professor of Veterinary Medicine and Professor of Physiology.*
John D. Wheat, D.V.M., *Professor of Veterinary Medicine.*
Theodore J. Hage, D.V.M., *Associate Professor of Veterinary Medicine.*
Jack A. Howarth, D.V.M., Ph.D., *Associate Professor of Veterinary Medicine.*
John P. Hughes, D.V.M., *Associate Professor of Veterinary Medicine.*
Gordon H. Theilen, D.V.M., *Associate Professor of Veterinary Medicine.*
†Murray E. Fowler, D.V.M., *Assistant Professor of Veterinary Medicine.*
Charles A. Hjerpe, D.V.M., *Assistant Professor of Veterinary Medicine.*
Terrell A. Holliday, D.V.M., Ph.D., *Assistant Professor of Veterinary Medicine.*
Bud C. Tennant, D.V.M., *Assistant Professor of Veterinary Medicine.*



- David E. Brown, M.D., *Lecturer in Surgery.*
Alfred G. Edward, D.V.M., *Lecturer in Laboratory-Animal Medicine.*
Charles E. Grayson, M.D., *Lecturer in Radiology.*
Troy G. Rollins, M.D., *Lecturer in Dermatology.*
Alida P. Wind, D.V.M., *Lecturer in Veterinary Medicine.*
———, *Lecturer in Veterinary Medicine.*
———, *Lecturer in Veterinary Medicine.*
———, *Lecturer in Veterinary Medicine.*
———, *Lecturer in Veterinary Medicine.*
———, *Lecturer in Veterinary Medicine.*

VETERINARY MEDICINE

UPPER DIVISION COURSES

- 100. Veterinary Medical Orientation. (No credit) I.** Mr. Christensen
Lecture—1 hour.
Prerequisite: first-year standing in the School of Veterinary Medicine.
An introduction to the literature and history, fields of specialization, and professional obligations of veterinary medicine.
- 110. Medical Terminology. (1) I.** Mr. Christensen
Lecture—1 hour.
Prerequisite: first-year standing in the School of Veterinary Medicine.
An introduction to medical terminology, with special reference to the meaning of roots, prefixes, and suffixes used in the formation of medical terms.
- 199. Special Study for Advanced Undergraduates. (1-5) I and II.**
The Staff (Mr. Rhode in charge)

† Absent on leave, 1965-1966.

GRADUATE COURSES

- 203. Introductory Medicine. (4) I.** Mr. Rhode, Mr. Cello
 Lecture—3 hours; laboratory—3 hours.
 Prerequisite: Pathology 122A, 122B; Physiological Sciences 123, 140, 140L.
 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.
- 204. Infectious Diseases. (5) II.** Mr. Howarth
 Lecture—5 hours.
 Prerequisite: course 203.
 Epidemiology, pathology, and control methods on diseases of livestock, including those diseases important in public health in which domestic livestock are the reservoirs of infection.
- 205. Small Animal Medicine. (5) II.** Mr. Cello, Mr. Holliday
 Lecture—5 hours.
 Prerequisite: course 203.
 Diagnosis, treatment, and prevention of infectious and noninfectious diseases of the dog, cat, and other small animals.
- 206. Large Animal Medicine. (3) II.** Mr. Hughes
 Lecture—3 hours.
 Prerequisite: courses 203, 210.
 The diagnosis and control of diseases of the gastrointestinal system, liver and peritoneum, diseases of the respiratory and cardiovascular systems, and diseases of the blood-forming organs of horses, cattle, swine, sheep, and goats.
- 207. Large Animal Medicine. (4) I.** Mr. Tennant, Mr. Cello
 Lecture—4 hours.
 Prerequisite: courses 203, 206.
 The diagnosis and control of diseases of the skin, internal parasitism, mastitis, diseases of the nervous and locomotor systems, diseases of the eye, metabolic and nutritional diseases, and poisonings of horses, cattle, swine, sheep, and goats.
- 210. Large Animal Medicine. (2) I.** Mr. Hjerpe
 Lecture—2 hours.
 Prerequisite: course 203.
 The diagnosis and control of internal parasitism, and diseases of the urinary systems of horses, cattle, swine, sheep, and goats.
- 220. Introductory Surgery. (4) II.** Miss Wind
 Lecture—3 hours; laboratory—3 hours.
 Prerequisite: Pathology 122A, 122B; Physiological Sciences 123.
 Principles and methods of surgical technique.
- 223. Large Animal Surgery. (4) I.** Mr. Wheat
 Lecture—4 hours.
 Prerequisite: course 220, Anatomy 220.
 Diseases of domestic animals that require surgical treatment.
- 224. Small Animal Surgery. (2) I.** Miss Wind
 Lecture—2 hours.
 Prerequisite: course 220.
 Surgical diseases of small animals.

- 225. Operative Surgery.** (1) I. Mr. Wheat, Miss Wind
Laboratory—4 hours.
Prerequisite: courses 223 and 224 (may be taken concurrently).
A laboratory course in specific surgical procedures in large and small animals.
- 230. Diseases of the Genital Organs and Obstetrics.** (4) I. Mr. Theilen
Lecture—3 hours; laboratory—3 hours.
Prerequisite: Pathology 122A, 122B; Physiological Sciences 123.
A course in the diagnosis, treatment, and control of diseases affecting the reproductive organs; the normal and disturbed physiology of reproduction; and obstetrics.
- 245. Ecological Factors of Animal Disease.** (2) I. Mr. McGowan
Lecture—2 hours.
Prerequisite: senior standing in the School of Veterinary Medicine or consent of the instructor.
Relationship of animal environment to control and prevention of disease. Application of nutrition, genetics, husbandry, and management to disease control.
- 249. Extra-Session Clinic.** (2-4) The Staff (Mr. Cello in charge)
Laboratory.
Prerequisite: completion of the first three years of the professional course in veterinary medicine.
Diagnosis and treatment of diseases and disorders of domestic animals. Work will be done in the clinic during the summer for any continuous period of six weeks.
May be repeated for credit.
- 250. Clinic Orientation.** (1) II. Mr. Hjerpe
Laboratory—3 hours.
Prerequisite: course 203.
Laboratory exercises in the practice of clinical procedures and methods of restraint used in the handling and treatment of horses, cattle, swine, sheep, dogs, cats, and other species.
- 251A. Clinics.** (5) I. The Staff (Mr. Cello in charge)
Laboratory—24 hours.
Prerequisite: courses 203, 220.
Interdepartmental course, offering training in ambulatory clinic, autopsy, clinical pathology, large animal clinic, pharmacy, poultry pathology, radiology, and small animal clinic. The student must make a passing grade in all sections to pass the course.
- 251B. Clinics.** (5) II. The Staff (Mr. Cello in charge)
Laboratory—24 hours.
Prerequisite: course 251A is prerequisite to 251B.
Interdepartmental course, offering training in ambulatory clinic, autopsy, clinical pathology, large animal clinic, pharmacy, poultry pathology, radiology, and small animal clinic. The student must make a passing grade in all sections to pass the course.
- 254. Clinic Conference.** (No credit) II. The Staff (Mr. Tennant in charge)
Lecture—1 hour.
Prerequisite: course 203.
Discussion of selected cases from the clinic.

- 256A. Clinic Conference.** (1) I. The Staff (Mr. Tennant in charge)
 Lecture—2 hours.
 Prerequisite: fourth-year standing.
 Discussion of selected cases from the clinic.
- 256B. Clinic Conference.** (1) II. The Staff (Mr. Tennant in charge)
 Lecture—2 hours.
 Prerequisite: fourth-year standing.
 Discussion of selected cases from the clinic.
- 260. Radiology.** (2) I. Mr. Hage, Mr. Grayson
 Lecture—1 hour; laboratory—3 hours.
 Prerequisite: Anatomy 120.
 Production of X rays, roentgenographic technique, roentgenographic interpretation, biological effect of, protection from, and the therapeutic use of ionizing irradiation as applied to veterinary medicine.
- 270A. Jurisprudence.** (0) I. Mr. Pritchard
 Lecture—1 hour.
 Professional ethics and legal medicine.
- 270B. Jurisprudence.** (0) II. Mr. Pritchard
 Lecture—1 hour.
 Professional ethics and legal medicine.
- 290. Seminar.** (1) I and II. The Staff (Mr. Cello in charge)
 Seminar—2 hours.
- 299. Research.** (1-6) I and II. The Staff (Mr. Cello in charge)

COMPARATIVE BIOCHEMISTRY

Sterling Chaykin, Ph.D., *Chairman of the Committee*
Committee Office, 576 Hutchison Hall

Committee in Charge:

Ransom L. Baldwin, Jr., Ph.D., *Assistant Professor of Animal Husbandry.*
Richard A. Bernhard, Ph.D., *Associate Professor of Food Science and Technology.*

Arthur L. Black, Ph.D., *Professor of Physiological Chemistry.*

Paul A. Castelfranco, Ph.D., *Associate Professor of Botany.*

Sterling Chaykin, Ph.D., *Associate Professor of Biochemistry.*

Clinton O. Chichester, Ph.D., *Professor of Food Science and Technology.*

†Eric E. Conn, Ph.D., *Professor of Biochemistry.*

Richard S. Criddle, Ph.D., *Assistant Professor of Biophysics.*

C. C. Delwiche, Ph.D., *Professor of Soil Science.*

Robert E. Feeney, Ph.D., *Professor of Food Science and Technology.*

Richard A. Freedland, Ph.D., *Associate Professor of Physiological Chemistry.*

Irving I. Geschwind, Ph.D., *Associate Professor of Animal Husbandry.*

Ray C. Huffaker, Ph.D., *Lecturer in Agronomy.*

Robert E. Hungate, Ph.D., *Professor of Bacteriology.*

Lloyd L. Ingraham, Ph.D., *Professor of Biophysics.*

Max Kleiber, Sc.D., *Professor of Animal Husbandry, Emeritus.*

Frank H. Kratzer, Ph.D., *Professor of Poultry Husbandry.*

Allen G. Marr, Ph.D., *Professor of Bacteriology.*

Mendel Mazelis, Ph.D., *Associate Professor of Food Science and Technology.*

Edgar P. Painter, Ph.D., *Professor of Chemistry.*

Daniel W. Peterson, Ph.D., *Associate Professor of Poultry Husbandry.*

Herman J. Phaff, Ph.D., *Professor of Food Science and Technology.*

Harlan K. Pratt, Ph.D., *Professor of Vegetable Crops.*

Jack Preiss, Ph.D., *Associate Professor of Biochemistry.*

Harold G. Reiber, Ph.D., *Professor of Chemistry.*

Monica Riley, Ph.D., *Assistant Professor of Bacteriology.*

Irwin H. Segel, Ph.D., *Assistant Professor of Biochemistry.*

Mortimer P. Starr, Ph.D., *Professor of Bacteriology.*

George F. Stewart, Ph.D., *Professor of Food Science and Technology.*

C. Ralph Stocking, Ph.D., *Professor of Botany.*

Paul K. Stumpf, Ph.D., *Professor of Biochemistry.*

†Aloys L. Tappel, Ph.D., *Professor of Food Science and Technology.*

John R. Whitaker, Ph.D., *Associate Professor of Food Science and Technology.*

Frederick P. Zscheile, Jr., Ph.D., *Professor of Agronomy.*

Gunter Zweig, Ph.D., *Lecturer in Entomology.*

GRADUATE COURSES

290. **Seminar.** (1) I and II. The Group
Seminar—1 hour.
Prerequisite: consent of instructor.

299. **Research.** (1-9) I and II. The Staff

DESIGN

For courses in design, see "Home Economics" on page 276.

† Absent on leave, 1965-1966.

DRAMATIC ART AND SPEECH

Theodore J. Shank, Ph.D., *Chairman of the Department.*
Department Office, 126 South Hall

James J. Murphy, Ph.D., *Associate Professor of Speech.*
Theodore J. Shank, Ph.D., *Associate Professor of Dramatic Art.*
Benne B. Alder, Ph.D., *Assistant Professor of Speech.*
Everard d'Harnoncourt, Ph.D., *Assistant Professor of Dramatic Art.*
Douglas McDermott, Ph.D., *Assistant Professor of Dramatic Art.*
Gerald P. Mohrmann, Ph.D., *Assistant Professor of Speech.*
Ralph S. Pomeroy, Ph.D., *Assistant Professor of Speech.*
Alan A. Stambusky, Ph.D., *Assistant Professor of Dramatic Art.*



William Barbe, B.A., *Lecturer in Dramatic Art.*
Gene A. Chesley, M.A., *Lecturer in Dramatic Art.*
Donovan J. Ochs, M.A., *Acting Assistant Professor of Speech.*
Alfred A. Rossi, M.A., *Acting Assistant Professor of Dramatic Art.*
Robert K. Sarlos, M.A., *Acting Assistant Professor of Dramatic Art.*
Daniel E. Snyder, *Lecturer in Dramatic Art.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

The Major Program.—Two majors are offered: Dramatic Art and a major combining Dramatic Art and Speech.

DRAMATIC ART MAJOR

Major Adviser.—Mr. Stambusky.

(A) Lower Division Courses.—Two courses selected from Dramatic Art 10A, 10B, Speech 2A; and Dramatic Art 20.

(B) Upper Division Courses.—Twenty-four units in Dramatic Art including the following: 124 (Visual Aspects of Dramatic Presentation) or 125 (Principles of Scene Design), 127 (Principles of Directing), 158A–158B (World Drama), 159 (Contemporary Drama), 160 (Principles of Playwriting), 165 (Dramatic Theory and Criticism), and 190 (Proseminar in Dramatic Art).

Except for course 190, with the adviser's consent, 6 units from other Dramatic Art courses or from related courses in other departments may be substituted for two of the above courses.

In addition each major student is expected to participate in departmental dramatic productions.

The department will certify to the completion of a major program for graduation only on the basis of at least a C average in the upper division courses taken in the department. Students who do not maintain such an average will be required to withdraw from the major in Dramatic Art.

Honors and Honors Program (see page 85).—The honors program comprises at least 3 units of Dramatic Art 194H (Special Study for Honors Students) in addition to the regular major.

DRAMATIC ART AND SPEECH MAJOR

Major Adviser.—Mrs. Alder.

(A) Lower Division Courses.—Speech 1A or 40, 2A; Dramatic Art 10A or 10B, 20 are required; Speech 1B and an additional lower division course in dramatic art are recommended.

(B) Upper Division Courses.—Twenty-four units in dramatic art and speech, including a minimum of 6 units each selected from Groups A, B, and C:

Group A: Dramatic Art 158A, 158B, 159, 165.

Group B: Speech 101, 102, Dramatic Art 125, 127, 160.

Group C: Speech 117, 130, 140.

In addition each major student is expected to participate in departmental dramatic productions or forensic activities, and each senior will be required to enroll in course 195.

The remainder of the 24 units may be satisfied by upper division courses in dramatic art and speech or by related courses in other departments.

Dramatic Art 124 or 127 is required of teaching majors.

The Department will certify to the completion of a major program for graduation only on the basis of at least a grade C average in the upper division courses taken in the department. Students who do not maintain such an average will be required to withdraw from the major in dramatic art and speech.

Honors and Honors Program (see page 85).—The honors program comprises at least 3 units of course 194H (Special Study for Honors Students) in addition to the regular major.

MASTER OF ARTS DEGREE IN DRAMATIC ART

Graduate Adviser.—Mr. d'Harnoncourt.

Candidates who meet the requirements of the Graduate Division and the Department of Dramatic Art and Speech will be admitted to graduate studies in Dramatic Art. After admission students will be required to complete a background examination in Dramatic Art.

Candidates for the degree must complete the following requirements:

(A) At least one graduate course in each of the following groups:

Group A: Dramatic Art 230, 235, 240.

Group B: Dramatic Art 250, 259, 265.

Group C: Dramatic Art 210, 224, 225, 227, 260.

Group D: Dramatic Art 280, 299.

(B) Graduate students who lack experience in some phase of dramatic production will be given assignments to make up their deficiencies. Beyond this, student participation, while highly encouraged, is voluntary.

(C) A reading knowledge of French or German (or other language approved by the Department). Demonstration of the student's ability to apply his knowledge of that language in a graduate course will satisfy the foreign language requirement.

(D) The requirements of one of the following plans must be fulfilled:

Plan I. Candidates must complete a minimum of 20 units in Dramatic Art and allied fields, must take an oral examination not less than two hours in length, and must submit a thesis which has been approved by the faculty committee in charge. The thesis may be of either type described below:

The Creative Thesis records an artistic accomplishment involving research and public performance in one of the following areas: Acting, Design, Directing, or Playwriting.

The Research Thesis presents the results of a historical or critical investigation of an important aspect of Dramatic Art.

Plan II. Candidates must complete a minimum of 24 units in Dramatic Art and allied fields of which at least twelve are in graduate courses and must take a written comprehensive examination not less than nine hours in length.

THE UNIVERSITY THEATER

Each year the Department of Dramatic Art and Speech 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.

DRAMATIC ART**LOWER DIVISION COURSES**

- 10A. Fundamentals of Acting. (3) I.** Mr. Rossi
Lecture—2 hours; laboratory—2 hours.
Reading and analysis of contemporary plays; theory and practice of acting with emphasis on character analysis and interpretation.
Field trips included.
- 10B. Fundamentals of Acting. (3) II.** Mr. Rossi
Lecture—2 hours; laboratory—2 hours.
Reading and analysis of plays of different types and forms selected from various periods; theory and practice of acting with emphasis on style.
Field trips included.
- 15. The Art of the Cinema. (3) I and II.** Mr. d'Harnoncourt
Lecture—2 hours; laboratory—2 hours.
The cinema as an art form; its relation to other arts; its evolution, with emphasis on the significant modern contributions.
- 20. Introduction to Dramatic Art. (3) I and II.**
Lecture—3 hours. Mr. Stambusky, Mr. McDermott
Understanding and appreciation of the arts and literature of the theater.
Field trips included.

UPPER DIVISION COURSES

English 1A is prerequisite to all upper division courses.

- 110. Advanced Acting (3) II.** Mr. Stambusky
Lecture—2 hours; laboratory—2 hours.
Prerequisite: course 10A or 10B or equivalent and consent of instructor.
Advanced theory and practice in the art of acting, with emphasis on individual problems. Detailed study of the Stanislavski system of acting and other advanced acting theories.
- *115. Advanced Study of Major Film Makers. (3) II.** Mr. d'Harnoncourt
Lecture—2 hours; laboratory—2 hours.
Prerequisite: course 15 or consent of the instructor.
Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and their application to selected films.
- 124. Visual Aspects of Dramatic Presentation. (3) II.** Mr. Chesley
Lecture—2 hours; laboratory—3 hours.
Dramatic emphasis as affected by theater design, stage decor and lighting, make-up, and costuming.
- 125. Principles of Scene Design. (3) I.** Mr. Snyder
Lecture—3 hours.
Principles of design as applied to stage settings. Study of various styles and periods of stage design. Execution of scene designs for modern and period dramas.

* Not to be given, 1965-1966.

- 127. Principles of Directing.** (3) I. Mr. Stambusky
Lecture—2 hours; laboratory—2 hours.
Prerequisite: course 10A or 10B, or equivalent.
The director's creative approach to the script, the actors, and the *mise en scène*. Theory of directing and its application.
- 150. American Drama.** (3) II. Mr. McDermott
Lecture—3 hours.
Selected plays and the history of the theater from Colonial times to the present.
- 158A. World Drama.** (3) I. Mr. Sarlos
Lecture—3 hours.
Selected plays and the history of the theater from ancient Greece to the Renaissance.
- 158B. World Drama.** (3) II. Mr. Sarlos
Lecture—3 hours.
Selected plays and the history of the theater from the Renaissance to the present time.
- 159. Contemporary Drama.** (3) I. Mr. McDermott
Lecture—3 hours.
Twentieth-century European, British, and American plays.
- 160. Principles of Playwriting.** (3) I. Mr. Shank
Lecture-seminar—3 hours.
Prerequisite: consent of the instructor or at least one of the following: courses 20, 150, 158A, 158B, 159, 165.
Analysis of dramatic structure and the composition of original plays.
- 165. Dramatic Theory and Criticism.** (3) II. Mr. McDermott
Lecture-seminar—3 hours.
Changing concepts of drama from Aristotle to the present.
- 180. Theater Laboratory.** (1-3) I and II. The Staff (Mr. Shank in charge)
Laboratory.
Prerequisite: consent of the instructor.
Projects in acting, production, scene design, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to a total of 8 units.
- 190. Proseminar in Dramatic Art.** (3) I and II. The Staff (Mr. Stambusky in charge)
Lecture-recitation—3 hours.
Selected aspects of Dramatic Art. Emphasis on individual study and research. Comprehensive examination covering the entire major field. Students may, with instructor's consent, substitute a thesis for the comprehensive examination.
- 194H. Special Study for Honors Students.** (3) I and II. The Staff
Prerequisite: majors with honors standing.
May be repeated once for credit.
- 195. Proseminar in Dramatic Art and Speech.** (3) I and II. The Staff (Mr. Stambusky in charge)
Lecture-seminar—3 hours.
Prerequisite: majors with senior standing. Not open to students who have received credit for Speech 195.
Extensive resurvey of the fields of dramatic art and speech, with emphasis upon individual study and research. Comprehensive examination covering the entire major field. Students may, with the instructor's consent, substitute a thesis for the comprehensive examination.

- 199. Special Study for Advanced Undergraduates.** (1-3) I and II. The Staff
Prerequisite: consent of the instructor.
Advanced study of dramatic literature, acting, or play production.

GRADUATE COURSES

- 210. Special Problems in Advanced Acting.** (3) I. Mr. Rossi
Lecture—2 hours; Laboratory—2 hours.
Study of specialized advanced-acting problems arising from differences in the type and style of dramatic production as they relate to the history, theory, and practice of acting through the ages.
- 224. Visual Theater.** (3) I. Mr. Chesley
Seminar—2 hours.
Selected theoretical and practical problems of the visual theater.
- 225. Design for the Theater.** (3) II. Mr. Snyder
Seminar—2 hours.
Advanced study of selected problems in the design of settings, costumes and lighting; practice in design.
- 227. Advanced Directing.** (3) II. Mr. Rossi
Lecture—2 hours; laboratory—2 hours.
Study of advanced directing techniques; specialized procedures in styles of drama. Projects in directing scenes from dramas of different types and periods.
- 230. Greek and Roman Theater.** (3) I. Mr. Sarlos
Seminar—2 hours.
Classical theater and drama.
- 235. Elizabethan Theater.** (3) II. Mr. Sarlos
Seminar—2 hours.
- *240. Seventeenth-century Theater.** (3) II. Mr. d'Harnoncourt
Seminar—2 hours.
The theater and drama of Restoration England and seventeenth-century France.
- *250. Realism in the Theater.** (3) I. Mr. Shank
Seminar—2 hours.
The realistic drama of the nineteenth and twentieth centuries. The development of realism in the theater. Consideration of such dramatists as Ibsen, Strindberg, Chekhov, and O'Neill.
- 259. Contemporary Trends in the Theater.** (3) II. Mr. d'Harnoncourt
Seminar—2 hours.
The major dramatists since Brecht. The development of the significant contemporary drama.
- 260. Advanced Playwriting.** (3) II. Mr. Shank
Seminar—2 hours.
Dramatic structure, character, and dialogue. Advanced projects in playwriting.
- 265. Theory of Dramatic Art.** (3) I. Mr. McDermott
Seminar—2 hours.
Theory and aesthetic principles of dramatic art as a fine art, including a consideration of traditional dramatic genres.

* Not to be given, 1965-1966.

280. Theater Laboratory. (1-6) I and II. The Staff (Mr. Shank in charge)
Advanced practice in acting, design, directing, playwriting, and technical theater.

299. Individual Study. (1-6) I and II. The Staff (Mr. Shank in charge)

SPEECH

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

LOWER DIVISION COURSES

Students must have passed Subject A before taking courses 1A or 2A.

1A. Elements of Speech. (3) I and II. The Staff
Lecture-recitation—3 hours.

The principles and practice of effective speech composition and delivery, with emphasis upon the logical organization and presentation of ideas.

1B. Elements of Speech. (3) I and II. The Staff
Lecture-recitation—3 hours.

Prerequisite: course 1A.

Application of the principles of effective speech composition and delivery to group discussion and public address.

2A. Fundamentals of Oral Interpretation of Literature. (3) I and II. Mrs. Alder
Lecture-recitation—3 hours.

Introduction to the oral reading of prose and poetry; practice in speaking and reading, with training in the principles of effective delivery.

25. Oral English for Foreign Students. (4) I and II. Mr. Mohrmann
Lecture-recitation—4 hours.

For foreign students only. Pronunciation, speaking, grammar, reading, and writing of English. Required of those who do not pass the examination in English and who are not qualified to take course 26.

26. Oral English for Foreign Students. (4) I and II. Mr. Mohrmann
Lecture-recitation—4 hours.

Continuation of course 25; required of those who have taken course 25.

40. Fundamentals of Debate. (3) I and II. Mr. Mohrmann
Lecture-recitation—3 hours.

Principles and practice of formal and informal debate. Emphasis on identification and analysis of issues and logical presentation of evidence.

UPPER DIVISION COURSES

Prerequisite to all upper division courses are upper division standing or two of the following courses: English 1A, 1B, Speech 1A, 1B, 40.

***101. Oral Interpretation of Poetry.** (3) II. Mrs. Alder
Lecture-recitation—3 hours.

Prerequisite: course 2A.

Thorough application of the principles of oral interpretation to poetic literature.

Offered in odd-numbered years.

* Not to be given, 1965-1966.

- 102. Oral Interpretation of Selected Fields of Literature. (3) II.**
Lecture-recitation—3 hours. Mrs. Alder
Prerequisite: course 2A.
Application of the principles of oral interpretation to selected types, periods, or authors. An opportunity for the student to choose an area of specialization for intensive study.
- 117. Theories of Rhetoric and Criticism. (3) I.** Mr. Murphy
Lecture—3 hours.
A study of the underlying nature of linguistic expression and communication as given in major theories, and comparison of their criteria of effectiveness. Attention to both artistic and instrumental functions of language.
Offered in odd-numbered years.
- 130. History of Public Address. (3) II.** Mr. Oehs
Lecture—3 hours.
A survey of public address in its major periods of influence in western civilization.
Offered in odd-numbered years.
- 140. Argumentation and Debate. (3) I.** Mr. Pomeroy
Lecture-recitation—3 hours.
Forms and techniques of argumentation and debate, with attention to the logical and rhetorical aspects. Materials taken largely from current events.
- 141. Debate Laboratory. (2) I and II.** Mr. Oehs
Laboratory—4 hours.
Prerequisite: consent of the instructor.
Practice in the principles of argumentation and debate. Intercollegiate and tournament debating. May be repeated for credit up to a total of 6 units.
- 194H. Special Study for Honors Students. (3) I and II.**
The Staff (Mrs. Alder in charge)
Prerequisite: majors with honors standing.
May be repeated once for credit.
- 195. Proseminar in Dramatic Art and Speech. (3) I and II.** The Staff
Lecture-seminar—3 hours.
Prerequisite: majors with senior standing.
Extensive resurvey of the fields of dramatic art and speech, with emphasis upon individual study and research. Comprehensive examination covering the entire major field.
- 199. Special Study for Advanced Undergraduates. (1-3) I and II.**
Prerequisite: consent of the instructor. The Staff
Advanced study of one phase of speech, such as public speaking, discussion, debate, oral interpretation.

GRADUATE COURSE

- 299. Individual Study. (1-6) I and II.** The Staff (Mr. Murphy in charge)

ECONOMICS

Frank C. Child, Ph.D., *Chairman of the Department.*
Department Office, 378 Voorhies Hall

Frank C. Child, Ph.D., *Professor of Economics.*
Thomas Mayer, Ph.D., *Professor of Economics.*
† Bruce Glassburner, Ph.D., *Associate Professor of Economics.*
Ralph C. James, Ph.D., *Associate Professor of Economics.*
Tsung-yuen Shen, Ph.D., *Associate Professor of Economics.*
Henry Y. Wan, Jr., Ph.D., *Associate Professor of Economics.*
Andrzej Brzeski, Ph.D., *Assistant Professor of Economics.*
Hiromitsu Kaneda, Ph.D., *Assistant Professor of Economics.*
Martin P. Oettinger, Ph.D., *Assistant Professor of Economics.*
Charles Schotta, Ph.D., *Assistant Professor of Economics.*
Elias H. Tuma, Ph.D., *Assistant Professor of Economics.*
W. Eric Gustafson, Ph.D., *Assistant Professor of Economics.*



Wallace N. Atherton, Ph.D., *Lecturer in Economics.*
Norman Schneider, A.B., *Acting Assistant Professor of Economics.*

Letters and Science List.—All undergraduate courses in economics are included in the Letters and Science List of Courses (see page 85).

Departmental Major Advisers.—Mr. Brzeski, Mr. Kaneda, Mr. Shen, Mr. James, Mr. Schneider, Mr. Schotta, Mr. Tuma, Mr. Atherton, Mr. Gustafson, Mr. Wan, Mr. Oettinger.

Graduate Adviser.—I. Mr. Mayer; II. Mr. Glassburner.

The Major Program

(A) Lower Division Courses.—Required: Economics 1A–1B and 6 additional units in social science; Economics 12 or a course in statistics approved by the department; at least a C average in these courses. Students planning to major in economics should complete these courses by the end of the sophomore year.

(B) Upper Division Courses.—Required: A total of 24 units of economics including (1) Economics 100A, 100B, (2) either 110A or 110B, and (3) 6 units selected from one of the following course combinations: Economics 110A and 110B; Economics 116 and 117; Economics 121A and 121B; Economics 130A and 130B; Economics 135A and 135B; Economics 150A and 150B; Economics 160A and 160B.

It is recommended that Economics 100A, 100B, and 110A or 110B be taken during the junior year. Except under extraordinary circumstances, no more than 9 units of economics may be taken in any one semester.

The department will certify to the completion of the major program for graduation only on the basis of at least a C average in the upper division courses taken in the department in satisfaction of major requirements. Students who do not maintain such an average may be required at any time to withdraw from the major in economics.

Graduate Study.—Students who meet the admission requirements of the Graduate Division and the Department of Economics may pursue studies leading to the degrees of Master of Arts and Doctor of Philosophy. Fields of emphasis for graduate study include: Economic Theory, Economic Development, Economic History, Economic Fluctuations, International Economics, Labor Economics, Industrial Organization, Comparative Economic Systems,

† Absent on leave, fall semester 1965–1966.

and History of Economic Thought, Monetary Economics, Public Finance, and Mathematical Economics.

For information about admission to graduate study, and requirements for graduate degrees, students should consult the *Graduate Bulletin* and contact the *Department's Graduate Adviser*.

LOWER DIVISION COURSES

- 1A. Principles of Economics.** (3) I and II. Mr. Gustafson
Lecture—2 hours; discussion—1 hour.
Analysis of the allocation of resources and distribution of income through the price system; competition and monopoly; comparative economic systems.
- 1B. Principles of Economics.** (3) I and II. Mr. Atherton
Lecture—2 hours; discussion—1 hour.
Analysis of the economy as a whole: determinants of national income; the level of employment; related topics including monetary policy, the business cycle, international trade and economic development.
- 11. Elementary Accounting.** (4) I and II. Mr. Oettinger
Lecture—3 hours; laboratory—2 hours.
Prerequisite: sophomore standing or consent of instructor.
The basic concepts of accounting; the history of accounting; the ledger, journals, income statement, and balance sheet; inventory valuation; depreciation; introduction to cost accounting; analysis of financial statements; social accounting.
- 12. Introduction to Quantitative Methods in Economics.** (4) I and II.
Lecture—3 hours; laboratory—2 hours. Mr. Gustafson
Prerequisite: two years of high school algebra or the equivalent.
Methods of analyzing quantitative economic and business data, including descriptive statistics, sampling and statistical inference, index numbers, correlation, and time series. Emphasis on the logic of procedures, interpretation, and application. Primarily for Economics majors; cannot be taken for credit by students who have completed Mathematics 13, Psychology 3 or Sociology 18.

UPPER DIVISION COURSES

- 100A. Economic Theory.** (3) I and II. Mr. Wan
Lecture—3 hours.
Prerequisite: courses 1A, 1B or consent of the instructor.
Price and distribution theory.
- 100B. Economic Theory.** (3) I and II. Mr. Atherton
Lecture—3 hours.
Prerequisite: courses 1A, 1B or consent of the instructor.
Scope and method of economic science; theory of income and employment.
- 101. History of Economic Thought.** (3) II. Mr. Shen
Lecture—3 hours.
Prerequisite: courses 1A, 1B, or consent of the instructor.
Historical survey of economic doctrine: the classical school and its antecedents, neoclassical thought, criticism of classical thought, emergence of modern economic thought.
- 102. Advanced Economic Theory.** (3) I. Mr. Wan
Lecture—3 hours.
Prerequisite: courses 100A and 100B.
Mathematical analysis in economic theory. Analysis of the determinants of the aggregate level of output and employment, and of the allocation of resources. Includes advanced value and distribution theory, and a brief review of modern monetary theory.

- *105. The Economics of Social Legislation. (3) I.** _____
Lecture—3 hours.
Prerequisite: courses 1A and 1B or consent of the instructor.
Theory of welfare economics. The economic impact of social legislation. Analysis of such current issues as health insurance and aid to education. The impact of economic growth, technological change, and inflation on existing programs.
- 110A. Economic History. (3) I.** Mr. Tuma
Lecture—3 hours.
Prerequisite: courses 1A, 1B or consent of the instructor.
Analysis of economic problems in their historical setting. Emphasis on development of economic institutions in Europe; implications for contemporary world economic relationships.
- 110B. Economic History. (3) II.** Mr. Tuma
Lecture—3 hours.
Prerequisite: courses 1A, 1B or consent of the instructor.
Analysis of economic problems in their historical setting. Examination of the evolution of economic institutions in the United States; their significance in the contemporary world economy.
- 115. Economic Development. (3) I.** Mr. Shen
Lecture—3 hours.
Prerequisite: courses 1A and 1B or consent of the instructor.
Theories of economic development and underdevelopment; economic policy for growth and development.
- 116. Comparative Economic Systems. (3) I.** Mr. Brzeski
Lecture—3 hours.
Prerequisite: courses 1A, 1B or consent of the instructor.
Critical examination of major economic systems, emphasizing their economic goals and institutions; achievements and problems of capitalism; fascism; Marxian thought and socialist economics; problems of economic planning in USSR, India, China, and other industrializing societies.
- 117. The Soviet Economy. (3) II.** Mr. Brzeski
Lecture—3 hours.
Prerequisite: course 1A, 1B, or consent of the instructor.
Survey of Soviet economic development: institutions, methods of planning, and performance.
- 121A. Industrial Organization I. (3) I.** Mr. Schneider
Lecture—3 hours.
Prerequisite: course 1A, 1B, or consent of the instructor.
An appraisal of the prevalence of effectiveness of competition in the American Economy; market structure, conduct, and economic performance of a variety of industries.
- 121B. Industrial Organization II. (3) II.** Mr. James
Lecture—3 hours.
Prerequisite: course 121A or consent of the instructor.
Public policy in a private-enterprise economy in light of the economist's concept of competition; and monopoly: anti-trust policy and the preservation of competition; the economics of regulated industries.

* Not to be given, 1965-1966.

- 130A. Economics of the Public Sector. (3) I.** Mr. Schotta
Lecture—3 hours.
Prerequisite: courses 1A, 1B, or consent of the 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.
- 130B. Economics of the Public Sector. (3) II.** Mr. Schotta
Lecture—3 hours.
Prerequisite: course 130A.
A continuation of Economics 130A.
- 131. The Economics of Corporation Finance. (3) I.** Mr. James
Lecture—3 hours.
Prerequisite: courses 1A, 1B or consent of the instructor.
The corporation as a form of business organization; financial aspects of promotion and organization, operation, expansion and consolidation, failure, and reorganization; the capital market, financial instruments and institutions; public regulation of security issues and security exchanges.
- 133. Dynamic Economics and Business Fluctuations. (3) II.** _____
Lecture—3 hours.
Prerequisite: Mathematics 13 or Economics 12, or consent of the instructor.
An analysis of the general features and chief causes of economic change, with special emphasis on the cyclical instability of economic activity. It is recommended that this course be taken in the senior year.
- 135A-135B. Money, Banking, and Monetary Policy. (3-3) Yr.** Mr. Mayer
Lecture—3 hours.
Prerequisite: courses 1A, 1B or consent of the instructor.
The monetary economy: commercial and central banking; monetary and income theory; monetary policy.
- 150A. Labor Economics. (3) I.** Mr. Oettinger
Lecture—3 hours.
Prerequisite: courses 1A, 1B or consent of the instructor.
Historical analysis of worker organization and of trade union philosophy and practice; theoretical exploration of basic influences affecting real wages and employment; examination of relevant statistical records; wage structure and wage level problems; union-management relations and the national economy.
- 150B. Labor Economics. (3) II.** Mr. Oettinger
Lecture—3 hours.
Prerequisite: courses 1A, 1B or consent of the instructor.
Labor law and legislation and their economic impact; collective bargaining and economic conflict; economic impact of laws regulating minimum wages, hours of work, and other labor standards; government intervention in collective bargaining and dispute settlement.
- 160A. International Economic Relations. (3) I.** Mr. Kaneda
Lecture—3 hours.
Prerequisite: courses 1A, 1B or consent of the instructor.
International trade theory; analysis of selected international and economic problems.

- 160B. International Economic Relations.** (3) II. Mr. Kaneda
Lecture—3 hours.
Prerequisite: courses 1A, 1B or consent of the instructor.
International finance; U. S. foreign trade policies and their impact on the world economy.
- 190. Senior Seminar.** (3) II. _____
Prerequisite: senior standing; open only to economics majors.
Selected topics in economic analysis and public policy.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

GRADUATE COURSES

- 200A. Economic Theory.** (3) I. Mr. Child
Lecture and discussion—3 hours.
Microstatic and microdynamic theoretical issues; theory of production, theory of the firm, and general theory of choice.
- 200B. Economic Theory.** (3) II. Mr. Child
Lecture and discussion—3 hours.
Macrostatic and macrodynamic theoretical issues; theory of income and employment and theory of economic growth.
- 201. History of Economic Thought.** (3) II. _____
Lecture—3 hours.
Analysis of the relationships between historical conditions, economic theory, and economic policy from the Greeks to modern times.
- 203A. Advanced Economic Theory.** (3) II. Mr. Wan
Discussion—3 hours.
Prerequisite: course 200A.
Theory of the firm, imperfect markets, distribution theory, welfare economics.
- 203B. Advanced Economic Theory.** (3) I. Mr. Wan
Discussion—3 hours.
Prerequisite: courses 200A, 200B.
Capital theory, growth theory, general equilibrium theory.
- 210. Economic History.** (3) I. Mr. Tuma
Lecture—3 hours.
American and European economic history. Emphasis upon development of economic institutions.
- 215A. Economic Development.** (3) I. Mr. Shen
Lecture—3 hours.
Theory of economic development.
- 215B. Economic Development.** (3) II. Mr. Glassburner
Lecture—3 hours.
Policies for economic development; problems from selected areas.
- 216. Comparative Economic Systems.** (3) I. Mr. Brzeski
Lecture—3 hours.
Comparative study of economic systems with reference to their organization and institutions, their prevailing values and goals, and various aspects of their economic performance.

- 217. Economics of Planning** (3) II. Mr. Brzeski
Lecture—3 hours.
Theories and principles of economic planning under different economic systems.
- 221. Industrial Organization.** (3) I. Mr. Schneider
Lecture—3 hours.
Analysis of market structure, conduct and performance under conditions of limited government interference.
- 222. Regulated Industries.** (3) II. Mr. James
Lecture—3 hours.
Analysis of government regulations, standards, and policies.
- 230. Public Finance.** (3) I. Mr. Schotta
Seminar—3 hours.
Role of the public sector; tax and expenditure theories; related topics.
- 232. Problems of the Public Sector.** (3) II. Mr. Schotta
Seminar—3 hours.
Public sector: institutions, problems, and policies.
- *233. Dynamic Economics and Business Fluctuations.** (3) II. ———
Lecture—3 hours.
Macro- and micro-dynamic economic models; review of business cycle theory; economic policy for growth and stability.
- 235. Monetary Theory.** (3) I. Mr. Mayer
Lecture—3 hours.
Theories of relationship between money (and other liquid assets) and income, employment, prices, allocation of resources and distribution of income.
- 236. Monetary Policy.** (3) II. Mr. Mayer
Lecture—3 hours.
Impact, evaluation, and problems of monetary policy.
- 250A. Labor Economics.** (3) I. Mr. Oettinger
Lecture—3 hours.
Philosophy and theory of the labor movement; union structure and organization under changing labor market conditions; labor market issues.
- 250B. Labor Economics.** (3) II. Mr. Oettinger
Seminar—3 hours.
Theory of the labor market; analysis of wage-employment, wage-investment, and wage-price relationships.
- 260A. International Economics.** (3) I. Mr. Kaneda
Seminar—3 hours.
Theory of international trade and finance.
- 260B. International Economics.** (3) II. Mr. Kaneda
Seminar—3 hours.
Problems and policies in international economic relations.
- 299. Individual Study.** (1-5) I and II. The Staff

* Not to be given, 1965-1966.

EDUCATION

Hugh C. Black, Ph.D., *Chairman of the Department.*
Department Office, 228 Voorhies Hall

Hugh C. Black, Ph.D., *Associate Professor of Education.*
Julius M. Sassenrath, Ph.D., *Associate Professor of Education.*
V. Kenneth Shrable, Ph.D., *Assistant Professor of Education.*
Leroy F. Troutner, Ph.D., *Assistant Professor of Education.*
George D. Yonge, Ph.D., *Assistant Professor of Education.*



Larry D. Estes, M.A., *Lecturer in Education, Supervisor of Teacher Education.*
Kent Gill, M.Ed., *Lecturer in Education, Supervisor of Teacher Education.*
Robert E. Hapworth, M.A., *Lecturer in Education, Supervisor of Teacher Education.*
Burt Liebert, M.F.A., *Lecturer in Education, Supervisor of Teacher Education.*
Walter T. Mara, M.S., *Lecturer in Education, Supervisor of Teacher Education.*
Douglas L. Minnis, Ed.D., *Head of Teacher Education, Lecturer in Education, Supervisor of Teacher Education.*
Shirley J. Skinner, M.A., *Lecturer in Education, Supervisor of Teacher Education.*
Margaret R. Sutherland, Ph.D., *Lecturer in Education, Supervisor of Teacher Education.*

Letters and Science List.—Education 110.

Credentials Counselors:

Junior College.—Mr. Mara.

Secondary.—Mr. Estes, Mr. Liebert, Mr. Mara.

Elementary.—Mrs. Skinner, Mr. Minnis, Mr. Hapworth.

Curricula for Teacher Education.—See pp. 93-96.

UPPER DIVISION COURSES

110. Introduction to Educational Psychology. (3) I and II.

Lecture—3 hours. Mr. Sassenrath, Mr. Shrable, Mr. Yonge

Prerequisite: Psychology 1 or 2.

The learning process; physical, mental, and social development; individual differences and their measurement; mental hygiene; the role of the teacher in guidance and counseling.

115. Tests and Measurements. (3) I.

Mr. Yonge

Lecture—3 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.

120. Educational Sociology. (3) I and II.

Mr. Black, Mr. Troutner

Lecture—3 hours.

Prerequisite: course 110 (may be taken concurrently).

The school as a social institution; historical development of purposes and programs of education; the role of the teacher.

- 163. Guidance and Counseling.** (3) II. Mr. Shrable
Lecture—3 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 particular emphasis on educational and vocational adjustment.
- 198. Directed Group Study.** (1-5) I and II. The Staff
Prerequisite: consent of the instructor.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

GRADUATE COURSE

- 290. Seminar.** (2) I and II. _____

PROFESSIONAL COURSES

- 300. Language Arts in the Elementary Schools.** (2) I and II. Mrs. Skinner
Lecture—2 hours.
Prerequisite: consent of the instructor.
Principles, procedures, and curricular materials for developing oral and written language skills.
- 302. Elementary School Curriculum.** (2) I and II. Mr. Minnis, Mr. Hapworth
Lecture—2 hours.
Current conceptions of the elementary school curriculum with emphasis on the role of social studies and science and on effective teaching methods.
- 320A. Introduction to Teaching in Secondary Schools.** (1) I and II. Mr. Estes, Mr. Mara
Lecture—1 hour; laboratory—2 hours.
Lectures, conferences, and field work in secondary teaching. Observations and participation in some form of public school work.
- ‡**320C. Supervised Teaching in Secondary Schools.** (3-8) I and II. The Staff
Prerequisite: course 320E (must be taken concurrently).
Directed teaching for candidates for the general secondary credential.
May be repeated for credit up to a total of 8 units.
- ‡**320E. Methods of Teaching in Secondary Schools.** (2) I and II. The Staff
Lecture—2 hours.
Prerequisite: course 320C (must be taken concurrently).
Methods of teaching in the secondary school; selection, organization, and evaluation of teaching materials including the use of audio-visual aids and the services of counseling and guidance programs.
- 330A. Introduction to Teaching in Elementary Schools.** (2) I and II. Mr. Minnis
Lecture—1 hour; laboratory—3 hours.
Lectures, conferences, and field work; observation of and participation in classroom activities in the public elementary schools.
- ‡**330C. Supervised Teaching in Elementary Schools.** (4-8) I and II. Mrs. Skinner, Mr. Minnis, Mr. Hapworth
Prerequisite: course 330E (must be taken concurrently).
Directed teaching for candidates for the general elementary credential.

‡ Open only to apprentice teachers and graduate students. All 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 semester in the public schools. Thus teaching assignments in the fall semester, 1965, will begin on or about September 7 and end January 28. For the spring semester, 1966, they will begin on or about January 31 and end June 10. Students should make arrangements accordingly.

‡330E. Methods of Teaching in Elementary Schools. (2) I and II.

Lecture—2 hours.

Mrs. Skinner, Mr. Minnis, Mr. Hapworth

Prerequisite: course 330C (must be taken concurrently).

Selection, organization, and evaluation of teaching materials, including the use of audio-visual aids.

340. Supervised Teaching in Junior Colleges. (3) I and II.

Mr. Mara

Discussion—1 hour.

Other—Supervised Teaching; minimum of 45 clock hours.

Prerequisite: graduate standing and consent of instructor.

Directed teaching for candidates for the standard teaching credential with specialization in junior college teaching.

341. Teaching in the Junior College. (3) I and II.

Mr. Mara

Lecture—3 hours.

Prerequisite: graduate standing and 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.

342. Learning Theory and Instruction in the Junior College. (2) II.

Lecture—2 hours.

Mr. Mara

Prerequisite: course 341 (may be taken concurrently).

Principles of learning; growth and development; instructional procedure; development and utilization of instructional materials; evaluation of learning; student personnel services.

‡ Open only to apprentice teachers and graduate students. All 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 semester in the public schools. Thus teaching assignments in the fall semester, 1965, will begin on or about September 7 and end January 28. For the spring semester, 1966, they will begin on or about January 31 and end June 10. Students should make arrangements accordingly.

EDUCATION ABROAD PROGRAM

- William H. Allaway, Ed.D., *Director*.
Paul M. Pitman, Ed.D., HH.D., *Associate Director*.
Robert H. Billigmeier, Ph.D., *Associate Director*.
Norman Ziff, Ph.D., *Director, Bogotá Study Center*.
Paul O. Proehl, J.D., *Director, Bordeaux Study Center*.
Jean Decock, Ph.D., *Associate Director, Bordeaux Study Center*.
Leonid M. Tichvinsky, D.E.M., *Director, Goettingen Study Center*.
David E. R. George, Ph.D., *Associate Director, Goettingen Study Center*.
C. Wayne Gordon, Ph.D., *Associate Director, Hong Kong Study Center*.
Philip W. Powell, Ph.D., *Director, Madrid Study Center*.
C. P. Otero, Ph.D., *Associate Director, Madrid Study Center*.
Henry J. Lagorio, M.A., *Director, Padua Study Center*.
Hans Baerwald, Ph.D., *Director, Mitaka-Tokyo Study Center*.
Robert B. Brode, Ph.D., Sc.D., *Director, United Kingdom Study Center*.

The Education Abroad Program, administered for the entire University by the Santa Barbara campus, offers unique opportunities for undergraduate students, regardless of major, to study in selected universities overseas.

University of California study centers have been established on three continents in cooperation with the University of Bordeaux, the Chinese University of Hong Kong, the University of Edinburgh, George August University (Goettingen), International Christian University (Mitaka-Tokyo), the University of Madrid, the University of Padua, the University of Birmingham, the University of Sussex (Brighton), and the University of the Andes (Bogotá).

Attention: A participant who wishes to make normal progress toward graduation should counsel *in advance* with his departmental adviser and the dean of his school or college in order to ascertain how participation will affect his academic program and his plans for graduation. While all courses listed below are University of California credit courses, each department retains the right to determine the extent to which it will accept the units so earned in fulfillment of the requirements for its own majors.

THE BORDEAUX STUDY CENTER

The upper division courses listed below are the 1965-66 University of California selections from the regular offerings of the University of Bordeaux. The California students may audit widely throughout the University.

Art

BC 116A-116B. History of French Art and Architecture. (4-4) Yr. Professor Pariset

A survey of French art since the Romanesque, with emphasis on medieval architecture, on painting since 1500, and on all the arts since 1900.

Zoology

BC 109A-109B. Vertebrate Physiology. (4-4) Yr. Professor Lafon

Prerequisite: consent of instructor.

The physiology of vertebrates, including nerve, muscle, blood, endocrine glands, and the processes of metabolism.

Chemistry

BC 140A-140B. Physical Chemistry. (4-4) Yr. Professors Pacault and Joussot-Dubien

Prerequisite: consent of instructor.

Elementary thermodynamics; chemical equilibria; gas laws; molecular-kinetic theory; electrochemistry.

Economics

BC 101A-101B. History of Economic Thought. (4-4) Yr. Professor Robine

The development of economic thought from the Greeks to Marshall and Keynes.

BC 107A-107B. Comparative Economic Systems. (4-4) Yr. Professor Garrigou-Lagrange

A comparative analysis of economic systems and structures: the principal types of economic organization, the evolution of some specific economies at different stages of development, the political economy according to these systems and structures.

BC 112A-112B. The Economic History of Europe. (4-4) Yr. Professors Schnapper and Minvielle

Survey of the development of the economic institutions of Europe; an analysis of economic problems and policies in their historical setting.

French**BC 101A-101B. Conversation and****Composition. (4-4) I. Professor Perrin**

Prerequisite: French 4 or equivalent.

Original composition; translation and discussion of selected passages from French literature. Use of films and language laboratory equipment.

BC 102A-102B. Advanced Conversation and**Composition. (4-4) I. Professor Perrin**

Prerequisite: French 101A-101B, or equivalent.

Original composition; translation and discussion of works of selected French authors on advanced level. Use of films and language laboratory equipment where appropriate.

(Note: French 101A-101B and 102A-102B are taken at the Institute at Pen during September and October.)

BC 112A-112B. French Literature: The**Nineteenth Century. (4-4) Yr.**

Professor Flottes

Prerequisite: French 101A-101B, or equivalent.

Lectures will treat the works of nineteenth century French literary figures, such as Leconte de Lisle, Zola, and Rimbaud.

BC 120-121. French Literature: The**Seventeenth and Eighteenth Centuries.****(4-4) Yr.**

Professor Mesnard

Prerequisite: French 101A-101B, or equivalent.

The works of seventeenth and eighteenth century French literary figures, such as Moliere, Le Sage, and LaClos.

BC 127A-127B. Comparative Literature.*(4-4) Yr.**

Professor Escarpit

Prerequisite: French 101A-101B, or equivalent.

An introduction to comparative literature: realism in the European novel, humor and irony in the eighteenth and nineteenth centuries, and dramatic theories at the end of the eighteenth century.

BC 132A-132B. Contemporary French**Literature. (4-4) Yr. Professor Dulck**

Prerequisite: French 101A-101B, or equivalent.

A general introduction to such representative twentieth century French authors as Valery, Proust, Gide, Mauriac, Camus, and others.

Geography**BC 141A-141B. Economic and Political****Geography. (4-4) Yr.**

Professor Enjalbert

Relationships between geography and the study of economic and political problems. Specific topics emphasized will vary each year in accordance with French university custom.

History**BC 102A-102B. History of Europe in the****Seventeenth and Eighteenth Centuries.****(4-4) Yr.**

Professor Braure

The history of Europe between the medieval period and the French Revolution, emphasizing political,

social, religious, and economic aspects of life. Specific topics considered will vary each year in accordance with French university custom.

BC 113A-113B. History of Europe in the**Nineteenth and Twentieth Centuries.****(4-4) Yr.**

Professor Dupeux

History of Europe since the French Revolution, emphasizing political, social, religious, and economic aspects of life. Specific topics covered will vary each year in accordance with French university custom.

BC 121-122. Medieval Europe. (4-4) Yr.

Professor Guillemain

The history of Europe between the fourth and the fifteenth centuries with an emphasis on political, social, religious, and economic aspects of life. Specific topics covered each year will vary in accordance with French university custom.

Mathematics**BC 104. Introduction to Mathematical****Analysis. (4) I.**

Professor Colmez

Prerequisite: Advanced calculus, or consent of instructor.

Point sets on the line and in Euclidean spaces, metric spaces, spaces of functions, differentiation, Riemann integration, interchange of order of limit operations, methods of successive approximations, existence theorems.

BC 113. Linear Algebra. (4) II.

Professor Colmez

Prerequisite: consent of instructor.

Vector spaces and linear transformations, matrices, rank, determinants, duality, bilinear and quadratic forms, unitary spaces, similarity and unitary similarity, canonical forms.

Political Science**BC 121A-121B. International Relations.****(4-4) Yr.**

Professor Merle

Contemporary international relations and international institutions. The problems and periods emphasized will vary each year in accordance with French university custom.

BC 125A-125B. Contemporary World**Political and Economic Problems.****(4-4) Yr.**

Professor Merle

A group of lectures on the current world scene by outstanding scholars. Topics covered will vary each year in accordance with French university custom.

BC 142A-142B. Government and Politics in**France. (4-4) Yr.**

Professor Merle

Introduction to the social, economic, and political structure of France and to the systems of thought applicable to political studies from both a literary and legalistic point of view.

Sociology**BC 163A-163B. Social Movements. (4-4) Yr.**

Professor Ellul

Social change and social movements: the development of collective enterprises in politics, religion, and art. The specific topics emphasized each year will vary in accordance with French university custom.

* Not to be given, 1965-66.

THE GOETTINGEN STUDY CENTER

The following courses were offered at George August University, Goettingen, during the academic years 1963-64 and 1964-65 and were approved for credit by the University of California.

Attention: It is not the custom of George August University to schedule the same courses each year. Consequently, only a fraction of these courses may be given again in 1965-66. Other courses, as they may be offered, will be selected for University of California credit.

The California students may audit widely throughout George August University.

Astronomy

GC 101. Introduction to Astronomy.

(2) I. Professor Voight

Prerequisite: consent of instructor.
Introduction to the principal fields of modern astrophysical research.

Biology

GC 101A-101B. Physiological Chemistry.

(5-4) Yr. Professor Deuticke

Prerequisite: consent of instructor.
General introduction to metabolism of proteins, carbohydrates, liquids, vitamins, salts, and hormones, with special emphasis on digestion, blood, and excretion from a medical and pathological standpoint.

GC 102. Chemistry and the Biological

Significance of the Steroids. (2) II.

Stereochemistry of steroid ring systems and general stereochemistry; the classification and separation of steroids; the descriptive chemistry of steroids; bile acids, adrenal cortical hormones, sex hormones, and alkaloids.

GC 105. General Microbiology. (6) I.

Professor Schlegel

Prerequisite: consent of instructor.
An introduction to the systematics, physiology, and genetics of the bacteria and fungi and the importance of their activities to man.

GC 105 (L). Microbiology Laboratory.

(2) I. Professor Schlegel

Prerequisite: consent of instructor.
Methods of microscopic examination, culture, isolation, and identification of bacteria.

GC 106 (L). Microbiology Laboratory.

(1½) II. Professor Schlegel

Prerequisite: Biology GC 105, GC 105(L).
The course gives an overview of the enrichment (or concentration), isolation and growth of soil and water bacteria. The students prepare a culture and ascertain the conditions one or another of the bacteria develops. Simultaneously attention is paid to the ecology and biology of the form under investigation.

GC 106 (S). Microbiology Seminar.

(2) II. Professor Schlegel

Prerequisite: Biology GC 105.
The seminar operates through questions and short research projects which then serve as the basis of discussion. It is intended to give added depth to the problems touched on in the lectures.

GC 109. Special Biochemistry of Micro-

organism II. (1½) II. Professor Schlegel

Prerequisite: consent of instructor.

The lecture serves primarily to introduce Microbiology majors into the special field of physiological metabolism and the biochemistry of microorganisms. It is preparation for the research problems dealt with in the Microbiological Institute.

GC 110. Biology of Selected Bacteria

Groups. (3) II. Professor Schlegel

Prerequisite: consent of instructor.
These lectures are designed primarily for Microbiology majors and are intended to deepen their knowledge of special bacterial groups which cannot be treated in the general lectures.

GC 130. Genetics. (4) II. Professor Heberer

Prerequisite: consent of instructor.
Gametogenesis, meiosis, chromosome morphology and anatomy, phenotypes and genotypes, variation and mutation. Genetic determination of sexes. Molecular genetics, role of DNA, RNA.

GC 133. Principles of Human Genetics.

(3) I. Professor Becker

Basic principles of human genetics. Fundamentals of molecular genetics, mutations, distortion, twin and family research.

GC 136. Statistics for Biologists, Psychologists and Medical Students.

(4) I. Professor Jacobs

Prerequisite: consent of the instructor.
Introduction to theory of probability, including distribution, expectation, variance, law of large numbers; statistical methods of proving hypotheses and evaluations.

Botany

GC 101. Introductory Botany. (5) II.

Professor Pirson

History and scope of botanical science; cell tissue and organ structure; nuclear phenomena and inheritance; physiology, including osmotic phenomena, metabolism, photosynthesis, carbon and nitrogen cycles, water relations; relationships of the major groups of plants; speciation.

GC 102. Introduction to Plant Taxonomy.

(2) II. Professor Beug

Prerequisite: Botany GC 101 taken concurrently.
Introduction to the more important plant families; laboratory study and field trips.

Zoology

GC 101. Comparative Embryology.

(3) II. Professor Bueckmann

Prerequisite: consent of instructor.
Introduction to invertebrate and vertebrate embryology.

GC 143. Comparative Physiology of the Nervous System. (4) II.

Professor Birukow
Prerequisite: consent of instructor.

Introduction to the general physiology of the sense organs. Comparative consideration of the structure and function of chemical, mechanical and optical receptors in animals and men, and of orientation reactions.

Chemistry**GC 109. Introduction to Physical Chemistry. (3) II.**

Professor Jost
Prerequisite: Chemistry 1A-1B and Chemistry 5.
An introduction to the major fields of Physical Chemistry.

GC 112A-112B. Organic Chemistry.

(6-5) Yr. Professor Brockmann
Prerequisite: consent of instructor.

The classes of organic compounds such as hydrocarbons, alcohols, and amines are discussed; also vitamins, sugar, alkaloids, and steroids.

GC 112A(L)-112B(L). Organic Chemistry Laboratory. (6-5) Yr.

Professor Brockmann
Prerequisite: consent of the instructor.
The application of theoretical knowledge.

GC 112A(S)-112B(S). Seminar in Organic Chemistry. (1-1) Yr.

Professor Brockmann
Prerequisite: Chemistry GC 112A-112B taken concurrently.

Bibliographical reports in organic chemistry.

GC 140A-140B. Introduction to Physical Chemistry. (3-3) Yr.

Professor Jost
Prerequisite: consent of instructor.
Chemical thermodynamics; equilibria and reaction kinetics.

GC 140A(L)-140B(L). Physical Chemistry Laboratory. (3-2) Yr.

Professor Jost
Prerequisite: Chemistry GC 140A-140B taken concurrently.
Experiments in chemical equilibrium, molecular structure, chemical thermodynamics, and reaction kinetics.

GC 171. Free Radicals in Organic Chemistry. (3) I.

Professor Luettke
Prerequisite: consent of instructor.
Surveys the formation, and the most important physical and chemical properties, of organic free radicals. Included are methods of graphical representation of free radicals, electron spin resonance spectroscopy, and mechanisms of radical reactions.

GC 183A-183B. Reaction Mechanisms.

(2-2) Yr. Professor Luettke
Prerequisite: consent of instructor.

Theories of reaction mechanisms in Organic Chemistry (equilibrium, rate process, collision, solvent effects, steric effects).

Economics**GC 100A-100B. Economic Theory.**

(5-4) Yr. Professor Suranyi-Unger

100A. Economic Theory: value, price formation, distribution of income.

100B. Factors that determine output, national income, and employment.

GC 101. History of Economic Doctrine.

(3) II. Professor Egner
Prerequisite: Economics 1A-1B.
Economic ideas from ancient times to the present.

GC 102. Economic Seminar.

(2) II. Professor Rittig
Prerequisite: consent of instructor.
Seminar in advanced economic theory.

GC 104-105. Economic Policy and Economic Theory. (8-6) Yr.

Professor Rittig
Prerequisite: Economics 1A-1B, or equivalent.
Economic theory and the application of theory to policy in various aspects of economic life, developed through lectures, seminars, and tutorial discussions.

GC 107. Comparative Economic Systems.

(5) I. Professor Egner
Prerequisite: Economics 1A-1B, or equivalent.
Study of economic systems of liberalism, conservatism, and socialism and their economic policies.

GC 114. Seminar in Economics.

(2) II. Professor Egner
Prerequisite: Economics 1A-1B.
Theories of economic development. Problems of accelerated development in poor countries and of maintaining development in rich countries.

German**GC 100A. German Literature in the Baroque Period. (5) I.**

Professor Schoene
Literature of the 17th century; a general survey with a study of selected examples in depth.

GC 100B. Lyric of the Baroque Period.

(5) I. Professor Killy, Dr. Schillemeit
An introduction to the Baroque lyric, based on a representative selection of poems; a study in depth of its language, its poetical and rhetorical characteristics.

GC 103. Thomas Mann's "The Magic Mountain." (4) II.

Professor Killy, Dr. Muschg
An intensive study of *The Magic Mountain* as an example of the genre "Novel" and of the literary methods and philosophy of Thomas Mann.

GC 104B. Buechner's Dramas. (4) II.

Professor Schoene, Herr Stenzel
Seminar problems in Georg Buechner's dramas with particular reference to the literary movements of his time.

GC 105. Lessing. (4) I.

Professor Woelfel
An emphasis on the dramatic works of Lessing. Specific contents will vary from year to year in accordance with German university custom.

GC 106A-106B. German Grammar and Composition. (4-4) I.

Professor Killy and Staff
Prerequisite: German 4, or equivalent.
Original composition; translation and discussion of selected passages from German literature; conversation. Highly intensive six weeks preparatory course for students in the Goettingen Center.

- GC 107A. The Young Herder. (5) I.**
 Professor Hassenstein
 Seminar on selected prose texts, giving an insight into the literary life of the Sturm und Drang generation.
- GC 108A. Schiller's Dramas. (3) II.**
 Professor Woelfel
 A study of Schiller's dramas and the development of Schiller as a dramatist.
- GC 108B. Seminar on Schiller's Prose. (5) I.**
 Professor Schoene, Herr Stenzel
 An analysis of Schiller's stories, his philosophical works, and his criticism.
- GC 109A. Young Goethe. (3) II.**
 Professor Killy
 Introduction to Goethe and to Goethe philology, with emphasis on the period prior to the Italian journey.
- GC 109C. Goethe's Letters. (3) II.**
 Frau Dr. May
 Seminar dealing with the analysis of form and content of a selection of Goethe's letters.
- GC 109D. Dramas of the Young Goethe. (5) I.**
 Professor Killy, Dr. Schillemeit
 A survey of the dramas of the early Goethe and an introduction to the methods of stylistic analysis.
- GC 109E. Seminar on Goethe's Ballads. (4) II.**
 Frau Dr. May
 Prerequisite: open only to German majors with previous experience in literature.
 Problems of poetics (epic, lyric, dramatic) based on examples from Goethe's ballads; the development of Goethe's language and stylistic forms; intensive study of selected ballads from the standpoint of idea content, background, and literary references.
- GC 110A. The German Ballad. (4) II.**
 Professor Schoene, Herr Stenzel
 Seminar on the types and development of the German ballad. Poetic interpretation of the ballad form through the study of selected texts.
- GC 110B. Heine's Lyrics. (4) II.**
 Professor Schoene, Herr Schluer
 Seminar on the lyrical work of H. Heine with an introduction to the analysis of lyrical poetry in general.
- GC 111. Seminar on the Tragedies of the German Classic Period. (4) II.**
 Dr. Hassenstein
 Study of the characteristics of German Classic Tragedy with special attention to style, genre, period. Includes intensive study of Goethe's "Natürliche Tochter" and Schiller's "Braut von Messina."
- GC 112. Seminar on German Nineteenth and Twentieth Century Drama. (5) I, (4) II.**
 Professor Killy, Dr. Boeschstein
 Selected texts from dramas of the nineteenth and twentieth centuries with emphasis on linguistic analysis and determining characteristic dramatic style of author concerned.
- GC 122. Twentieth Century Drama and Lyrics. (4) II.**
 Professor Schoene
 The study of selected texts in the field of modern German poetry and drama.
- GC 125A. Seminar on Selected Lyrical Texts. (5) I, (4) II.**
 Professor Schoene, Herr Schluer
 Emphasis on technical terminology, particularly in metrics, and methods of text analysis. Specific topics to be covered will vary from year to year according to German university custom but will be selected from the whole range of German lyrical production.
- GC 125B. Problems of Lyric Poetry. (4) I.**
 Professor Killy
 Using selected examples of lyric poetry, basic problems and techniques of this poetic form will be discussed. A study in depth of the poetic process.
- GC 126. Seminar on Selected Prose Texts. (5) I, (4) II.**
 Professor Killy, Dr. Schillemeit
 A selection of prose texts such as Wieland, Goethe, Stifter, and Kafka is to provide the basis for the study and practice in the fundamental concepts of stylistic analysis and the art of narration.
- GC 128. Literature of the German Romantic Period. (4) I.**
 Professor Killy
 Lecture course on the Literature of the German Romantic period. Specific topics covered will vary from year to year in accordance with German university system.
- GC 130A-130B. Advanced German Grammar and Composition. (4-4) I.**
 Professor Killy and Staff
 Prerequisite: German 108A-108B or equivalent.
 Highly intensive six weeks preparatory course for students in the Goettingen Study Center.
- GC 131A-131B. Exercises in German Style. (3-2) Yr.**
 Frau Dr. May
 Analysis of composition in terms of style with a special emphasis on needs of foreign students of German philology.
- GC 140. German Poetry in the Period of the Enlightenment. (3) II.**
 Professor Schoene
 German literature of the Period of the Enlightenment, including the history of ideas, the theory of art, and the creative writing of the period, especially Klopstock, Lessing, and Wieland.
- GC 141. Seminar on Kleist's Novellas. (4) II.**
 Professor Schoene, Herr Stenzel
 A study of narrative art and processes, especially the literary characteristics of Kleist.
- GC 145. Seminar on the Stories of Keller. (4) II.**
 Professor Schoene, Herr Stenzel
 A study of narrative art and processes based on selected stories of Keller, including literary characteristics of Keller.
- GC 149A. Seminar on Wedekind. (5) I.**
 Professor Killy, Dr. Muschg
 Outline of a theory of comedy and an intensive study of Wedekind's plays and prose works.

GC 150A. Seminar on the Novels of Wieland.

(5) I. Professor Schoene, Herr Stenzel
Methods of interpreting narrative prose and basic techniques in study of German philology. Emphasis on a single novel with a brief survey of literary history.

GC 150B. Seminar on Thomas Mann's "Buddenbrooks." (5) I.

Professor Schoene, Herr Stenzel
An introduction to the main motifs of early works of Mann with regard to content and style; introduces student to methods of prose interpretation and philological techniques.

GC 160. Seminar on Brecht's Theoretical Drama. (4) II.

Professor Killy, Dr. Muschg
Study of the technique and artistic characteristics of Brecht's doctrinal works.

History**GC 103C. Economic and Social History of the West. (1750-1832) (4) I.**

Professor Treue
Prerequisite: History 4A-4B, or equivalent.
Includes the Industrial Revolution, development of modern commerce and finance, beginnings of colonial policies of the 19th century, liberation of the European peasants, internal and external migration, constitutional problems, English parliamentary reform, and the rise of the Middle Class.

GC 103D. Economic and Social History of Western Europe. (3) II. Professor Treue

Prerequisite: History 4A-4B, or equivalent.
Covers the period from 1830 to 1914.

GC 113A-113B. History of Europe in the Nineteenth and Twentieth Centuries.

(6-4%) Yr. Professor Nürnberger
History of Europe since 1800. Specific topics to be covered will vary each year in accordance with German university custom.

GC 113C-113D. Seminar in Modern European History. (5-3%) Yr. The Staff

Seminar on various aspects of European history of the nineteenth and twentieth centuries. The specific topics covered vary each year in accordance with German university custom.

GC 113E. History of the Second World War. (4) I. Professor Schramm

Prerequisite: History 4A-4B, or consent of instructor.
The rise of the National Socialist Party; political and economic factors leading to war; the course of the War and its outcome.

GC 121-122. Medieval Europe. (5-3%) Yr. Professor Heimpel

Prerequisite: History 4A-4B, or equivalent.
History of medieval Europe (300 A.D.-1350 A.D.). Specific topics to be covered will vary each year in accordance with German university custom.

GC 143. European Nationalism.

(4) II. Professor Wittram
Prerequisite: consent of instructor.
The development of nationalism in Europe from 1848 to 1917.

GC 145A-145B. History of Early Mercantilism. (5-4) Yr. Professor Treue

Prerequisite: consent of the instructor.
Lectures, seminar, and independent study in the economic history of Europe in the seventeenth and eighteenth centuries.

GC 150C. The Russian Revolution of 1917. (5) I. Professor Wittram

Prerequisite: History 4A-4B, or consent of instructor.
The history of the Russian Revolution, including its social, economic, and political background and its results.

Mathematics**GC 105. Measure and Integration. (5) II. Professor Jacobs**

Prerequisite: consent of instructor.
Families of sets, Borel fields, measures, measurable functions, integration theory, spaces L^p , Lattices (Banach, etc.)

GC 108. Matrix Theory. (3) I. Dr. Pommerenke

Prerequisite: consent of instructor.
Operations on matrices. Elementary theory of vector spaces. Hermite normal form. Permutations, determinants. Symmetric and hermitian matrices and forms. Characteristic roots and vectors. Numerical methods.

GC 111. Analytical Geometry and Linear Algebra. (5) II. Professor Lyra

Prerequisite: Math 8 or equivalent.
Sets, equivalence relations, integral domains, fields, rings, linear transformation, vector spaces, matrices, rank, determinants, duality, bilinear and quadratic forms, similarity and canonical forms.

GC 115A-115B. Algebraic Number Theory. (6-5) Yr. Professor Maak

Prerequisite: consent of the instructor.
Elementary theory of numbers; integral quadratic forms (Zahlenkörper).

GC 122. Introduction to Theory of Complex Variables. (6) I. Professor Grauert

Prerequisite: consent of instructor.
Analytic functions, integration in the complex plane, analytic continuation, conformal mapping, introduction to applications in the engineering field.

GC 126. Introduction to Topology. (2) I. Professor Jacobs

Prerequisite: consent of the instructor.
Properties of Topological Spaces.

Music

GC 114. Chamber and Orchestra Music of the Baroque. (3) II. Professor Boetticher

This is a survey lecture on the music of the Baroque (instrumental). The various aspects: form, melody, counterpoint, etc. are discussed. The problems of style and criticism of modern performance are treated. The history is traced from about 1600 to 1750.

GC 174. Beethoven's "Missa Solemnis."

(2) II. Dr. Stephan

A seminar with research papers required of each class member, both written and orally. Each member studies a different aspect of the work, counterpoint, harmony, form, etc. The work is discussed with regard to its style and in relation to other choral works. It is seen in relation to other works and the other masses by Beethoven.

GC 175. Selected Problems in Bach

Philology. (4) I. Professor Dürr

Prerequisite: consent of the instructor.
Philological study of selected works of J. S. Bach, comparing original manuscripts with copies.

GC 176A-176B. The German Lied from Schubert to Brahms. (3-2) Yr.

Professor Boetticher

Prerequisite: consent of the instructor.
A study in depth of the German Lied from Schubert to Brahms, including Hugo Wolf.

GC 179. Seminar on Criticism of Style in the Music of Impressionism. (1½) II.

Professor Boetticher

This is a seminar covering the period from the early 1880's to the end of the first quarter of the twentieth century. Each student is required to do an oral report up to 45 minutes on some aspect of composition of the Impressionistic School of composition. The period is discussed in relation to the historical past as well as its influence on the modern period.

GC 186. The Life and Work of Alban Berg. (2) II.

Dr. Stephan

This is a survey lecture on the life and work of Berg and his place in and influence on modern music. Various pieces are analyzed and compared with his entire product and those of other composers of his time, e.g. Schoenberg, Webern. His development as a composer is studied.

Philosophy

GC 187. Logic, Language and Reality. (3) I.

Professor Patzig

Prerequisite: consent of the instructor.
Study of the development, meaning, and interrelationship of logic, language, and reality.

Physics

GC 109. Transistors and Diodes.

(1) II. Dr. Kuttuff

Prerequisite: consent of instructor.
General theory of transistors and diodes.

GC 111. Technique of Electronic Measurement. (3) II.

Professor Meyer
Prerequisite: consent of instructor.
Laboratory techniques in electronics.

GC 113A(L)-113B(L). Advanced Physics Laboratory. (2-2) Yr.

Professor Flammersfeld

Prerequisite: consent of the instructor.
Includes such experiments as electron diffraction, Wilson chamber, Franz Herz, x-ray diffraction, and optics.

GC 114. Theory of Electricity.

(5) I. Professor Lüders

Prerequisite: consent of the instructor.
Electromagnetic phenomena with emphasis on physical concepts; introduction to mechanics, vector-analysis, electrostatic fields in empty space and insulators, induction phenomena, and application of Maxwell's theory to magnetic fields.

GC 114 (S). Theory of Electricity.

(Seminar). (1) I. Professor Lüders

Prerequisite: Physics GC 114 taken concurrently.

GC 122. Fundamental Experiments for the Quantum Theory. (2) I.

Dr. Sander

Prerequisite: consent of instructor.
Description of the fundamental physical phenomena that form the foundation of quantum theory.

GC 124A-124B. Introductory Nuclear Physics. (2-2) Yr.

Professor Flammersfeld

Prerequisite: Calculus and consent of the instructor.
Radioactivity, elementary particles, and nuclear reactions.

GC 125. Neutron Physics. (2) I.

Professor Schmidt-Ott

Prerequisite: consent of the instructor.
The discovery of the neutron; its magnetic moment, interaction with nuclei, and decay.

GC 135. Atomic and Nuclear Moments.

(1) II. Professor Schmidt-Ott

Prerequisite: consent of instructor.
General description of atomic moments and nuclear moments.

GC 198. Selected Topics in Modern Physics. (1½) I.

Professor Schmidt-Ott

Prerequisite: consent of instructor.
Selected topics in modern physics, including X-ray and gamma radiations.

Political Science

GC 140A-140B. The Theory of Politics.

(7-5) Yr. Professor Seidel

Problems concerning the nature and influence of state bureaucracy. The bureaucracy of pressure groups and political parties, party ideologies, and major twentieth century developments will be discussed, particularly as they affect Germany.

Psychology**GC 148. Psychology of Personality.**

(5) I. Professor Gottschaldt

Prerequisite: consent of instructor.

Modern psychology as approached through the study of personality. Neurological, ethological, genetic, environmental, and psycho-pathological evidence is examined. Problems considered include attitudes, prejudices, memory, association, and personality diagnosis.

Sociology**GC 101A-101B. General Sociology.**

(5-4) Yr. Professor Bahrdt

A study of the hypotheses, principles, and problems of sociology.

GC 120. Sociology of the Family.

(4) II. Professor Bahrdt

The human family, past and present; adjustments in the modern family.

GC 188A-188B. Analysis of Contemporary**Society. (7-5) Yr. Professor Bahrdt**

The role of such factors as science, technology, industrialization and bureaucracy; developed through lectures, seminars, and tutorial discussions.

THE MADRID STUDY CENTER

The courses below are the University of California selections from the regular offerings of the University of Madrid. Several courses may be added in 1965-66. In addition, the University of California students may audit widely throughout the University of Madrid.

Anthropology**MC 105. Anthropology and Ethnology of the Americas. (8) Yr.**

Professor Esteva Fabregat

An introduction to the theory and methods of anthropology and a study of the anthropology and ethnology of North and South America with special attention to indigenous cultures.

Art**MC 116. Spanish Painting. (8) Yr.**

Professor Azcárate

The history of Spanish painting through the collection of the Prado Museum.

Economics**MC 104. Problems in Economics. (8) Yr.**

Professor Vicente-Arche

Monographic study of economic theory illustrated with Spanish examples.

Geography**MC 123. Geography of Spain. (8) Yr.**

Professor Terán

Study of the geography of Spain.

History**MC 160A. The Spanish Empire. (8) Yr.**

Professor Hernández Sánchez-Barba

The Spanish conquest and colonization of the Americas.

***MC 160B. Spain in the Middle Ages.**

(8) Yr. Professor Pérez de Urbel

History of Spain in the Middle Ages.

* Not to be given, 1965-66.

MC 160C. Modern Spain. (8) Yr.

Professor Jover

History of Spain from the Renaissance to modern times.

***MC 160D. The Spain of Philip II. (8) Yr.**

Professor Moxó

Monographic study of the Spanish Empire under Philip II.

MC 160E. Spanish Legislation in the

Americas. (8) Yr. Professor García Gallo
Study of Spanish legislation and jurisprudence in the American colonies.

MC 160F. Recent History of Spain.

(8) Yr. Professor Palacio Atard

A history of Spain from the Napoleonic invasion (1808) to the end of the Civil War (1939).

MC 162. Introduction to Spanish Civiliza-*tion. (2) I. Professor Powell and Staff**

Contemporary Spain: its recent historical background, regional characteristics, governmental institutions, economy, art, architecture, education, and customs and mores.

Sociology**MC 132. Urban Sociological Problems.**

(8) Yr. Professor Terán

Readings and discussion of the sociological problems pertaining specifically to the cities of Spain.

Spanish**MC 25A-25B. Advanced Spanish.**

(3-3) I. The Staff

Prerequisite: Spanish 4 or equivalent.
Intensive preparatory course.

MC 105. Pérez Galdós and the Realistic Novel. (8) Yr. Professor Valbuena Prat
Monographic study of the nineteenth century novel and its principal exponent.

MC 106. History of the Spanish Language. (8) Yr. Professor Bustos
A philological course for students specializing in Romance languages and literatures.

MC 107. Spanish American Literature. (8) Yr. Professor Morales
Survey of Spanish American literature, from the sixteenth century to the contemporary.

MC 109. Spanish Literature to the Seventeenth Century. (8) Yr. Professor Entrambasaguas
Survey of Spanish literature from its beginnings through the Golden Age.

MC 110. Modern Spanish Literature. (8) Yr. Professor Rozas
Survey of modern Spanish literature from 1700 to the present.

MC 112. The Life and Work of Lope de Vega. (8) Yr. Professor Entrambasaguas
Monographic study of Lope de Vega's dramatic theory, analysis of selected works, and discussions of his relationship to the other authors of the Golden Age.

MC 116A-116B. Advanced Grammar and Composition. (3-3) I. The Staff
Prerequisite: Spanish MC 25A-25B, or equivalent.
An advanced course in conversation, grammar, and composition. Intensive preparatory course.

***MC 118A. The Life and Work of Juan Ruiz.** (8) Yr. Professor Criado de Val
Monographic study of the work and times of a major medieval poet and of the beginning of the medieval theater.

MC 118B. Unamuno and Ortega y Gasset. (8) Yr. Professor Cimadevilla
Monographic study of two outstanding writers and philosophers of the twentieth century.

* Not to be given, 1965-66.

THE PADUA STUDY CENTER

The courses listed below are the 1964-65 University of California selections from the regular offerings of the University of Padua. With some additions and substitutions these courses may be taken for academic credit by the 1965-66 participants.

The University of California students may audit widely throughout the University of Padua.

Anthropology

PC 103A-103B. Prehistorical Civilizations. (4-4) Yr. Professor Polacco
Course will vary in specific content from year to year according to the Italian university system.

Art

PC 105A-105B. History of Art. (4-4) Yr. Professor Polacco
Prerequisite: consent of instructor.
Archeology and history of Greek and Roman art with intensive emphasis on the art of the Venetian region in the Roman Era.

PC 108A-108B. Italian Renaissance Art. (4-4) Yr. Professor Pallucchini
Course which will deal intensively with particular aspects of the general subject cited but will vary in specific content from year to year according to the Italian university system.

Classics

PC 100A-100B. Greek Language and Civilization. (4-4) Yr. Professor Zadro
Greek Civilization, including development of the arts, science and literature; an intensive period of Greek history; basic language requirements which will enable the student to understand the development of the Greek language and original passages he will encounter. Content will vary from year to year in accordance with Italian university custom.

History

PC 109A-109B. Ancient History. (4-4) Yr. Professor Sartori
A course in Roman history which will deal intensively with particular aspects of the general subject cited but will vary in content from year to year.

PC 113A-113B. History of Europe in the Nineteenth and Twentieth Centuries. (4-4) Yr. Professor De Rosa
Prerequisite: consent of instructor.
Emphasis on a detailed study of Italian politics before World War I. Specific contents will vary from year to year in accordance with Italian university custom.

PC 125A-125B. History of Europe from the Renaissance to the Nineteenth Century. (4-4) Yr. Professor Seneca
Course which will deal intensively with particular aspects of the general subject cited but will vary in content from year to year.

Italian

PC 101A-101B. Grammar, Composition and Conversation. (4-4) I. Professor Policardi and Staff
Prerequisite: Italian 4 or equivalent.
Original composition; translation and discussion of selected passages from Italian literature; conversation; lectures on Italian language and literature. Highly intensive six weeks preparatory course for students in the Padua Center.

PC 112A-112B. History of Modern and Contemporary Italian Literature. (4-4) Yr.

Professor Pullini

General history of Italian literature from 1850 to the present. Includes intensive monographic studies which vary from year to year according to the Italian university system.

PC 130A-130B. Advanced Grammar, Composition and Conversation. (4-4) I.

Professor Policardi and Staff

Prerequisite: Italian 101A-101B or equivalent.

An emphasis on original composition, grammar review and analysis in greater depth, conversation, and lectures on Italian language and literature. Highly intensive six weeks preparatory course for students in the Padua Center.

PC 160A-160B. Italian Literature and Criticism. (5-5) Yr. Professor Branca

Prerequisite: consent of instructor.

History of Italian literature from its origins to the present day, including currents of criticism and philology. The *Divine Comedy* is studied. The monographic portion of the course varies from year to year according to Italian university custom.

Political Science**PC 125A-125B. History of Treaties and International Policy.** (5-5) Yr.

Professor Ancheri

Course which will deal intensively with particular aspects of the general subject cited but will vary in specific content from year to year. Study of basic documents.

THE TOKYO STUDY CENTER

The courses listed below are the 1964-65 University of California selections from the regular offerings (in English) of the International Christian University in Mitaka-Tokyo. With some additions and substitutions, these courses may be taken by the 1965-66 participants.

The Fall, Winter, and Spring semesters are indicated by I, II, and III respectively.

Anthropology**TC 125A-125B. Social Anthropology.**

(3-3) I, II.

Professor Newell

Prerequisite: principles of Sociology or consent of instructor.

The principles of political, kinship, legal, religious, and economic organization as illustrated by the study of particular tribal groups.

TC 135A-135B. Introduction to the Study of Asian Societies. (3-3) I, II.

The Staff

Study of the chief cultural traditions of Asia and of the character of their different responses to the Western impact. A—China and Korea; B—India and Japan.

TC 137. Culture Change in Japan. (3) III.

Professor Kiyoko Cho

Prerequisite: consent of instructor.

A study of the cultural modernization of Japan, emphasizing both ideology and social structure.

Art**TC 10. Introduction to the Art of the Far East.** (3) I.

Professor Kidder

The architecture, sculpture, painting, and minor arts of China, Korea, and Japan from prehistoric to modern times.

TC 11. Introduction to Western Art. (3) II.

Professor Kidder

The architecture, sculpture, and painting of Europe.

TC 102A. The Art of India. (3) I.The Staff
The architecture, sculpture, painting, and minor arts of Prehistoric, Buddhist, and Mogul India.**TC 102B. The Art of Japan.** (3) II.The Staff
The development of Japanese art from prehistoric times to the twentieth century is traced in the fields of architecture, sculpture, painting, and the minor arts.**TC 102C. The Art of China.** (3) II.

Professor Yamada

A survey of Chinese art from prehistoric times to modern, with emphasis on stylistic characteristics and changes in architecture, sculpture, painting, pottery, and the metal crafts.

TC 199. Independent Studies in Art.

(1-4) I.

The Staff

Prerequisite: consent of department.

Special independent work in the history of art.

Biology**TC 140. Principles of Ecology.** (3) III.

Professor Hoslett

Prerequisite: six units of biological science.

A study of the inter-relationship between living organisms and their environment; biological zones, relationships between organisms, plant succession, and specific modifications.

TC 194. Group Studies in Biology.

(2) I, II, III.

The Staff

Prerequisite: consent of department.

Independent study of topics of particular interest and value to the individual student. (UCD students may repeat this course for a maximum of four units.)

Zoology**TC 106. Comparative Vertebrate Anatomy.**

(3) II. Professor Hoslett

A comparative study of the gross structural anatomy of several major vertebrate groups, specifically the Prochordates, the fishes, and the mammals. Traces evolutionary development with emphasis on the circulatory, excretory, and nervous systems.

TC 114. Vertebrate Biology. (3) I.

Professor Hoslett

A study of major groups of vertebrates with emphasis on taxonomy, geographic distribution, ecology, and methods for research study in the field.

Dramatic Art**TC 143. Dramatic Interpretation. (2) I.**

Professor Cubbage

The analysis, adaptation, and oral presentation of dramatic literature, including dialogue, choral reading, and the development of characterization.

TC 199. Independent Studies in Drama.

(2-6) I, II, III. Professor Shumaker

Prerequisite: consent of instructor.
Study of Japanese drama, both classical and modern, culminating in a research paper.

Economics**TC 1B. Principles of Economics. (3) I.**

Professor Sun

Prerequisite: Economics 1A.
The elements of economics, with an emphasis on micro-theory.

TC 114. Economic Development. (3) III.

Professor Sun

Prerequisite: Economics 1A-1B.
Theories of economic development. Problems of accelerated development in poor countries and of maintaining development in rich countries.

TC 115. Economic Development of China and India. (3) II.

Professor Sun

Prerequisite: Economics 1A-1B.
Comparative study of the economic development of China and India.

TC 119. Economic Development of Modern Japan. (3) II.

The Staff

Prerequisite: Economics 1A-1B.
Study of the historical bases of Japan's modern industrial and financial systems; the role of foreign trade in economic development; the origins and significance of such problems as the dual structure and disguised unemployment.

TC 135. Money and Banking in Japan.

(3) II. Professor Sun

Prerequisite: Economics 1A-1B, or consent of instructor.
Functions of money in the economic system; monetary values and price movement; quantity theory; income theory; fiscal policy.

TC 153. Labor Problems in Japan. (3) I.

Professor Iwas Ayusawa

Prerequisite: consent of instructor.
Study of the origin and peculiar nature of labor problems in Japan; development of labor laws; extent and character of trade unions; labor disputes; systems of mediation, conciliation, and arbitration.

TC 180. International Trade and Commercial Policy. (3) II.

Professor Odaka

Prerequisite: Economics 1A-1B.
Classical theory of international trade, and recent modifications. The gold standard, inconvertible paper currencies, problems of exchange, theory of capital movement, government controls, import quotas, barter and reciprocal trade agreements, the economic development of backward areas, and related problems.

Education**TC 117. Guidance in Secondary Schools.**

(3) II. Professor Bale

The role of guidance in the teaching process and in the learning experience.

English**TC 111A. English Literature: 1740-1805.**

(3) I. Professor Hardie

A survey of the characteristics of the literature of the period and of its background.

TC 111B. English Literature: 1805-1830.

(3) I. Professor Hardie

A survey of the characteristics of the literature of the period and of its background.

TC 111C. English Literature: 1830-1900.

(3) II. Professor Hardie

A survey of the characteristics of the literature of the period and of its background.

TC 111D. English Literature: 1900 to the

Present. (3) II. Professor Hardie

A survey of the latest developments in English literature.

***TC 120A-120B. Tragedy. (3-3) I, II.**

Professor Hardie

Focuses on the moral and religious implications of tragedy. Works read include, in the first term, Aristotle's *Poetics*, Greek tragedies, and early religious tragedies in England; in the second, tragedies by Shakespeare and other writers up to the Restoration.

TC 131A-131B. Survey of American

Literature. (3-3) I, II. The Staff

Survey of American literature from the colonial period to the present time.

TC 133. American Poetry. (3) III. The Staff

Introduction to American poetry.

* Not to be given, 1965-66.

Japanese

TC 1A-B-C. Elementary Japanese.

(4-4-4) I, II, III.

The Staff

Elementary course in the Japanese language; pronunciation, basic structure, conversation, and idiom. Includes Kana and some simple Kanji, but the principal emphasis is on conversational vocabulary.

TC 2A-2B. Semi-Intensive Japanese.

(6-6) I, II.

The Staff

Beginning course in oral and written Japanese, including pronunciation, basic structure, conversation, and reading and writing of Kana and Kanji.

TC 3. Intensive Japanese. (12) I.

The Staff

An intensive beginning course in oral and written Japanese. Includes pronunciation, grammar, and the reading and writing of Kana and Kanji.

TC 109. Intermediate Japanese. (6) III.

The Staff

Prerequisite: Japanese TC 2B.

Further study of oral and written Japanese. Includes grammar and the reading and writing of Kana and Kanji.

TC 119A-119B. Advanced Japanese.

(12-12) II, III.

The Staff

Prerequisite: Japanese TC 3.

Full-time advanced study of oral and written Japanese.

Linguistics

TC 150A-150B. Comparative Indo-European Linguistics. (3-3) I, II.

Professor Ege

Prerequisite: six units of a European language other than English; consent of instructor.

The reconstruction of Indo-European, with particular reference to Germanic, Romance, and Slavic languages. The historical approach to phonology, morphology, and other aspects of grammar is considered, especially in relation to modern linguistic theory.

History

TC 185A. Introduction to Japanese History.

(3) III.

Professor Miller

A survey of Japanese history from ancient times to 1600.

TC 185B. History of Japan. (3) I.

Professor Miller

The history of Japan from 1600 to the present.

TC 195A-B-C. Senior Thesis. (2-2-2)

I, II, III.

The Staff

Prerequisite: consent of department.

Preparation of a thesis in the student's field of interest under the supervision of a staff member of appropriate specialization.

Mathematics

TC 3A-3B. Analytic Geometry and Calculus, I and II. (3-3) I, II.

Professor Geeslin

Prerequisite: Advanced algebra, trigonometry. An introduction to differential and integral calculus supplemented by analytic geometry.

TC 118A-118B. Real Analysis. (2-2) II, III.

Professor Geeslin

Prerequisite: consent of instructor. Includes an introduction to real analysis, i.e., theoretical foundations of calculus, point set theory, Lebesgue integral, Fourier analysis, etc.

TC 122. Theory of Complex Variables.

(2) III.

Professor Geeslin

Prerequisite: consent of instructor. Theory of functions of one complex variable. Includes conformal mappings, complex integration, regular functions and harmonic functions, analytic functions and analytic continuation, Riemann surfaces, elliptic functions, gamma functions, Bessel functions, and other special functions.

TC 194A-194B. Group Studies for Advanced Students. (3-3) I, II.

The Staff

Prerequisite: consent of instructor. Topics in functional analysis, theory of probability, number theory, Riemannian geometry, algebraic topology, etc.

Philosophy

TC 123. Comparative Ethics: The Chinese

Tradition. (3) II. Professor Norimoto Iino

Study of Confucian, Taoist, and Buddhist philosophies and their relationship with Western Thought.

TC 132. Semantics. (3) III.

Professor Takeshi Saito

Prerequisite: consent of instructor. Analysis of modern investigations on the implications and the use of language for clarity, accuracy, and proper evaluation; the role of language in the development of conflict, confusion, and prejudice; the phenomena of identification, over-simplification, distortion, abstracting, ambiguity, and projection.

TC 198A-B-C. Readings in Philosophy.

(2-2-2) I, II, III.

Professor Norimoto Iino

Prerequisite: admission by special arrangement. Individual readings of the works of specific philosophers.

Physics

TC 11. Introduction to the Physical Sciences.

(3) II.

Professor Worth

To assist an understanding of natural phenomena and the values and limitations of science and its methods. The emphasis is on the physical sciences. An attempt is made to integrate the physical, chemical, and geological facts of nature.

TC 124. Nuclear Physics. (3) II.

Professor Worth

Prerequisite: consent of instructor.

Nuclear phenomena and theory. Includes study of nucleons and nuclear structure, nuclear transformation process, the interactions of nuclear radiation with matter, the machines and devices of nuclear physics, and cosmic radiation.

Political Science**TC 46. World Politics. (3) I.**

Professor Dugliss

Study of the factors affecting international relations and the basic policies of selected national states.

TC 120. Government of the United States.

(3) II.

Professor Dugliss

Prerequisite: six units of political science or consent of instructor.

Constitutional structure of the United States national, state, and local governments. Analysis of the operation of government in the United States in the light of both theory and social process.

TC 122. International Politics: Selected Problems. (3) II.

Professor Soon Sung Cho

Prerequisite: six units of political science or consent of instructor.

Study of the basic elements in different kinds of international conflict. Detailed study of one or more contemporary problems in international relations with some attention to primary sources.

TC 137. Political and Social Development of Southeast Asia. (3) I.

The Staff

Prerequisite: consent of instructor.

Development of the societies of Southeast Asia from the colonial period to the present. Comparison of the major colonial regimes and their impact on indigenous cultures; postwar developments; comparative analysis of contemporary national problems.

TC 138. Japanese Government and Politics. (3) II.

Professor Inomata

An analysis of the structure and functions of Japanese government. Structural description and functional analysis of Japanese political parties. Special emphasis on historical background of the Constitution and leading Supreme Court cases.

TC 151. Parties and Elections. (3) II.

Professor Dugliss

Prerequisite: six units of political science or consent of instructor.

A study of the practical adaptations of political theory. Electoral and party systems in various countries, but especially in Great Britain, the United States, France, and Japan.

TC 185A-185B. Modern Japanese Political Thought. (3-3) I, II.

Professor Tatsuo Arima

Prerequisite: consent of instructor.

A study of the political thought which shapes contemporary Japan. Traces the current streams of political thought in their historical, legal, and social origins from China, Japan, and the West.

TC 199. Independent Study in Political Science. (1-4) I.

The Staff

Prerequisite: consent of the department.
Special independent work in political science.

Religious Studies**TC 10. Introduction to the Judeo-Christian Heritage. (3) III.**

Professor Barksdale

An introductory study of the Judaic and Christian Scriptures.

TC 115A-B-C. Readings in the Texts of Religion. (3-3-3) I, II, III.

The Staff

Prerequisite: consent of department.

Study of the ideas of the great religious thinkers of all ages, reading of their works, in the original language when possible.

TC 116A-116B. Literature and Religion of the New Testament. (3-3) I, II.

Professor Barksdale

Prerequisite: consent of instructor.

Introduction to early Christianity and its literature, with special consideration of the Jewish matrix and its adaptation to the Hellenistic world.

Sociology**TC 173. Sociology of American Religious Institutions. (3) II.**

Professor Lee

Prerequisite: consent of instructor.

Conceptual approaches to the study of religion; the nature of religious inquiry; theories of sectarianism; religion and class stratification; the impact of religion on Western culture.

Speech**TC 107. Argumentation and Debate. (3) II.**

Professor Cabbage

Prerequisite: consent of instructor.

The study of argumentation and logical discourse.

TC 158. Discussion and Conference. (3) I.

Professor Cabbage

Principles and practice of discussion and group dynamics in committees, conferences, panels, and symposia.

THE BOGOTA STUDY CENTER

The University of California Study Center, Bogotá will open in fall, 1965. Each participant will elect a program of courses from among the regular offerings of the University of the Andes. For the most part, these courses will be in fields related to Latin American studies.

THE HONG KONG STUDY CENTER

The University of California Study Center, Hong Kong will open in fall, 1965 for both undergraduate and graduate students. The undergraduates will elect programs from among the regular courses offered by Chung Chi College in the English language. While not required to have a knowledge of the Chinese language, all undergraduates will include the study of Chinese in their programs at Chinese University of Hong Kong.

THE UNITED KINGDOM STUDY CENTER

The University of California Study Center in the United Kingdom will open in fall, 1965. The participants will study at the Universities of Birmingham, Edinburgh, and Sussex where they will elect courses in the Arts, Humanities, and Social Sciences. Students selected to study at the University of Sussex will also be able to elect courses in the Natural Sciences.

ENGINEERING

Roy Bainer, M.S., *Dean of the College*
College Office, 204 Walker Engineering Building

LOWER DIVISION COURSES

- 1A. Plane Surveying.** (3) I. Mr. Allen
Lecture—2 hours; laboratory—3 hours.
Prerequisite: plane trigonometry. Not open to students in Engineering.
Principles; field practice; calculations and mapping with special reference to irrigation, drainage, and agricultural engineering problems.
- 3. Engineering Methods.** (4) I and II. Mr. Goss
Lecture—2 hours; laboratory—6 hours.
Prerequisite: Mathematics 9A (may be taken concurrently). Not open to students who have received credit for course 1A.
Elementary problems in engineering measurement, instrumentation, and data analysis applied to plane surveying, temperature fluid flow, electrical and other physical quantities. Introduction to electronic analog and digital computers, with actual elementary programming applications.
- 4. Engineering Geometry.** (3) I and II. Mr. Hart
Lecture—2 hours; laboratory—3 hours.
Prerequisite: mechanical drawing; trigonometry; Mathematics 9A (may be taken concurrently).
Principles of descriptive geometry and of mechanical and freehand drawing; their application in the representation, visualization, and solution of engineering problems.
- 35. Statics.** (3) I and II. Mr. Badoux, Mr. Hanson
Lecture—3 hours.
Prerequisite: Physics 4A; Mathematics 9C (may be taken concurrently).
Force systems and equilibrium conditions with emphasis on engineering problems covering structures, distributed forces, beams, cables, and friction. Includes graphical solutions and an introduction to the method of virtual work.
- 45. Properties of Materials.** (3) I and II. Mr. Krause
Lecture—2 hours; laboratory—3 hours.
Prerequisite: sophomore standing in engineering.
An introductory course on the properties of engineering materials. Applications of basic principles to the selection and use of engineering materials.

UPPER DIVISION COURSES

- 100A. Electronics.** (3) I and II. Mr. La Patra, Mr. Soohoo
Lecture—3 hours.
Prerequisite: Mathematics 109, or the equivalent; Physics 4B.
Basis circuit analysis techniques; transient and steady state solutions from differential equation viewpoint; equivalent circuits for active devices.
- 101. Electrical Laboratory.** (2) I and II. ———, Mr. Green
Laboratory—6 hours.
Prerequisite: course 100A (should be taken concurrently).
Instruction and practice in the use of basic electronics devices and measuring instruments. Laboratory problems involving both experimental and analytical design techniques. Problem topics include passive and active circuits, electromechanical devices, signal analysis and nonlinear components.

- 102. Dynamics.** (3) I and II. Mr. Henderson, Mr. Hutchinson
Lecture—3 hours.
Prerequisite: course 35; Mathematics 109 or the equivalent.
Kinematics and kinetics of a particle and of rigid bodies as applied to engineering problems. Force, energy, and momentum methods of solution. Introduction to mechanical vibrations.
- 103. Elementary Fluid Mechanics.** (3) I and II. Mr. McKillop
Lecture—3 hours.
Prerequisite: course 102.
The principles of mechanics applied to the statics and to the flow of incompressible fluids.
- 104. Mechanics of Materials.** (3) I and II.
Lecture—3 hours. Mr. Whitaker, Mr. Herrmann, Mr. Badoux
Prerequisite: course 35.
Elastic and ultimate resistance of materials; stress and deformation analysis of bars, shafts, and beams; combined stresses; columns; elements of design for wood and metal members.
- 105. Thermodynamics** (3) I and II. Mr. Leonard, Mr. Bell
Lecture—3 hours.
Prerequisite: course 102 (may be taken concurrently); Chemistry 1B or 8; Physics 4C.
Thermodynamics of one-component systems; equations of state; first and second laws applied to both closed and steady flow systems; phase equilibrium; work-producing and work-absorbing cycles; measures of performance.
- 106. Engineering Economics.** (3) I and II. Mr. Krone
Lecture—3 hours.
Prerequisite: upper division standing in engineering.
The analysis, synthesis and evaluation of problems in engineering economics; operations research techniques; relevant differences between alternatives; discounted cash flow concept; income tax considerations; recovery of proposed investment plus return commensurate with the risk.
- 190. Professional Responsibilities of Engineers.** (2) I and II. Mr. McDonald
Lecture—2 hours.
Prerequisite: senior standing in Engineering.
Professional ethics and social responsibilities of engineers; introduction to contracts and elements of business law; engineering organization; engineering specifications; written and oral presentation of short technical reports.

GRADUATE COURSE

- 230. Engineering Analysis.** (3) II. Mr. Giedt
Lecture—3 hours.
Prerequisite: Mathematics 109 or equivalent.
Methods of theoretical analysis of typical engineering problems in heat transfer, fluid mechanics, electrical network, mechanical vibrations, and elasticity.

ENGINEERING: AGRICULTURAL

Coby Lorenzen, M.S., *Chairman of the Department*
Department Office, 206 Walker Engineering Building

S. Milton Henderson, M.S., *Professor of Agricultural Engineering.*
Robert A. Kepner, B.S., *Professor of Agricultural Engineering.*
Coby Lorenzen, M.S., *Professor of Agricultural Engineering.*
Loren W. Neubauer, Ph.D., *Professor of Agricultural Engineering.*
William J. Chancellor, Ph.D., *Associate Professor of Agricultural Engineering.*
John R. Goss, M.S., *Associate Professor of Agricultural Engineering.*
Samuel A. Hart, Ph.D., *Associate Professor of Agricultural Engineering.*
Robert B. Fridley, M.S., *Assistant Professor of Agricultural Engineering.*
Errol D. Rodda, Ph.D., *Assistant Professor of Agricultural Engineering.*

UPPER DIVISION COURSES**

- 112. Unit Operations in Agricultural Processing.** (3) II. Mr. S. M. Henderson
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Chemical Engineering 186.
Thermodynamic and mass transfer procedures applied to such processes as drying, dehydration, refrigeration, size reduction, separation, and materials handling.
- 114. Principles of Farm Machinery.** (3) I. Mr. Kepner
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Engineering 102.
Functional requirements, basic principles, and performance characteristics of field machines. General design considerations, cost analysis, testing methods, and laboratory studies of specific machines.
- 115. Farm Structures Design.** (3) I. Mr. Neubauer
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Engineering 102.
The design of farm buildings including houses, storage buildings, and production structures, with emphasis on functional requirements and characteristics of materials. Study of the principles of lighting, heating, insulating, water supply, and sanitation.
- 116. Agricultural Power.** (3) II. Mr. Chancellor
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Engineering 105.
Principles of internal combustion engines and accessories for stationary and mobile power. Design criteria for agriculture.
- 198. Directed Group Study.** (1-5) I and II. The Staff
Prerequisite: senior standing in engineering with at least a B average.
Group study of selected topics. Student groups may be organized in instrumentation and design problems. Students may enroll in one or more separate subjects.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

** Agricultural Engineering is also a department in the College of Agriculture. For a complete roster of the faculty and additional courses offered primarily for students enrolled in that college, see page 109.

GRADUATE COURSES

290. Seminar. (1) II.

The Staff

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.

298. Group Study. (1-5) I and II.

The Staff (Mr. Lorenzen in charge)

The topics treated are dependent upon the availability of staff and student interest.

299. Research. (1-6) I and II.

The Staff

ENGINEERING: APPLIED SCIENCE

Edward Teller, Ph.D., *Chairman of the Department.*
Albert J. Kirschbaum, Ph.D., *Vice-Chairman of the Department.*
Department Office, TB106

Stewart D. Bloom, Ph.D., *Professor of Applied Science.*
Edward Teller, Ph.D., *Professor of Applied Science.*
Richard J. Borg, Ph.D., *Associate Professor of Applied Science.*
Carl A. Jensen, Ph.D., *Assistant Professor of Applied Science.*
Wilson K. Talley, Ph.D., *Assistant Professor of Applied Science.*



Berni J. Alder, Ph.D., *Lecturer in Applied Science.*
Sidney S. Fernbach, Ph.D., *Lecturer in Applied Science.*
Harold P. Furth, Ph.D., *Lecturer in Applied Science.*
Montgomery H. Johnson, Ph.D., *Lecturer in Applied Science.*
John Killeen, Ph.D., *Lecturer in Applied Science.*
Albert J. Kirschbaum, Ph.D., *Lecturer in Applied Science.*
Leroy D. Krider, B.S., *Lecturer in Applied Science.*
Cecil E. Leith, Ph.D., *Lecturer in Applied Science.*
Michael M. May, Ph.D., *Lecturer in Applied Science.*
Richard F. Post, Ph.D., *Professor of Applied Science in Residence.*

UPPER DIVISION COURSE

Davis Campus

100. **Production and Use of Nuclear Energy.** (3) I. Mr. Talley
Lecture—3 hours.
Prerequisite: Mathematics 109, Physics 4C.
Introduction to nuclear energy; controlled fission reactors; peaceful uses of nuclear explosives; controlled thermonuclear fusion.
115. **Elements of Programming.** (3) II. _____
Lecture—3 hours.
Prerequisite: Mathematics 109.
Lectures and laboratory work on electronic digital computers concerning programming systems, languages, flow charts, and numerical analysis. Applications to engineering problems.

GRADUATE COURSES

Davis Campus

- 230A-230B. **Structure of Matter.** (3-3) Yr. Mr. Teller, Mr. Jensen
Lecture—3 hours.
Prerequisite: course 110B or Mathematics 220A, course 270 or Electrical Engineering 181.
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.
- 240A-240B. **Nuclear Reactor Analysis.** (3-3) Yr. Mr. Talley
Lecture—3 hours.
Prerequisite: course 110B or Mathematics 220A (may be taken concurrently).
The analytic techniques used in studying the physics of nuclear reactors.

245. Nuclear Reactor Systems. (3) II. Mr. Talley

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, isotope separation.

***260. Statistical Theory of Equilibrium and Transport Phenomena. (4) I.**

Lecture—4 hours.

Prerequisite: course 120 or Physics 121 and course 110A or Mathematics 109.

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; transport of neutrons and radiation.

290. Seminar. (1-2) I and II. The Staff**298. Group Study. (1-3) I and II.** The Staff

Lecture—1-3 hours.

Advanced study in various fields of applied science. Topics may include neutron physics, nuclear technology, advanced hydrodynamics, plasma physics, advanced mathematics, or other selected subjects.

299. Research (1-6) I and II. The Staff

Individual study and research.

UPPER DIVISION COURSES

*Livermore***110A-110B. Mathematical Methods. (3-3) Yr.** Mr. Killeen

Lecture—3 hours.

Prerequisite: Mathematics 109.

Infinite series; infinite integrals; functions of a complex variable; series solution of ordinary differential equations; Legendre functions; Bessel functions; Fourier series and integrals; Fourier and Laplace transforms; vectors; matrices; orthogonal functions; eigenvalue problems; vector analysis; boundary value problems; conformal mapping.

115. Elements of Programming (3) II. Mr. Krider

Lecture—3 hours.

Prerequisite: Mathematics 109.

Lectures and laboratory work on electronic digital computers concerning programming systems, languages, flow charts and numerical analysis. Applications to engineering problems.

120. Chemistry for Physicists and Engineers. (4) I. _____

Lecture—4 hours.

Prerequisite: Chemistry 1B and Mathematics 9C or the equivalent.

Concepts of chemistry and physical chemistry, including atomic and molecular structure and the properties of liquids and solids.

* Not to be given, 1965-1966

GRADUATE COURSES

Livermore

- 210A-210B. Advanced Mathematical Methods for the Physical Sciences** (3-3) Yr. Mr. Killeen
Lecture—3 hours.
Prerequisite: course 110B or Mathematics 220A.
Theory and solution of initial value and boundary value problems for hyperbolic, parabolic, and elliptic partial differential equations, with emphasis on computational techniques and non-linear equations. Applications from hydrodynamics, transport theory, wave propagation, and plasma physics.
- 220. Advanced Physical Chemistry (3) I.** Mr. Borg
Lecture—3 hours.
Prerequisite: course 120 or Chemistry 109 or Chemistry 110A.
Advanced chemical thermodynamics, chemical kinetics, electrochemistry.
- 221. Physical Chemistry of Solids. (3) II.** Mr. Borg
Lecture—3 hours.
Prerequisite: course 220.
Crystal structure, heterogeneous equilibria, thermodynamics of the solid state, solid state reactions, dislocation theory, strength properties of materials, radiation damage.
- 230A-230B. Structure of Matter. (3-3) Yr.** Mr. Teller
Lecture—3 hours.
Prerequisite: course 110B or Mathematics 220A, course 270 or Electrical Engineering 181.
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.
- 231A-231B. Theory of The Solid State. (3-3) Yr.** Mr. Johnson
Lecture—3 hours.
Prerequisite course 230A-230B.
Structure, binding, and mechanical properties of crystals; dielectrics, electrons in metals, metals and alloys; magnetism, superconductivity, and semiconductors.
- 235. Nuclear Physics. (3) I and II.** Mr. Bloom
Lecture—3 hours.
Prerequisite: course 230A-230B.
Basic properties of nuclei, radioactive decay, nuclear models; low-energy nuclear reactions; neutron physics; interaction of particles and radiation with matter.
- 240A-240B. Nuclear Reactor Analysis (3-3) Yr.** Mr. Kirschbaum
Lecture—3 hours.
Prerequisite: course 110B or Mathematics 220A (may be taken concurrently).
The analytic techniques used in studying the physics of nuclear reactors.
- 245. Nuclear Reactor Systems. (3) 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, isotope separation.

250. Continuum Mechanics. (3) I and II. Mr. Leith

Lecture—3 hours.

Prerequisite: course 110B or Mathematics 220A.

Tensor notation, algebra, and analysis. Theory of elasticity, stress-strain relations, strain energy, reciprocity laws, elastic waves. Hydrodynamics of compressible and incompressible flows in two and three dimensions.

260. Statistical Theory of Equilibrium and Transport Phenomena. (4) II.

Lecture—4 hours.

Mr. Alder

Prerequisite: course 120 or Physics 121 and course 110A or Mathematics 109.

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; transport of neutrons and radiation.

270. Electromagnetic Theory. (3) I. Mr. May

Lecture—3 hours.

Prerequisite: Electrical Engineering 171A–171B and Mathematics 109 or the equivalent.

Elementary 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.

271. Electrodynamics. (3) II. Mr. May

Lecture—3 hours.

Prerequisite: course 270.

Special relativity. Motion of charges in fields; radiation from moving charges; scattering and dispersion of electromagnetic waves. Magnetohydrodynamics and plasma physics.

275A–275B. Plasma Physics (3–3) Yr. Mr. Furth

Lecture—3 hours.

Prerequisite: course 271 or Electrical Engineering 210.

Basic equations governing the behavior of a fully ionized plasma in a magnetic field; simple plasma configurations in controlled fusion research and space applications. Theory of plasma waves and instabilities. Transport coefficients and radiation phenomena.

290. Seminar. (1–2) I and II. The Staff**298. Group Study.** (1–3) I and II. The Staff

Lecture—1–3 hours.

Advanced study in various fields of applied science. Topics may include neutron physics, nuclear technology, advanced hydrodynamics, plasma physics, advanced mathematics, or other selected subjects.

299. Research (1–6) I and II. The Staff

Individual study and research.

ENGINEERING: CHEMICAL

Joseph M. Smith, Sc.D., *Chairman of the Department*
Department Office, TB108

Joseph M. Smith, Sc.D., *Professor of Chemical Engineering and Professor of Food Science and Technology.*
Richard L. Bell, Ph.D., *Assistant Professor of Chemical Engineering.*
Bruce Caswell, Ph.D., *Assistant Professor of Chemical Engineering.*
Stephen Whitaker, Ph.D., *Assistant Professor of Chemical Engineering.*

UPPER DIVISION COURSES

- 152. Chemical Engineering Thermodynamics.** (4) II. Mr. Whitaker
Lecture—4 hours.
Prerequisite: Engineering 105; Chemistry 110A.
Use of the principles of conservation of mass and energy in chemical process calculations. Application of the laws of thermodynamics, with particular emphasis on the behavior of fluids, phase equilibria, and chemical reaction equilibria.
- 154. Chemical Engineering Transport Processes.** (3-3) I. Mr. Caswell
Lecture—3 hours.
Prerequisite: course 186, Chemistry 110A.
Fundamental concepts of mass transfer in fluids; their applications to absorption, extraction, distillation, and other separation processes.
- 155A. Chemical Engineering Laboratory.** (1) I. Mr. Caswell
Laboratory—3 hours.
Prerequisite: course 186 (should be taken concurrently).
Laboratory experiments and analysis emphasizing fundamentals of momentum and energy transfer.
- 155B. Chemical Engineering Laboratory.** (2) II. Mr. Caswell
Laboratory—6 hours.
Prerequisite: courses 154, 155A.
Laboratory experiments and analysis emphasizing fundamentals of mass transfer. Applications to absorption, extraction, distillation and other separation processes.
- 156. Chemical Engineering Kinetics.** (3) II. Mr. Smith
Lecture—2 hours.
Prerequisite: course 152, Chemistry 110A and 112A.
Chemical kinetics and introduction to homogeneous and heterogeneous reactor design.
- 158. Chemical Engineering Process Design.** (3) II. Mr. Smith
Lecture—2 hours.
Prerequisite: courses 156 (may be taken concurrently), 186.
Integration and application of momentum, energy and mass transfer, thermodynamics, and kinetics to design of processes.
- 186. Momentum and Energy Transfer.** (3) I and II. Mr. McDonald
Lecture—3 hours.
Prerequisite: Engineering 103 and 105.
Fundamental concepts of momentum and energy transfer in fluids; their application to heat transfer and flow processes.

198. Directed Group Study. (1-5) I and II. The Staff

Prerequisite: senior standing in engineering with at least a B average.

Group study of selected topics. Student groups may be organized in instrumentation and design problems. Students may enroll in one or more separate subjects.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff

GRADUATE COURSES

252. Advanced Engineering Thermodynamics. (3) I. Mr. Smith

Lecture—3 hours.

Prerequisite: Engineering 105 or 152, or the equivalent.

General treatment of the first and second laws; applications of thermodynamic relationships to chemical and nonchemical systems and to phase and chemical reaction equilibrium; introduction to irreversible processes and to statistical thermodynamics.

253. Advanced Transport Phenomena I. (3) I. Mr. Whitaker

Lecture—3 hours.

Prerequisite: course 186 or equivalent.

The study of vector and tensor methods required in the formulation of the equations of mass, momentum, energy, and entropy in continuous media. Applications to fluid flow, rheology, and surface mechanics.

254. Advanced Transport Phenomena II. (3) II. Mr. Caswell

Lecture—3 hours.

Prerequisite: course 253.

Application of the methods developed in course 253 to multi-component systems. The laws of molecular diffusion and energy transport, surface diffusion and chemically reacting flows.

255. Equilibrium Stage Processing. (3) I. Mr. Bell

Lecture—3 hours.

Prerequisite: courses 154 and 252 (may be taken concurrently).

The concept of equilibrium stage processing; application to the design of distillation, absorption, and extraction processes.

256. Applied Kinetics and Reactor Design. (3) II. Mr. Smith

Lecture—3 hours.

Prerequisite: courses 156 and 252 or the equivalent.

Application of kinetics and transport rates to the design of chemical reactors; emphasis on heterogeneous catalytic systems.

257. Rheology of Fluids. (3) II. Mr. Caswell

Lecture—3 hours.

Prerequisite: course 253 or equivalent.

Non-Newtonian and viscoelastic behaviour 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.

290. Seminar. (1) II.

The Staff

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.

298. Group Study. (1-5) I and II.

The Staff (Mr. Smith in charge)

The topics treated are dependent upon the availability of staff and student interest.

299. Research. (1-6) I and II.

The Staff

ENGINEERING: CIVIL

Don O. Brush, Ph.D., *Chairman of the Department.*
Department Office, 222 Walker Engineering Building

Don O. Brush, Ph.D., *Professor of Engineering.*
Robert H. Burgy, M.S., *Professor of Civil Engineering.*
James N. Luthin, Ph.D., *Professor of Civil Engineering.*
Verne H. Scott, Ph.D., *Professor of Civil Engineering.*
Jaime Amorocho, Ph.D., *Associate Professor of Civil Engineering.*
Ray B. Krone, Ph.D., *Associate Professor of Engineering.*
James A. Cheney, Ph.D., *Assistant Professor of Engineering.*
Robert D. Hanson, Ph.D., *Assistant Professor of Civil Engineering.*
Leonard R. Herrmann, Ph.D., *Assistant Professor of Engineering.*
James R. Hutchinson, Ph.D., *Assistant Professor of Engineering.*
Theodor S. Strelkoff, Ph.D., *Assistant Professor of Civil Engineering.*
———, *Assistant Professor of Water Science.*



John C. Badoux, M.S., *Acting Assistant Professor of Civil Engineering.*
William O. Pruitt, Jr., M.S., *Lecturer in Civil Engineering.*

UPPER DIVISION COURSES

131. Structural Analysis. (3) I and II. Mr. Herrmann
Lecture—3 hours.

Prerequisite: Engineering 104.

Analysis of determinate structures, including beams, frames, and roof and bridge trusses by algebraic and graphical methods. Introduction to indeterminate structural analysis.

132A. Design of Structural Elements. (2) II. Mr. Badoux
Lecture—2 hours.

Prerequisite: Engineering 104.

Reinforced concrete beams, columns, slabs, footings; linearly-elastic theory and plastic theory. Introduction to prestressed concrete, plastics.

132B. Design of Structural Elements. (3) II. Mr. Hanson
Lecture—3 hours.

Prerequisite: Engineering 104.

Metal beams, columns, other members; analysis, design of riveted, bolted, welded joints; design of simple beam connections, moment resistant connections, column base plates. Elements of timber structures and laminated structures.

133. Soil Mechanics. (3) I. Mr. Cheney
Lecture—3 hours.

Prerequisite: Engineering 104; Engineering Geology 150.

Soil as foundation and construction material; origin; classification; physical and mechanical properties; stress; deformation; failure theories; stability; fluid flow (seepage, consolidation); cementive additives and compaction; consideration of design for static and dynamic loads on soil masses (embankments, walls, piles, footings).

134. Analysis and Design of Buildings. (3) I. Mr. Rodda
Lecture—1 hour; laboratory—6 hours.

Prerequisite: courses 131, 132A, 132B. Recommended: course 133 (may be taken concurrently).

Analysis and design of building structures under the action of vertical dead and live loads, and of wind and earthquake forces. Building code and structural requirements in connection with the use of timber, steel frame, reinforced concrete, and brick.

135. Advanced Structural Mechanics. (3) II. Mr. Cheney
Lecture—3 hours.

Prerequisite: Engineering 104, course 134.

Shear flow analysis of full and semi-monocoque sections; elastic and plastic design of rigid frames, two- and three-hinged arches, and other indeterminate structures; introduction to matrix analysis of space frames; bulkhead and bin design.

137. Construction Principles. (3) I. Mr. Hanson
Lecture—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.

142. Water Supply. (3) I. Mr. Burgy
Lecture—3 hours.

Prerequisite: Engineering 103 or Water Science 118 (may be taken concurrently).

Origin, occurrence, and utilization of surface and ground water supplies; hydrologic analysis and methods of predicting surface and ground water yields; irrigation and urban water requirements; water supply systems including dams and reservoirs, wells, pumping plants, and introduction to water treatment processes.

143. Water Resources Engineering. (3) II. Mr. Scott
Lecture—3 hours.

Prerequisite: course 142.

Basic concepts of water resources planning; water inventories, use, and control; regional economy and economic potential; water conservation measures and legislation; multiple-purpose project planning, domestic and foreign water development projects.

144. Principles of Drainage Engineering. (2) II. Mr. Luthin
Lecture—2 hours.

Prerequisite: Engineering 103; course 133; or Water Science 100 or Soil Science 107.

Elements of seepage through porous media; theory of drainage; depth and spacing of drains; methods of drainage investigation; project planning for drainage; loads on buried pipe; design of gravel filters; strength of tile; engineering analysis of surface drainage.

145. Hydraulic System Design. (3) II. Mr. Amorocho
Lecture—3 hours.

Prerequisite: Mechanical Engineering 185.

Hydraulic and structural design of impounding structures, diversion works, closed conduit systems, open channel systems, and energy dissipators; engineering analysis of systems for hydro-power generation, irrigation and drainage and flood control projects.

146. Irrigation Engineering Laboratory. (2) II. Mr. Scott
Lecture—1 hour; laboratory—3 hours.

Prerequisite: course 145 (may be taken concurrently), Mechanical Engineering 185.

Experimental analysis and design of water supply systems including related storage and conveyance structures, and of irrigation and drainage systems; measurements and instrumentation.

147. Waterborne Waste Management Systems. (3) I. Mr. Krone
Lecture—2 hours; laboratory—3 hours.

Prerequisite: Engineering 103; Chemistry 8 and Bacteriology 1 recommended.

Introduction to industrial and domestic waterborne waste collection and treatment systems; methods of treated waste release.

148. Solid and Airborne Waste Management. (3) II. Mr. Krone
Lecture—2 hours; laboratory—3 hours.

Prerequisite: Chemistry 8 and Bacteriology 1 recommended.

Introduction to solid waste collection, treatment and disposal, and to air pollution control.

183. Intermediate Mechanics of Materials. (3) I and II. Mr. Brush
Lecture—3 hours.

Prerequisite: Engineering 104.

Failure theories; elastic and inelastic behavior; strain energy methods; bending theory, including curved beams; unsymmetrical loading; beams on elastic foundations; torsion of noncircular elements; thin plates; stability; stress concentrations; creep; fatigue.

***189. Dimensional Analysis and Theory of Models.** (2) I. ———

Lecture—2 hours.

Prerequisite: Engineering 103.

Dimensions; dimensionless products and algebraic theory; similarity and models; applications in solid and fluid mechanics, thermodynamics, and electrodynamics.

198. Directed Group Study. (1-5) I and II. The Staff

Prerequisite: senior standing in engineering with at least a B average.

Group study of selected topics. Student groups may be organized in instrumentation and design problems. Students may enroll in one or more separate subjects.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff

GRADUATE COURSES

225. Theory of Elasticity. (3) I. Mr. Cheney

Lecture—3 hours.

Prerequisite: Mathematics 109, or the equivalent.

Tensor formulation of the stress-strain field. Plane stress and strain in rectangular and cylindrical coordinates. Solution by complex variable method. Introduction to three-dimensional problems. Bending and torsion of prismatic bars and plates. Display and measurement of strain.

226. Theory of Elastic Stability. (3) II. Mr. Cheney, Mr. Brush

Lecture—3 hours.

Prerequisite: course 183 or consent of the instructor.

Stability analysis of structural elements by solution of differential equations; energy approximations; variational methods; buckling of rectangular plates; introduction to inelastic and creep buckling.

* Not to be given, 1965-1966

- 227. Theory of Plates and Shells. (3) II.** Mr. Cheney
Lecture—3 hours.
Prerequisite: Engineering 104.
Analysis of stress, deformation in plates bent by transverse loads. Applications to circular, rectangular, other shapes. Direct stresses in shells with axial symmetry. Application to shell roofs, tanks, cylindrical shells, pipelines. Bending stresses in shells.
- *235. Energy Methods in Applied Mechanics. (3) I.** Mr. Brush
Lecture—3 hours.
Prerequisite: Engineering 102 and Mathematics 109.
Principles of mechanics; variational principles; equilibrium and stability of deformable bodies; generalized theories of dynamics; equations of Lagrange and Hamilton; vibrations; orbits and trajectories; optimization.
- 271. Advanced Hydrology. (2) I.** Mr. Burgy
Lecture—2 hours.
Prerequisite: course 142 and consent of the instructor.
Advanced study and analysis of hydrologic processes including the theoretical considerations in investigation and analysis of water development for power, irrigation, municipal, industrial, and other uses. Hydrometeorology, including analysis of precipitation and runoff, unit graphs, and flood forecasting, routing, and control.
- 272. Advanced Ground Water Problems. (2) II.** Mr. Scott
Lecture—2 hours.
Prerequisite: course 142 and consent of the instructor.
Analyses and methods of groundwater development; fluid mechanics of porous solids; geophysical exploration and analysis; artificial recharge concepts; hydraulics of wells, including analytical treatment of transient flow problems; and problems of well design.
- 275. Flow in Porous Media. (2) II.** Mr. Luthin
Lecture—2 hours.
Prerequisite: Mathematics 109, or the equivalent, and consent of the the instructor.
Elements of potential theory, methods of solving flow equations, numerical analysis, and solutions to specific seepage problems involving dams and other hydraulic structures.
- 276. Hydrologic and Hydraulic System Analysis. (3) II.** Mr. Amorocho
Lecture—3 hours.
Prerequisite: courses 142 and 145; Mathematics 109.
Theory and application of the methods of techniques of modern system analysis to hydrologic and hydraulic systems; emphasis on flood prediction studies and on planning, development, and operation of irrigation and power projects.
- 277. Mechanics of Open-Channel Flow. (3) II.** Mr. Strelkoff
Lecture—3 hours.
Prerequisite: Mechanical Engineering 185; Mathematics 109. Recommended: a short course in Fortran programming (may be taken concurrently).
Principles of fluid mechanics adapted to flow with free surface. Resistance in uniform flows; gradually and rapidly varied flows; critical depth; unsteady flows, graphic and numerical solutions; supercritical flows; shock waves; hydraulic jump. Solutions by digital computer.
Offered in even-numbered years.

* Not to be given, 1965-1966.

278. Hydrodynamics. (3) I.

Mr. Strelkoff

Lecture—3 hours.

Prerequisite: Mathematics 109 and 185. Recommended: Mechanical Engineering 185.

General equations of motion, momentum and energy. Stream function; velocity potential; conformal mapping. Direct solutions for irrotational flow around bodies and in conduits; gravitational effects.

279. Advanced Mechanics of Fluids. (3) I.

Mr. Strelkoff

Lecture—3 hours.

Prerequisite: Mechanical Engineering 185; Mathematics 109.

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.

290. Seminar. (1) II.

The Staff

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.

298. Group Study. (1-5) I and II.

The Staff

The topics treated are dependent upon the availability of staff and student interest.

299. Research. (1-6) I and II.

The Staff

ENGINEERING: ELECTRICAL

Ronald F. Soohoo, Ph.D., *Chairman of the Department*
Department Office, 228 Walker Engineering Building

- J. B. Powers, Ph.D., *Professor of Electrical Engineering.*
R. F. Soohoo, Ph.D., *Professor of Electrical Engineering.*
R. B. Green, Ph.D., *Assistant Professor of Electrical Engineering.*
J. W. LaPatra, Ph.D., *Assistant Professor of Electrical Engineering.*
V. R. Latorre, Ph.D., *Assistant Professor of Electrical Engineering.*
H. H. Loomis, Jr., Ph.D., *Assistant Professor of Electrical Engineering.*
E. W. Owen, Ph.D., *Assistant Professor of Electrical Engineering.*

UPPER DIVISION COURSES

- 100B. Electronics.** (3) I and II. Mr. Powers
Lecture—3 hours.
Prerequisite: Engineering course 100A.
Physical theory and development of equivalent circuits for active devices; dc operation of amplifying and control devices; linear small signal amplifiers, feedback amplifiers.
- 160. Advanced Electronics.** (3) I and II. Mr. Latorre
Lecture—3 hours.
Prerequisite: courses 100B and 182.
Oscillators; steady state and transient response of multistage amplifiers; noise; signal-to-noise ratio in amplifiers; fundamentals of wave shaping and pulse circuits.
- 161. Electronics Laboratory.** (2) I and II. Mr. Latorre
Laboratory—6 hours.
Prerequisite: Engineering 101.
Design of small-signal amplifiers, feedback amplifiers, and tuned amplifiers; observation of the properties of resonant circuits, oscillators, and large signal amplifiers.
- 162. Electronics Laboratory.** (2) I. Mr. Loomis
Laboratory—6 hours.
Prerequisite: courses 160 (may be taken concurrently) and 161.
Laboratory experiments with electronic components and circuits used in pulse, digital, and switching systems.
- 163. Data Systems.** (4) I. Mr. Loomis
Lecture—3 hours; laboratory—3 hours.
Prerequisite: Engineering 100A or the equivalent.
A study of the theoretical and practical aspects of data systems; Boolean algebra; switching circuits; sequential machines; computer system organization; laboratory investigation of switching circuits and sequential machines, including design and construction of computer functional parts.
- 164. Signal Analysis and Information Transmission.** (3) II. Mr. Loomis
Lecture—3 hours.
Prerequisite: courses 100B and 182.
Discrete and continuous signal systems used in the transmission of information; frequency spectra; modulation and demodulation; probability; random noise; correlation functions; information theory and coding.

165A. Solid State Materials and Components. (3) I. Mr. Soohoo
Lecture—3 hours.

Prerequisite: courses 100B and 181; Physics 121 (may be taken concurrently).

A study of the electrical characteristics of semiconductor, magnetic, and dielectric materials and solid-state electronic devices, e.g., rectifiers, transistors, magnetic cores, tunnel diodes, multijunction switches, parametric amplifiers, and integrated microelectronic circuits.

165B. Solid State Materials and Components. (3) II. Mr. Soohoo
Lecture—3 hours.

Prerequisite: courses 100B and 181; Physics 121.

A study of the electrical characteristics of semiconductors, magnetic, and dielectric materials and solid-state electronic devices, e.g., rectifiers, transistors, magnetic cores, tunnel diodes, multijunction switches, parametric amplifiers, and integrated microelectronic circuits.

167. Network Synthesis. (3) II. Mr. LaPatra
Lecture—3 hours.

Prerequisite: course 182.

An introduction to modern network synthesis techniques. Topics include one- and two-port networks, approximation problems, realization procedures, and filter theory.

168. Electromechanics. (3) II. Mr. LaPatra
Lecture—3 hours.

Prerequisite: Engineering 100A.

Electromechanical devices from a systems viewpoint. Topics include principles of rotating and translating electromechanical energy converters, energy relations, transfer function analysis, device dynamics, topological representation of devices and device control.

170. Communication Systems. (3) II. _____

Lecture—3 hours.

Prerequisite: courses 160 and 162 (may be taken concurrently).

Introduction to information transmission systems; response of networks and systems to signals; modulation, demodulation and transmission systems; sampling and pulse modulation; time division and frequency division systems.

171A. Electromagnetic Fields and Waves. (3) I. Mr. Green
Lecture—3 hours.

Prerequisite: course 181. (Not open to students taking Physics 110A and 110B.)

Maxwell's equations applied to static field problems. The diffusion and wave equations; retarded potentials; high frequency resistance; transmission lines; lumped parameters. Wave guides, cavity resonators, and microwave technique. Simple antennas and arrays.

171B. Electromagnetic Fields and Waves. (3) II. Mr. Green
Lecture—3 hours.

Prerequisite: course 181 (not open to students taking Physics 110A and 110B).

Maxwell's equations applied to static field problems. The diffusion and wave equations; retarded potentials; high frequency resistance; transmission lines; lumped parameters. Wave guides, cavity resonators, and microwave technique. Simple antennas and arrays.

- 180. Instrumentation Systems.** (3) I. Mr. Owen
 Lecture—2 hours; laboratory—3 hours.
 Prerequisite: Engineering 100A.
 Analytical and design methods common to all instrumentation systems; statistical methods; dynamic response; transducers; signal conditioning, data transmission and readout.
- 181. Introduction to Field Theory.** (3) I and II. Mr. Powers
 Lecture—3 hours.
 Prerequisite: Mathematics 109.
 Use of vector calculus in the description of steady potential and solenoidal fields with illustrations in gravitational, electrostatic, magnetostatic, thermal, thermodynamic, elastic and fluid domains. Potential and stream functions. Precise and approximate methods of solution of Laplace's equation.
- 182. Linear Systems Analysis.** (3) I and II. _____
 Lecture—3 hours.
 Prerequisite: Engineering 100A and 102.
 The use of operational mathematics in the analysis of lumped-parameter systems and engineering processes characterized by sets of linear differential equations; translational and rotational mechanical systems; hydraulic and pneumatic systems; thermal and chemical processes; electromechanical systems; electronic circuits.
- 187. Control Systems.** (3) II. Mr. Owen
 Lecture—3 hours.
 Prerequisite: course 182.
 Design and analysis of closed-loop automatic control systems. Examples are drawn from all engineering fields. The mathematical representation of systems; frequency and S-plane methods; stability criteria; application of analog computers; introduction to nonlinear systems.
- 198. Directed Group Study.** (1-5) I and II. The Staff
 Prerequisite: senior standing in engineering with at least a B average.
 Group study of selected topics. Student groups may be organized in instrumentation and design problems. Students may enroll in one or more separate subjects.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff
- GRADUATE COURSES
- 210. Field Theory.** (3) I. Mr. Green
 Lecture—3 hours.
 Prerequisite: course 181.
 Maxwell's equations; computation of fields from current distributions in free space; construction of solutions to Maxwell's equations using eigen functions.
- 260. System Analysis.** (3) I. Mr. Owen
 Lecture—3 hours.
 Prerequisite: course 182.
 Properties of systems and their mathematical characteristics, state-space concepts, time-invariant systems, time-varying systems, discrete time systems, real-time analysis, frequency methods.
- *261. Nonlinear Control Systems.** (3) II. Mr. Owen
 Lecture—3 hours.
 Prerequisite: course 187 or the equivalent.
 Techniques for solving nonlinear control problems, state-space methods, stability theorems, Lyapunov's methods, sinusoidal describing functions, on-off systems.

* Not to be given, 1965-1966.

- 262. Control System Optimization.** (3) II. Mr. Owen
Lecture—3 hours.
Prerequisite: course 187 or the equivalent.
Optimization of systems by the adjustment of parameters and by the use of Pontryagin's maximum principle and Bellman's principle of optimality.
- 263. Theory of Automata.** (3) II. Mr. Loomis
Lecture—3 hours.
Prerequisite: course 163 or the equivalent.
A study of finite and infinite automata; finite-state machines, the state assignment problem, questions of synchronization, delay and rate of operation, neural network models; Turing machines and computability; non-deterministic machines; reliability.
- 265. Theory of Semiconductor Devices.** (3) I. Mr. Soohoo
Lecture—3 hours.
Prerequisite: course 165A-165B or the equivalent.
The theoretical development of the concepts germane to design of semiconductor electronic devices, including microelectronic circuits.
- 267A. Network Theory.** (3) I. Mr. LaPatra
Lecture—3 hours.
Prerequisite: course 167.
Advanced topics in network analysis, including the graph theory approach, matrix techniques, distributed parameter circuits, and time-varying networks.
- 267B. Network Theory.** (3) II. Mr. LaPatra
Lecture—3 hours.
Prerequisite: course 267A.
Advanced topics in network synthesis, including n-port networks, switching networks, and communication nets. Topological analysis of linear and sampled data systems.
- 269. Theory of Magnetics.** (3) II. Mr. Soohoo
Lecture—3 hours.
Prerequisite: course 165A-165B or the equivalent.
A development of the theory of magnetism in solids and analyses of systems composed of arrays of magnetic components.
- 280. Process Control.** (3) II. _____
Lecture—3 hours.
Prerequisite: course 187.
Automatic control of physical and chemical processes. Consideration of sensing elements, control modes and final control elements. Computer simulation of processes and associated control systems.
- 290. Seminar.** (1) II. The Staff
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.
- 298. Group Study.** (1-5) I and II. The Staff (Mr. Soohoo in charge)
The topics treated are dependent upon the availability of staff and student interest.
- 299. Research.** (1-6) I and II. The Staff

ENGINEERING: MECHANICAL

W. H. Giedt, Ph.D., *Chairman of the Department.*
Department Office, 224 Walker Engineering Building

C. F. Garland, M.S., *Professor of Mechanical Engineering.*
W. H. Giedt, Ph.D., *Professor of Mechanical Engineering.*
†C. W. Beadle, Ph.D., *Associate Professor of Engineering.*
H. Brandt, Ph.D., *Associate Professor of Engineering.*
J. D. Kemper, M.S., *Associate Professor of Engineering.*
A. A. McKillop, Ph.D., *Associate Professor of Engineering.*
J. M. Henderson, D.E., *Assistant Professor of Engineering.*
A. T. McDonald, Ph.D., *Assistant Professor of Engineering.*
P. S. Moller, Ph.D., *Assistant Professor of Engineering.*
A. T. Yang, Ph.D., *Assistant Professor of Engineering.*



D. J. Krause, M.S., *Acting Assistant Professor of Engineering.*
A. S. Leonard, M.S., *Lecturer in Engineering.*

UPPER DIVISION COURSES

- 117. Aerospace Design. (3) II.** Mr. Cheney, Mr. Moller
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 127.
Design of aircraft and missile systems; considerations of aerodynamic and inertial loading, propulsion, guidance and control, and structural integrity.
- 118. Machine Design. (3) II.** Mr. Henderson
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Engineering 102 and 104.
Application of the principles of engineering mechanics, physical properties of materials, and manufacturing processes in the design of machine parts.
- 119. Dynamics of Machines. (3) I.** Mr. Yang
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Engineering 102.
Advanced kinematic analysis and synthesis of typical elements of mechanism; velocity and acceleration analysis of linkages, gearing and cams; inertia forces and balancing problems in machinery.
- 120. Advanced Machine Design. (3) II.** Mr. Yang
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 118.
Engineering properties of specific arrangements and materials for refinement of machines and their components; vibration isolation; balancing; stress concentration; residual stresses; curved beam analysis; bearing lubrication; design of castings, weldments, and forgings.

† Absent on leave, 1965–1966

- 121. Manufacturing Processes. (2) I.** Mr. Kemper
Lecture—1 hour; laboratory—3 hours.
Prerequisite: Engineering 45 and 104, or the equivalent.
Casting processes; hot and cold working; machining; measuring and gaging; welding; surface finishing; tooling; jigs and fixtures; introduction to the theoretical basis of metal forming; forces and energy in metal working; interrelation of design and production.
- 122. Introduction to Mechanical Vibrations. (3) I.** Mr. Kemper
Lecture—3 hours.
Prerequisite: Engineering 102.
Free and forced vibrations in simple lumped-parameter systems with and without damping; vibrations in coupled systems; equivalent electrical networks; use of energy conservation principle and Lagrange's equations.
- 123. Engineering Laboratory. (3) I.** The Staff (Mr. Henderson in charge)
Laboratory—9 hours.
Prerequisite: Engineering 103, 104, 105, Electrical Engineering 100B.
Special projects designed to acquaint students with techniques of experimental analysis of engineering systems.
- 124. Engineering Systems Design. (3) II.** Mr. Kemper
Lecture—3 hours.
Prerequisite: senior standing in engineering.
The design of engineering systems based on the synthesis of components from the several engineering fields.
- 125. Mechanics of Compressible Fluids. (3) II.** Mr. Moller
Lecture—3 hours.
Prerequisite: Engineering 103.
The theory of one-dimensional, compressible flow with related phenomena; unsteady flow in conduits; application to fluid machinery.
- 127. Aerodynamics. (3) I.** Mr. Moller
Lecture—3 hours.
Prerequisite: Engineering 103.
Spanwise and chordwise load distribution; thin airfoil and slender body theory; boundary layer control and effects on drag and separation; compressibility effects, mutual interference, static and elementary dynamic stability; propulsion.
- 184. Experimental Stress Analysis. (3) II.** Mr. Kemper
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Engineering 104.
Experimental methods for the analysis of stress and strain, including photoelasticity, brittle lacquers, mechanical and electrical strain gages and instrumentation; analog methods and principles of similitude for loaded structural models.
- 185. Intermediate Fluid Mechanics. (3) I and II.** Mr. Moller
Lecture—3 hours.
Prerequisite: Engineering 103.
Fundamentals of fluid mechanics considering incompressible and compressible flow; dimensional analysis, Navier-Stokes equations and solutions; momentum integral methods; potential theory; propulsion; open channel flow.

- 188. Engineering Materials.** (2) I. Mr. Krause
Lecture—2 hours.
Prerequisite: Engineering 45, Mathematics 109.
Characteristics of engineering materials such as metals, natural and synthetic organic materials, and fluids. Illustration for engineering design.
- 198. Directed Group Study.** (1-5) I and II. The Staff
Prerequisite: senior standing in engineering with at least a B average.
Group study of selected topics. Student groups may be organized in instrumentation and design problems. Students may enroll in one or more separate subjects.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

GRADUATE COURSES

- 203. Convective Heat Transfer.** (3) II. Mr. McKillop
Lecture—3 hours.
Prerequisite: Chemical Engineering 186 and Engineering 230 or the equivalent.
Development of equations describing heat and momentum transfer by convection during laminar and turbulent flow; discussion of allied topics such as boiling and condensation.
- 204. Heat Conduction.** (2) I. Mr. Giedt
Lecture—2 hours.
Prerequisite: Chemical Engineering 186, Engineering 230 or the equivalent (may be taken concurrently).
Steady-state and transient problems of heat conduction, using both mathematical and numerical methods of solution.
- 205. Thermal Radiation.** (2) I. Mr. Brandt
Lecture—2 hours.
Prerequisite: Chemical Engineering 186.
The transfer of radiant energy, gaseous radiation, geometrical and spectral characteristics of systems involving thermal radiation.
- *218. Advanced Kinematic Analysis.** (3) I. Mr. Yang
Lecture—3 hours.
Prerequisite: course 119.
Advanced kinematic analysis of planar motions; Euler-Savary equations, inflection circle, curvature theory, Bobillier's construction, Hartmann's construction. Analysis of spatial mechanisms; mathematical preliminaries for and application of vector, dual number, dual vector, matrix, quaternions, and associated computer methods.
- *219. Kinematic Synthesis of Mechanisms.** (3) II. Mr. Yang
Lecture—3 hours.
Prerequisite: course 119.
Introduction to curve and function synthesis. Chevichev's theorem. Approximate theory. Structural errors. Complex number methods. Geometrical synthesis using poles, pole paths and center point curves. The Roberts-Chevichev theorem. Burmester's theorem. Computer techniques for synthesis.

* Not to be given, 1965-1966.

220. Mechanical Vibrations. (3) II.

Mr. Garland

Lecture—3 hours.

Prerequisite: course 122.

Systems with many degrees of freedom. Newton's and Lagrange's methods and Rayleigh-Ritz approximation. Vibration of beams, shafts, and machine elements. Non-harmonic vibrations. Solution by precise, graphical, and numerical techniques. Vibration of diaphragms. Autoexcitation. Vibration measurement.

279. Boundary Layer Theory. (3) I.

Mr. Brandt

Lecture—3 hours.

Prerequisite: course 185; Mathematics 109; or consent of the instructor.

Laminar boundary layers. Steady state boundary layer equations in two and three dimensional motion. Non-steady boundary layers. Approximate methods for solution of boundary layer equations. Boundary layers in compressible flow. Turbulent boundary layers.

290. Seminar. (1) II.

Mr. Giedt

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.

298. Group Study. (1-5) I and II.

The Staff (Mr. Giedt in charge)

The topics treated are dependent upon the availability of staff and student interest.

299. Research. (1-6) I and II.

The Staff

ENGLISH

William V. O'Connor, Ph.D., *Chairman of the Department.*

Brom Weber, Ph.D., *Vice-Chairman of the Department.*

Department Office, 222 Sproul Hall

Everett Carter, Ph.D., *Professor of English.*

Solomon Fishman, Ph.D., *Professor of English.*

Thomas A. Hanzo, Ph.D., *Professor of English.*

‡Gwendolyn B. Needham, Ph.D., *Professor of English.*

Linda Van Norden, Ph.D., *Professor of English.*

William V. O'Connor, Ph.D., *Professor of English.*

Brom Weber, Ph.D., *Professor of English.*

Robert A. Wiggins, Ph.D., *Professor of English.*

Celeste T. Wright, Ph.D., *Professor of English.*

§Jay L. Halio, Ph.D., *Associate Professor of English.*

§Elizabeth R. Homann, Ph.D., *Associate Professor of English.*

Hugh B. Staples, Ph.D., *Associate Professor of English.*

Wayne C. Harsh, Ph.D., *Assistant Professor of English.*

Robert Hogan, Ph.D., *Assistant Professor of English.*

Robert H. Hopkins, Ph.D., *Assistant Professor of English.*

†Hilton J. Landry, Ph.D., *Assistant Professor of English.*

John L. Magnus, M.A., *Acting Assistant Professor of English.*

Arthur E. McGuinness, Ph.D., *Assistant Professor of English.*

Epifanio S. San Juan, Jr., Ph.D., *Assistant Professor of English.*

*John D. Seelye, Ph.D., *Assistant Professor of English.*

*Daniel S. Silvia, Jr., Ph.D., *Assistant Professor of English.*

—, *Assistant Professor of English.*



Howard Baker, Ph.D., *Lecturer in English.*

Lindsay A. Mann, M.A., *Acting Assistant Professor of English.*

Vivian de Sola Pinto, Ph.D., *Visiting Professor of English.*

Sarita G. Schotta, B.A., B.M., *Acting Assistant Professor of English Linguistics.*

ENGLISH MAJOR

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

Departmental Major Advisers.—Mr. Harsh, (Chairman), Mr. Fishman, Mr. Halio, Mrs. Homann, Mr. Landry, Mr. Magnus, Mr. Mann, Mr. McGuinness, Mrs. Needham, Mr. San Juan, Mr. Seelye, Mr. Silvia, Miss Van Norden, Mrs. Wright.

The Major Program

(A) Lower Division Courses.—First year, English 1A–1B, Second Year, English 45A, English 46A–46B (46A to be taken before English 46B). Recommended: a course in philosophy, a course in classics.

(B) Upper Division Courses.—Twenty-four units of upper-division courses in literature, which must include 117J, 9 units of courses in literature prior to 1800, and 9 in literature after 1800. These divisions include all courses except the writing and language courses: 106G, 106L, and 110.

‡ Absent on leave, fall semester, 1965–1966.

* Sabbatical leave in residence, 1965–1966.

† Absent on leave, 1965–1966

§ Absent on leave, spring semester 1966.

Students working for high or highest honors at graduation or planning to do graduate work in English must take in their senior year 197, Special Examination in English and American Literature, for which 3 units are given. All other English majors and minors are urged to take this Special Examination as the culmination of their study in English and American literature. Recommended: A course in English history.

Although only 24 units are required for the major, a total of 30 units in English is allowed by the College of Letters and Science to count towards graduation. For honor students, more than 30 units in English is allowed.

Besides the departmental major, an English teaching major in the teacher-training curriculum requires courses 106L, 110, and 300 (which counts as 2 units of credit in education). These may be postponed to the fifth year. Detailed information may be obtained from Professor Wayne Harsh, Department of English.

Attention is called to the requirements in foreign languages for higher degrees in English: a reading knowledge of French or German for the M.A. degree; of French, German, and Latin for the Ph.D. degree. Undergraduates contemplating advanced study in English should prepare to satisfy these requirements as they proceed to the bachelor's degree.

Honors and Honors Program (see page 85). The honors program consists of course 197 in the senior year in addition to the regular major.

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 by writing to Professor Hugh B. Staples, Assistant to the Chairman (graduate studies), Department of English.

Linguistics see Linguistics section.

LOWER DIVISION COURSES

Students must have passed Subject A before taking any course in English.

1A. First-Year Reading and Composition. (3) I and II.

Lecture—1 hour; discussion—2 hours. The Staff (Mr. Hogan in charge)

1B. First-Year Reading and Composition. (3) I and II.

Lecture—1 hour; discussion—2 hours. The Staff (Mr. Hogan in charge)

Prerequisite: course 1A.

Continuation of course 1A. For maximum benefit, the student is advised to complete both courses.

30A. Survey of American Literature to the Civil War. (3) I. Mr. Wiggins

Lecture—3 hours.

Prerequisite: course 1A.

30B. Survey of American Literature after the Civil War. (3) II.

Lecture—3 hours.

Mr. Wiggins

Prerequisite: course 1A. Course 30A is not prerequisite to 30B.

31. Intermediate Composition. (3) I and II. Mr. Hopkins, Mr. McGuinness

Lecture—3 hours.

Prerequisite: course 1B.

Designed primarily for non-majors who wish to improve their skills in expository writing.

45A. Critical Reading of Poetry. (3) I and II.

Lecture—3 hours.

Mr. Halio, Mr. Hanzo, Mr. Landry, Mrs. Wright

Prerequisite: course 1B.

Analysis and evaluation of works representing main types of English and American poetry.

- *45B. Critical Reading of Prose.** (3) I and II. Mr. Silvia
Lecture—3 hours.
Prerequisite: course 45A.
Analysis and evaluation of works representing main types of English and American prose.
- 46A. Masterpieces of English Literature.** (3) I and II. Mrs. Homann, Mr. McGuinness
Lecture—3 hours.
Prerequisite: course 1A. Recommended: course 1B.
Selected works of principal writers before the eighteenth century; lectures and discussion. Designed for majors and non-majors.
- 46B. Masterpieces of English Literature.** (3) I and II. Mr. Hanzo, Mrs. Homann, Mr. Hopkins
Lecture—3 hours.
Prerequisite: course 1A. Recommended: course 1B.
Selected works of principal writers after 1700; lectures and discussion. Designed for majors and non-majors.
- 47. Introduction to Modern Literature.** (3) II. Mr. Staples
Lecture—3 hours.
Prerequisite: course 1B.
Chief twentieth-century writers of England and America.

UPPER DIVISION COURSES

English 1A is prerequisite to all upper division courses.

- 106G. Creative Writing.** (3) II. Mr. Baker
Lecture—3 hours.
Prerequisite: course 1B. Sophomore students may enroll in this course with the consent of the instructor.
- 106L. Advanced Composition.** (3) I and II. Mr. Magnus, Mr. Mann, Mr. McGuinness
Lecture—3 hours.
Prerequisite: course 1B.
Designed to develop a clear, accurate, interesting style. Required of prospective high school English teachers.
- 110. Language.** (3) I and II. Mrs. Schotta
Lecture—3 hours.
Origins, materials, growth, and function of language, with emphasis on English.
- 114A. The English Drama to 1620.** (3) I. Mrs. Wright
Lecture—3 hours.
Medieval, Tudor, and early Stuart plays.
- 114B. The English Drama from 1620 to 1800.** (3) II. Mr. Hogan
Lecture—3 hours.
Later Stuart, Restoration, and Eighteenth Century plays.
- 114C. The English Drama from 1800 to the Present.** (3) I. Mr. Hogan
Lecture—3 hours.
- 116. The English Bible as Literature.** (3) II. Miss Van Norden
Lecture—3 hours.
- 117J. Shakespeares.** (3) I and II. Mr. Halio, Mr. Landry, Mrs. Wright
Lecture—3 hours.
Study of twelve to fifteen of Shakespeare's principal plays.

* Not to be given, 1965-1966.

- *117S. Shakespeare.** (3) I. Mrs. Wright
Lecture—3 hours.
Study of selected plays of Shakespeare. May not be taken for credit by students whose major is English nor counted as part of the minor in English for prospective teachers.
- 119. The Age of Johnson.** (3) II. Mr. Hopkins
Lecture—3 hours.
- 125C. The English Novel.** (3) II. Mrs. Needham
Lecture—3 hours.
From the beginnings to Dickens.
- 125D. The English Novel.** (3) II. Mr. San Juan
Lecture—3 hours.
From Dickens to Hardy.
- 125E. The American Novel.** (3) II. Mr. Weber
Lecture—3 hours.
Reading and discussion of selected American novels.
- 125F. The English Novel.** (3) I. Mr. Fishman
Lecture—3 hours.
From Hardy to the present.
- 131. Early American Literature.** (3) I. Mr. Weber
Lecture—3 hours.
Literature in America to 1800.
- 132. Romanticism in American Literature.** (3) II. Mr. Magnus
Lecture—3 hours.
Irving, Cooper, Emerson, Thoreau, and other early nineteenth-century writers.
- *133. Hawthorne and Melville.** (3) II. Mr. Seelye
Lecture—3 hours.
- 134. American Literature from 1865 to 1914.** (3) I. Mr. Seelye
Lecture—3 hours.
- 135. Modern American Literature.** (3) I. Mr. Staples
Lecture—3 hours.
Twentieth-century prose, poetry, and drama.
- 137. American Literary Humor.** (3) II. Mr. Weber
Lecture—3 hours.
Prerequisite: course 1A.
The American humorous vision as expressed in such modes as comedy, satire, irony, and their combinations from the 17th century to the present, with attention given to such matters as the nature of humor and the cultural influences affecting its development.
- *144A. Masterpieces of World Literature: The Epic.** (3) I. Miss Van Norden
Lecture—3 hours.
Iliad; Odyssey; Aeneid; Beowulf; Divine Comedy; Paradise Lost.
- *144B. Masterpieces of World Literature: The European Novel.** (3) II. Mr. San Juan
Lecture—3 hours.
Representative European novelists of the nineteenth and twentieth centuries.

- *147. **Introduction to Principles of Criticism.** (3) II. Mr. Fishman
Lecture—3 hours.
Examination of the principal theories of literary criticism and their application to literature, with emphasis on modern criticism.
149. **The English Lyric.** (3) I. Mr. Hanzo
Lecture—3 hours.
Reading and discussion of representative lyric poems, English and American.
151. **Study of a Major Writer.** (3) I and II.
(T. S. Eliot—I) Mr. Hanzo, (William Faulkner—II) Mr. O'Connor,
Lecture—3 hours. (William Blake—II) Mr. Pinto.
With the consent of the instructor, this course may be repeated for credit.
154. **Chaucer.** (3) I. Mr. Silvia
Lecture—3 hours.
155. **Medieval Literature.** (3) II. Mr. Silvia
Lecture—3 hours.
Chief writers of the Middle Ages other than Chaucer.
- 158A. **The Age of Elizabeth.** (3) I. Mr. Landry
Lecture—3 hours.
Beginnings of the English Renaissance, and literature of the sixteenth century.
- 158B. **Literature of the Seventeenth Century.** (3) II. Mr. Mann
Lecture—3 hours.
159. **Milton.** (3) I. Miss Van Norden
Lecture—3 hours.
165. **The Age of Dryden.** (3) I. Mr. Pinto
Lecture—3 hours.
English literature of the Restoration.
166. **The Age of Swift and Pope.** (3) I. Mr. McGuinness
Lecture—3 hours.
177. **The Romantic Period.** (3) II. Mr. Staples
Lecture—3 hours.
Wordsworth, Coleridge, Byron, Shelley, Keats, and their eighteenth-century precursors.
187. **Prose and Poetry of the Victorian Period.** (3) I. Mr. San Juan
Lecture—3 hours.
Major poets and nonfiction prose writers of the period 1832–1901, including Tennyson, Browning, and Arnold; Carlyle, Ruskin, and Newman.
191. **British Literature from 1880 to 1918.** (3) I. Mr. Fishman
Lecture—3 hours.
Wells, Shaw, Conrad, Hardy, Housman, and other representative writers.
- *192. **British Literature from 1918 to the Present.** (3) II. Mr. Fishman
Lecture—3 hours.
Lawrence, Joyce, Yeats, Eliot, and other representative writers.

- 194H. Special Study for Honors Students.** (2) I and II.
 Conference—1 hour. The Staff (Mr. Harsh in charge)
 Prerequisite: honors status.
 Individual directed study leading to preparation of a long paper. May be repeated once for credit.
- 197. Special Reading and Examination in English and American Literature.** (3) I and II. The Staff (Mr. Harsh in charge)
 Lecture—3 hours.
 Open to all English majors or minors in their senior year and required of all English honor students who desire to earn high or highest honors at graduation or who desire to be recommended for graduate work in English.
- 198. Directed Group Study.** (3) I and II. The Staff (Mr. Harsh in charge)
 Lecture—3 hours.
- 199. Special Study for Advanced Undergraduates.** (1-3) I and II.
 The Staff (Mr. Harsh in charge)
 Limited to seniors who have completed at least 9 units of upper division English and who have the consent of the instructor.

GRADUATE COURSES

- 200. Techniques of Literary Scholarship.** (3) I and II.
 Lecture—3 hours. Mr. O'Connor, Miss Van Norden
- 211A. Introduction to Old English.** (3) I. Mr. Harsh
 Lecture—3 hours.
 Old English language and literature.
- 211B. Beowulf.** (3) II. Mr. Silvia
 Lecture—3 hours.
 Prerequisite: course 211A or the equivalent.
- 212. Middle and Early Modern English.** (3) I. Mr. Harsh, Mrs. Schotta
 Lecture—3 hours.
 A study of the English language and its dialects as exhibited in literary texts dating from the twelfth through the seventeenth centuries.
- 230. Medieval Literature.** (3) II. Mr. Silvia
 Lecture—3 hours.
- 231. Renaissance Literature.** (3) II. Mrs. Wright
 Lecture—3 hours.
- 232. Literature of the Earlier Seventeenth Century.** (3) I. Miss Van Norden
 Lecture—3 hours.
- 233. Literature from 1660 to 1745.** (3) II. Mrs. Needham
 Lecture—3 hours.
- 234. Literature of the Later Eighteenth Century.** (3) I. Mr. Hopkins
 Lecture—3 hours.
- 235. Literature of the Romantic Period.** (3) I. Mr. Fishman
 Lecture—3 hours.
- *236. Victorian Literature.** (3) I. Mr. Staples
 Lecture—3 hours.
- *237. Twentieth-Century British Literature.** (3) II. Mr. Hanzo, Mr. O'Connor
 Lecture—3 hours.

* Not to be given, 1965-1966.

- *238. **American Literature to the Civil War.** (3) I. Mr. Seelye
Lecture—3 hours.
239. **American Literature After the Civil War.** (3) I. Mr. Seelye
Lecture—3 hours.
- *250. **Topics in Medieval Literature.** (3) II. Mrs. Homann, Mr. Silvia
Seminar—3 hours.
251. **Topics in Renaissance Literature.** (3) I. Mr. Landry
Seminar—3 hours.
- *252. **Topics in the Literature of the Earlier Seventeenth Century.** (3) I. Miss Van Norden
Seminar—3 hours.
253. **Topics in Literature from 1660 to 1745.** (3) I. Mr. Pinto
Seminar—3 hours.
- *254. **Topics in the Literature of the Later Eighteenth Century.** (3) II. Mrs. Needham
Seminar—3 hours.
255. **Topics in the Literature of the Romantic Period.** (3) II. Mr. Pinto
Seminar—3 hours.
- *256. **Topics in Victorian Literature.** (3) II. Mr. Staples
Seminar—3 hours.
257. **Topics in Twentieth-Century British Literature.** (3) I. Mr. Hanzo, Mr. O'Connor
Seminar—3 hours.
258. **Topics in American Literature to the Civil War.** (3) I. Mr. Seelye
Seminar—3 hours.
259. **Topics in American Literature After the Civil War.** (3) II. Mr. Weber
Seminar—3 hours.
- *270. **Arthurian Romance.** (3) I. Mrs. Homann
Seminar—3 hours.
The Arthurian tradition in the Middle Ages.
271. **Chaucer.** (3) I. Mrs. Homann, Mr. Silvia
Seminar—3 hours.
272. **Shakespeare.** (3) I. Mr. Halio
Seminar—3 hours.
- *273. **Elizabethan and Jacobean Drama.** (3) II. Mrs. Homann
Seminar—3 hours.
274. **Milton.** (3) II. Miss Van Norden
Seminar—3 hours.
- *275. **Sense and Sensibility in the Eighteenth Century.** (3) II. Mrs. Needham
Seminar—3 hours.
Rationalism and sentimentalism in eighteenth-century thought and literature.
276. **Studies in American Writers.** (3) I. Mr. Carter
Seminar—3 hours.
Examination of a major figure (Herman Melville). With the consent of the instructor, this course may be repeated for credit.
277. **Modern Anglo-Irish Writers.** (3) II. Mr. Hogan
Seminar—3 hours.
Examination of major figures.

- *278. **James Joyce.** (3) II. Mr. Staples
Seminar—3 hours.
Comprehensive study of the Joyce canon.
- *279. **Studies in Modern British and American Literature.** (3) I. Mr. O'Connor
Seminar—3 hours.
Themes and forms common to British and American writers of the twentieth century.
- *280. **American-European Literary Relations.** (3) I. Mr. Wiggins
Seminar—3 hours.
The interchange of ideas and genres between Europe and America from the seventeenth through the twentieth century.
- *281. **Dramatic Literature.** (3) II. Mr. Hogan
Seminar—3 hours.
Problems in dramatic theory and criticism.
- 282A. **Fiction.** (3) II. Mr. Baker
Seminar—3 hours.
Problems in the theory and practice of fiction.
- *282B. **Poetics.** (3) I. Mr. O'Connor
Seminar—3 hours.
Problems in the theory and practice of poetry.
283. **Literary Criticism.** (3) II. Mr. Fishman
Seminar—3 hours.
A survey of literary criticism from Aristotle to the present.
- *284. **Modern Critical Theory.** (3) I. Mr. Fishman, Mr. O'Connor
Seminar—3 hours.
Examination of problems in the theory underlying the practice of literary criticism from Eliot to the present.
299. **Individual Study.** (1-3) I and II. The Staff (Mr. Staples in charge)
This course is for students investigating a restricted field; it involves research and the writing of a report. It is not a substitute for available seminars.
- 299D. **Special Study for the Doctoral Dissertation.** (1-6) I and II. The Staff (Mr. Staples in charge)

PROFESSIONAL COURSE

300. **Problems in Teaching English Literature and Composition in Secondary Schools.** (2) I and II. Mr. Harsh, Mrs. Schotta
Prerequisite: senior or graduate standing; an English teaching major or minor.
This course, designed for seniors and graduate students undertaking an English teaching major or minor, should be completed before practice teaching. The course is accepted in partial satisfaction of the 22-unit requirement in education for the general secondary credential.

ENOLOGY

For courses in Enology see "Viticulture and Enology," page 376; for programs in Enology see curriculum in Food Science, page 55.

* Not to be given, 1965-1966.

ENTOMOLOGY

Richard M. Bohart, Ph.D., *Chairman of the Department.*

Department Office, 124 Robbins Hall

Oscar G. Bacon, Ph.D., *Professor of Entomology.*
Stanley F. Bailey, Ph.D., *Professor of Entomology.*
Richard M. Bohart, Ph.D., *Professor of Entomology.*
Harry H. Laidlaw, Jr., Ph.D., *Professor of Entomology.*
William H. Lange, Jr., Ph.D., *Professor of Entomology.*
Eugene M. Stafford, Ph.D., *Professor of Entomology.*
Francis M. Summers, Ph.D., *Professor of Entomology.*
John E. Eckert, Ph.D., *Professor of Entomology, Emeritus.*
Leslie M. Smith, Ph.D., *Professor of Entomology, Emeritus.*
Albert A. Grigarick, Jr., Ph.D., *Associate Professor of Entomology.*
Donald L. McLean, Ph.D., *Associate Professor of Entomology.*
Frank E. Strong, Ph.D., *Associate Professor of Entomology.*
Norman E. Gary, Ph.D., *Assistant Professor of Entomology.*
Charles L. Judson, Ph.D., *Assistant Professor of Entomology.*
G. A. H. McClelland, Ph.D., *Assistant Professor of Entomology.*

Merlin W. Allen, Ph.D., *Professor of Nematology.*
James R. Douglas, Ph.D., *Professor of Parasitology.*
Paul D. Hurd, Jr., Ph.D., *Lecturer in Entomology (Berkeley campus).*
John W. MacSwain, Ph.D., *Professor of Entomology (Berkeley campus).*
Gunter Zweig, Ph.D., *Lecturer in Entomology.*

ENTOMOLOGY

Departmental Major Advisers.—Mr. Bacon, Mr. Grigarick.

Bachelor of Science Major Program and Graduate Study. See page 55.

LOWER DIVISION COURSES

1. **An Introduction to Entomology.** (4) II. Mr. Strong
Lecture—2 hours; laboratory—6 hours.
A basic study of insects: their biology, anatomy, classification, and relation to human welfare.
10. **Natural History of the Insects.** (3) I. Mr. Bacon
Lecture—3 hours.
Prerequisite: designed for students not specializing in zoological sciences. Not open for credit to students who have had course 1.
Principles of biology as illustrated by the taxonomy, morphology, and behavior of insects.
49. **Summer Field Course.** (No credit). Mr. Bohart, Mr. Hurd, Mr. MacSwain
Five weeks, daily.
Prerequisite: one course in entomology or consent of the instructor.
The study and collection of insects in their natural habitats, with special emphasis on ecology, life histories, and field recognition.

UPPER DIVISION COURSES

105. **An Introduction to Apiculture.** (2) II. Mr. Gary
Lecture—2 hours.
Prerequisite: Biology 1 or 10, or Botany 1, or consent of the instructor.
Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities.

- 105L. Apiculture Laboratory. (2) II.** Mr. Gary
Laboratory—6 hours.
Prerequisite: course 105 (may be taken concurrently).
Biology and behavior of honeybees (especially communicative behavior); fundamentals of colony management necessary for efficient agricultural use; utilization of bees in research and teaching.
- 106. Introduction to Structure and Function in Insects. (4) I.** Mr. Summers
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 1 or equivalent.
General principles of insect morphology with emphasis on the functional approach. Comparative anatomy of selected insect types.
- 107. Advanced Apiculture. (4) II.** Mr. Laidlaw
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 105 or consent of the instructor.
Principles of modern queen bee rearing; function of the queens; anatomy of reproductive system, formation of germ cells; genetic considerations; artificial insemination.
Offered in even-numbered years.
- 110. Insect Physiology. (3) I.** Mr. Judson
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 1 or the equivalent, Chemistry 8. Recommended: course 106.
Vital functions of insects and related organisms.
- 112. Systematic Entomology. (4) I.** Mr. Bohart
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 1 or equivalent.
The classification of insects, taxonomic categories and procedures; bibliographical methods; nomenclature; museum practices.
- 119. Acarology. (3) II.** Mr. Summers
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 112 or 124.
The taxonomy, morphology, and ecology of mites, with special emphasis on plant-feeding and predaceous species.
Offered in odd-numbered years.
- 124. Economic Entomology. (4) I and II.**
I. Mr. Grigarick; II. Mr. Lange.
Lecture—2 hours; laboratory—6 hours.
Life histories, habits, and principles underlying control of insects attacking fruit trees, field and vegetable crops.
- 126. Medical Entomology. (3) II.** Mr. McClelland
Lecture—3 hours.
Prerequisite: one course in entomology or consent of instructor.
Biology of insects and other arthropods of medical importance throughout the world, with special emphasis on epidemiology of human diseases.
- 126L. Medical Entomology Laboratory. (1) II.** Mr. McClelland
Laboratory—3 hours.
Prerequisite: course 126 (may be taken concurrently).
Demonstration and practice in the entomological aspects of human disease epidemiology.

- 127. Insect Ecology. (3) II.** Mr. Bailey
Lecture—3 hours.
Prerequisite: upper division standing in one of the biological sciences.
Principles of ecology with examples from the insects; insect behavior; analysis of the insect environment; population dynamics.
- 128. Chemistry of Insecticides and Fungicides. (4) II.** Mr. Stafford
Lecture—2 hours; laboratory—6 hours.
Prerequisite: Chemistry 8, or consent of the instructor.
Chemical composition and reactions of insecticides and fungicides, and their physiological effects on plant and animal tissues.
- 130A. Agricultural Entomology. (3) I.** Mr. Bacon, Mr. Lange
Lecture—3 hours.
Prerequisite: course 124.
Bionomics and principles involved in control of insects and mites; side effects on vertebrates and invertebrates following insecticide usage. Primary emphasis on field and vegetable crops.
Offered in even-numbered years.
- 130B. Agricultural Entomology. (3) II.** Mr. Bailey
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 124.
Complementary to 130A but emphasizing plot design, sampling techniques, control programs, and equipment. Examples primarily from deciduous fruit and nut pests.
Offered in odd-numbered years.
- 198. Directed Group Study. (1-5) I and II.** The Staff (Mr. Bohart in charge)
Prerequisite: consent of the instructor.
Group study of selected topics in acarology, coccidology, immature insects, and other problems for which student groups may be organized.
- 199. Special Study for Advanced Undergraduates. (1-5) I and II.**
The Staff (Mr. Bohart in charge)

GRADUATE COURSES

- 250. Principles and Methods of Entomological Research. (3) II.**
Lecture—2 hours; laboratory—3 hours. Mr. Lange, Mr. Strong
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.
- 290. Seminar. (2) I and II.** The Staff
Seminar—2 hours.
Advanced study in various fields of entomology and parasitology. Topics will vary from year to year.
- 299. Research. (1-9) I and II.** The Staff

FOOD SCIENCE AND TECHNOLOGY

Reese H. Vaughn, Ph.D., *Chairman of the Department.*

Department Office, 126A Cruess Hall

- Clinton O. Chichester, Ph.D., *Professor of Food Science and Technology.*
Edwin B. Collins, Ph.D., *Professor of Food Science and Technology.*
Walter L. Dunkley, Ph.D., *Professor of Food Science and Technology.*
Robert E. Feeney, Ph.D., *Professor of Food Science and Technology.*
George L. Marsh, M.S., *Professor of Food Science and Technology.*
Emil M. Mrak, Ph.D., *Professor of Food Science and Technology.*
Herman J. Phaff, Ph.D., *Professor of Food Science and Technology.*
Clarence Sterling, Ph.D., *Professor of Food Science and Technology.*
George F. Stewart, Ph.D., *Professor of Food Science and Technology.*
†Aloys L. Tappel, Ph.D., *Professor of Food Science and Technology.*
Nikita P. Tarassuk, Ph.D., *Professor of Food Science and Technology.*
Reese H. Vaughn, Ph.D., *Professor of Food Science and Technology.*
Eugene L. Jack, Ph.D., *Professor of Food Science and Technology, Emeritus.*
Chester L. Roadhouse, D.V.M., *Professor of Dairy Industry, Emeritus.*
Richard A. Bernhard, Ph.D., *Associate Professor of Food Science and Technology.*
Walter G. Jennings, Ph.D., *Associate Professor of Food Science and Technology.*
Mendel Mazelis, Ph.D., *Associate Professor of Food Science and Technology.*
Martin W. Miller, Ph.D., *Associate Professor of Food Science and Technology.*
Thomas A. Nickerson, Ph.D., *Associate Professor of Food Science and Technology.*
Lloyd M. Smith, Ph.D., *Associate Professor of Food Science and Technology.*
John R. Whitaker, Ph.D., *Associate Professor of Food Science and Technology.*
George K. York, II, Ph.D., *Assistant Professor of Food Science and Technology.*



- Maynard A. Amerine, Ph.D., *Professor of Enology.*
Harold W. Berg, M.S., *Professor of Enology.*
A. Wade Brant, Ph.D., *Lecturer in Food Science and Technology.*
Donald G. Crosby, Ph.D., *Lecturer in Food Science and Technology.*
James F. Guymon, Ph.D., *Professor of Enology.*
John C. Harper, D.Sc., *Associate Professor of Agricultural Engineering.*
Wendell W. Kilgore, Ph.D., *Lecturer in Food Science and Technology.*
Samuel Lepkovsky, Ph.D., *Professor of Poultry Husbandry (Berkeley Campus).*
Michael J. Lewis, Ph.D., *Lecturer in Food Science and Technology.*
Bor S. Luh, Ph.D., *Lecturer in Food Science and Technology.*
Daniel W. Peterson, Ph.D., *Associate Professor of Poultry Husbandry.*
Edward B. Roessler, Ph.D., *Professor of Mathematics.*
Vernon L. Singleton, Ph.D., *Lecturer in Enology.*
Joseph M. Smith, Sc.D., *Professor of Engineering and Food Science and Technology.*
A. Dinsmoor Webb, Ph.D., *Professor of Enology.*
Morris H. Woskow, Ph.D., *Lecturer in Food Science and Technology and Lecturer in Psychology.*

† Absent on leave, 1965-1966.

Departmental Major Advisers. Mr. Marsh, Mr. Miller; Food Science (Dairy Science), Mr. Collins; Food Science (Enology), Mr. Webb.

Bachelor of Science Major Program and Graduate Study. See page 55.

LOWER DIVISION COURSE

1. **Introduction to Food Science.** (2) I.

Lecture—2 hours.

Mr. Amerine, Mr. Stewart, Mr. Vaughn

Historical and philosophical aspects of food processing and its relationships to man's health and well-being. World's food supply and its use by human populations. Trends in the processing, preservation, and utilization of food.

UPPER DIVISION COURSES

101. **Chemistry and Biochemistry of Food Processing.** (2) II.

Lecture—2 hours.

Mr. Sterling, Mr. Tappel

Prerequisite: Biochemistry 101 or equivalent.

Chemical and biochemical principles in relation to food processing problems: hydrophilic polymers, enzymes, lipids, proteins, and vitamins.

103. **Physical and Chemical Methods for Food Analysis.** (4) II.

Lecture—2 hours; laboratory—6 hours.

Mr. Bernhard

Prerequisite: Chemistry 5 and Biochemistry 101L or their equivalents.

Theory and application of physical and chemical methods for analyzing foods.

105. **Food and Industrial Microbiology.** (3) I.

Mr. Collins, Mr. York

Lecture—3 hours.

Prerequisite: Bacteriology 1; Chemistry 1B, and 8.

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.

105L. **Food and Industrial Microbiology Laboratory.** (2) I.

Laboratory—6 hours.

Mr. Collins, Mr. York

Prerequisite: course 105 (should be taken concurrently); Bacteriology 1; Chemistry 8.

Laboratory procedures selected to follow subject matter sequence of course 105.

106. **Food and Industrial Microbiology Summer Laboratory.** (2)

Laboratory—90 hours total.

Mr. Lewis, Mr. Miller

Prerequisite: Bacteriology 106.

Microorganisms and their activities in relation to industrial processes such as baking; brewing; production of industrial alcohol, yeasts, solvents, vitamins, enzymes, antibiotics, and other drugs.

107. **Analysis of Foods by Sensory Methods.** (3) II.

Lecture—2 hours; laboratory—3 hours.

Mr. Amerine, Mr. Roessler

Prerequisite: Mathematics 13.

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.

108. Food Industry Sanitation. (3) II.

Mr. Jennings

Lecture—2 hours; laboratory—3 hours.

Prerequisite: Bacteriology 1; Chemistry 8.

Principles and practices of food industry sanitation, laws and regulations; inspection techniques; significance of microorganisms; control of animal and insect pests; detergents and chemical sanitizers; water supplies and waste disposal; plant and equipment problems; and sanitation of selected food industries.

109. Quality Control for Food Processing Operations. (3) I.

Lecture—2 hours; laboratory—3 hours.

Mr. Bernhard, Mr. Smith

Prerequisite: courses 103 and 105L; Mathematics 13 or equivalent.

Objectives of quality control; measurement of quality attributes; development of grades and standards of quality; sampling and inspection techniques; statistical procedures; application of analyzed data to control of quality. Offered in even-numbered years.

110. Engineering Principles of Food Processing. (5) I.

Mr. Dunkley, Mr. Harper, Mr. Guymon

Lecture—3 hours; laboratory—6 hours.

Prerequisite: Mathematics 16B; Physics 2B, 3B; Chemistry 109.

Application of the conservation of mass and energy to food processing. Elements of fluid mechanics and heat transfer and introduction to process principles, including counter-current operation and equilibrium stage processing. Field trips to food processing operations in the area.

114. Principles of Processing Fruit and Vegetable Products. (3) II.

Lecture—2 hours; laboratory—3 hours.

Mr. Marsh

Prerequisite: Bacteriology 1; Chemistry 8.

Technical principles relating to processing operations used in the commercial preservation of fruit and vegetable products; theory and practical applications; field trips.

118A. Principles of Dairy Processing. (3) I.

Mr. Dunkley

Lecture—3 hours.

Prerequisite: Biochemistry 101 or the equivalent; Bacteriology 1.

Principles of dairy processing including pasteurization, sterilization, homogenization, separation, and condensing.

118B. Principles of Dairy Processing. (3) II.

Mr. Nickerson

Lecture—3 hours.

Prerequisite: Biochemistry 101 or the equivalent; Bacteriology 1.

Principles of dairy processing including freezing, drying, crystallization, emulsification, and stabilization.

122. Enzyme Technology. (3) II.

Mr. Whitaker

Lecture—2 hours; laboratory—3 hours.

Prerequisite: Biochemistry 101.

Special emphasis on enzymes involved in food and beverage production. The characteristics of these enzymes, methods of production, measurement of activity, control and utilization in the preparation and preservation of specific foods and food products.

130. Chemistry of Milk and Dairy Products. (2) II.

Mr. Tarassuk

Lecture—2 hours.

Prerequisite: Biochemistry 101 or the equivalent.

The physical and chemical properties of milk and milk products and their relationship to the manufacture and quality of dairy products.

Offered in even-numbered years.

- 190. Recent Advances in Food Technology.** (1) I. Mr. Chichester
Lecture—1 hour.
Prerequisite: two courses in food science and technology or equivalent.
Assigned topics, reports, and discussions concerning recent advances in food technology.
- 198. Directed Group Study.** (1-5) I and II.
Prerequisite: consent of the instructor. The Staff (Mr. Vaughn in charge)
Directed group study of selected topics in food science and technology for advanced undergraduates.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II.
The Staff (Mr. Vaughn in charge)

GRADUATE COURSES

- 210. Proteins—Their Functional Activities and Interactions.** (3) II.
Lecture—3 hours. Mr. Feeney
Prerequisite: Biochemistry 101; Chemistry 109 or 110B; or consent of the instructor. Recommended: Chemistry 112A, 112B.
The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products.
- 211. Chemistry of the Food Lipids.** (2) I. Mr. Smith
Lecture—2 hours.
Prerequisite: Biochemistry 101 or equivalent.
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.
Offered in odd-numbered years.
- 216. Yeasts and Related Organisms.** (4) II. Mr. Miller, Mr. Phaff
Lecture—2 hours; laboratory—6 hours.
Prerequisite: a general course in microbiology, 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, including certain industrial aspects.
- 220. The Natural Coloring Matters.** (2) I. Mr. Chichester
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.
- 290. Seminar.** (1) I and II. Mr. Mazelis
- 299. Research.** (1-9) I and II. The Staff (Mr. Vaughn in charge)
Prerequisite: graduate standing.

RELATED COURSES

- Agricultural Business Management** (Agricultural Economics 115)
Small Grains, Corn, Sorghum, and Beans (Agronomy 111)
Industrial Fermentations (Bacteriology 106)
Chemistry of Natural Products (Chemistry 150A, 150B)

Crop Production Under Tropical Conditions (International Agricultural Development 101)

Concepts of Animal Nutrition (Nutrition 250)

Handling, Storage, and Transit of Fruits (Pomology 112)

Technology of Handling Poultry Products (Poultry Husbandry 121)

Handling, Storage, and Transit of Vegetables (Vegetable Crops 112)

Enology: Introduction to Wine Making (Viticulture 3).

Enology: Wine Processing and Analyses (Viticulture 124)

Enology: Wine Preparation (Viticulture 125)

Principles of Distillation and Brandy Technology (Viticulture 140)

FOREIGN LITERATURE IN TRANSLATION

For course listing, see page 248.

FRENCH AND ITALIAN

Merle L. Perkins, Ph.D., *Chairman of the Department.*
Department Office, 524 Sproul Hall

Merle L. Perkins, Ph.D., *Professor of French.*

²Max Bach, Ph.D., *Associate Professor of French.*

†Martin Kanes, Docteur de l'Universite de Paris, Ph.D., *Associate Professor of French.*

Marshall Lindsay, Ph.D., *Associate Professor of French.*

Alfredo Bonadeo, Ph.D., *Assistant Professor of Italian.*

George H. Keith, Ph.D., *Assistant Professor of French.*

English Showalter, Jr., Ph.D., *Assistant Professor of French.*

Ruth B. York, Ph.D., *Assistant Professor of French.*



Jo Ann Creore, M.A., *Acting Assistant Professor of French.*

Suzanne E. Doty, M.A., *Associate in French.*

William P. Galvin, M.A., *Lecturer in Foreign Languages.*

Frieda M. Lacina, M.A., *Associate in French.*

Rosabianca T. LoVerso, M.A., *Associate in French and Italian.*

Marie-Madeleine Ory, Licence, *Lecturer in French.*

Dennis D. Porter, M.A., *Lecturer in French.*

Jane A. Rebholz, M.A., *Associate in French.*

Leonilla Strelkoff, M.A., *Associate in French.*

FOREIGN LANGUAGES PROFESSIONAL COURSE

300. The Teaching of a Modern Foreign Language. (2) II. The Staff

Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

Analysis and discussion of a variety of teaching techniques by representatives of modern foreign languages and linguistics; orientation in language laboratory operation; practice in evaluating oral and written performance in language classes.

FRENCH

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 85.

Departmental Major Advisers.—Mr. Bach, Mr. Lindsay, Mr. Showalter.

Graduate Adviser.—Mr. Perkins.

The Major Program

(A) Lower Division Courses.—French 1, 2, 3, and 4, or their equivalents. Recommended: one year of college Latin or the equivalent; classics 39A and 39B.

(B) Upper Division Courses.—Required: 24 units of upper division courses, including 101A–101B, 109A, a separate course in each of the following periods: seventeenth century, eighteenth century, nineteenth century. Students who major in French must maintain at least an average of C in upper division French courses.

Course 134 and either course 130A or 130B are required for the General Secondary Teaching Credential in French.

† Absent on leave, 1965–1966.

² Sabbatical leave in residence, 1965–1966.

Honors and Honors Program (see page 85).—The honors program comprises two semesters of study under course 194H, which will include a research paper and a comprehensive examination.

Graduate Study in French.

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.

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 French—Beginning. (4) I and II. The Staff
Recitation—3 hours; laboratory—2 hours.

This course corresponds to the first two years of high school French. No credit will be allowed if the student has completed two or more years of high school French.

2. Elementary French—Continued. (4) I and II. The Staff
Recitation—3 hours; laboratory—2 hours.

Prerequisite: course 1 or two years of high school French. Only two units of credit will be allowed if the student has completed three or more years of high school French.

3. Intermediate French. (4) I and II. The Staff
Recitation—3 hours; laboratory—2 hours.

Prerequisite: course 2 or three years of high school French.

4. Intermediate French. Conversation and Reading. (4) I and II. The Staff
Recitation—4 hours.

Prerequisite: course 3 or four years of high school French.
Spoken French stressed through class discussion of a variety of selected readings.

5. Intermediate French. Conversation and Reading. (3) II. The Staff
Lecture—3 hours.

Prerequisite: course 4 or the equivalent. Open only to freshmen.
Introduction to the study of French literature. Spoken French stressed through class discussion and oral reports.

UPPER DIVISION COURSES

Prerequisite for all courses except 150, 160: course 4 or its equivalent.

101A. Advanced Grammar, Composition, and Conversation. (3) I. The Staff
Lecture—3 hours.

101B. Advanced Grammar, Composition, and Conversation. (3) II. The Staff
Lecture—3 hours.

109A. Survey of French Literature to 1715. (3) I. The Staff
Lecture—3 hours.

Readings from major works; discussion of literary history; introduction to bibliography.

***109B. Survey of French Literature from 1715 to Present.** (3). II. The Staff
Lecture—3 hours.

Readings from major works; discussion of literary history; elementary bibliography and research techniques.

Offered in odd-numbered years.

* Not to be given, 1965–1966.

110. **Advanced Composition and Translation.** (2) I and II. The Staff
Lecture—2 hours.
Prerequisite: courses 101A and 101B.
Course may be repeated for credit.
116. **Literature of the Sixteenth Century.** (3) II. Mr. Lindsay
Lecture—3 hours.
Readings in Rabelais and Montaigne.
Offered in even-numbered years.
- *117A. **The Theater of the Seventeenth Century.** (3) I. _____
Lecture—3 hours.
Offered in even-numbered years.
- 117B. **Novelists and Moralists of the Seventeenth Century.** (3) II.
Lecture—3 hours. Mr. Showalter
Offered in even-numbered years.
- 118A. **The Age of Voltaire and Rousseau.** (3) I. Mr. Perkins
Lecture—3 hours.
A study of writings which helped mold the intellectual environment of
the American and French Revolutions.
Offered in odd-numbered years.
- *118B. **Drama and Novel in the Eighteenth Century.** (3) II. Mr. Showalter
Lecture—3 hours.
Plays of Marivaux and Beaumarchais; novels of Lesage, Prevost, Diderot,
Voltaire, Rousseau.
Offered in odd-numbered years.
- *119A. **The Nineteenth Century.** (3) I. Mr. Bach
Lecture—3 hours.
Romanticism in drama and poetry: Hugo, Musset, Vigny; novels of
Balzac and Stendhal.
Offered in even-numbered years.
- 119B. **The Nineteenth Century.** (3) II. Mr. Porter
Lecture—3 hours.
Realism and naturalism (Flaubert, Zola, Maupassant); criticism (Sainte-
Beuve, Renan, Taine); symbolism (Baudelaire, Verlaine, Rimbaud, Mal-
larmé).
Offered in even-numbered years.
124. **French Lyric Poetry.** (3) I. Mr. Lindsay
Lecture—3 hours.
Prerequisite: one upper division course in French or consent of the in-
structor.
Study of French versification and poetic conventions; intensive analysis
of the works of major poets.
Offered in odd-numbered years.
- *130A. **Advanced Grammar and Composition.** (3) II. Mr. Bach
Lecture—3 hours.
Prerequisite: courses 101A, and 101B or either course with grade B or
better.
Offered in odd-numbered years.

* Not to be given, 1965-1966.

- 130B. Advanced Grammar and Composition.** (3) I. Mr. Bach
Lecture—3 hours.
Prerequisite: courses 101A, and 101B or either course with grade B or better.
Offered in odd-numbered years.
- *134. Survey of French Culture and Institutions.** (3) I. Mr. Bach
Lecture—3 hours.
Offered in even-numbered years.
- 140. Study of a Major Writer.** (3) I. Mr. Lindsay
Lecture—3 hours.
With the consent of the instructor, this course may be repeated for credit.
Offered in odd-numbered years.
- *150. Masterpieces of French Literature.** (3) II. The Staff
Lecture—3 hours.
Prerequisite: English 1B.
Reading, lectures, and discussion in English. May not be counted as part of the major in French.
Offered in odd-numbered years.
- 160. French Literature of the Twentieth Century.** (3) II. Mr. Lindsay
Lecture—3 hours.
Representative readings from Proust, Gide, Valery, Sartre and others.
Lectures in English; readings in English or French. Knowledge of French not required.
Offered in even-numbered years.
- 194H. Special Study for Honors Students.** (3) I and II. The Staff
Prerequisite: open only to honors students.
Guided research leading to an honors thesis.
- 199. Special Study for Advanced Undergraduates.** (1-4) I and II. The Staff

GRADUATE COURSES

- 201. History of the French Language.** (3) I. Mr. Keith
Seminar—3 hours.
Offered in odd-numbered years.
- 202. Medieval French Literature.** (3) II. Mr. Keith
Seminar—3 hours.
Offered in even-numbered years.
- *217. Seventeenth-Century French Literature.** (3) I. Mr. Perkins
Seminar—3 hours.
Offered in even-numbered years.
- 218. Eighteenth-Century French Literature.** (3) II. Mr. Showalter
Seminar—3 hours.
With the consent of the instructor, this course may be repeated for credit.
Offered in even-numbered years.
- *219. Nineteenth-Century French Literature.** (3) II. Mr. Bach
Seminar—3 hours.
With the consent of the instructor this course may be repeated for credit.
Offered in odd-numbered years.
- 220. Twentieth-Century French Literature.** (3) I. Miss York
Seminar—3 hours.
Prerequisite: With the consent of the instructor, this course may be repeated for credit.
Offered in odd-numbered years.

* Not to be given, 1965-1966.

299. Research. (1-4) I and II.

The Staff

ITALIAN

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 85.

LOWER DIVISION COURSES

1. **Elementary Italian—Beginning.** (4) I. Mr. Bonadeo
Recitation—3 hours; laboratory—2 hours.
Prerequisite: this course corresponds to the first two years of high school Italian. No credit will be allowed if the student has completed two or more years of high school Italian.
2. **Elementary Italian—Continued.** (4) II. Mr. Bonadeo
Recitation—3 hours; laboratory—2 hours.
Prerequisite: course 1 or two years of high school Italian. Only two units of credit will be allowed if the student has completed three or more years of high school Italian.
3. **Intermediate Italian.** (4) I. Mr. Bonadeo
Recitation—4 hours.
Prerequisite: course 2 or three years of high school Italian.
4. **Intermediate Italian.** (4) II. Mr. Bonadeo
Recitation—4 hours.
Prerequisite: course 3 or four years of high school Italian.

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

- 39A and 39B. Greek Literature in Translation.
40. Roman Literature in Translation.

DRAMATIC ART

- 158A and 158B. The World Drama.
159. Contemporary Drama.

ENGLISH

116. The English Bible as Literature.
144A. Masterpieces of World Literature: The Epic.
144B. Masterpieces of World Literature: The European Novel.

FRENCH

150. Masterpieces of French Literature.
160. French Literature of the Twentieth Century.

GERMAN

150. Masterpieces of German Literature.
160. German Literature of the Twentieth Century.

RUSSIAN

131. The Russian Novel of the Nineteenth Century.
132. Russian Literature Since 1917.

SPANISH

150. Masterpieces of Spanish Literature.

GENETICS

Alex S. Fraser, Ph.D., *Chairman of the Department*
Department Office, 201 Hutchison Hall

Robert W. Allard, Ph.D., *Professor of Genetics and Professor of Agronomy.*
Alex S. Fraser, Ph.D., *Professor of Genetics.*
Melvin M. Green, Ph.D., *Professor of Genetics.*
G. Ledyard Stebbins, Ph.D., *Professor of Genetics.*
Sidney R. Snow, Ph.D., *Associate Professor of Genetics.*
Harris Bernstein, Ph.D., *Assistant Professor of Genetics.*

Hugh P. Donald, Ph.D., *Visiting Professor of Genetics.*

Members of the Genetics Group:

Ursula H. Abbott, Ph.D., *Associate Professor of Poultry Husbandry.*
Hans Abplanalp, Ph.D., *Associate Professor of Poultry Husbandry.*
Robert W. Allard, Ph.D., *Professor of Genetics and Professor of Agronomy.*
Vigfus S. Asmundson, Ph.D., *Professor of Poultry Husbandry, Emeritus.*
G. Eric Bradford, Ph.D., *Associate Professor of Animal Husbandry.*
Fred N. Briggs, Ph.D., *Professor of Agronomy, Emeritus.*
Royce S. Bringham, Ph.D., *Associate Professor of Pomology.*
Glen N. Davis, Ph.D., *Professor of Vegetable Crops.*
Robert E. Feeney, Ph.D., *Professor of Food Science and Technology.*
Alex S. Fraser, Ph.D., *Professor of Genetics.*
Melvin M. Green, Ph.D., *Professor of Genetics.*
Paul W. Gregory, Sc.D., *Professor of Animal Husbandry.*
Claron O. Hesse, Ph.D., *Professor of Pomology.*
Subodh K. Jain, Ph.D., *Lecturer in Agronomy.*
Paulden F. Knowles, Ph.D., *Professor of Agronomy.*
Robert C. Laben, Ph.D., *Professor of Animal Husbandry.*
Harry H. Laidlaw, Jr., Ph.D., *Professor of Entomology.*
† Lloyd A. Lider, Ph.D., *Associate Professor of Viticulture.*
R. Merton Love, Ph.D., *Professor of Agronomy.*
Harold P. Olmo, Ph.D., *Professor of Viticulture.*
† Charles M. Rick, Jr., Ph.D., *Professor of Vegetable Crops.*
Monica Riley, Ph.D., *Assistant Professor of Bacteriology.*
Wade C. Rollins, Ph.D., *Professor of Animal Husbandry.*
Charles W. Schaller, Ph.D., *Professor of Agronomy.*
Dale G. Smeltzer, Ph.D., *Assistant Professor of Agronomy.*
Francis L. Smith, Ph.D., *Professor of Agronomy.*
Paul G. Smith, Ph.D., *Professor of Vegetable Crops.*
Sidney R. Snow, Ph.D., *Associate Professor of Genetics.*
Ernest H. Stanford, Ph.D., *Professor of Agronomy.*
G. Ledyard Stebbins, Ph.D., *Professor of Genetics.*
Clyde Stormont, Ph.D., *Professor of Immunogenetics.*
J. Caswell Williams, Jr., Ph.D., *Lecturer in Agronomy.*
Stephen L. Wolfe, Ph.D., *Assistant Professor of Zoology.*

Departmental Major Adviser.—Mr. Stebbins.

Bachelor of Science Major Program and Graduate Study (Animal Science).
See page 53.

Bachelor of Science Major Program and Graduate Study (Plant Science).
See page 60.

‡ Absent on leave, fall semester, 1965-1966.

† Absent on leave, 1965-1966.

LOWER DIVISION COURSE

- 10. Heredity and Evolution.** (3) II. Mr. Fraser
Lecture—3 hours.
For students not specializing in biology. No credit to students who have had or are taking upper division genetics, botany, or zoology courses. The general principles of the laws of heredity and evolution.

UPPER DIVISION COURSES

- 100. Principles of Genetics.** (3) I and II.
I. Mr. Allard, Mr. Fraser, Mr. Bernstein; II. Mr. Fraser, Mr. Bernstein, Mr. Snow.
Lecture—3 hours; conference—1 hour.
Prerequisite: general botany or generally zoology. Not open to students who have received credit in Genetics 115.
Introduction to genetics with some consideration of its application in agriculture and biology.
Students taking course 100L concurrently will include their conference hour within the laboratory period of that course.
- 100L. Principles of Genetics Laboratory.** (1) I and II. Mr. Bernstein
Laboratory—3 hours.
May be taken concurrently with course 100.
Laboratory work in elementary genetics to supplement course 100.
- 101. Cytogenetics.** (3) II. Mr. Snow
Lecture—3 hours.
Prerequisite: course 100 or upper division equivalent.
Genetics as related to cytological conditions with particular reference to plant material.
- 101L. Cytogenetics Laboratory.** (2) II. Mr. Snow
Laboratory—6 hours.
Prerequisite: course 101 (may be taken concurrently); Botany 130.
Laboratory study of chromosome morphology and behavior as related to problems in genetics.
- 103. Organic Evolution.** (3) II. Mr. Stebbins
Lecture—3 hours.
Prerequisite: course 100 or upper division equivalent.
The principles of evolution, with particular reference to the evolutionary processes in plants.
- 105. Population Genetics.** (3) I. Mr. Fraser
Lecture—2 hours; laboratory—2 hours.
Prerequisite: course 100 or upper division equivalent.
An introductory course in the analysis and interpretation of population genetics, and of quantitative genetic systems.
- 106. Advanced Genetics.** (3) I. Mr. Green, Mr. Bernstein
Lecture—3 hours.
Prerequisite: course 100 or upper division equivalent; Botany 130; Chemistry 8.
An introduction into the nature and properties of the gene; gene mutation, the mechanism of gene action and related topics.
Offered in odd-numbered years.

- 115. Human Genetics.** (3) II. Mr. Green
Lecture—3 hours; conference—1 hour.
Prerequisite: introductory course in zoology, botany, or biology; upper division standing. Not open for credit to students who have received credit in course 100 or the equivalent.
Principles of genetics applied to the physical, biochemical, and mental characteristics of man; genetics of human populations; the heredity-environment problem.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. Mr. Fraser

GRADUATE COURSES

- 206. Current Problems in Genetics.** (3) I and II. I. Mr. Donald;
Lecture—2 hours; laboratory—2 hours. II. _____
Prerequisite: course 100 or upper division equivalent, 100L or the equivalent; consent of the instructor.
Selected topics in advanced genetics. May be repeated for credit.
- 291. Seminar in the History of Genetics.** (1-3) I. Mr. Laidlaw, Mr. Stebbins
Seminar—1 hour; individual conferences. The development of modern genetic theories, beginning with Mendel.
- 292. Seminar in Gene Structure and Action.** (1-3) II. Mr. Bernstein
Seminar—1 hour; individual conferences.
Prerequisite: course 291.
Topics of current interest related to the structure of genes, mutation, and the mechanism of gene action.
- 293. Seminar in Cytogenetics and Evolution.** (1-3) I. Mr. Knowles
Seminar—1 hour; individual conferences.
Prerequisite: Genetics 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 problems of organic evolution.
- 294. Seminar in Breeding Systems.** (1-3) II. _____
Seminar—1 hour; individual conferences.
Prerequisite: course 291.
Topics of current interest relating genetics to problems of animal and plant breeding.
- 299. Research.** (1-6) I and II. The Staff
- Staff Seminar in Genetics.** (No credit) I and II. The Genetics Group
Prerequisite: course 100.
Weekly meetings for presentation of topics by members of the staff, visiting investigators, and graduate students.

RELATED COURSES

- Principles of Plant Breeding (Agronomy 121)
Advanced Plant Breeding (Agronomy 221)
Quantitative Genetics and Plant Improvement (Agronomy 222)
The Genetics of Animal Breeding (Animal Husbandry 107)
Bacterial Genetics (Bacteriology 207)
Plant Cytology (Botany 130)
Applied Statistical Methods (Mathematics 105A-105B)
Fruit Breeding (Pomology 114)
Vegetable Breeding (Vegetable Crops 220)

GEOGRAPHY

Kenneth Thompson, Ph.D., *Chairman of the Department*
Department Office, 330 Voorhies Hall

Howard F. Gregor, Ph.D., *Associate Professor of Geography.*
Kenneth Thompson, Ph.D., *Associate Professor of Geography.*
Philip L. Wagner, Ph.D., *Associate Professor of Geography.*
Stephen C. Jett, Ph.D., *Assistant Professor of Geography.*



Paul D. Marr, M.A., *Acting Assistant Professor of Geography.*
Herbert B. Schultz, Ph.D., *Lecturer in Geography and Associate Professor of Agricultural Engineering.*
Roy J. Shlemon, M.S., *Acting Assistant Professor of Geography.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

Departmental Major Adviser.—Mr. Thompson.

Graduate Adviser.—Mr. Wagner.

The Major Program

(A) Lower Division Courses.—Required: Geography 1, 2, 3, 5; Anthropology 2; Economics 1A; Geology 1A.

(B) Upper Division Courses.—Required: 24 upper division units in Geography. Each program should normally include Geography 101 (Methods of Geographic Research), 105 (Cartography), and 151 (History of Geographic Thought).

Students who desire to prepare themselves 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.

Graduate Study.—The department offers a program of study and research leading to the M.A. degree in Geography. Detailed information regarding graduate study may be obtained from the Graduate Adviser, Department of Geography.

LOWER DIVISION COURSES

1. Introduction to Physical Geography. (3) I and II.

Lecture—3 hours.

Mr. Shlemon, Mr. Thompson

A study of the basic physical elements of geography (especially climate, landforms, soils, and natural vegetation) and their integrated patterns of world distribution.

2. Introduction to Cultural Geography. (3) I and II.

Mr. Jett

Lecture—3 hours.

A study of the basic cultural elements of geography (especially population distribution, general settlement and land-use patterns, and economics) and their correlation with the physical elements. Delimitation of the major geographic regions of the world.

3. Introduction to Climate and Weather. (2) I.

Mr. Schultz

Lecture—2 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.

4. **Introduction to Maps.** (2) II. Mr. Shlemon
 Lecture—2 hours.
 History and principles of cartography; great map-makers; national surveys; modern trends in mapping.
5. **Introductory Economic Geography.** (3) I. Mr. Thompson
 Lecture—3 hours.
 Geographic aspects of the production, exchange, and consumption of goods.

UPPER DIVISION COURSES

101. **Methods of Geographic Research.** (3) II. Mr. Shlemon
 Lecture—1 hour; laboratory—4 hours.
 Prerequisite: courses 1 and 2 and consent of the instructor.
 Research methodology; field study of a unit area, with systematic mapping of the elements that constitute the natural region and of the forms of its utilization; field trips.
105. **Cartography.** (3) I. Mr. Gregor
 Lecture—1 hour; laboratory—4 hours.
 Prerequisite: course 4 or consent of the 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.
106. **Interpretation of Aerial Photographs.** (3) II. Mr. Marr
 Lecture—1 hour; laboratory—4 hours.
 Prerequisite—course 1.
 Analysis of landscape from aerial photographs: land forms; vegetation; land use; settlements; transport and communications.
119. **Geography of the Arid Lands.** (3) I. Mr. Jett
 Lecture—3 hours.
 A study of the physical and cultural characteristics of the arid and semi-arid regions of the world.
121. **The Geography of Anglo-America.** (3) II. Mr. Gregor
 Lecture—3 hours.
 Prerequisite: courses 1 and 2 or consent of the instructor.
 A geographical survey of the major natural and economic regions of the United States and Canada.
122. **The Geography of Latin America.** (3) II. Mr. Wagner
 Lecture—3 hours.
 Prerequisite: courses 1 and 2 or consent of the instructor.
 A study of the physical and cultural characteristics of Latin America's geographical regions.
123. **The Geography of Europe.** (3) I. Mr. Wagner
 Lecture—3 hours.
 Prerequisite: courses 1 and 2 or consent of the instructor.
 A study of the geographic conditions and their relation to the economic, social, and political problems of Europe, excluding the USSR.
- *124. **The Geography of the Soviet Union.** (3) II. Mr. Wagner
 Lecture—3 hours.
 Prerequisites: courses 1 and 2 or consent of the instructor.
 A study of the geographic conditions and their relation to the economic, social, and political problems of the USSR.

* Not to be given, 1965–1966.

- *125. The Geography of North Africa and the Near East.** (3) I. Mr. Marr
Lecture—3 hours.
Prerequisite: courses 1 and 2 or consent of the instructor.
Physical, cultural, and historical geography of the Arab World and its near neighbors.
- 126. The Geography of Sub-Saharan Africa.** (3) II. Mr. Jett
Lecture—3 hours.
Prerequisite: courses 1 and 2 or consent of the instructor.
Physical, cultural, and historical geography of Africa south of the Sahara.
- 131. Geography of California.** (3) I and II. Mr. Gregor, Mr. Shlemon
Lecture—3 hours.
A study of the geographical regions of California: landforms, climate, and other physical characteristics; agricultural, mineral, and other resources; and patterns of settlement, population, transportation, and economy.
- 141. Economic Geography.** (3) II. Mr. Gregor
Lecture—3 hours.
Prerequisite: course 5, or consent of the instructor.
Factors in economic regionalism. Analysis of major economic regions of the earth.
- 143. Political Geography.** (3) II. Mr. Thompson
Lecture—3 hours.
Areal differentiation of the natural and cultural phenomena that affect the world's political organization.
- 151. History of Geographic Thought.** (3) II. Mr. Marr
Lecture—3 hours.
Prerequisite: three upper division courses in geography.
Objectives, subdivisions, and development of geography.
- 155. Urban Geography.** (3) I. Mr. Marr
Lecture—3 hours.
The origin, development, distribution, and regional variation of the world's cities, with emphasis on an analysis of the functions and patterns of American cities.
- 156. Regional Structure.** (3) II. Mr. Marr
Lecture—3 hours.
Prerequisite: course 1 or 2.
The concept of regional structure and its application to geographic problems; nodes, linkages, circulation, and regions. Quantitative and cartographic methods of regional research.
- 161. The Conservation of Natural Resources.** (3) II. Mr. Jett
Lecture—3 hours.
The general principles of conservation and their application, especially in the United States.
- 162. Geography of Water Resources.** (3) I. Mr. Marr
Lecture—3 hours.
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.

170. **Cultural Ecology.** (3) I. Mr. Jett
 Lecture—3 hours.
 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.

199. **Special Study for Advanced Undergraduates.** (1-3) I and II.
 Investigation of special problems. The Staff (Mr. Thompson in charge)

GRADUATE COURSES

250. **Theory and Method in Geography.** (2) I. Mr. Wagner in charge
 Lecture—1 hour; discussion—1 hour. The Staff (Mr. Wagner in charge)
291. **Seminar in Cultural Geography.** (2) II. Mr. Wagner
 Seminar—2 hours.
292. **Seminar in Physical Geography.** (2) I. Mr. Shlemon
 Seminar—2 hours.
293. **Seminar in Economic Geography.** (2) II. Mr. Gregor, Mr. Thompson
 Seminar—2 hours.
294. **Seminar in Climatology.** (2) I. Mr. Schultz
 Seminar—2 hours.
299. **Research.** (1-6) I and II. The Staff (Mr. Wagner in charge)
 Seminar—2 hours.

PROFESSIONAL COURSE

300. **Problems in Teaching Geography.** (1) I. Mr. Thompson
 Lecture—1 hour.
 Prerequisite: course 1 or 2.
 Problems in establishing, organizing, and conducting courses in geography and regional study. Designed primarily for prospective elementary and secondary school teachers of the social sciences.

GEOLOGY

Cordell Durrell, Ph.D., *Chairman of the Department.*
Department Office, 306A Physical Sciences Building.

Cordell Durrell, Ph.D., *Professor of Geology.*
Donald O. Emerson, Ph.D., *Associate Professor of Geology.*
†Charles G. Higgins, Ph.D., *Associate Professor of Geology.*
James W. Valentine, Ph.D., *Associate Professor of Geology.*
Charles V. Guidotti, Ph.D., *Assistant Professor of Geology.*
Emile A. Pessagno, Jr., Ph.D., *Assistant Professor of Geology.*
Thomas W. Todd, Ph.D., *Assistant Professor of Geology.*



Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

Departmental Major Adviser.—Mr. Todd.

GEOLOGY MAJOR PROGRAMS

Students who are interested in becoming professional geologists and continuing their geological studies at the graduate level should elect the program leading to the Bachelor of Science degree. Students desiring a less intensive program in geology as part of their general education or as preparation for nonprofessional careers in geology 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

The major program consists of 60 units of mathematics and natural science courses including:

(A) Lower Division Courses.—Chemistry 1A-1B or preferably 7A-7B; Geology 1A-1B, 6; Mathematics 9A-9B-9C; Physics 4A, 4C. Recommended: Zoology 1A; Mathematics 13; Chemistry 5, Physics 4B.

(B) Upper Division Courses.—24 units of upper division courses in Geology including the following: Geology 102A-102B, 103, 111, 116, and a summer field course, Geology 118 as offered at the University of California, Berkeley and Los Angeles, or its equivalent at another institution with departmental approval.

Students who have special interests in paleontology, biostratigraphy, engineering geology, hydrogeology, mineralogy, or petrology of igneous, metamorphic or sedimentary rocks should take additional elementary and advanced courses in such fields as chemistry, physics, mathematics, zoology, genetics, engineering and soil science. Because consideration must be given to the prerequisites of such courses, students are required to consult their adviser as early as possible.

Bachelor of Arts Major Program

(A) Lower Division Courses.—Chemistry 1A or 7A; Geology 1A-1B, 6; Physics 2A; Zoology 1A; and one of the following courses: Chemistry 1B or 7B; Mathematics 13; Physics 2B; Zoology 1B.

(B) Upper Division Courses.—Geology 102A, 103, 111, 116, and other upper division courses in geology and related fields to total not less than 24 units selected in accordance with a plan approved by the major adviser.

† Absent on leave, 1965-1966.

Honors and Honors Program (see page 85).—The honors program in geological sciences consists of course 194H and an honors thesis incorporating studies undertaken in course 194H.

Graduate Study.—The Department of Geology offers a program of study and research leading to the M.S. and Ph.D. degrees in Geology. For information regarding graduate study in geology, address the Graduate Adviser, Department of Geology.

LOWER DIVISION COURSES

1A. General Geology: Physical. (3) I. Mr. Valentine
Lecture—3 hours.

An introduction to the earth's physical features and the changes they undergo through dynamic processes. Students are urged to take course 1AL concurrently.

1AL. Physical Geology Laboratory. (1) I. ———
Laboratory—3 hours.

Identification of common minerals and rocks; interpretation of landforms and geologic structures from topographic and geologic maps and air photographs.

1B. General Geology: Historical (4) II. Mr. Pessagno
Lecture—3 hours; laboratory—3 hours.

Prerequisite: course 1A.

Origin and geological history of the earth and the evolution of its plant and animal inhabitants. Several of the lecture periods will be combined in all-day field trips.

6. Mineralogy and Petrology. (4) I. Mr. Guidotti
Lecture—2 hours; laboratory—6 hours.

Prerequisite: Chemistry 1A or 7A.

Properties, origins, and associations of important rock-forming and economic minerals and of the rocks in which they occur.

UPPER DIVISION COURSES

102A–102B. Field Geology (2–2) I and II. The Staff
Laboratory and field—1 day per week.

Prerequisite: courses 1A, 103 (may be taken concurrently).

Principles and methods of geologic mapping. Preparation of geologic reports.

103. Petrology. (4) I. Mr. Durrell
Lecture—2 hours; laboratory—6 hours.

Prerequisite: courses 1A, 6.

Origins and characteristics of rocks. Laboratory study of hand specimens.

104A. Crystallography and Optical Mineralogy. (4) I. Mr. Emerson
Lecture—2 hours; laboratory—6 hours.

Principles of structural, morphological and optical crystallography; microscopic study of mineral fragments and thin sections.

104B. Optical Petrology. (4) II. Mr. Emerson
Lecture—2 hours; laboratory—6 hours.

Prerequisite: courses 6 and 104A.

Origin, occurrence, and classification of rocks, and their description and interpretation by megascopic and microscopic means.

107. **Evolution of North America.** (2) I. Mr. Pessagno
Lecture—2 hours.
Prerequisite: course 116.
Origin of continents and their tectonic elements, applied to a study of North America.
111. **Invertebrate Paleontology.** (4) I. Mr. Pessagno
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 1B or Zoology 1A or 10.
Morphology, systematics, paleoecology, and evolution of invertebrates common in the fossil record.
112. **Stratigraphy.** (3) II. Mr. Valentine
Lecture—3 hours.
Prerequisite: course 1B.
The principles of stratigraphy, sedimentation, and sedimentary tectonics.
116. **Structural Geology.** (3) II. Mr. Guidotti
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 1A.
Deformation of the earth; causes, mechanics, and effects of crustal deformation; laboratory practice in three-dimensional geology problems.
- *117. **Geomorphology.** (2) II. Mr. Higgins
Lecture—2 hours.
Prerequisite: course 1A.
Sculpture of the earth's surface by natural processes.
150. **Engineering Geology.** (3) II. Mr. Todd
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Chemistry 1A; Mathematics 9A or 16A; Physics 2A or 4A.
Geologic processes; properties of geologic materials; the interpretation of field and laboratory data important to engineering problems.
- *152. **Photogeology.** (2) II. Mr. Higgins
Lecture—1 hour; laboratory—3 hours.
Prerequisite: course 1A or 150.
Introduction to aerial photography and photogrammetry; the use of air photos in interpretation of regional geologic structure, rock types, and geologic history by analysis of land forms, drainage patterns, soils, vegetation, and outcrop patterns.
Offered in odd-numbered years.
- 194H. **Special Study for Honors Students.** (3) I and II. The Staff
Prerequisite: open only to majors of senior standing who qualify for the honors program.
Independent study of selected topics under direction of the staff. Completion will involve the writing of an honors thesis.
198. **Directed Group Study.** (2) I and II. The Staff
Prerequisite: senior standing in geology.
199. **Special Study for Advanced Undergraduates.** (1-3) I and II. The Staff

GRADUATE COURSES

- *213. **Geomorphology.** (2) II. Mr. Higgins
Seminar—2 hours.
Prerequisite: course 117 or the equivalent.
Surficial processes and evolution of land forms.
Offered in even-numbered years.

255. **Metamorphic Petrology.** (3) I. Mr. Guidotti
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 104B.
Physiochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks.
257. **Sedimentary Petrology.** (3) I. Mr. Todd
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 104B.
Examination and interpretation of sedimentary rocks using the petrographic microscope.
260. **Paleontology.** (3) I. Mr. Valentine
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 111.
Morphological and biostratigraphic studies of Mesozoic and Cenozoic invertebrates important as index fossils.
280. **Igneous Petrology.** (3) II. Mr. Emerson
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 104A.
Origin and classification of the igneous rocks.
298. **Group Study.** (2) I and II. The Staff
299. **Research.** (1-6) I and II. The Staff

GERMAN

For courses in German see "German and Russian" on page 260.

GREEK

For courses in Greek see "Classics" on page 164.

GERMAN AND RUSSIAN

Clifford A. Bernd, Dr. phil., *Chairman of the Department.*
Department Office, 722 Sproul Hall

Clifford A. Bernd, Dr. phil., *Associate Professor of German.*
Roland W. Hoermann, Ph.D., *Associate Professor of German.*
Valerie Tumins, Ph.D., *Associate Professor of Russian.*
James E. Copeland, Ph.D., *Assistant Professor of German.*
Ulrich Gaier, Dr. phil., *Assistant Professor of German.*
Guenther H. Nerjes, Ph.D., *Assistant Professor of German.*
Alex M. Shane, Jr., Ph.D., *Assistant Professor of Russian.*



James E. Copeland, B.A., *Acting Assistant Professor of German.*
William M. Estabrook, M.A., *Acting Assistant Professor of German.*
John F. Fetzer, M.A., *Acting Assistant Professor of German.*
Anthony S. Kawczynski, Mag. phil., *Lecturer in Foreign Languages.*
Maria Stoffers-Edlinger, Dr. phil., *Lecturer in German.*
Michael Winkler, M.A., *Acting Assistant Professor of German.*

FOREIGN LANGUAGES

PROFESSIONAL COURSES

300. The Teaching of a Modern Foreign Language. (2) II. The Staff
Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

Analysis and discussion of a variety of teaching techniques by representatives of modern foreign languages and linguistics; orientation in language laboratory operation; practice in evaluating oral and written performance in language classes.

GERMAN

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 85.

Departmental Major Advisers.—Mr. Bernd, Mr. Nerjes.

Graduate Adviser.—Mr. Hoermann.

The Major Program

(A) Lower Division Courses.—German 1, 2, 3, 4, or their equivalents.

(B) Upper Division Courses.—Twenty-four units in upper division courses, including one full year's course in composition. Six of the 24 units may be related work in other departments. Students who fail to maintain an average of C or better in upper division courses in German will be excluded from the major.

Honors and Honors Program (see page 85).—The honors program comprises two semesters of study under course 194H, which will include a research paper and a comprehensive examination.

The Master of Arts Degree in German

The Department offers courses leading to the Master of Arts degree in German to students who have completed with distinction the A.B. degree in German, or its equivalent. Candidates will be recommended for admission to graduate studies in German provided they meet the requirements of the Graduate Division and the Department of Foreign Languages. Detailed information may be obtained by writing to the Graduate Adviser, Department of German and Russian.

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 German—Beginning.** (4) I and II. The Staff
 Recitation—3 hours; laboratory—2 hours.
 This course corresponds to the first two years of high school German. No credit will be allowed if the student has completed two or more years of high school German.
- 2. Elementary German—Continued.** (4) I and II. The Staff
 Recitation—3 hours; laboratory—2 hours.
 Prerequisite: course 1 or two years of high school German. Only two units of credit will be allowed if the student has completed three or more years of high school German.
- 3. Intermediate German.** (4) I and II. The Staff
 Recitation—3 hours; laboratory—2 hours.
 Prerequisite: course 2 or three years of high school German.
- 4. Intermediate German. Conversation and Reading.** (4) I and II. The Staff
 Recitation—4 hours.
 Prerequisite: course 3 or four years of high school German.
 Spoken German stressed through class discussion of a variety of selected readings.
- 1G. German for Graduate Students.** (No credit) I and II. Mr. Kawczynski
 Lecture—3 hours.
 A course designed to prepare students for the graduate reading examination.

UPPER DIVISION COURSES

Prerequisite for all courses except 150, 160: course 4 or its equivalent.

- 101A. Advanced Grammar, Composition, and Conversation.** (3) I. Mr. Fetzer
 Lecture—3 hours.
- 101B. Advanced Grammar, Composition, and Conversation.** (3) II. Mr. Estabrook
 Lecture—3 hours.
- 102. German Poetry.** (3) II. Mr. Gaier
 Lecture—3 hours.
 Literary, folk, and church forms in German lyric and narrative verse from the Middle Ages to the present.
 Offered in even-numbered years.
- 103A. The Classical Period: Lessing and Schiller.** (3) I. Mr. Nerjes
 Lecture—3 hours.
 The major dramas and aesthetic principles of Lessing and Schiller.
 Offered in odd-numbered years.
- *103B. The Classical Period: Goethe.** (3) II. Mr. Nerjes
 Lecture—3 hours.
 A study of *Iphigenie*; *Tasso*; and *Faust*, Parts I and II.
 Offered in odd-numbered years.
- *109. The "Sturm und Drang" Period.** (3) I. Mr. Hoermann
 Lecture—3 hours.
 The reaction against rationalism, and the liberation of feeling.
 Offered in even-numbered years.

* Not to be given, 1965–1966.

110. **The Romantic Movement.** (3) II. Mr. Hoermann
Lecture—3 hours.
Short-story, *Kunstmärchen* and verse genres from 1795–1830.
Offered in even-numbered years.
- *114. **Nineteenth-Century German Prose.** (3) I. Mr. Bernd
Lecture—3 hours.
Readings from representative German prose writers of the nineteenth century from the end of Romanticism to Naturalism.
Offered in odd-numbered years.
116. **Nineteenth-Century German Drama.** (3) II. Mr. Bernd
Lecture—3 hours.
The development of the German drama during the nineteenth century.
Readings of representative plays by Kleist, Büchner, Grillparzer, and Hebbel.
Offered in even-numbered years.
118. **Twentieth-Century German Drama.** (3) I. Mr. Hoermann
Lecture—3 hours.
Development of the German drama from naturalism to the present.
Offered in odd-numbered years.
- *121. **History of German Literature.** (3) II. Mr. Estabrook
Lecture—3 hours.
A survey of German literature from the Middle Ages through the Baroque.
Offered in odd-numbered years.
122. **History of German Literature.** (3) I. Mr. Fetzer
Lecture—3 hours.
A survey of German literature from the end of the Baroque through nineteenth century realism.
Offered in odd-numbered years.
- 130A. **Advanced Grammar and Composition.** (3) I. Mr. Winkler
Lecture—3 hours.
Prerequisite: courses 101A and 101B, or either course with grade of B or better.
Offered in odd-numbered years.
- 130B. **Advanced Grammar and Composition.** (3) II. Mr. Copeland
Lecture—3 hours.
Prerequisite: courses 101A and 101B, or either course with grade B or better.
Offered in even-numbered years.
135. **History of the German Language.** (3) I. Mr. Copeland
Lecture—3 hours.
Offered in even-numbered years.
150. **Masterpieces of German Literature.** (3) I. Mr. Bernd
Lecture—3 hours.
Prerequisite: English 1B.
Reading, lectures, and discussion in English. May not be counted as part of the major in German.
Offered in odd-numbered years.

* Not to be given, 1965–1966.

160. German Literature of the Twentieth Century. (3) II. Mr. Fetzer
Lecture—3 hours.
Representative readings from Rilke, Kafka, Hesse, Brecht, Thomas Mann, and others. Lectures in English; readings in English or German. Knowledge of German not required.
Offered in even-numbered years.
- 194H. Special Study for Honors Students. (3) I and II. The Staff
Prerequisite: open only to honors students.
Guided research leading to an honors thesis.
199. Special Study for Advanced Undergraduates. (1-3) I and II. The Staff

GRADUATE COURSES

202. Middle High German. (3) I. Mr. Estabrook
Seminar—3 hours.
- *205. Sixteenth- and Seventeenth-Century German Literature. (3) I. Mr. Gaier
Seminar—3 hours.
208. Eighteenth-Century German Literature. (3) II. Mr. Nerjes
Seminar—3 hours.
211. Nineteenth-Century German Literature. (3) I. Mr. Gaier
Seminar—3 hours.
With the consent of the instructor, this course may be repeated for credit.
217. Twentieth-Century German Literature. (3) II. Mr. Winkler
Seminar—3 hours.
299. Research. (1-4) I and II. The Staff

RUSSIAN

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 85.

Departmental Major Adviser.—Mr. Shane.

The Major Program.

Requirements are Russian 4 or its equivalent and a minimum of 24 units of upper division course work including Russian 101A, 101B, 102A, 131, 132, and 198 with a passing grade in the Senior Comprehensive Examination. Students who major in Russian must maintain at least an average of C in upper division Russian courses.

Recommended: History 137A-137B.

LOWER DIVISION COURSES

1. Elementary Russian—Beginning. (5) I. The Staff
Recitation—5 hours; laboratory—2 hours.
This course corresponds to the first two years of high school Russian. No credit will be allowed if the student has completed two or more years of high school Russian.
2. Elementary Russian—Continued. (5) II. The Staff
Recitation—5 hours; laboratory—2 hours.
Prerequisite: course 1 or two years of high school Russian. Only two units of credit will be allowed if the student has completed three or more years of high school Russian.

* Not to be given, 1965-1966.

3. **Intermediate Russian.** (4) I. The Staff
 Recitation—4 hours.
 Prerequisite: course 2.
4. **Intermediate Russian.** (4) II. The Staff
 Recitation—4 hours.
 Prerequisite: course 3.
- 1G. **Russian for Graduate Students.** (No credit) I. The Staff
 Lecture—3 hours.
 A course designed to prepare students for the graduate reading examination.

UPPER DIVISION COURSES

- 101A. **Advanced Grammar, Composition and Conversation.** (3) I. Mr. Shane
 Lecture—3 hours.
 Prerequisite: course 4 or the equivalent.
- 101B. **Advanced Grammar, Composition, and Conversation.** (3) II. Mr. Shane
 Lecture—3 hours.
 Prerequisite: course 101A or the equivalent.
- 102A. **Advanced Composition.** (3) I. Miss Tumins
 Lecture—3 hours.
 Prerequisite: course 101B or the equivalent.
- 102B. **Advanced Composition.** (3) II. Miss Tumins
 Lecture—3 hours.
 Prerequisite: course 102A or the equivalent.
131. **The Russian Novel of the Nineteenth Century.** (3) II. Mr. Shane
 Lecture—3 hours.
 Prerequisite: English 1B.
 The evolution of Russian fiction; readings in Pushkin, Lermontov, Gogol, Goncharov, Turgenev, Tolstoy, and Dostoyevsky. Lectures, readings, and discussions in English. Knowledge of Russian not required.
 Offered in even-numbered years.
132. **Russian Literature since 1917.** (3) II. Mr. Shane
 Lecture—3 hours.
 Prerequisite: English 1B.
 Representative readings from Gorky, Blok, Mayakovsky, Zamyatin, Pilnyak, Fedin, A. Tolstoy, Ehrenburg, Leonov, Fadeyev, Olesha, Katayev, Sholokhov, Pasternak, and others. Lectures, readings, and discussions in English. Knowledge of Russian not required.
 Offered in odd-numbered years.
- *134. **The Russian Short Story.** (3) II. The Staff
 Lecture—3 hours.
 Prerequisite: course 101A or the equivalent.
 Readings in major authors of the nineteenth and twentieth centuries.
 Offered in odd-numbered years.
135. **Russian Drama.** (3) II. Miss Tumins
 Lecture—3 hours.
 Prerequisite: course 101A or the equivalent.
 Readings in major authors of the eighteenth, nineteenth and twentieth centuries.
 Offered in even-numbered years.

* Not to be given, 1965-1966.

136. Russian Poetry. (3) I.

Miss Tumins

Lecture—3 hours.

Prerequisite: course 101B or the equivalent.

Study of Russian versification; readings from major poets.

Offered in odd-numbered years.

198. Directed Group Study. (3) II.

The Staff

Discussion—3 hours.

Prerequisite: Open only to seniors majoring in Russian.

Independent reading in Russian literature with reports and discussion in preparation for the Senior Comprehensive Examination.

199. Special Study for Advanced Undergraduates (1-3) I and II. The Staff

HISTORY

Walter L. Woodfill, Ph.D., *Chairman of the Department.*
Department Office, 176 Voorhies Hall

W. Turrentine Jackson, Ph.D., *Professor of History.*
Kwang-Ching Liu, Ph.D., *Professor of History.*
‡C. Bickford O'Brien, Ph.D., *Professor of History.*
James H. Shideler, Ph.D., *Professor of History.*
F. Wilson Smith, Ph.D., *Professor of History.*
Walter L. Woodfill, Ph.D., *Professor of History.*
David L. Jacobson, Ph.D., *Associate Professor of History.*
Peter Paret, Ph.D., *Associate Professor of History.*
Rollie E. Poppino, Ph.D., *Associate Professor of History.*
†Richard N. Schwab, Ph.D., *Associate Professor of History.*
†Irwin Unger, Ph.D., *Associate Professor of History.*
F. Roy Willis, Ph.D., *Associate Professor of History.*
‡Arthur F. Corwin, Ph.D., *Assistant Professor of History.*
Craig B. Fisher, Ph.D., *Assistant Professor of History.*
Manfred P. Fleischer, Ph.D., *Assistant Professor of History.*
Paul Goodman, Ph.D., *Assistant Professor of History.*
C. Roland Marchand, Ph.D., *Assistant Professor of History.*
Richard Millman, Ph.D., *Assistant Professor of History.*
Morgan B. Sherwood, Ph.D., *Assistant Professor of History.*
Donald C. Swain, Ph.D., *Assistant Professor of History.*
———, *Assistant Professor of History.*
———, *Assistant Professor of History.*
———, *Assistant Professor of History.*
———, *Assistant Professor of History.*



William J. Jones, Ph.D., *Visiting Associate Professor of History.*
James P. Kindregan, M.A., *Lecturer in History.*
Basil H. Liddell Hart, D. Litt., *Visiting Professor of History.*
Jung-Pang Lo, Ph.D., *Lecturer in History.*
John W. McDermott, Jr., M.A.T., *Associate in History.*
Daniel M. Mulholland, M.A., *Acting Assistant Professor of History.*

HISTORY

Letters and Science List.—All undergraduate courses in history are included in the Letters and Science List of Courses (see page 85).

Departmental Advisers.—Mr. Fisher, Mr. Jacobson, Mr. Liu, Mr. Marchand, Mr. Millman, Mr. Paret, Mr. Poppino, Mr. Smith, Mr. Swain, Mr. Willis.

Graduate Advisers.—Mr. O'Brien, Mr. Paret, Mr. Shideler, Mr. Smith.

Introductory Courses.—Courses 4A, 4B, 17A and 17B are open to all students.

The American History and Institutions Requirement may be satisfied by any two of the following courses: course 17A, 17B, 170A, 170B, 171, 172A, 172B, 174A, 174B, 175A, 175B, 176A, 176B, 178A, 178B, 179A, 179B, 180, 183. See also page 38.

The Major Program

(A) *Lower Division Courses.*—Required: courses 4A–4B, 17A–17B. It is recommended that students, in consultation with their advisers, also take

‡ Absent on leave, fall semester 1965–1966.

† Absent on leave, 1965–1966.

6 units (normally a two-semester sequence of courses) in one of the following fields: cultural anthropology, cultural geography, principles of economics, English literature, literature of the United States, philosophy, political science, psychology, or sociology.

(B) Upper Division Courses.—Required: (1) Students majoring in history must complete 24 upper division units in history, including:

(a) Course 101.

(b) A minimum of 9 units (including a two-semester sequence of courses) in a field of concentration (for "field" see below).

(c) A minimum of 6 units in another field of history. (The fields referred to in (b) and (c) above are Europe, Great Britain, Far East, Latin America, and the United States.)

(2) History students must maintain at least a grade C average in the major.

Honors and Honors Program (see page 85).—A student may become eligible for graduation with honors in history by enrolling in the department's Honors Program. This comprises course 101, completed with a grade of B or better, and three units of course 199 to be taken preferably during the second senior semester in relation to an upper division course chosen in consultation with the student's academic adviser and with the permission of the course instructor. Before being admitted to the honors program, a student must complete 12 units of history, including both United States and European history (normally courses 4 and 17) with an average grade of B.

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.

LOWER DIVISION COURSES

4A. History of Western Civilization. (3) I. The Staff
Lecture—2 hours; discussion—1 hour.

The growth of western civilization from ancient times through the seventeenth century.

4B. History of Western Civilization. (3) II. The Staff
Lecture—2 hours; discussion—1 hour.

The development of western civilization in the eighteenth, nineteenth, and twentieth centuries.

17A. History of the United States. (3) I and II. The Staff
Lecture—2 hours; discussion—1 hour.

American national beginnings from colonial times through 1865.

17B. History of the United States. (3) I and II. The Staff
Lecture—2 hours; discussion—1 hour.

The American nation from the Civil War to the present.

UPPER DIVISION COURSES

101. Introduction to Historical Method and Historiography. (3) I and II.
Lecture—3 hours. Mr. Marchand

111A. Ancient History. (3) I. Mr. Fisher
Lecture—3 hours.

A survey of the history of the Near East and Mediterranean area from the beginning of recorded history to the reign of Alexander the Great.

111B. Ancient History. (3) II. Mr. Fisher
Lecture—3 hours.

The history of the Near East and Mediterranean area from the reign of Alexander the Great to the time of Constantine.

- 121A. Medieval History.** (3) I. Mr. Fisher
Lecture—3 hours.
A survey of European history from the reign of Constantine to the tenth century, with readings from the literary sources.
- 121B. Medieval History.** (3) II. Mr. Fisher
Lecture—3 hours.
European history from the tenth century to the Renaissance, with readings from the literary sources.
- 131. The Renaissance and Reformation.** (3) I. Mr. Fleischer
Lecture—3 hours.
A study of the period 1300–1600, with primary attention to the leading figures and with readings from their major works.
- 132. Europe in the Seventeenth and Eighteenth Centuries.** (3) II. Mr. Fleischer
Lecture—3 hours.
A survey of the period 1600–1789 with emphasis on the growth of the modern state, the new interest in science, and the growth of critical thought leading to revolutionary sentiment.
- *133. The Age of Reason.** (3) I. Mr. Schwab
Lecture—3 hours.
Relationship of ideas to European society in the seventeenth and eighteenth centuries; the intellectual background of the French Revolution. Extensive source readings.
- *134A. The Age of Revolution.** (3) II. Mr. Schwab
Lecture—3 hours.
The intellectual and social history of Europe from the French Revolution to the late nineteenth century. Extensive source readings.
- *134B. The Age of Revolution.** (3) I. Mr. Schwab
Lecture—3 hours.
The intellectual and social history of Europe since the late nineteenth century. Extensive source readings.
- *137A. Russian History to 1725.** (3) I. Mr. O'Brien
Lecture—3 hours.
From the beginnings through the reforms of Peter the Great.
- 137B. Russian History, 1725–1856.** (3) II. Mr. O'Brien
Lecture—3 hours.
From the Petrine period through the Crimean War.
- 138A. Russian History, 1856–1914.** (3) I. Mr. Mulholland
Lecture—3 hours.
From the beginning of the Great Reforms to World War I.
- 138B. Russia since 1914.** (3) II. Mr. Mulholland
Lecture—3 hours.
The Russian Revolution and the Soviet Regime.
- *139. Russian Social and Intellectual History.** (3) I. ———
From the Eighteenth Century to 1917.
- 140. The Two World Wars.** (3) I. Mr. Liddell Hart
Lecture—3 hours.
An analysis of the two World Wars, of their nineteenth-century backgrounds, and of the military trends during the interwar years.

* Not to be given, 1965–1966.

141. **France since 1815.** (3) I. Mr. Willis
Lecture—3 hours.
- *144A. **History of Germany to 1815.** (3) I. Mr. Paret
Lecture—3 hours.
A history of the Germanies through the Congress of Vienna.
- 144B. **History of Germany since 1815.** (3) II. Mr. Paret
Lecture—3 hours.
The German national unification, the age of Bismarck and William II, and the wars and revolutions of the twentieth century.
- 145A. **Europe in the Nineteenth Century.** (3) I. Mr. Millman
Lecture—3 hours.
A survey of the history of Western Europe from 1815 to 1870.
- 145B. **Europe in the Nineteenth Century.** (3) II. Mr. Millman
Lecture—3 hours.
A survey of the history of Western Europe from 1870 to 1914.
- 146A. **Europe in the Twentieth Century.** (3) I. Mr. Willis
Lecture—3 hours.
A survey of the history of Europe from 1914 to 1939.
- 146B. **Europe in the Twentieth Century.** (3) II. Mr. Willis
Lecture—3 hours.
A survey of the history of Europe from 1939 to the present.
- *147. **Ideas and Politics in Twentieth-Century Europe.** (3) II. Mr. Paret
Lecture—2 hours; discussion—1 hour.
Prerequisite: courses 4A and 4B, or consent of the instructor.
Political, military, and intellectual history of Europe from the turn of the century to the present. Extensive source readings.
- *148A. **Diplomatic History of Modern Europe.** (3) I. Mr. Millman
Lecture—3 hours.
A survey of the diplomatic relations of the European powers from the eighteenth century to the middle of the nineteenth century.
- 148B. **Diplomatic History of Modern Europe.** (3) II. Mr. Millman
Lecture—3 hours.
A survey of the diplomatic relations of the European powers from the middle of the nineteenth century to the 1930s.
149. **History of Military Thought and Policy from Machiavelli to the Present.** (3) I. Mr. Paret
Lecture—3 hours.
Prerequisite: courses 4A and 4B. Additional background in history, political theory, or sociology is recommended.
An analysis of military affairs and of their interaction with intellectual, social, economic, and political history since the Renaissance.
- 151A. **History of England to 1603.** (3) I. Mr. Woodfill
Lecture—3 hours.
- 151B. **History of England from 1603.** (3) II. Mr. Woodfill
Lecture—3 hours.

* Not to be given, 1965-1966.

- 152A. English Constitutional History.** (3) I. Mr. Jones
Lecture—3 hours.
Prerequisite: courses 151A and 151B or their equivalent, or consent of the instructor.
From Anglo-Saxon times to the reign of Edward IV.
- 152B. English Constitutional History.** (3) II. Mr. Jones
Lecture—3 hours.
Prerequisite: course 152A or the equivalent; or consent of the instructor.
From the reign of Edward IV to the present.
- *153. English Society in the Early Modern Period.** (3) II. Mr. Woodfill
Discussion—3 hours.
Prerequisite: courses 151A and 151B or the equivalent, or consent of the instructor.
Reading in sources and monographs, sixteenth and seventeenth centuries; discussion and reports.
- 154. Tudor and Stuart England.** (3) I. Mr. Jones
Lecture and discussion—3 hours.
Prerequisite: consent of the instructor.
- *160. Spain from the Sixteenth to the Eighteenth Centuries.** (3) II. ———
Lecture and discussion—3 hours.
Emphasis on Spanish political, social, and economic developments from about 1475 to about 1789, with some attention to cultural and intellectual factors. Discussion and reports.
- 161A. Latin-American History.** (3) I. Mr. Poppino
Lecture—3 hours.
Colonial history of Latin America.
- 161B. Latin-American History.** (3) II. Mr. Corwin
Lecture—3 hours.
The National Period of Latin-American history.
- 163. History of Brazil.** (3) I. Mr. Poppino
Lecture—3 hours.
The history of Brazil since 1500, dealing with colonial origins and subsequent development of political, economic, and social institutions. Emphasis on the period since independence.
Offered in even-numbered years.
- 165. Twentieth-Century Latin-American Social Revolutions.** (3) I. Mr. Poppino
Lecture—2 hours; discussion—1 hour.
Major social upheavals in Mexico, Argentina, Brazil, Bolivia, Guatemala, and Cuba, examined as to similarities and differences in causes, course, and consequences. Reading knowledge of Spanish helpful but not required.
Offered in even-numbered years.
- 166. History of Mexico.** (3) II. Mr. Corwin
Lecture—3 hours.
The colonial origins and development of the Mexican nation; its political, economic, and social institutions. Emphasis on the period since 1910.
- *167. Proseminar in Latin-American History.** (3) I. Mr. Poppino
Discussion—3 hours.
Prerequisite: courses 161A and 161B or the equivalent, and consent of the instructor. Reading knowledge of Spanish or Portuguese recommended.
Research and writing on selected topics in Latin-American history.

* Not to be given, 1965-1966.

- 168. History of Inter-American Relations. (3) I.** Mr. Poppino
Lecture—3 hours.

Diplomatic history of Latin-America since independence, intra-Latin American relations, relations with the U. S., participation in international organizations, and communism in Latin America. Reading knowledge of Spanish or Portuguese helpful but not required.

Offered in odd-numbered years.

- 170A. Colonial America. (3) I.** Mr. Jacobson
Lecture—3 hours.

A survey of 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.

- 170B. The American Revolution. (3) II.** Mr. Goodman, Mr. Jacobson
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.

- 171. The Early National Period, 1789–1815. (3) II.** Mr. Goodman
Lecture—3 hours.

The political and social history of the American republic from the adoption of the Constitution through the War of 1812.

- *172A. The Jacksonian Era. (3) I.** _____
Lecture—3 hours.

Prerequisite: courses 17A and 17B.

The political and social history of the American republic from the War of 1812 to the Compromise of 1850, with special emphasis on inter-sectional rivalry.

- 172B. American Civil War. (3) I.** Mr. Kindregan
Lecture—3 hours.

Prerequisite: Recommended, courses 17A and 17B.

Major aspects of the 1850's and the Civil War era; factors leading to the sectional crisis and war; problems relating to Negro freedom; constitutional adjustments; economic and political changes; military and diplomatic policies of Union and Confederacy.

- 173. The Emergence of Modern America. (3) II.** Mr. Kindregan
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.

- 174A. Recent History of the United States. (3) I.** Mr. Swain
Lecture—3 hours.

A study of political economic, and cultural aspects of American democracy in recent years from 1900 to the 1930's.

- 174B. Recent History of the United States. (3) II.** Mr. Swain
Lecture—3 hours.

A study of political, economic, and cultural aspects of American democracy from the 1930's to the present.

- 175A. Intellectual History of the United States. (3) I.** Mr. Smith
Lecture—3 hours.

A history of ideas—political, economic, social, religious—in America. From colonial times to the 1860's.

- 175B. Intellectual History of the United States.** (3) II. Mr. Smith
Lecture—3 hours.
A history of ideas—political, economic, social, religious—in America. From the 1860's to the present.
- *176A. Social and Cultural History of the United States.** (3) I. Mr. Marchand
Lecture—3 hours.
To 1865.
Offered in even-numbered years.
- 176B. Social and Cultural History of the United States.** (3) I. Mr. Marchand
Lecture—3 hours.
1865 to the present.
Offered in odd-numbered years.
- 178A. Great Issues in United States History: Ideas and Interpretations.**
(3) I. Mr. Jackson
Lecture—3 hours.
Selected topics in the political, economic, social, and intellectual history of the United States. A study of historical thought and interpretation concerning the main currents of national development. To 1876.
- 178B. Great Issues in United States History: Ideas and Interpretations.**
(3) II. Mr. Jackson
Lecture—3 hours.
Selected topics in the political, economic, social, and intellectual history of the United States. A study of historical thought and interpretation concerning the main currents of national development. 1876 to the present.
- *179A. Economic Growth of the United States.** (3) I. Mr. Unger
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.** (3) II. Mr. Unger
Lecture—3 hours.
The changing nature of industrial capitalism and its effects on agriculture, labor, business, and government in the late nineteenth century and twentieth century.
- *180. The Westward Movement to 1850.** (3) I. Mr. Jacobson
Lecture—3 hours.
The political, economic, and social significance of the westward movement from colonial times to 1850.
Offered in even-numbered years.
- 183. The Trans-Mississippi Frontier.** (3) I. Mr. Jackson
Lecture—3 hours.
The fur trade, western exploration and transportation, the mining kingdom, range cattle industry, and settlement of the West.
- 185. History of Science and Technology in America.** (3) II. Mr. Sherwood, Mr. Swain
Lecture—3 hours.
A study of science and technology in America, emphasizing the development of scientific ideas and institutions.
- 188A. History of Agriculture in the United States.** (3) I. Mr. Shideler
Lecture—2 hours; discussion—1 hour.
History of agricultural development to 1900 with emphasis on social and economic institutions.

* Not to be given, 1965-1966.

- 188B. History of Agriculture in the United States.** (3) II. Mr. Shideler
Lecture—2 hours; discussion—1 hour.
History of agricultural changes from 1900 to the present with emphasis on the background and evolution of government policy.
- 189A. History of the Pacific Coast and California.** (3) I. Mr. Jackson
Lecture—3 hours.
History of the Pacific Coast and California to 1850.
Offered in even-numbered years.
- 189B. History of the Pacific Coast and California.** (3) II. Mr. Jackson
Lecture—3 hours.
History of California since 1850.
- 190A. East Asian Civilization.** (3) I. Mr. Liu
Lecture—3 hours.
A survey of East Asian history and culture to about 1800. Emphasis on China and Japan; attention also to Korea and Southeast Asia.
- 190B. East Asian Civilization.** (3) II. Mr. Liu
Lecture—3 hours.
Recommended: course 190A.
The history, culture and problems of East Asia since about 1800. Emphasis on China and Japan; attention also to Korea and Southeast Asia.
- 191A. China.** (3) I. Mr. Lo
Lecture—3 hours.
A study of the distinctive features of Chinese civilization before the modern era. Emphasis on thought and institutions.
- 191B. China.** (3) II. Mr. Lo
Lecture—3 hours.
Recommended: course 191A.
A study of the Western impact on China and of her revolutionary transformation from the nineteenth century to the present.
- 192. Modern China and the West.** (3) II. Mr. Liu
Discussion—3 hours.
Prerequisite: course 191B, or consent of the instructor.
Selected topics in the history of modern China and her relations with the West.
- 193. China's Relations with Southeast Asia.** (3) I. Mr. Lo
Lecture—2 hours; discussion—1 hour.
China's historical relations with Southeast Asia—military, political, cultural, and economic.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

GRADUATE COURSES

- 201. Sources and General Literature of History.** (3) I and II. The Staff
Seminar—3 hours.
Advanced studies in bibliography and historiography in the several fields of history, for students preparing for higher degrees in history.
May be repeated for credit.

- *237. Russian History.** (3) I and II. Mr. O'Brien
Seminar—3 hours.
Prerequisite: courses 137A and 137B or equivalent.
Topics relating to the political and cultural history of Russia in the seven-teenth, eighteenth, and nineteenth centuries.
- *242. History of the Enlightenment.** (3) II. Mr. Schwab
Seminar—3 hours.
Prerequisite: a reading knowledge of French. Course 133 or the equiv-alent.
Intellectual and social history of Europe during the Enlightenment.
May be repeated for credit.
- 245. History of the Napoleonic Era.** (3) I and II. Mr. Paret
Seminar—3 hours.
Prerequisite: a reading knowledge of French or German; consent of the instructor.
Political, intellectual, social, and military history of Europe from the Consulate to the Congress of Vienna.
- 246. Europe in the Twentieth Century.** (3) II. Mr. Willis
Seminar—3 hours.
Political history of Europe since World War I.
- *248. Modern European Diplomacy.** (3) I and II. Mr. Millman
Prerequisite: a reading knowledge of French or German and courses 148A and 148B, or consent of the instructor.
Topics in the diplomatic history of Europe from the French Revolution to the 1930's; emphasis on the nineteenth century.
- 249. Military Theory, Institutions, and Policy since the Renaissance.**
(3) I and II. Mr. Liddell Hart, Mr. Paret
Prerequisite: consent of the instructors.
Recommended: course 149.
- 251. English History.** (3) I and II. Mr. Woodfill
Seminar—3 hours.
- *261. Latin-American History.** (3) I and II. Mr. Poppino
Seminar—3 hours.
Prerequisite: two semesters of Latin-American history; consent of the instructor; reading knowledge of Spanish or Portuguese.
- 270. Early American History.** (3) I and II. Mr. Jacobson
Seminar—3 hours.
- 271. History of the American West.** (3) I. Mr. Jackson
Seminar—3 hours.
- *272. History of the United States, 1815-1865.** (3) I and II _____
Seminar—3 hours.
- *273. History of the United States, 1865-1900.** (3) I and II. Mr. Unger
Seminar—3 hours.
Prerequisite: consent of the instructor.
Selected topics in American history from the Civil War to the Progressive Movement.
- 274. Recent History of the United States.** (3) I and II. Mr. Swain
Seminar—3 hours.
Topics in twentieth-century American history.

* Not to be given, 1965-1966.

* Not to be given, fall semester 1965-1966.

275. **Intellectual History of the United States.** (3) I and II. Mr. Smith
Seminar—3 hours.
Research and studies in the main intellectual currents of American history.
288. **History of the United States.** (3) I and II. Mr. Shideler
Seminar—3 hours.
Prerequisite: consent of the instructor.
Emphasis on agricultural history and closely related topics such as exports, transportation, and politics.
291. **Chinese History.** (3) I and II. Mr. Liu
Seminar—3 hours.
299. **Research.** (1-4) I and II. The Staff
- 299D. **Individual Study** (1-5) I and II. The Staff

PROFESSIONAL COURSE

300. **The Teaching of History in the Secondary School and the Junior College.** (2) II. Mr. McDermott
Prerequisite: upper division standing; a teaching major or minor in social studies.
Methods for the presentation of history at the secondary and junior college level.

⁴ Not to be given, fall semester 1965-1966.

HOME ECONOMICS

Fredric W. Hill, Ph.D., *Acting Associate Dean, Consumer and Family Science*
Department Office, 152 Home Economics Building

Gladys J. Everson, Ph.D., *Professor of Home Economics.*
Fredric W. Hill, Ph.D., *Professor of Nutrition.*
Pauline C. Paul, Ph.D., *Professor of Home Economics.*
———, *Professor of Home Economics.*
Lucille S. Hurley, Ph.D., *Associate Professor of Nutrition.*
Mary Ann Morris, Ph.D., *Associate Professor of Home Economics.*
Emmy E. Werner, Ph.D., *Associate Professor of Child Development.*
Roberta R. Collard, Ph.D., *Assistant Professor of Child Development.*
Elizabeth M. Elbert, Ph.D., *Assistant Professor of Home Economics.*
Betty E. Haskell, Ph.D., *Assistant Professor of Nutrition.*
Frances J. Zeman, Ph.D., *Assistant Professor of Home Economics.*



Robert C. Arneson, M.F.A., *Assistant Professor of Art.*
Richard D. Cramer, M.F.A., (Architecture), *Associate Professor of Design.*
R. Lorene Dryden, M.A., *Lecturer in Home Economics.*
Helen E. Giambruni, B.A., *Lecturer in Design.*
Doris F. Heineman, B.A.E., *Lecturer in Design.*
Arline Johnson, M.S., *Lecturer in Education.*
Eleanor A. Johnson, M.S., *Lecturer in Home Economics.*
Agnes McClelland, M.A., *Lecturer in Home Economics.*
Rosana Pistolese, Classica, *Lecturer in Design.*
Jane N. Welker, M.A., *Lecturer in Child Development.*

Departmental Major Advisers.—Mr. Arneson, Miss Collard, Mr. Cramer, Miss Dryden, Miss Elbert, Miss Everson, Mrs. Haskell, Mrs. Heineman, Mr. Herrmann, Mrs. Hurley, Mrs. Johnson, Miss McClelland, Miss Morris, Miss Werner, Miss Zeman.

Graduate Adviser.—Miss Everson.

Teaching Credential Adviser.—Miss Johnson.

Bachelor of Science Major Program and Graduate Study. See page 55.

DESIGN

LOWER DIVISION COURSES

- 6A. Theory of Design.** (2) I and II. The Staff
Laboratory—6 hours.
Basic elements of form, texture, and color in two and three dimensions;
studio exercises.
- 6B. Theory of Design.** (2) I and II. The Staff
Laboratory—6 hours.
Prerequisite: course 6A.
Basic elements of form, texture, and color in two and three dimensions;
studio exercises.

- *8. Principles of **Typographic Design.** (2) II. _____
 Laboratory—6 hours.
 Prerequisite: course 6B or consent of the instructor.
 Letter and type forms as elements of design.

UPPER DIVISION COURSES

130. **Interior Design.** (2) II. Mrs. Heineman
 Lecture—2 hours.
 Prerequisite: course 6A.
 Introduction to the principles of design. Analysis, organization, and solution of problems in interior design in reference to functional and aesthetic aspects.
- 130L. **Interior Design.** (1) II. Mrs. Heineman
 Laboratory—3 hours.
 Prerequisite: course 130 (may be taken concurrently).
 Introduction to the principles of design. Analysis, organization, and solution of problems in interior design in reference to functional and aesthetic aspects.
150. **The House.** (3) II. Mr. Cramer
 Lecture—3 hours.
 Prerequisite: course 6A or consent of the instructor.
 The tenets of modern architecture as illustrated in the contemporary house.
- 160A–160B. **Textile Design.** (2–2) Yr. Mrs. Heineman
 Laboratory—6 hours.
 Prerequisite: course 6B or consent of the instructor.
 Studio projects in textile printing.
191. **History of Design.** (3) I. Mrs. Giambruni
 Lecture—3 hours.
 Prerequisite: one semester of history of art.
 From ancient to modern times.
- *192A–192B. **Costume Design.** (2–2) Yr. Mrs. Giambruni
 Laboratory—6 hours.
 Prerequisite: course 6B and Art 16, or consent of the instructor.
 Studio projects in contemporary costume design.
193. **History of Costume.** (3) II. Mrs. Giambruni
 Lecture—3 hours.
 Prerequisite: one semester of history of art.
 From ancient to modern times.
- *195. **History of Interior Design.** (3) II. _____
 Lecture—3 hours.
 Prerequisite: one semester of history of art.
 From ancient to modern times.
- 196A–196B. **Advanced Interior Design.** (2–2) Yr. Mrs. Heineman
 Laboratory—6 hours.
 Prerequisite: course 6B, 130L (may be taken concurrently) and Art 16, or consent of the instructor.
 Studio projects in interior design.

* Not to be given, 1965–1966.

* Not to be given, fall semester, 1965–1966.

- 197. Individual Problems in Design.** (2) I and II. The Staff
 Laboratory—6 hours.
 Prerequisite: one year upper division work in design, or consent of the instructor.
 Senior thesis; a comprehensive design problem independently pursued under the direction of a member of the faculty.
- 198. Directed Group Study.** (1-3) I and II. The Staff
 Prerequisite: upper division standing and consent of the instructor.
 Group study of selected problems in design.
- 199. Special Study for Advanced Undergraduates.** (1-3) I and II. The Staff

HOME ECONOMICS

LOWER DIVISION COURSES

- 6. Introduction to Textiles.** (2) II. Miss Morris
 Lecture—2 hours.
 Prerequisite: Chemistry 8.
 Study of plant, animal, and synthetic fibers used in textiles and of the finished textile fabrics.
 Field trips are included.
- 6L. Introduction to Textiles Laboratory.** (1) II. Miss Dryden
 Laboratory—3 hours.
 Prerequisite: course 6 (should be taken concurrently).
 Study of plant, animal, and synthetic fibers used in textiles and of the finished textile fabrics.
 Field trips are included.
- 7. Clothing Study.** (2) I and II. Miss Dryden
 Lecture—2 hours.
 Prerequisite: Design 6A.
 Social, psychological, and economic aspects of clothing as related to selection, design, and construction.
- 7L. Clothing Study Laboratory.** (1) I and II. Miss Dryden, Miss McClelland
 Laboratory—3 hours.
 Prerequisite: course 7 (should be taken concurrently).
 Social, psychological, and economic aspects of clothing as related to selection, design, and construction.

UPPER DIVISION COURSES

- 100A-100B. Experimental Food Study.** (2-2) Yr. Miss Elbert
 Lecture 2 hours.
 Prerequisite: Chemistry 8; Bacteriology 1.
 Introduction to chemical and bacteriological aspects of food, and their relation to physical and chemical changes in food preparation; food combinations and service.
- 101A-101B. Experimental Food Study Laboratory.** (1-1) Yr. Miss Elbert
 Laboratory—3 hours.
 Prerequisite: course 100A-100B (should be taken concurrently).
 Introduction to chemical and bacteriological aspects of food, and their relation to physical and chemical changes in food preparation; food combinations and service.

- 104A-104B. Advanced Food Study.** (4-4) Yr. Miss Paul
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 100B or consent of the instructor.
Application of principles of chemistry and physics to experimental food studies; development of experimental attitudes and techniques.
- 112A-112B. Nutrition and Dietetics.** (2-2) Yr. Miss Everson
Lecture—2 hours.
Prerequisite: Chemistry 8; Physiology 1.
An introduction to the principles of nutrition. Study of the nutrients and their chemical and physiological roles in metabolism. Nutrient requirements of man at various phases of the life cycle.
- 113A-113B. Nutrition and Dietetics Laboratory.** (1-1) Yr. Miss Everson
Laboratory—3 hours.
Prerequisite: course 112A-112B (should be taken concurrently).
An introduction to the principles of nutrition; study of the nutrients and their chemical and physiological roles in metabolism; nutrient requirements of man at various phases of the life cycle.
- 114. Physiological Processes in Child Development.** (3) I. Mrs. Hurley
Lecture—3 hours.
Prerequisite: course 112B.
Physical development, physiological changes, and nutritional needs during the embryological period, infancy, childhood, and youth.
- 116. Nutrition and Diet Therapy.** (3) I. Mrs. Haskell
Lecture—3 hours.
Prerequisite: course 112B or equivalent.
Physiological basis for the use of special diets. Problems in the planning and computation of dietaries for normal and pathological conditions.
- 117. Problems in Human Nutrition.** (4) II. Mrs. Haskell
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 112B; Biochemistry 101; Chemistry 5.
Second-year study of nutrition, dealing primarily with aspects of human nutrition, e.g., evaluation of nutritional status, factors influencing nutrient requirements of man, deficiencies versus excesses, world nutrition problems.
- 121. Institution Food Study.** (4) I. Miss Zeman
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 100B.
The principles and problems involved in the preparation and service of food in institutions.
- 122. Institution Organization and Management.** (4) II. Miss Zeman
Lecture—3 hours; laboratory—3 hours.
Prerequisite: course 121 or permission of instructor.
The principles and problems involved in the organization and management of institution households, such as residence halls, hospitals, and hotels.
- 131. Development in Infancy and Early Childhood.** (3) I. Miss Collard
Lecture—3 hours.
Prerequisite: Psychology 1 or 2.
Psychological and cultural factors in the development of infants and pre-school children.
- 133. Laboratory in Child Development.** (1) I and II. Mrs. Welker
Laboratory—3 hours.
Prerequisite: course 131 (may be taken concurrently).
Laboratory conducted at the nursery school.

- 136. Development in Middle Childhood and Adolescence.** (3) II. Miss Werner
 Lecture—3 hours.
 Prerequisite: Psychology 1 or 2.
 Psychological and cultural factors in the development of school-age children and adolescents.
- 137. The Contemporary American Family.** (3) II. _____
 Lecture—3 hours.
 Sociological and psychological factors influencing marriage and the family in present-day society.
- 138. Exceptional Children.** (3) II. Miss Collard, Miss Werner
 Lecture—3 hours.
 Prerequisite: courses 131 and 136, or Psychology 112.
 General consideration of emotionally disturbed, handicapped, and gifted children. Introduction to research findings and to special diagnostic and training facilities available.
- 139. Diagnostic Techniques with Children.** (3) I. Miss Werner
 Lecture—3 hours.
 Prerequisite: courses 131 and 136, or Psychology 112.
 Evaluation of intelligence, personality, and special abilities of children. Class demonstrations of individual tests for infants, preschool, and school-age children. Concepts of measurement and empirical research.
- 140. Home Management.** (3) I. Mrs. Johnson
 Lecture—3 hours.
 Prerequisite: Psychology 1.
 Management principles in relation to home and family resources.
- 140L. Laboratory in Home Management.** (2) I and II. Mrs. Johnson
 Prerequisite: course 140 (may be taken concurrently) and senior or graduate standing.
 Integrated experiences in the various phases of home management, as provided by five weeks' residence in the home management house. A fee is required.
- 141. Consumers and the Market.** (3) I. _____
 Lecture—3 hours.
 Prerequisite: Economics 1A, 1B; a course in statistics.
 Study of the functions and structure of the market from the standpoint of consumers; evaluation of the guides available for consumers in buying; agencies aiding and protecting consumers.
- 142. Social and Economic Problems of Families.** (3) II. _____
 Lecture—3 hours.
 Prerequisite: Economics 1A, 1B; a course in statistics.
 Present-day problems of families as they are related to economic and social conditions.
- 151A-151B. Housing.** (3-3) Yr. Mr. Cramer
 Lecture—3 hours.
 Prerequisite: Design 150.
 Housing problems as they have developed in Europe and in America; social, economic, technical, and aesthetic aspects; activities of private agencies and programs of government; the current scene as indicative of problems ahead.

- 160. Textiles. (3) I.** Miss Morris
Lecture—2 hours; laboratory—3 hours.
Prerequisite: courses 6, 6L.
The chemical and physical structure of textile fibers, and its relations to fiber and fabric properties.
- 162. The Textile Economy. (3) II.** Miss Morris
Lecture—2 hours; laboratory—3 hours.
Prerequisite: courses 6, 6L; Economics 1A, 1B.
Organization of the textile industry; production and consumption of textile products; principles involved in the maintenance of textile products.
- 175. Clothing Design and Construction. (3) I and II.** Miss McClelland
Lecture—1 hour; laboratory—6 hours.
Prerequisite: courses 6, 7.
Wardrobe planning and problems in advanced clothing construction.
- 198. Directed Group Study. (1-3) I and II.** The Staff
Prerequisite: consent of the instructor.
Directed group study of selected topics in home economics for advanced undergraduates.
- 199. Special Study for Advanced Undergraduates. (1-5) I and II.** The Staff

GRADUATE COURSES

- 247. Consumption and Standards of Living. (3) I.** _____
Lecture—3 hours.
Prerequisite: courses 141 and 142 or equivalent.
The effects of family income, size, residence, and occupation on consumption; the relation of standards of living to levels of consumption. Appraisal of methodology of collecting data and analysis.
- 290. Seminar. (1) I and II.** The Staff
Seminar—1 hour.
Prerequisite: consent of the instructor.
Selected topics in the fields of food, nutrition, consumer economics, or child development.
- 292. Seminar in Textiles. (2) I.** Miss Morris
- 299. Research. (2-6) I and II.** The Staff
Research in foods, nutrition, consumer economics, textiles, or child development.

PROFESSIONAL COURSE

- 300. Teaching Home Economics in Secondary Schools. (2) I and II.** Miss Johnson
Lecture—2 hours.
Prerequisite: senior or graduate standing; major or minor in home economics.
Philosophy of homemaking education; organization of the curriculum; methods and techniques of teaching homemaking; selection and use of materials of instruction; evaluation procedures.

RELATED COURSE

- Extension Education in Agriculture and Home Economics (Agricultural Education 187)**

INTERNATIONAL AGRICULTURAL DEVELOPMENT

Duane S. Mikkelsen, Ph.D., *Chairman of the Committee.*

Committee Office, 109 Hunt Hall

Committee in Charge:

Norman B. Akesson, M.S., *Professor of Agricultural Engineering.*

J. Richard Blanchard, M.S., *University Librarian.*

Floyd D. Carroll, Ph.D., *Professor of Animal Husbandry.*

William J. Chancellor, Ph.D., *Associate Professor of Agricultural Engineering.*

Walter L. Dunkley, Ph.D., *Professor of Food Science and Technology.*

Bruce Glassburner, Ph.D., *Associate Professor of Economics.*

Robert M. Hagan, Ph.D., *Professor of Water Science and Professor of Engineering.*

Charles M. Hardin, Ph.D., *Professor of Political Science.*

Trimble R. Hedges, Ph.D., *Professor of Agricultural Economics.*

William M. Herms, *Public Services.*

Fredric W. Hill, Ph.D., *Professor of Nutrition.*

Donald E. Jasper, D.V.M., Ph.D., *Professor of Clinical Pathology.*

Hinomitsu Kaneda, Ph.D., *Assistant Professor of Economics.*

Peter C. Kennedy, D.V.M., Ph.D., *Professor of Pathology.*

Lysle D. Leach, Ph.D., *Professor of Plant Pathology.*

Edward C. Maxie, Ph.D., *Lecturer in Pomology.*

Duane S. Mikkelsen, Ph.D., *Professor of Agronomy.*

Leonard L. Morris, Ph.D., *Professor of Vegetable Crops.*

Harold P. Olmo, Ph.D., *Professor of Viticulture.*

Pauline C. Paul, Ph.D., *Professor of Home Economics.*

Maurice L. Peterson, Ph.D., *Professor of Agronomy (Berkeley campus).*

Rollie E. Poppino, Ph.D., *Associate Professor of History.*

Dewey J. Raski, Ph.D., *Professor of Nematology.*

Magnar Ronning, Ph.D., *Associate Professor of Animal Husbandry.*

William C. Smith, Ph.D., *Assistant Professor of Anthropology.*

J. Herbert Snyder, Ph.D., *Associate Professor of Agricultural Economics.*

Orville E. Thompson, Ph.D., *Associate Professor of Agricultural Education.*

Philip L. Wagner, Ph.D., *Associate Professor of Geography.*

Lynn D. Whittig, Ph.D., *Associate Professor of Soil Science.*

§ William A. Williams, Ph.D., *Professor of Agronomy.*

Major Adviser.—Mr. Hedges.

Instruction in International Agricultural Development is not organized as a single administrative unit in the University, but the relevant courses are offered by a number of departments, and are coordinated by the Committee in charge. An undergraduate major is offered in the College of Agriculture.

UPPER DIVISION COURSES

101. Crop Production under Tropical Conditions. (3) I. The Staff

Lecture—3 hours.

(Mr. Williams in charge)

Prerequisite: Botany 1.

Climatic and soil adaptation; varieties and varietal improvement in annual and perennial crops; pests, diseases, and their control; fertilization and other management practices.

§ Absent on leave, spring semester 1966

- 102. Livestock Production under Tropical Conditions.** (3) II. The Staff
Lecture—3 hours. (Mr. Carroll in charge)
Prerequisite: Genetics 100; Animal Husbandry 103 (may be taken concurrently).
Kinds and breeds of livestock in tropical agriculture; breeding, feeding, and nutrition; pests, diseases, and their control; management practices.
- 190. Proseminar in International Agricultural Development.** (1) I and II.
Lecture—1 hour. The Staff (Mr. Smith in charge)
Prerequisite: consent of the instructor.
Problems of coordinating principles and information from technical agriculture and the social sciences in the context of economic development.
- 198. Directed Group Study.** (1-5) I and II. The Staff (Mr. Akesson in charge)
Prerequisite: consent of the instructor.
Selected topics for advanced undergraduates.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff (Mr. Hedges in charge)
- 280. Social, Technological, and other Factors in Agricultural Development.**
(2) I and II. The Staff (I. Mr. Hedges in charge; II. ——— in charge)
Seminar—2 hours.
Problem identification and analysis in agricultural development; cultural forces; political, social, and economic organization; human factors in relation to resource use and technology; function and use of the change agent; program development, planning, and execution.
- 299. Research.** (1-5) I and II. The Staff (Mr. Mikkelsen in charge)

LANDSCAPE HORTICULTURE

Richard W. Harris, Ph.D., *Chairman of the Department.*
Department Office, 106 Landscape Horticulture Building

Richard W. Harris, Ph.D., *Professor of Landscape Horticulture.*
Harry C. Kohl, Jr., Ph.D., *Professor of Floriculture.*
John H. Madison, Ph.D., *Associate Professor of Landscape Horticulture.*
Roy Sachs, Ph.D., *Associate Professor of Landscape Horticulture.*
James Harding, Ph.D., *Assistant Professor of Landscape Horticulture.*
Andrew T. Leiser, Ph.D., *Assistant Professor of Landscape Horticulture.*
Jack L. Paul, Ph.D., *Assistant Professor of Landscape Horticulture.*



Robert D. Danielson, M.S., *Lecturer in Landscape Architecture.*
Leonard H. McVicar, *Lecturer in Park Administration.*
———, *Lecturer in City and Regional Planning.*

Departmental Major Advisers.—Landscape Horticulture, Mr. Danielson,
Mr. Harris; Park Administration, Mr. Harris.

Bachelor of Science Major Program and Graduate Study. See page 60.

LANDSCAPE HORTICULTURE

LOWER DIVISION COURSES

- 1. Introduction to Landscape Design. (3) I.** Mr. Danielson
Lecture—2 hours; laboratory—3 hours.
Design principles; practice in analysis and design with reference to landscape problems.
- 2. Elements of Landscape Design. (3) II.** Mr. Danielson
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 1.
Analysis and solution by design of typical site problems.
- 4. Introduction to Landscape Horticulture. (3) II.** Mr. Harris
Lecture—2 hours; laboratory—3 hours.
Principles and practices of growing turf, flowers and herbaceous and woody plants in the landscape.
- *49. Orientation in Landscape Horticulture. (No credit) II.** Mr. Harris
Prerequisite: consent of the instructor.
Field trips to observe and study the opportunities for careers in the management of parks, golf courses, and public grounds; arboriculture; landscape construction and contracting; nursery production and management; commercial floriculture; and teaching, research, and extension.
To be given during the spring recess of odd-numbered years.

UPPER DIVISION COURSES

- *104. Principles of Landscape Construction. (3) I.** Mr. Danielson
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 1; Engineering 1A (may be taken concurrently).
The analysis and solution of construction problems as they relate to design and site development. Emphasis on physical structures rather than plant materials.
Offered in even-numbered years.

* Not to be given, 1965–1966.

- 105A. Taxonomy of Landscape Trees.** (3) I. Mr. Leiser
Lecture—1 hour; laboratory—6 hours.
Prerequisite: Botany 1. Recommended: Botany 108.
Morphological comparison, identification, adaptation, and evaluation of landscape trees of Western and Southern United States.
- 105B. Taxonomy of Landscape Shrubs.** (3) II. Mr. Leiser
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 105A or consent of the instructor.
Morphological comparison, identification, adaptation, and evaluation of landscape shrubs, vines, and groundcovers of Western and Southern United States.
- 105C. Spring Field Course.** (1) II. Mr. Leiser
Prerequisite: course 105B or consent of the instructor.
Morphological comparison, identification, adaptation, and evaluation of desert, tropical, and subtropical landscape plants. Field study of landscape plantings, plant survey practices, and preparation of field reports.
Offered during the spring recess of even-numbered years.
- 120. Physiology of Ornamental Plants.** (3) I. Mr. Kohl
Lecture—3 hours.
Prerequisite: Botany 111.
Physiological processes of ornamental plants; their response to environment and cultural practices.
- 121. Analysis of Horticultural Problems.** (2) I. Mr. Sachs
Lecture—1 hour; laboratory—3 hours.
Prerequisite: course 120 (should be taken concurrently).
Principles and methods of analyzing responses of ornamental plants to environment and cultural practices.
- *125. Floriculture and Nursery Management.** (3) II. Mr. Kohl, Mr. Sachs
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 120.
Practices and principles in planning and producing ornamental crops. Several field trips required.
- 128. Advanced Landscape Horticulture.** (2) II. Mr. Harris, Mr. Madison
Lecture—1 hour; laboratory—3 hours.
Prerequisite: course 120.
Practices and principles in planning, establishing, and maintaining plantings in the landscape with emphasis on trees and turf. Several field trips required.
- 198. Directed Group Study.** (1-5) I and II.
The Staff (Mr. Harris in charge)
Prerequisite: 3 units of upper division work in landscape horticulture; consent of the instructor.
Selected problems in floriculture, nursery management, and landscape horticulture.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II.
Prerequisite: consent of the instructor. The Staff (Mr. Harris in charge)

* Not to be given, 1965-1966.

GRADUATE COURSES

290. **Seminar.** (1) I and II. Mr. Danielson, Mr. Madison
Seminar—1 hour.
Selected topics in floriculture, nursery management, and landscape horticulture.
299. **Research.** (1-6) I and II. The Staff (Mr. Madison in charge)
Prerequisite: graduate standing.
Research in floriculture, nursery management, and landscape horticulture.

RELATED COURSES

- Business Law: Introduction** (Agricultural Economics 18)
Managerial Accounting (Agricultural Economics 111)
Agricultural Business Management (Agricultural Economics 115)
Weed Control (Botany 107)
Plant Ecology (Botany 117)
Economic Entomology (Entomology 124)
Introduction to Climate and Weather (Geography 3)
Water-Soil-Plant Relationships (Water Science 100)
Plant Diseases (Plant Pathology 120)
Principles of Plant Propagation (Pomology 9)
Introduction to Soil Science (Soil Science 1)
Vegetable Breeding (Vegetable Crops 220)

PARK ADMINISTRATION

110. **Introduction to City Planning.** (3) II. _____
Lecture—3 hours.
Survey of city planning as it has evolved in the United States since 1800 in response to physical, social, and economic problems; major concepts and procedures used by city planners and local governments to improve the urban environment.
134. **Park and Recreation Area Planning.** (3) II. Mr. Danielson
Lecture—1 hour; laboratory—6 hours.
Principles, standards, and procedures in planning and design of areas for park recreation use.
140. **Park Administration.** (3) I. Mr. McVicar
Lecture—3 hours.
Prerequisite: consent of the instructor.
The acquisition, development, and management of parks, street tree plantings, and other landscaped areas.
198. **Directed Group Study.** (1-5) I and II. Mr. Danielson
Prerequisite: consent of the instructor.
Selected problems in park administration.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff
Prerequisite: consent of the instructor.

RELATED COURSES

- Economic Analysis in Resource Development and Use** (Agricultural Economics 176)
Technical Journalism (Agricultural Education 188)

- Plane Surveying** (Engineering 1A)
- Introduction to Cultural Geography** (Geography 2)
- Urban Geography** (Geography 155)
- The Conservation of Natural Resources** (Geography 161)
- General Geology: Physical** (Geology 1A)
- Elementary Statistics** (Mathematics 13)
- Recreation in the Community** (Physical Education 140)
- Local Government** (Political Science 103)
- California State and Local Government** (Political Science 104)
- Political Behavior** (Political Science 161)
- Elements of Public Administration** (Political Science 181)
- Personnel Administration and Human Relations** (Political Science 183)
- Social Psychology** (Psychology 145)
- Introduction to Range Management** (Range Management 1)
- Work and Leisure** (Sociology 160)
- Complex Social Organizations** (Sociology 180)

LATIN

For courses in Latin see "Classics" on page 165.

LINGUISTICS

David L. Olmsted, Ph.D., *Chairman of the Committee*
Committee Office, 331 Voorhies Hall

Committee in Charge:

- R. A. Arbini, Ph.D., *Assistant Professor of Philosophy.*
J. Bastian, Ph.D., *Assistant Professor of Psychology.*
M. A. Baumhoff, Ph.D., *Associate Professor of Anthropology.*
J. Creore, M.A., *Acting Assistant Professor of French.*
H. P. Gates, A.B., *Acting Assistant Professor of Classics and Sanskrit.*
W. C. Harsh, Ph.D., *Assistant Professor of English.*
G. H. Keith, Ph.D., *Assistant Professor of French.*
E. S. Liu, M.S., *Acting Assistant Professor of Oriental Languages.*
O. T. Myers, Ph.D., *Assistant Professor of Spanish.*
D. L. Olmsted, Ph.D., *Professor of Anthropology.*
S. G. Schotta, A.B., *Acting Assistant Professor of English and Linguistics.*
E. J. Tully, Jr., Ph.D., *Assistant Professor of Mathematics.*
S. A. Tyler, Ph.D., *Assistant Professor of Anthropology.*
P. L. Wagner, Ph.D., *Associate Professor of Geography.*
B. E. Wallacker, Ph.D., *Associate Professor of Oriental Languages.*

Letters and Science List.—Course 140.

Graduate Adviser.—Mr. Olmsted.

UPPER DIVISION COURSE

- 140. Grammatical Analysis.** (3) I. Mrs. Schotta
Lecture—3 hours.
Prerequisite: Anthropology 110A.
Introduction to the theory of grammatical analysis; practice in solving exercise problems.

GRADUATE COURSES

- 202. Principles of Historical Linguistics.** (3) II. _____
Lecture—3 hours.
Prerequisite: Anthropology 110B or the equivalent.
Advanced treatment of the theory and method of historical linguistics, with special emphasis on Indo-European.
- 215. Computational Linguistics.** (2) II. Mr. Liu
Lecture—2 hours.
Prerequisite: Consent of the instructor.
The use of electronic computers and other computational devices in linguistic analysis, mechanical translation; and lexicography.
- 225. Modern Linguistics Theory.** (3) I. Mr. Harsh
Lecture—3 hours.
Prerequisite: Course 140.
Survey of leading contributions to linguistic theory from de Saussure to the present.

PROFESSIONAL COURSE

- 300. The Teaching of English as a Foreign Language.** (3) II. Mrs. Schotta
Lecture—3 hours.
Methods for the use of applied linguistics in the teaching of English to non-native speakers.

MATHEMATICS

Edward B. Roessler, *Chairman of the Department.*
Department Office, 824 Sproul Hall

Henry L. Alder, Ph.D., *Professor of Mathematics.*
George A. Baker, Ph.D., *Professor of Mathematics.*
Curtis M. Fulton, Ph.D., *Professor of Mathematics.*
Charles A. Hayes, Jr., Ph.D., *Professor of Mathematics.*
Edward B. Roessler, Ph.D., *Professor of Mathematics.*
‡Sherman K. Stein, Ph.D., *Professor of Mathematics.*
Hubert A. Arnold, Ph.D., *Associate Professor of Mathematics.*
‡Dallas O. Banks, Ph.D., *Associate Professor of Mathematics.*
Donald C. Benson, Ph.D., *Associate Professor of Mathematics.*
Albert C. Burdette, Ph.D., *Associate Professor of Mathematics.*
Richard F. DeMar, Ph.D., *Associate Professor of Mathematics.*
Peter W. M. John, Ph.D., *Associate Professor of Mathematics.*
Kurt Kreith, Ph.D., *Associate Professor of Mathematics.*
Donald A. Norton, Ph.D., *Associate Professor of Mathematics.*
Takayuki Tamura, D.Sc., *Associate Professor of Mathematics.*
———, *Associate Professor of Mathematics.*
Eugene Albert, Ph.D., *Assistant Professor of Mathematics.*
Carlos Borges, Ph.D., *Assistant Professor of Mathematics.*
Leon E. Borgman, Ph.D., *Assistant Professor of Mathematics.*
Gulbank D. Chakerian, Ph.D., *Assistant Professor of Mathematics.*
Doyle O. Cutler, Ph.D., *Assistant Professor of Mathematics.*
§Melven R. Krom, Ph.D., *Assistant Professor of Mathematics.*
Gary J. Kurowski, Ph.D., *Assistant Professor of Mathematics.*
Robert W. Stringall, Ph.D., *Assistant Professor of Mathematics.*
Edward J. Tully, Jr., Ph.D., *Assistant Professor of Mathematics.*
Howard J. Weiner, Ph.D., *Assistant Professor of Mathematics.*
Fawzi M. Yaqub, Ph.D., *Assistant Professor of Mathematics.*



Shirley A. Goldman, M.S., *Associate in Mathematics.*
Fred Krakowski, Ph.D., *Lecturer in Mathematics.*
Archibald J. Mac Intyre, Ph.D., *Visiting Professor of Mathematics.*
William H. Simmons, Ph.D., *Visiting Associate Professor of Mathematics.*
Edward H. Theil, M.S., *Acting Assistant Professor of Mathematics.*

Letters and Science List.—All undergraduate courses in mathematics except 129 are included in the Letters and Science List of Courses. (See page 85.)

Major Subject Advisers.—Mr. Alder, Mr. Baker, Mr. Banks, Mr. Borgman, Mr. Burdette, Mr. Chakerian, Mr. Krakowski, Mr. Kreith, Mr. Krom, Mr. Norton, Mr. Stein and Mr. Tully.

Bachelor of Arts Major Program

(A) Lower Division Courses.—Required: courses 7B, 9A, 9B, 9C. Total: 15 units.

(B) Upper Division Courses.—In the 24 units of upper division work required for the major in mathematics, the student is to acquire competence in algebra, analysis, and geometry. For this purpose he must elect, subject to the approval of the adviser, at least 3 units of upper division work in each of these fields, including courses 108 and 127A.

The department will certify to the completion of the major program for

‡ Absent on leave, fall semester, 1965-1966.

§ Absent on leave, spring semester, 1966

graduation only on the basis of at least a C average in the upper division courses offered by the student in satisfaction of major requirements. Students who fail to maintain a C average may be excluded from the major in mathematics.

Bachelor of Science Major Program

The major program consists of 60 units of numbered mathematics and/or natural sciences courses including:

(A) Lower Division Courses.—Required: courses 7B, 9A, 9B, 9C. Total: 15 units.

(B) Upper Division Courses.—The student must pass successfully courses 108, 109, 111A, 127A, one course in geometry, and at least 11 additional units in upper division or graduate mathematics courses. Total: 24 units. Students specializing in statistics may substitute course 132 for the geometry course.

The department will certify to the completion of the major program for graduation only on the basis of at least a C average in the upper division courses offered by the students in satisfaction of major requirements. Students who fail to maintain a C average may be excluded from the major in mathematics.

A lower division course in mathematics is not acceptable as a prerequisite for another course in mathematics unless a grade of C or higher has been attained in it.

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 University credit is earned by passing such an examination. Arrangements for an examination must be made with the department secretary in 822 Sproul Hall, on or before the Monday of registration week.

LOWER DIVISION COURSES

7A. Introduction to Mathematical Structures. (3) I and II. The Staff

Lecture—3 hours.

Prerequisite: two years of high school algebra or the equivalent, trigonometry.

Topics selected from advanced algebra, including combinations and permutations, theory of equations, matrices and determinants.

7B. Introduction to Mathematical Structures. (3) I and II. The Staff

Lecture—3 hours.

Prerequisite: course 7A or 9B.

An introduction to axiomatics by means of the study of number systems and other algebraic systems.

9A. Analytic Geometry and Calculus, First Course. (4) I and II.

Lecture—4 hours.

Prerequisite: two years of high school algebra or the equivalent, plane geometry, plane trigonometry. Only 2 units of credit will be allowed students who have received credit for course 16A or 3A.

Introduction to analytic geometry and calculus. The sequence 9A, 9B, 9C

includes plane and solid analytic geometry, differentiation and integration of elementary functions, infinite series, functions of several variables, partial differentiation, multiple integration, and elementary differential equations.

9B. Analytic Geometry and Calculus, Second Course. (4) I and II.

Lecture—4 hours.

The Staff

Prerequisite: course 9A or 16B. Only two units of credit will be allowed students who have received credit for course 16B or 3B.

Continuation of course 9A.

9C. Analytic Geometry and Calculus, Third Course. (4) I and II. The Staff

Lecture—4 hours.

Prerequisite: course 9B. Only three units of credit will be allowed students who have received credit for course 4A.

Continuation of course 9B.

13. Elementary Statistics. (3) I and II.

The Staff

Lecture—3 hours.

Prerequisite: two years of high school algebra or the equivalent.

Arrays of experimental measurements, measures of central tendency, variation and correlation, significance of measures, elementary reliability and validity of tests.

16A. Analytic Geometry and Calculus. (3) I and II.

The Staff

Lecture—3 hours.

Prerequisite: one and one-half years of high school algebra or the equivalent, plane geometry, plane trigonometry. Not open for credit to students who have received credit in course 9A.

A short course in analytic geometry and in differential and integral calculus. Primarily for students in the biological sciences.

16B. Analytic Geometry and Calculus. (3) I and II.

The Staff

Lecture—3 hours.

Prerequisite: course 16A. Not open for credit to students who have received credit in course 9B. Only 2 units of credit will be allowed if the student has received credit in course 9A.

Continuation of course 16A.

30. Introduction to Computer Science. (3) I.

Mr. Norton

Lecture—2 hours; laboratory—2 hours.

Prerequisite: two years of high school algebra or the equivalent.

Logical structure of a computer, its capabilities and its limitations, man-machine communication, associated languages, algorithmic formulation of problems.

36. Fundamentals of Mathematics. (3) I and II. Mr. Alder, Mr. Chakerian

Lecture—3 hours.

Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics.

38. Topics in Geometry. (3) II.

Mr. Chakerian

Lecture—3 hours.

Topics in Euclidean geometry selected from the theory of geometric transformations; the area and dissection of plane figures, convex polyhedra, foundations of geometry.

41. Discrete Probability. (3) II.

Lecture—3 hours.

Prerequisite: two years of high school algebra and consent of the instructor.

Introduction to logic, set theory, probability, vectors, and matrices. Applications to elementary Markov chains.

UPPER DIVISION COURSES

Students who major in mathematics must maintain at least a grade C average in upper division courses in mathematics.

105A. Applied Statistical Methods: Analysis of Variance and Related

Topics. (3) I and II.

Mr. John

Lecture—3 hours.

Prerequisite: course 13.

Applications of Student's t-distribution, chi-square distribution; F-distribution; the sign test. Analysis of variance. Duncan's multiple range test. Design of experiments including randomized complete-block designs, Latin squares, split-plot designs, factorial designs, and incomplete block designs.

105B. Applied Statistical Methods: Matrix Algebra and Regression and Correlation Theory. (3) II.

Lecture—3 hours.

Prerequisite: course 105A or Agricultural Economics 106.

Matrix algebra including addition, multiplication and inversion of matrices. Linear regression and correlation theory. Multiple regression. The use of Gauss multipliers. Nonlinear regression. Analysis of covariance with one and two criteria of classification.

108. Linear Algebra. (3) I and II.

Mr. Krakowski

Lecture—3 hours.

Prerequisite: courses 7B and 9B.

Vector spaces, linear transformations and matrices, characteristic values, quadratic forms.

109. Advanced Topics in Analysis. (4) I and II.

Lecture—4 hours.

Prerequisite: course 9C or 4B. Only three units credit will be given to students who have received credit for course 106. Not open for credit to students who have received credit in course 107.

Vestor analysis; series solutions of differential equations, functions of several variables.

111A. Introduction to Higher Algebra. (3) I and II.

Mr. Cutler

Lecture—3 hours.

Prerequisite: course 7B or consent of instructor.

Introduction to the formal systems of modern algebra, including groups, rings, and fields.

111B. Introduction to Higher Algebra. (3) I.

Mr. Yaqub

Lecture—3 hours.

Prerequisite: course 111A.

Continuation of course 111A.

***112. Higher Geometry. (3) I.**

Mr. Fulton

Lecture—3 hours.

Prerequisite: course 7B, or consent of the instructor.

Homogeneous point and line coordinates, cross ratio, one- and two-dimensional projective geometry, point and line conics.

Offered in even-numbered years.

* Not to be given, 1965-1966.

- 113. Synthetic Projective Geometry.** (3) II. Mr. Fulton
Lecture—3 hours.
Prerequisite: course 7B, or consent of the instructor.
Duality, perspectivity, harmonic sets, projectivity, definition of conics, theorems on conics, pole and polar.
Offered in even-numbered years.
- 114. The Theory of Convex Sets.** (3) I. Mr. Chakerian
Lecture—3 hours.
Prerequisite: courses 9C and 7B, or consent of the instructor.
Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry.
Offered in odd-numbered years.
- 115A. The Theory of Numbers.** (3) I. Mr. Alder
Lecture—3 hours.
Prerequisite: course 7B.
Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers, congruences of the first degree.
- 115B. The Theory of Numbers.** (3) II. Mr. Alder
Lecture—3 hours.
Prerequisite: course 7B. Course 115A is not a prerequisite to 115B.
Continued fractions; partitions; congruences of higher degree; primitive roots, quadratic reciprocity law.
- *116. Metric Differential Geometry.** (3) II. Mr. Fulton
Lecture—3 hours.
Prerequisite: course 109, or consent of the instructor.
Vector analysis; curves and surfaces in three dimensions.
Offered in odd-numbered years.
- 119. Theory of Differential Equations.** (3) II. _____
Lecture—3 hours.
Prerequisite: course 109.
Elementary theory of ordinary differential equations with special attention to linear equations, Sturm-Liouville systems, Laplace transforms, introduction to partial differential equations.
- 125. Introduction to Mathematical Logic.** (3) I. Mr. Krom
Lecture—3 hours
Prerequisite: one year of calculus.
Propositional and predicate calculi. Normal forms, completeness, decision procedures, and topics from the theory of models.
- 127A. Advanced Calculus.** (3) I. Mr. Arnold
Lecture—3 hours.
Prerequisite: course 109.
The real number system, continuity, differentiation and integration on the real line, vector calculus and functions of several variables, theory of convergence.
- 127B. Advanced Calculus.** (3) II. _____
Lecture—3 hours.
Prerequisite: course 127A.
Continuation of course 127A.

- 128A. Numerical Analysis. (3) I.** Mr. Kurowski
Lecture—3 hours.
Prerequisite: course 9C.
Finite differences, interpolation, polynomial approximations, non-linear equations, integration of differential equations, partial differential and difference equations, large systems of linear equations, linear programming, programming for analog and digital calculators, large-scale methods.
- 128B. Numerical Analysis. (3) II.** Mr. Kurowski
Lecture—3 hours.
Prerequisite: course 128A.
Continuation of course 128A.
- 129. Introduction to Algorithmic Languages and Compilers. (3) II.** Mr. Norton
Lecture—3 hours.
Prerequisite: course 30.
The structure of procedure-oriented computer languages; machine translation from procedure-oriented language to a machine-oriented language.
- 131A. Introduction to Mathematical Statistics. (3) I.** Mr. Weiner
Lecture—3 hours.
Prerequisite: course 9B or 16B.
A basic, introductory course in the theory and applications of statistical methods.
- 131B. Introduction to Mathematical Statistics. (3) II.** Mr. Weiner
Lecture—3 hours.
Prerequisite: course 131A.
Continuation of course 131A.
- 132. Introduction to Stochastic Processes. (3) II.** Mr. John
Lecture—3 hours.
Prerequisite: course 131A.
Random walks, recurrent events, Markov chains, birth and death processes.
- 168. Linear Programming and Game Theory. (3) I.** Mr. Benson
Lecture—3 hours.
Prerequisite: courses 7A or 9B or 41.
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 odd-numbered years.
- 185. Introduction to Functions of a Complex Variable. (3) I.** Mr. Burdette
Lecture—3 hours.
Prerequisite: course 9C.
Differentiability of complex functions, Cauchy's integral, power series, Laurent series, residue theorem, conformal mapping.
- 198. Directed Group Study. (1-5) I and II.** The Staff
Prerequisite: consent of the instructor.
Selected subjects in mathematics.
- 199. Special Study for Advanced Undergraduates. (1-5) I and II.**
The Staff (Mr. Roessler in charge)

GRADUATE COURSES

- 201A. Functions of a Real Variable.** (3) I. Mr. Hayes
Lecture—3 hours.
Prerequisite: course 127B.
Real number system, theory of point sets in Euclidean spaces, content, measure, Riemann-Stieltjes and Lebesgue integration.
- 201B. Functions of a Real Variable.** (3) II. Mr. Hayes
Lecture—3 hours.
Prerequisite: course 201A.
Continuation of course 201A.
- 202A. Functional Analysis.** (3) I. Mr. Kreith
Lecture—3 hours.
Prerequisite: courses 108 and 127B.
General theory of measure and integration, Hilbert and Banach spaces, linear operations.
- 202B. Functional Analysis.** (3) II. Mr. Kreith
Lecture—3 hours.
Prerequisite: course 202A.
Continuation of course 202A.
- 205A. Functions of a Complex Variable.** (3) I. Mr. Mac Intyre
Lecture—3 hours.
Prerequisite: course 127B.
Theory of analytic functions, Cauchy integral theorem, power series, analytic continuation, conformal mapping, special functions.
- 205B. Functions of a Complex Variable.** (3) II. Mr. Mac Intyre
Lecture—3 hours.
Prerequisite: course 205A.
Continuation of course 205A.
- *208. Linear Algebra.** (3) II. _____
Lecture—3 hours.
Vector spaces, linear transformations, Euclidean spaces.
- *215A. Topology.** (3) I. Mr. Stein
Lecture—3 hours.
Prerequisite: course 127B.
Topics selected from general topology (compactness, connectedness, metrization, Euclidean space); algebraic topology (complexes, homology, duality); and applications to analysis, geometry, and algebra.
- *215B. Topology.** (3) II. Mr. Stein
Lecture—3 hours.
Prerequisite: course 215A.
Continuation of course 215A.
- *216. Integral Equations.** (3) II. _____
Lecture—3 hours.
Prerequisite: courses 108 and 127B.
Volterra equations, Fredholm equations, symmetric kernels.
Offered in odd-numbered years.

* Not to be given, 1965-1966.

- *218. Partial Differential Equations.** (3) I. Mr. Banks
 Lecture—3 hours.
 Prerequisite: courses 108 and 127B.
 Topics from the theory of first order hyperbolic and elliptic partial differential equations.
 Offered in even-numbered years.
- 219. Ordinary Differential Equations.** (3) II. Mr. Banks
 Lecture—3 hours.
 Prerequisite: courses 127A-127B and 185.
 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 even-numbered years.
- 220A. Mathematics for Students in the Physical Sciences.** (3) I. Mr. De Mar
 Lecture—3 hours.
 Prerequisite: courses 109, 185 (may be taken concurrently).
 Topics in ordinary and partial differential equations, boundary value problems, functions of a complex variable, matrices, and calculus of variations.
- 220B. Mathematics for Students in the Physical Sciences.** (3) II. Mr. De Mar
 Lecture—3 hours.
 Prerequisite: course 220A.
 Continuation of course 220A.
- 223A. Theory of Groups.** (3) I. Mr. Tamura
 Lecture—3 hours.
 Elements of group theory, structure and construction of composite groups, Sylow theory of groups, solvable groups, group extension.
- 223B. Theory of Groups.** (3) II. Mr. Tamura
 Lecture—3 hours.
 Continuation of course 223A.
- *225. Metamathematics.** (3) II. Mr. Krom
 Lecture—3 hours.
 Prerequisite: courses 111A and either 125 or Philosophy 12.
 Axiomatizability, consistency, and completeness of formalized mathematical theories. Definability in formal languages.
- *227. Theory of Sets.** (3) I. _____
 Lecture—3 hours.
 Fundamental concepts, cardinal numbers, order types, ordinal numbers. The axiom of choice and its role in the theory of sets.
 Offered in odd-numbered years.
- *228. Advanced Numerical Analysis of Differential Equations.** (3) I. _____
 Lecture—2 hours; laboratory—3 hours.
 Prerequisite: course 128B. Recommended: course 129.
 Difference methods in systems of ordinary differential equations, error analysis, and stability, two-point boundary value problems, numerical analysis of partial differential equations of first and second order, relaxation techniques, higher order equations, use of digital computers.
- *231. Multivariate Analysis.** (3) I. Mr. Baker
 Lecture—3 hours.
 Prerequisite: courses 131B and 109 or consent of the instructor.
 Multivariate normal distribution, analysis of variance, correlation and regression, chi-square.
 Offered in even-numbered years.

* Not to be given, 1965-1966.

- *232. Theory of Estimation and Testing Hypotheses.** (3) II. Mr. Baker
Lecture—3 hours.
Prerequisite: courses 109 and 131B or consent of the instructor.
Estimates, asymptotic efficiency and normality, theory of statistical tests.
Offered in odd-numbered years.
- 233. Design of Experiments.** (3) II. Mr. John
Lecture—3 hours.
Prerequisite: course 234.
Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces.
- 234. Analysis of Variance.** (3) I. Mr. John
Lecture—3 hours.
Prerequisite: course 131B.
Estimation and testing for the general linear hypothesis, components of variance, multiple comparisons.
- *235A. Analytic Probability Theory.** (3) I. Mr. Albert
Lecture—3 hours.
Prerequisite: course 127B.
Measure-theoretic foundations of probability, distribution functions and characteristic functions, law of large numbers and central limit theorems, conditional probabilities, martingales.
- *235B. Analytic Probability Theory.** (3) II. Mr. Albert
Lecture—3 hours.
Prerequisite: course 235A.
Continuation of course 235A
- 236A. Advanced Mathematical Statistics.** (3) I. Mr. Borgman
Lecture—3 hours
Prerequisite: courses 127B, 131B.
Distribution theory, parametric and non-parametric estimation, principles of statistical tests, sequential analysis, statistical decision functions.
- 236B. Advanced Mathematical Statistics.** (3) II. Mr. Borgman
Lecture—3 hours.
Prerequisite: course 236A.
Continuation of course 236A.
- 240A. Differential Geometry.** (3) I. Mr. Fulton
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.
- 240B. Differential Geometry.** (3) II. Mr. Fulton
Lecture—3 hours.
Prerequisite: course 240A.
Continuation of course 240A.
Offered in even-numbered years.
- 250A. Algebra.** (3) I. Mr. Tully
Lecture—3 hours.
Prerequisite: course 111B (111B may be taken concurrently with 250A).
The basic tools of commutative algebra: theory of fields, algebraic and transcendental extensions, Galois theory, valuations, ideal theory.

250B. Algebra. (3) II.

Lecture—3 hours.

Prerequisite: course 250A.

Continuation of course 250A.

Mr. Tully

290. Seminar. (1-6) I and II.

The Staff

Advanced study in various fields of mathematics as follows: (a) algebra, (b) analysis, (c) geometry, (d) mathematical logic, (e) number theory, (f) topology, (g) theoretical statistics, (h) applied statistics, (i) applied mathematics.

299. Research. (2-6) I and II.

The Staff

PROFESSIONAL COURSE**300. The Teaching of Mathematics. (3) I.**

Mrs. Goldman

Prerequisite: senior or graduate standing.

Accepted in partial satisfaction of the 22-unit requirement in education for the general secondary credential and the 24-unit requirement in education for the elementary credential.

MEDICINE, SURGERY, AND CLINICS

This is now called "Clinical Sciences," see page 169.

MICROBIOLOGY

Herman J. Phaff, Ph.D., *Chairman of the Executive Committee*
Committee Office, Cruess Hall

Microbiology (the biology of bacteria, viruses, fungi, algae or protozoa) constitutes a field of study for the degrees of Master of Arts and Doctor of Philosophy, the requirements are administered by a faculty group in Microbiology, through an Executive Committee.

Committee in charge:

Henry E. Adler, D.V.M., Ph.D., *Professor of Veterinary Medicine.*

Raymond A. Bankowski, D.V.M., Ph.D., *Professor of Veterinary Medicine.*

Ernst L. Biberstein, D.V.M., Ph.D., *Associate Professor of Veterinary Microbiology.*

Victor W. Burns, Ph.D., *Associate Professor of Physiological Sciences.*

Hugh S. Cameron, D.V.M., Ph.D., *Professor of Veterinary Microbiology, Emeritus.*

Edwin B. Collins, Ph.D., *Professor of Food Science and Technology.*

Constant C. Delwiche, Ph.D., *Professor of Soil Science.*

Roy H. Doi, Ph.D., *Assistant Professor of Biochemistry.*

James R. Douglas, Ph.D., *Professor of Parasitology.*

John B. Enright, Ph.D., *Associate Professor of Veterinary Public Health.*

Robert E. Hungate, Ph.D., *Professor of Bacteriology.*

†John L. Ingraham, Ph.D., *Professor of Bacteriology.*

Wendell W. Kilgore, Ph.D., *Lecturer in Food Science and Technology.*

Ralph E. Kunke, Ph.D., *Assistant Professor of Enology.*

Norma Jean Lang, Ph.D., *Assistant Professor of Botany.*

Allen G. Marr, Ph.D., *Professor of Bacteriology.*

Delbert G. McKercher, D.V.M., Ph.D., *Professor of Veterinary Medicine.*

Martin W. Miller, Ph.D., *Associate Professor of Food Science and Technology.*

Emil M. Mrak, Ph.D., *Chancellor, Professor of Food Science and Technology.*

John W. Osebold, D.V.M., Ph.D., *Professor of Immunology.*

Herman J. Phaff, Ph.D., *Professor of Food Science and Technology, and Professor of Bacteriology.*

Jack Preiss, Ph.D., *Assistant Professor of Biochemistry.*

Livio G. Raggi, D.V.M., Ph.D., *Associate Professor of Veterinary Medicine.*

Donald M. Reynolds, Ph.D., *Associate Professor of Bacteriology.*

Hans P. J. S. Riemann, Ph.D., *Lecturer in Public Health.*

Monica Riley, Ph.D., *Assistant Professor of Bacteriology.*

Irwin H. Segel, Ph.D., *Assistant Professor of Biochemistry.*

Mortimer P. Starr, Ph.D., *Professor of Bacteriology.*

Reese H. Vaughn, Ph.D., *Professor of Food Science and Technology.*

Kenneth Wells, Ph.D., *Associate Professor of Botany.*

George K. York, II, Ph.D., *Assistant Professor of Food Science and Technology.*

GRADUATE COURSES

290. **Seminar.** (1) I and II.

The Staff (Mr. Phaff in charge)

299. **Research.** (1-6) I and II.

The Staff

The research work will ordinarily be under the direction of a member of the group under whose guidance the student will conduct his research program for the dissertation.

† Absent on leave, 1965-1966.

MILITARY SCIENCE

Orrin A. Tracy, Colonel, Infantry; *Chairman of the Department.*
Department Office, 125 Gymnasium

- Orrin A. Tracy, Colonel, Infantry; *Professor of Military Science.*
Richard W. Pfeiffer, Captain, Infantry; *Assistant Professor of Military Science.*
Rockwell C. Cramer, Captain, Artillery; *Assistant Professor of Military Science.*
John R. Nee, Captain, Chemical Corps; *Assistant Professor of Military Science.*

In addition to courses offered in the Department of Military Science, upper division military science requires the completion of six units outside the department which may fulfill dual requirements for the baccalaureate degree in the Colleges as well as for the commission as a Second Lieutenant of the United States Army Reserve. One dual-credit unit must be taken in P.E. 10 (Physical Conditioning Activities). The remaining five dual-credit units may be completed in any of the general areas of natural science, psychology, effective communication, or political science. Elected subjects must be taken while enrolled in the advanced course. In the event that a subject was required in the student's normal academic curriculum during his freshman and sophomore years, electives must be selected either from another general area or from advanced subjects in the same area. Conversely, for subjects not required in the student's academic curriculum during his freshman and sophomore years, complete freedom of selection from the four academic areas is permissible.

Lower division Military Science requires the completion of two units outside the department during the freshman year. The subject elected for ROTC credit may be one that is required in the student's normal academic curriculum during his freshman year; but it must be from one of the general subject areas mentioned above.

The chairman of the department will evaluate and approve the elective subjects selected. Consideration will be given to the value of the subjects in furthering the professional qualifications of the student as a prospective commissioned officer in the United States Army.

College of Letters and Science.—The Bachelor of Arts degree requires the completion of 120 units. One hundred five of the 120 units must be in courses chosen from the Letters and Science List of Courses. The 6 units of lower division military science courses are included in the list. Upper division military science courses may be accredited to the remaining 15 of the total 120 units required. The dual-credit units in general areas may be selected from the List of Courses.

College of Agriculture.—The Bachelor of Science degree in agriculture requires the completion of 124 units. All units of upper and lower division military science courses combined may be accredited toward this requirement. The dual-credit units in general areas may be selected from upper division courses required by the College of Agriculture.

College of Engineering.—The Bachelor of Science degree in engineering requires the completion of 132-137 units. Six units of military science may be accredited toward this requirement. The dual-credit units in general areas may be selected from upper division courses required by the College of Engineering.

School of Veterinary Medicine.—The Bachelor of Science degree in veterinary medicine requires the completion of 124 units. Eight units of military science may be accredited toward this requirement. Students in upper division military science may select the dual-credit units in general areas from upper division courses required by the School of Veterinary Medicine. Graduates with the D.V.M. degree may apply for direct commissions as First Lieutenants in the United States Army Veterinary Corps. The selection of those to be commissioned is based on the needs of the Army, and the qualifications of the applicant.

GENERAL MILITARY SCIENCE

For the general regulations concerning enrollment and the program in Military Science, see page 29.

LOWER DIVISION COURSES

1A. Basic General Military Science (First Year). (1) I. The Staff
Lecture—1 hour; drill—1 hour.

Prerequisite: meet enrollment criteria stated on page 28, *General Regulations*.

Organization of the Army and ROTC; individual weapons and marksmanship; leadership laboratory.

1B. Basic General Military Science (First Year). (1) II. The Staff
Lecture—1 hour; drill—1 hour.

Prerequisite: course 1A, or the equivalent.

United States Army and national security, leadership laboratory.

20A. Basic General Military Science (Second Year). (2) I. The Staff
Lecture—2 hours; drill—1 hour.

Prerequisite: course 1B, or the equivalent.

American military history; leadership laboratory.

20B. Basic General Military Science (Second Year). (2) II. The Staff
Lecture—2 hours; drill—1 hour.

Prerequisite: course 20A or the equivalent.

Map and aerial photograph reading; introduction to basic tactics and techniques; leadership laboratory.

UPPER DIVISION COURSES

130A. Advanced General Military Science (First Year). (2) I. The Staff
Lecture—2 hours; drill—1 hour.

Prerequisite: completion of the lower division courses or the equivalent.

Leadership, military teaching principles, and leadership laboratory.

130B. Advanced General Military Science (First Year). (3) II. The Staff
Lecture—3 hours; drill—1 hour. Field trips to be arranged.

Prerequisite: course 130A.

Organization, missions, and functions of the branches of the U. S. Army; small-unit tactics; communications; leadership laboratory; pre-camp orientation.

140A. Advanced General Military Science (Second Year). (2) I. The Staff
Lecture—2 hours; drill—1 hour. Field trips to be arranged.

Prerequisite: course 130B.

Command and staff; military intelligence; training management; logistics; leadership laboratory.

140B. Advanced General Military Science (Second Year). (3) II. The Staff Lecture—3 hours; drill—1 hour. Field trips to be arranged.

Prerequisite: course 140A.

Army administration; military law; service orientation; role of the U. S. in world affairs; leadership laboratory.

ROTC Summer Training for Advanced Military Students. (3).

Summer training is of six weeks' duration from approximately June 20 to August 1.

Prerequisite: course 130B.

Practical training in atomic, chemical, biological, and radiological warfare; tactical, technical, and administrative duties in the field; firing individual and crew-served weapons; bivouac; individual and small-unit tactics; and development of military leadership.

Successful completion is a requisite for the commission.

MUSIC

Richard G. Swift, M.A., *Chairman of the Department.*
Department Office, 922 Sproul Hall

†Jerome W. Rosen, M.A., *Professor of Music.*
Larry D. Austin, M.M., *Associate Professor of Music.*
Richard G. Swift, M.A., *Associate Professor of Music.*
Sydney R. Charles, Ph.D., *Assistant Professor of Music.*
Theodore C. Karp, Ph.D., *Assistant Professor of Music.*



John W. Baker, *Associate in Music.*
Marvin H. Tartak, M.A., *Acting Assistant Professor of Music.*
Robert S. Bloch, M.A., *Lecturer in Music.*
Stanley G. Lunetta, B.A., *Associate in Music.*
Arthur N. Woodbury, M.M., *Lecturer in Music.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

A student may not receive more than 8 units of credit in performance courses.

Major Subject Advisers.—Mr. Austin, Mr. Swift.

The Major Program

(A) Lower Division Courses.—Required: Music 1A, 1B, 1C, 1D, 4A, 4B, 5A, 5B, and at least two semesters' participation in a lower division performance course (41, 42, 43, 44, or 46A-46B). Beginning and transfer students must take an examination in piano playing during registration week. Those showing deficiencies will be required to take Music 405. Sufficient pianistic ability to perform a four-part chorale and a composition comparable in difficulty to *The Little Preludes* by Bach is prerequisite to upper division courses in the major. Undergraduate students transferring from other colleges should consult with the departmental major adviser before enrolling in any music course.

(B) Upper Division Courses.—Required: Music 104A, 104B, 121A, 121B and two semesters of 141, 142, 143, or 144. In addition, at least eight units must be selected from the following courses: 105B, 108, 112A, 112B, 114, 115, 116, 117, 118, 119, 199.

The department will certify to the completion of a major program for graduation only on the basis of at least a grade C average in the upper division courses taken in the department. Students who do not maintain such an average will be advised to withdraw from the major in Music.

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 field with courses in allied fields. The major subject adviser should be consulted for details.

Teaching Major and Minor.—see p. 93.

Graduate Study.—The Department of Music offers programs of study and research leading to the M.A. degree in composition or musicology. Detailed

† Absent on leave, 1965-1966.

information regarding graduate study may be obtained from the graduate adviser for Music, Mr. Karp.

GROUP I

Courses primarily for students whose major is music.

LOWER DIVISION COURSES

- 1A. Masterworks of Musical Literature. (2) I.** Mrs. Charles
Lecture—3 hours.
Prerequisite: ability to read music or consent of the instructor.
Guided listening to important works from the seventeenth century to the present and discussion of their style and form.
- 1B. Masterworks of Musical Literature. (2) II.** Mrs. Charles
Lecture—3 hours.
Prerequisite: ability to read music or consent of the instructor.
Guided listening to important works from the seventeenth century to the present and discussion of their style and form.
- 1C. Masterworks of Musical Literature. (2) I.** Mr. Tartak
Lecture—3 hours.
Prerequisite: courses 1A, 1B, 4A and 4B or consent of the instructor.
Guided listening to important works from the seventeenth century to the present and discussion of their style and form. A continuation of course 1A and 1B.
- 1D. Masterworks of Musical Literature. (2) II.** Mr. Tartak
Lecture—3 hours.
Prerequisite: courses 1A, 1B, 4A and 4B or consent of the instructor.
Guided listening to important works from the seventeenth century to the present and discussion of their style and form. A continuation of course 1A and 1B.
- 4A. Elementary Theory. (5) I.** Mr. Bloch
Lecture—5 hours.
Exercises in notation, rhythm, ear-training, beginning counterpoint and harmony.
- 4B. Elementary Theory. (5) II.** Mr. Bloch
Lecture—5 hours.
A continuation of course 4A.
- 5A. Intermediate Theory. (4) I.** Mr. Swift
Lecture—4 hours.
Prerequisite: courses 4A and 4B.
A continuation of courses 4A and 4B.
- 5B. Intermediate Theory. (4) II.** Mr. Swift
Lecture—4 hours.
Prerequisite: courses 4A, 4B and 5A.

UPPER DIVISION COURSES

- 101. Modal Counterpoint. (3) I.** Mr. Karp
Lecture—3 hours.
Prerequisite: course 5B.
Sixteenth-century theory and practice. Preparatory exercises and motet writing.

- 104A. **Advanced Theory.** (3) I. Mr. Austin
Lecture—3 hours.
Prerequisite: course 5B.
Two and three part tonal counterpoint leading to the writing of canons, inventions, and chorale preludes.
- 104B. **Advanced Theory.** (3) II. Mr. Austin
Lecture—3 hours.
Prerequisite: course 104A.
Homophonic forms, beginning with phrase and period structure.
- *105A. **Principles of Composition.** (3) I. Mr. Swift, Mr. Austin
Lecture—3 hours.
Prerequisite: course 104B.
Elementary assignments in free composition.
- *105B. **Principles of Composition.** (3) II. Mr. Swift, Mr. Austin
Lecture—3 hours.
Prerequisite: course 104A.
Elementary assignments in free composition.
106. **Fugue.** (3) II. Mr. Karp
Lecture—3 hours.
Prerequisite: course 104A.
108. **Instrumentation.** (3) I. Mr. Woodbury
Lecture—3 hours.
Prerequisite: course 5B.
A study of the instruments of the orchestra, leading to practice in scoring for instrumental combinations.
- *112A. **Choral Conducting.** (2) I. Mr. Rosen
Lecture—2 hours.
Prerequisite: course 5B.
A study of the principles and techniques of conducting choral ensembles.
Offered in odd-numbered years.
- 112B. **Instrumental Conducting.** (2) II. Mr. Woodbury
Lecture—2 hours.
Prerequisite: course 108.
A study of the principles and techniques of conducting instrumental ensembles.
Offered in even-numbered years.
114. **Polyphonic Music of the Medieval Period.** (3) I. Mr. Karp
Lecture—3 hours.
Prerequisite: courses 1D and 5B, or consent of the instructor.
An historical survey of the development of polyphonic music in the medieval period.
115. **Music of the Renaissance.** (3) I. Mrs. Charles
Lecture—3 hours.
Prerequisite: courses 1D and 5B, or consent of the instructor.
Survey of the period 1430-1600.
116. **Music of the Baroque Period.** (3) II. Mr. Tartak
Lecture—3 hours.
Prerequisite: courses 1D and 5B, or consent of the instructor.
A survey of the period from Monteverdi to Handel and J. S. Bach.

* Not to be given, 1965-1966.

- *117. Music of the Classic Period.** (3) I. Mr. Swift
Lecture—3 hours.
Prerequisite: courses 1D and 5B, or consent of the instructor.
An historical survey of the music and style of the classic period.
- *118. Music of the Romantic Period.** (3) II. Mrs. Charles
Lecture—3 hours.
Prerequisite: courses 1D and 5B, or consent of the instructor.
An historical survey of the music and style of the romantic period.
- *119. Music of the 20th Century.** (3) II. Mr. Tartak
Lecture—3 hours.
Prerequisite: courses 1D and 5B, or consent of the instructor.
Critical and analytical study of works by such composers as Schoenberg, Stravinsky, Milhaud, Bartok, Hindemith, and Sessions.
- 121A. History and Literature of Music.** (3) I. Mr. Karp
Lecture—3 hours.
Prerequisite: courses 1C, 1D, and 4B, or consent of the instructor.
A study of the development of music from antiquity to the present; lectures, listening, technical analysis, and written reports.
- 121B. History and Literature of Music.** (3) II. Mr. Karp
Lecture—3 hours.
Prerequisite: course 121A.
- 199. Special Study for Advanced Undergraduates.** (1-4) I and II.
The Staff (Mr. Swift in charge)

GROUP II

Courses open to all students in the University.

LOWER DIVISION COURSES

- 10. Basic Musicianship.** (2) I and II. Mr. Woodbury, Mr. Lunetta
Lecture—3 hours.
Fundamentals of music, with singing, ear-training, harmonization of melodies, and conducting.
- 27A. Introduction to Musical Literature.** (3) I and II. Mr. Tartak, Mr. Karp
Lecture—2 hours; discussion—1 hour.
Lectures, guided listening, and readings designed to furnish the student with an understanding of basic musical concepts.
Intended primarily for students whose major is not music.
- 27B. Introduction to Musical Literature.** (3) II. Mr. Tartak
Lecture—3 hours.
Prerequisite: course 27A or consent of the instructor.
Lectures, guided listening, and readings designed to acquaint the student with stylistic elements characterizing music of the eighteenth, nineteenth and twentieth centuries.
Intended primarily for students whose major is not music.

Performance Courses

- 41. University Symphony Orchestra.** (1-2) I and II. Mr. Bloch
Open to any student in the University whose technical proficiency meets the requirements of concert performance.
Rehearsal and performance of symphonic music. May be repeated once for credit.

* Not to be given, 1965-1966

- 42. The Repertory Band. (1) I.** Mr. Austin
 Rehearsal—2 hours.
 Prerequisite: consent of the instructor.
 Open to any student in the University whose technical proficiency meets the requirements of concert performance.
 Rehearsal and performance of selected music for wind ensemble. May be repeated once for credit.
- 43. University Concert Band. (2) II.** Mr. Austin, Mr. Woodbury
 Rehearsal—4 hours.
 Open to any student in the University whose technical proficiency meets the requirements of concert performance.
 Rehearsal and performance of band music. May be repeated once for credit.
 In the fall semester, band practice and performance will be offered as an activity, rather than a course, with one two-hour rehearsal per week.
- 44. University Chorus. (2) I and II.** Mr. Swift
 Rehearsal—4 hours.
 Rehearsal and performance of choral music. May be repeated once for credit.
- 46A. Chamber Music Ensemble. (1) I.** The Staff (Mr. Bloch in charge)
 Rehearsal—2 hours.
 Open to any student in the University of sufficient technical ability to take part in ensemble combinations for strings, wind instruments, and piano.
 May be repeated once for credit.
- 46B. Chamber Music Ensemble. (1) II.** The Staff (Mr. Bloch in charge)
 Rehearsal—2 hours.
 Open to any student in the University of sufficient technical ability to take part in ensemble combinations for strings, wind instruments, and piano.
 May be repeated once for credit.

UPPER DIVISION COURSES

- 127A. Musical Literature: The Opera. (3) I.** Mr. Tartak
 Lecture—3 hours.
 Prerequisite: courses 27A and 27B or consent of the instructor.
 A study of selected operas such as *Dido and Aeneas*, *The Marriage of Figaro*, *The Barber of Seville*, *Tristan and Isolde*, *Aida*, *Pelleas and Melisande*, and *Wozzeck*, emphasizing the contribution of music to the total dramatic effect.
 Intended primarily for students whose major is not music.
- 127B. Musical Literature: The Symphony. (3) II.** Mr. Woodbury
 Lecture—3 hours.
 Prerequisite: courses 27A and 27B or consent of the instructor.
 A study of selected symphonies by composers such as Haydn, Mozart, Beethoven, Schubert, Brahms, and Stravinsky, emphasizing form and style.
 Intended primarily for students whose major is not music.
 Offered in even-numbered years.

Performance Courses

- 141. Advanced University Symphony Orchestra (1-2) I and II.** Mr. Bloch
 Prerequisite: 2 semesters in course 41.
 May be repeated once for credit.

142. **Advanced Repertory Band.** (1) I. Mr. Austin
 Rehearsal—2 hours.
 Prerequisite: Music 42 or consent of the instructor.
 Open to any student in the University whose technical proficiency meets the requirements of concert performance.
 Rehearsal and performance of selected music for wind ensemble. May be repeated once for credit.
143. **Advanced University Concert Band.** (2) II. Mr. Austin, Mr. Woodbury
 Rehearsal—4 hours.
 Prerequisite: 2 semesters in course 43.
 May be repeated once for credit.
144. **Advanced University Chorus.** (2) I and II. Mr. Swift
 Rehearsal—4 hours.
 Prerequisite: 2 semesters in course 44.
 May be repeated once for credit.
146. **Chamber Music Ensemble.** (1) I and II.
 Rehearsal—2 hours. The Staff (Mr. Bloch in charge)
 Open to any student in the University of sufficient technical ability to take part in ensemble combinations for strings, wind instruments, and piano. May be repeated once for credit.

GRADUATE COURSES

- 200A–200B. **Introduction to Musicology.** (3–3) Yr. Mrs. Charles
 Lecture—3 hours.
 Bibliography, individual research projects, and a class problem.
- 203A. **Composition.** (3) I. Mr. Austin
 Seminar—3 hours.
 Prerequisite: courses 104B and 105B, or the equivalent.
 Technical projects.
- 203B. **Composition.** (3) II. Mr. Austin
 Seminar—3 hours.
 Prerequisite: course 203A.
 Free composition.
- *210A–210B. **History of Notation.** (3–3) Yr. Mr. Karp
 Seminar—3 hours.
- *215A–215B. **Topics in Music History.** (3–3) Yr. Mrs. Charles, Mr. Karp
 Seminar—3 hours.
 Studies in selected areas of music history and theory.
- 240A–240B. **Techniques of Analysis.** (3–3) Yr. Mrs. Charles, Mr. Karp
 Seminar—3 hours.
 Analysis and analytical techniques as applied to music of all historical style periods.
299. **Individual Study.** (2–4) I and II. The Staff
 Special studies and projects for the advanced graduate student in musical composition or music history.

* Not to be given, 1965–1966

TEACHING METHODS COURSE

Instrumental Methods

Prerequisite: courses 1A-1B and 4A-4B, or consent of the instructor.

The courses in this series consider methods of teaching orchestra and band instruments, and include repertory and program planning for secondary schools. Each course may be repeated once for credit.

- *329A. Stringed Instruments. (1) I and II. Mr. Bloch
Laboratory—2 hours.
- *329B. Brass Instruments. (1) I. Mr. Woodbury
Laboratory—2 hours.
- *329C. Woodwind Instruments. (1) II. Mr. Woodbury
Laboratory—2 hours.

PROFESSIONAL COURSE

- 405A. Elementary Piano. (1) I. Mr. Baker
Lecture—2 hours.
Prerequisite: consent of the instructor.
Open to music majors and candidates for the general secondary credential with a minor in music.
- 405B. Elementary Piano. (1) II. Mr. Baker
Lecture—2 hours.
Prerequisite: course 405A or consent of the instructor.
Open to music majors and candidates for the general secondary credential with a minor in music.

* Not to be given, 1965-1966

NEMATOTOLOGY

Merlin W. Allen, Ph.D., *Chairman of the Department.*
Department Office, 223 Hoagland Hall

Merlin W. Allen, Ph.D., *Professor of Nematology.*

Dewey J. Raski, Ph.D., *Professor of Nematology.*

† Armand R. Maggenti, Ph.D., *Associate Professor of Nematology.*



Bert Lear, Ph.D., *Lecturer in Nematology.*

Benjamin F. Lownsbery, Ph.D., *Lecturer in Nematology.*

David R. Viglierchio, Ph.D., *Lecturer in Nematology.*

UPPER DIVISION COURSE

100. **General Plant Nematology.** (4) I.

Mr. Raski

Lecture—2 hours; laboratory—6 hours.

Prerequisite: Zoology 1A or 10.

An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.

GRADUATE COURSES

220. **Principles and Techniques of Nematode Taxonomy and Morphology.**

(3) I.

Mr. Allen

Lecture—1 hour; laboratory—6 hours.

Prerequisite: course 100 (may be taken concurrently).

Analysis and evaluation of the techniques used in the collection, extraction, and preparation of specimens, free-hand and histologic sections; presentation of illustrative material.

*221. **Nematode Pathogenicity and Control.** (3) II.

Lecture—1 hour; laboratory—6 hours.

Mr. Lear, Mr. Lownsbery

Prerequisite: course 100.

Advanced studies of the relation of nematodes to plants and control of plant parasitic nematodes.

225. **Nematode Taxonomy and Comparative Morphology.** (4) II. Mr. Allen

Lecture—2 hours; laboratory—6 hours.

Prerequisite: course 220.

The taxonomy, morphology, and comparative anatomy of soil and freshwater nematodes.

290. **Seminar.** (1) I and II.

The Staff (Mr. Allen in charge)

Seminar—1 hour.

299. **Research.** (1-6) I and II.

The Staff (Mr. Allen in charge)

† Absent on leave, 1965-1966.

* Not to be given, 1965-1966.

NUTRITION

Magnar Ronning, Ph.D., *Chairman of the Executive Committee.*
Committee Office, 234 Animal Science Building.

Committee in Charge:

- Ransom L. Baldwin, Jr., Ph.D., *Assistant Professor of Animal Husbandry.*
Arthur L. Black, Ph.D., *Professor of Physiological Chemistry.*
Floyd D. Carroll, Ph.D., *Professor of Animal Husbandry.*
Perry T. Cupps, Ph.D., *Professor of Animal Husbandry.*
Rocco J. Della Rosa, Ph.D., *Lecturer in Radiobiology.*
Gladys J. Everson, Ph.D., *Professor of Home Economics.*
Robert E. Feeney, Ph.D., *Professor of Food Science and Technology.*
Richard A. Freedland, Ph.D., *Assistant Professor of Physiological Chemistry.*
William N. Garrett, Ph.D., *Lecturer in Animal Husbandry.*
Marvin Goldman, Ph.D., *Lecturer in Radiobiology.*
Charles R. Grau, Ph.D., *Professor of Poultry Husbandry.*
Betty E. Haskell, Ph.D., *Assistant Professor of Nutrition.*
Hubert Heitman, Jr., Ph.D., *Professor of Animal Husbandry.*
Fredric W. Hill, Ph.D., *Professor of Nutrition.*
Harold F. Hintz, Ph.D., *Assistant Professor of Animal Husbandry.*
Lucille S. Hurley, Ph.D., *Associate Professor of Nutrition.*
Jiro J. Kaneko, Ph.D., *Associate Professor of Clinical Pathology.*
Warren G. Kinzey, Ph.D., *Assistant Professor of Anthropology and Zoology.*
Max Kleiber, Sc.D., *Professor of Animal Husbandry, Emeritus.*
Frank H. Kratzer, Ph.D., *Professor of Poultry Husbandry.*
Samuel Lepkovsky, Ph.D., *Professor of Poultry Husbandry (Berkeley campus).*
†Glen P. Lofgreen, Ph.D., *Professor of Animal Husbandry.*
James H. Meyer, Ph.D., *Professor of Animal Husbandry.*
Leo C. Norris, Ph.D., *Lecturer in Poultry Husbandry.*
Daniel W. Peterson, Ph.D., *Associate Professor of Poultry Husbandry.*
Magnar Ronning, Ph.D., *Associate Professor of Animal Husbandry.*
Leon H. Schmidt, Ph.D., *Professor of Comparative Pharmacology.*
George F. Stewart, Ph.D., *Professor of Food Science and Technology.*
†Aloys L. Tappel, Ph.D., *Professor of Food Science and Technology.*
Pran N. Vohra, Ph.D., *Assistant Research Nutritionist.*
†William C. Weir, Ph.D., *Professor of Animal Husbandry.*
Barry W. Wilson, Ph.D., *Assistant Professor of Poultry Husbandry.*
Frances J. Zeman, Ph.D., *Assistant Professor of Home Economics.*

GRADUATE COURSES

- 201A. Advanced General Nutrition. (3) I.** The Staff (Mr. Hill in charge)
Lecture—3 hours.
Prerequisite: Bacteriology 1; Biochemistry 101; a course in animal physiology; a course in nutrition.
Advanced studies of proteins and amino acids in nutrition; metabolic function and nutritional importance of vitamins; deficiency diseases. Emphasis on comparative aspects among animal species.

† Absent on leave, 1965–1966.

201B. Advanced General Nutrition. (3) II.

Lecture—3 hours.

The Staff (Mr. Ronning in charge)

Prerequisite: Bacteriology 1; Biochemistry 101; a course in animal physiology; a course in nutrition.

Advanced studies of fats and carbohydrates in energy metabolism; energy evaluation of foods; relationships of fat to degenerative diseases; minerals; water balance. Emphasis on comparative aspects of nutrition.

250. Concepts of Animal Nutrition. (2) II.

Mr. Lepkovsky

Lecture—2 hours.

Prerequisite: biochemistry or physiological chemistry; Chemistry 8; Physiology 1; Zoology 1B; or consent of the instructor.

Dynamic interrelationships between food, animal, and environment, including concepts in food intake, digestion, absorption, and utilization of nutrients.

290. Seminar. (1) I and II.

The Staff

Seminar—1 hour.

Discussion and critical evaluation of advanced topics in nutrition research.

ORIENTAL LANGUAGES

Benjamin E. Wallacker, Ph.D., *Associate Professor of Oriental Languages.*

Olof G. Lidin, M.A., *Lecturer in Oriental Languages.*

Eric S. Liu, Ph.D., *Assistant Professor of Oriental Languages.*

Bezadel Porten, Ph.D., *Assistant Professor of Hebrew and Bible.*

Stephen A. Tyler, Ph.D., *Assistant Professor of Anthropology.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

LOWER DIVISION COURSES

- 1A-1B. Elementary Modern Chinese.** (4-4) Yr. Mr. Liu
Lecture—3 hours; laboratory—2 hours.
Introduction to the standard or "National Language" (Kuo Yü) of China.
- 9A-9B. Elementary Modern Japanese.** (4-4) Yr. Mr. Lidin
Lecture—3 hours; laboratory—2 hours.
Prerequisite: course 9A is prerequisite to 9B.
- 10A-10B. Elementary Hebrew.** (4-4) Yr. Mr. Porten
Lecture—3 hours; laboratory—2 hours.

UPPER DIVISION COURSES

- 100. Languages of Eastern Asia.** (3) II. Mr. Wallacker
Lecture—3 hours.
A survey course on the nature and distribution of the main languages of Eastern Asia.
- 101A. Intermediate Chinese.** (3) I. Mr. Wallacker
Lecture—3 hours; laboratory—1 hour.
Prerequisite: course 1B.
A continuation of 1A-1B.
- 101B. Intermediate Chinese.** (3) II. Mr. Wallacker
Lecture—3 hours; laboratory—1 hour.
Prerequisite: course 101A.
- 112. Chinese Literature in Translation.** (3) I. Mr. Wallacker
Lecture—3 hours.
No knowledge of Chinese is required.
Representative works—including classics, histories, belles-lettres, and fiction—in English translation.
- 123. Chinese Grammar.** (3) I. Mr. Liu
Lecture—3 hours.
Prerequisite: courses 1A-1B or consent of instructor.
- 132. History of Japanese Literature.** (3) II. Mr. Lidin
Lecture—3 hours.
From the beginning to modern times, emphasizing Chinese, Buddhist, and Western influences. Reading, lectures, and discussion in English.
- 142J. Civilizations of Eastern Asia: Japan.** (3) I. Mr. Lidin
Lecture—3 hours.
A broad survey of Japanese civilization dealing with cultural, literary, religious, and social development.

- 145. Elementary Telugu. (3) I.** Mr. Tyler
Lecture—2 hours; laboratory—2 hours.
Offered in odd-numbered years.
- *146. The Dravidian Languages. (3) I.** Mr. Tyler
Lecture—2 hours; laboratory—2 hours.
Analysis of the structures and distribution of the Dravidian languages.
Offered in even-numbered years.
- 150A. Ancient Israel. (3) I.** Mr. Porten
Lecture—3 hours.
The culture of Israel as reflected in the Bible and archaeological discoveries. Patriarchal period to David.
- 150B. Ancient Israel. (3) II.** Mr. Porten
Lecture—3 hours.
The culture of Israel as reflected in the Bible and archaeological discoveries. Solomon to the Maccabees.

* Not to be given, 1965–1966.

PARK ADMINISTRATION

See "Landscape Horticulture," page 286.

PATHOLOGY

Donald R. Cordy, D.V.M., Ph.D., *Chairman of the Department.*
Department Office, 1221 Haring Hall

Donald R. Cordy, D.V.M., Ph.D., *Professor of Veterinary Pathology.*
Peter C. Kennedy, D.V.M., Ph.D., *Professor of Veterinary Pathology.*
Jack E. Moulton, D.V.M., Ph.D., *Professor of Veterinary Pathology.*
Donald L. Dungworth, B.V.Sc., Ph.D., *Assistant Professor of Veterinary Pathology.*
———, *Assistant Professor of Veterinary Pathology.*



William P. C. Richards, M.V.Sc., *Lecturer in Veterinary Pathology.*

UPPER DIVISION COURSES

122A. Veterinary Pathology. (5) I. Mr. Cordy, Mr. Moulton

Lecture—3 hours; laboratory—6 hours.

Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the instructor.

The fundamental degenerative, vascular and inflammatory processes; oncology; systemic pathology; and the pathology of communicable diseases and the toxicoses.

122B. Veterinary Pathology. (5) II.

Mr. Dungworth, Mr. Kennedy, Mr. Richards

Lecture—4 hours; laboratory—3 hours.

Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the instructor.

The fundamental degenerative, vascular and inflammatory processes; oncology; systemic pathology; and the pathology of communicable diseases and the toxicoses.

199. Special Study for Advanced Undergraduates. (1-5) I and II.

The Staff (Mr. Cordy in charge)

GRADUATE COURSES

251A. Necropsy Laboratory. (1/4) I. The Staff (Mr. Kennedy in charge)

Laboratory—23 hours. (Hours per semester)

Prerequisite: fourth-year standing in the School of Veterinary Medicine. Supervised experience in necropsy diagnosis, including techniques and interpretation.

251B. Necropsy Laboratory. (1/2) II. The Staff (——— in charge)

Laboratory—23 hours. (Hours per semester)

Prerequisite: fourth-year standing in the School of Veterinary Medicine. Supervised experience in necropsy diagnosis, including techniques and interpretation.

- 280. Advanced Pathology.** (3) II. Mr. Cordy, Mr. Kennedy
Lecture—1 hour; laboratory—3 hours; discussion—1 hour.
Prerequisite: course 122A, 122B.
Selected topics in the pathology of non-neoplastic diseases. Mechanisms of disease and patterns of reaction are stressed.
Offered in odd-numbered years.
- 281. Necropsy and Surgical Pathology.** (1-4) I and II.
Laboratory. The Staff (I. Mr. Kennedy, II. —, in charge)
Prerequisite: courses 122A-122B and 251A-251B.
Responsible diagnostic casework. Conduct of necropsies, slide reading, and case reporting.
- 282. Tumor Pathology.** (2) I. Mr. Dungworth, Mr. Moulton
Lecture—1 hour; laboratory—3 hours.
Prerequisite: course 122A.
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.
- 283. Pathology of Irradiation.** (2) I. ———
Lecture—1 hour; laboratory—3 hours.
Prerequisite: course 122B.
Explanation and demonstration of radiation-induced changes at lethal and sublethal levels. Types of radiations briefly described, with emphasis on ensuing gross and subgross damage. Enrollment limited.
Offered in even-numbered years.
- 290. Seminar.** (1) I and II. The Staff (Mr. Kennedy in charge)
Seminar—1 hour.
- 291. Histopathology Conference.** (1) I and II.
Lecture—1 hour. I. Mr. Kennedy, II. Mr. Cordy
Discussion of selected cases based on records and slides. Defense of diagnoses.
- 298. Group Study.** (1-4) I and II. The Staff
Group Study of advanced topics in pathology.
- 299. Research.** (1-9) I and II. The Staff

PHILOSOPHY

Neal W. Gilbert, Ph.D., *Chairman of the Department.*
Department Office, 422 Sproul Hall

Arthur Child, Ph.D., *Professor of Philosophy.*
Marjorie Grene, Ph.D., *Professor of Philosophy.*
William H. Bossart, Ph.D., *Associate Professor of Philosophy.*
Neal W. Gilbert, Ph.D., *Associate Professor of Philosophy.*
Ronald A. Arbini, Ph.D., *Assistant Professor of Philosophy.*
John F. Malcolm, Ph.D., *Visiting Assistant Professor of Philosophy.*



Paul J. Johnson, M.A., *Acting Assistant Professor of Philosophy.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

Departmental Major Advisers.—Mr. Gilbert, Mr. Bossart.

The Major Program

(A) Lower Division Courses.—Required: courses 20A–20B, and 12.

(B) Upper Division Courses.—Twenty-four units in upper division courses in philosophy, selected with the approval of a departmental major adviser.

Students who do not maintain a grade C average in the upper division courses of the major program will be required to withdraw from the major in philosophy.

LOWER DIVISION COURSES

6. **Introduction to Philosophy.** (3) I and II. The Staff
Lecture—3 hours.
Political, aesthetic, religious, metaphysical, and other concerns of philosophy, as exemplified in major works from various periods.
12. **Introduction to Logic.** (3) I and II. The Staff
Lecture—3 hours.
Principles of inference and definition for symbolic deductive systems; sentential connectives, quantifiers, classes and relations. Applications of such systems in mathematics, science, and ordinary language.
- 20A. **History of Philosophy.** (3) I and II. The Staff
Lecture—3 hours.
From the Pre-Socratics to the Scholastics.
- 20B. **History of Philosophy.** (3) I and II. The Staff
Lecture—3 hours.
From Descartes to Kant.

UPPER DIVISION COURSES

COURSES IN THE PROBLEMS OF PHILOSOPHY

100. **Recurrent Types of Philosophy.** (3) I. Mr. Johnson
Lecture—3 hours.
Several problems in different fields—for example, the problems of truth, causation, and freedom of the will—as treated by representatives of various perennial types of philosophy.

101. **Metaphysics.** (3) II. Mr. Bossart
Lecture—3 hours.
The search for being; the meaning of being and the relation of being to ontology. Possible types of world order.
Offered in odd-numbered years.
102. **Theory of Knowledge.** (3) I. Mr. Child
Lecture—3 hours.
Philosophical problems of perception and thought, memory and precognition, imagination, truth and error, belief and knowledge. Types of epistemology.
Offered in odd-numbered years.
103. **Philosophy of Mind.** (3) II. Mr. Arbini
Lecture—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.
105. **Philosophy of Religion.** (3) I. Mr. Child
Lecture—3 hours.
Nature of religion; its relations to morality and institutions; sources, status, and kinds of religious knowledge; existence and nature of God; man's relations to the divine; significance of death; concepts of survival; relations of church and state.
107. **Philosophy of Science.** (3) I. Mrs. Grene
Lecture—3 hours.
Basic concepts and methods of the mathematical, physical, and biological sciences; philosophical reflections on science.
109. **Theory of History.** (3) II. Mr. Child
Lecture—3 hours.
The nature of historical thinking and of the historical process, and the relations between them.
Offered in odd-numbered years.
114. **Ethics.** (3) I. Mr. Johnson
Lecture—3 hours.
Principles of intelligent conduct: their status and nature; how they are discovered, known, and proved; their relationships to the principles of art, science, and logic.
123. **Aesthetics.** (3) II. Mr. Child
Lecture—3 hours.
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.
Offered in even-numbered years.
126. **Philosophy of the Visual Arts.** (3) I. Mr. Bossart
Lecture—3 hours.
Prerequisite: one course in art or design, or consent of the instructor.
Aesthetics of the graphic and plastic arts.
Offered in even-numbered years.
132. **History of Logic.** (3) I. Mr. Gilbert
Lecture—3 hours.
Aristotle's *Organon*; Stoic logic; the medieval contributions; the major 19th century logicians; the initiation of contemporary logic by Whitehead and Russell.
Offered in even-numbered years.

137. **Philosophy of Language.** (3) II. Mr. Arbini
 Lecture—3 hours.
 Problems that arise from the consideration of natural and formalized languages. Such authors as Aristotle, Wittgenstein, Austin, Carnap, Quine, and Ziff, and their contributions to semantic analysis.
 Offered in odd-numbered years.

COURSES ON HISTORICAL PERIODS AND INDIVIDUAL THINKERS

Group A: Periods

146. **Renaissance Philosophy.** (3) II. Mr. Gilbert
 Lecture—3 hours.
 Renaissance conceptions of man, as found in writings of Valla, Ficino, Pico, Pomponazzi, Erasmus, Vives, Luther, Montaigne, and Calvin.
 Offered in odd-numbered years.
151. **Philosophy of the 19th Century.** (3) II. Mr. Bossart
 Lecture—3 hours.
 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.
155. **American Philosophy.** (3) II. Mr. Johnson
 Lecture—3 hours.
 Study of such American thinkers as Peirce, James, Royce, Dewey, Santayana, Whitehead, and C. I. Lewis.
 Offered in even-numbered years.
- 157A. **Contemporary European Philosophy.** (3) I. Mr. Bossart
 Lecture—3 hours.
 A study of contemporary directions in European philosophy, paying particular attention to the development of phenomenology and *Existenzphilosophie* in Germany. Readings in Husserl, Heidegger, Jaspers, and related philosophers.
 Offered in odd-numbered years.
- 157B. **Contemporary European Philosophy.** (3) II. Mrs. Grene
 Lecture—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.

Group B: Individual Thinkers

161. **Plato.** (3) II. Mr. Malcolm
 Lecture—3 hours.
 Prerequisite: course 6 or consent of the instructor.
 Themes from the thought of Plato, especially as treated in the *Phaedrus*, *Parmenides*, *Theaetetus*, *Sophist*, *Statesman*, *Philebus*, and *Timaeus*.
 Offered in odd-numbered years.
162. **Aristotle.** (3) II. Mrs. Grene
 Lecture—3 hours.
 Prerequisite: course 6 or consent of the instructor.
 The *Metaphysics* and related portions of other treatises.
 Offered in even-numbered years.

174. **Hume.** (3) I. Mr. Arbini
 Lecture—3 hours.
A Treatise of Human Nature; some reference to the *Enquiries*.
 Offered in odd-numbered years.
175. **Kant.** (3) I. Mr. Bossart
 Lecture—3 hours.
 Prerequisite: course 20B or consent of the instructor.
 The *Critique of Pure Reason* and selections from other works.
 Offered in even-numbered years.
185. **Founders of Modern Thought.** (3) I and II. The Staff
 Lecture—3 hours.
 Influential theories of metaphysics, theory of knowledge, and ethics from Descartes through Nietzsche. Not open to philosophy majors or to students who have taken course 20B.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II.
 Prerequisite: consent of the instructor. The Staff

GRADUATE COURSES

291. **Seminar in Metaphysics.** (3) I. Mrs. Grene
 Seminar—2 hours.
292. **Seminar in Theory of Knowledge.** (3) II. Mr. Arbini
 Seminar—2 hours.
293. **Seminar in Ethics.** (3) II. Mr. Child
 Seminar—2 hours.
294. **Seminar in Philosophy of Kant.** (3) I. Mr. Bossart
 Seminar—2 hours.
 Analysis of the *Critique of Practical Reason* and the *Critique of Judgment*.

PHYSICAL EDUCATION

Charles R. Kovacic, Ed.D., *Chairman of the Department.*
Department Office, 264 Gymnasium

Charles R. Kovacic, Ed.D., *Professor of Physical Education.*
†Willard S. Lotter, Ed.D., *Associate Professor of Physical Education.*
Everett D. Ryan, Ed.D., *Associate Professor of Physical Education.*
Marya Welch, Ed.D., *Associate Professor of Physical Education.*
William C. Adams, Ph.D., *Assistant Professor of Physical Education.*
Edmund M. Bernauer, Ph.D., *Assistant Professor of Physical Education.*
Barbara J. Heller, Ed.D., *Assistant Professor of Physical Education.*
William L. Lakie, Ed.D., *Assistant Professor of Physical Education.*



Robert R. Brooks, M.A., *Associate Supervisor of Physical Education.*
Carl E. J. Carlson, M.A., *Assistant Supervisor of Physical Education.*
Robert I. Hamilton, M.S., *Assistant Supervisor of Physical Education.*
Vernard B. Hickey, B.A., *Intercollegiate Athletics Director and Supervisor of Physical Education.*
Jerry W. Hinsdale, A.B., *Assistant Supervisor of Physical Education.*
Ramona J. Finnila, B.S., *Junior Supervisor of Physical Education.*
Dorothy M. Lyons, A.A., *Associate in Physical Education.*
Judith L. Meyers, M.A., *Assistant Supervisor of Physical Education.*
John W. Pappa, M.A., *Assistant Supervisor of Physical Education.*
Herbert A. Schmalenberger, M.A., *Associate Supervisor of Physical Education.*
‡George A. Stromgren, M.S., *Lecturer and Supervisor of Physical Education.*
Phillip S. Swimley, M.A., *Assistant Supervisor of Physical Education.*

The incidental fee, payable by all students at the time of registration, entitles students to the use of the gymnasium, swimming pool, 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. Locker keys 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. Adams, Mr. Bernauer, Miss Heller, Mr. Kovacic, Mr. Lakie, Mr. Ryan, Miss Welch.

The Major Program

Students will specialize in one of two areas of concentration, i.e., biological aspects or psychological aspects of physical education.

(A) Lower Division Courses.—Required of all students: Chemistry 1A, Mathematics 13, Physical Education 45, Physics 2A, Physiology 1, Psychology 1, Zoology 1A and Zoology 25. Those students interested in the biological aspects of physical education will be required to take Chemistry 8 and Zoology 1B.

(B) Upper Division Courses.—Required of all students: Physical Education 103, 104, 110, 120, and 135. Required of students in biological area: Animal Husbandry 110; recommended: Animal Physiology 102. Required of students in psychological area: Psychology 112 and three courses selected

† Absent on leave, 1965–1966.

‡ Absent on leave, fall semester, 1965

from one of the following groups: a) Psychology 108, 130, 134, 147; b) Psychology 145, Sociology 152, 160.

Students who are preparing for careers as teachers upon consultation with their adviser will elect additional physical education courses that satisfy requirements for the teaching credential.

LOWER DIVISION COURSES FOR MEN

- 1. Physical Education for Men. (1) I and II.** The Staff
Laboratory—2 hours.

Sections are organized in archery, badminton, dance (social, folk and square), baseball, basketball, boxing, football, golf, handball, soccer, tennis, touch football, track, trampolining, tumbling, wrestling, volleyball, swimming, lifesaving and water sports. Men qualified for athletics may enroll in any sport pursued at Davis, such as baseball, basketball, football, and receive credit for this elective.

This course may be repeated for credit not to exceed a total of 4 units.

- 10. Professional Physical Education Activities (Men). (1) I and II.**

Lecture—1 hour; laboratory—2 hours. The Staff

Fundamental knowledges and skills in swimming, basketball, football, track, baseball, tennis, golf, combative sports, developmental activities, court sports, tumbling.

LOWER DIVISION COURSES FOR WOMEN

- 22. Professional Physical Education Activities (Women). (1) I and II.**

Lecture—1 hour; laboratory—2 hours. The Staff

Fundamental knowledge and skill in aquatics (swimming—beginning, intermediate, advanced, synchronized; diving; lifesaving; water safety); archery; badminton; basketball; dance (folk and square, modern, social); tennis; tumbling; gymnastics; volleyball.

- 26. Physical Education for Women. (1) I and II.** The Staff

Laboratory—2 hours.

Sections are organized in archery, badminton, dance (modern, social, folk and square), golf, tennis, trampolining, tumbling, volleyball, swimming, lifesaving and swimming formations.

This course may be repeated for credit not to exceed a total of 4 units.

- 35. Rhythmic Form and Analysis. (1) II.**

Mrs. Finnila

Lecture—1 hour; laboratory—2 hours.

The fundamentals of rhythmic form; the use of rhythm as the basic element in activity and its application to physical education. A workshop class in the function of rhythm, form, and analysis.

LOWER DIVISION COURSES FOR MEN AND WOMEN

- 5A. First Aid. (1) I and II.**

The Staff

Lecture—2 hours.

Standard course. Upon successful completion of the course, the Red Cross Certificate is awarded.

- 24. The Theory of Swimming and Diving. (1) I and II.**

Mr. Hinsdale

Lecture—1 hour; laboratory—2 hours.

Prerequisite: course 1 or 26 in swimming or equivalent.

Advanced swimming and diving, including water safety. Red Cross Senior Lifesaving Certificate awarded those who qualify. Fundamental skills and teaching techniques.

25. The Theory of Lifesaving and Water Safety. (1) I and II. Mr. Hinsdale
Lecture—1 hour; laboratory—2 hours.

Prerequisite: course 24 or equivalent and Red Cross Lifesaving Certificate.
Organization of waterfront activities in schools, colleges, camps, and recreation centers. Skill and techniques of teaching swimming and lifesaving. An Instructor's Red Cross Certificate awarded upon completion of the course.

***36A. Dance History and Practice.** (2) I. _____

Lecture—1 hour; laboratory—3 hours.

Prerequisite: body mechanics section of course 22 or 26 (may be taken concurrently).

Survey of the dance from its origins in prehistoric and antique ceremonial to 1900. A study of the materials, growth, and function of dance in society. Practice primarily in dance forms which developed out of Renaissance foundations.

***36B. Dance History and Practice.** (2) II. _____

Lecture—1 hour; laboratory—3 hours.

Prerequisite: body mechanics section of course 22 or 26 (may be taken concurrently).

Survey of the dance from its origins in prehistoric and antique ceremonial to 1900. A study of the materials, growth, and function of dance in society. Practice primarily in dance forms which developed out of Renaissance foundations.

***37A. Contemporary Dance Theory and Practice.** (2) I. _____

Lecture—1 hour; laboratory—3 hours.

Prerequisite: courses 36A and 36B.

A study of the perspectives and practices of contemporary American art dance: traditional forms and twentieth-century innovation. A comparative study of selected theories and practices in America, Europe, and the Orient.

***37B. Contemporary Dance Theory and Practice.** (2) II. _____

Lecture—1 hour; laboratory—3 hours.

Prerequisite: courses 36A and 36B.

A study of the perspectives and practices of contemporary American art dance: traditional forms and twentieth-century innovation. A comparative study of selected theories and practices in America, Europe, and the Orient.

44. Principles of Healthful Living. (1) II.

Miss Heller

Lecture—2 hours.

Use of scientific information, proper attitudes, knowledge and health practices in daily living.

45. Foundations of Physical Education. (3) I.

Mr. Adams

Lecture—3 hours.

Survey of the mode, expressive form, development and objective of human movement.

UPPER DIVISION COURSES FOR MEN

***171. Conditioning of Athletes and Care of Injuries.** (2) I. Mr. Stromgren
Lecture—1 hour; laboratory—3 hours.

Prerequisite: course 5A, physiology or anatomy.

Modern principles and practices in conditioning and care of athletes. Prevention, care of athletic injuries and therapeutic exercises applied to athletic injuries; training-room equipment, protective devices and supplies.

* Not to be given, 1965-1966

UPPER DIVISION COURSES FOR MEN AND WOMEN

- 103. Analysis of Human Movement.** (4) I. Mr. Kovacic
Lecture—3 hours; laboratory—3 hours.
Prerequisite: Physics 2A, Physiology 1, Zoology 25.
Anatomical and physiological concepts and physical laws as applied to human movement.
- 104. Physiology of Muscular Activity.** (4) II. Mr. Bernauer
Lecture—3 hours; laboratory—3 hours.
Prerequisite: course 103, Chemistry 1A, Zoology 1A.
Neuromuscular and circulatory-respiratory response to exercise in man including the regulation of body fluids, blood gases and body temperature. Adaptation to persistent programs of physical training are reviewed.
- 110. Psychosocial Factors in Motor Performance.** (3) II. Mr. Ryan
Lecture—3 hours.
Prerequisite: Psychology 1 or 2.
Analysis of various psychological and social factors affecting the development and use of motor skills.
- 120. Sports in American Society.** (3) I. Mr. Lakie
Lecture—3 hours.
Prerequisite: History 17A.
The interrelationships of sports with other aspects of society, including 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.
- 130. Principles and Theory of Physical Education.** (3) II. Miss Welch
Lecture—3 hours.
A critical analysis of the assumptions underlying the physical education program.
- 135. Research Design and Instrumentation in Physical Education.** (3) I. Mr. Bernauer
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Mathematics 13.
Methods, techniques, and design of experimental research in physical education.
- 140. Recreation in the Community.** (2) II. Miss Welch
Lecture—2 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.
- 145. School Health Education.** (2) II. Miss Heller
Lecture—2 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.
- 180. Physical Education in the Secondary School.** (3) I. Miss Heller, Mr. Schmalenberger
Lecture—3 hours.
Prerequisite: course 130.
An analysis and study of the principles and methods basic to physical education in the secondary school.

199. Special Study for Advanced Undergraduates. (1-5) I and II.

Prerequisite: consent of department. The Staff (Mr. Kovacic in charge)

PROFESSIONAL COURSE

380. Methods of Physical Education in the Secondary School. (3) II.

Lecture—1 hour; laboratory—6 hours. Miss Heller, Mr. Schmalenberger

Prerequisite: course 180.

The methods of teaching group and individual activities in the secondary school; program planning; class management; organization of the intramural and extramural programs. Laboratory experience in teaching methods.

PHYSICS

William J. Knox, Ph.D., *Chairman of the Department*
Department Office, 109 Physical Science Building

James E. Draper, Ph.D., *Professor of Physics.*
Milton E. Gardner, Ph.D., *Professor of Physics.*
John A. Jungerman, Ph.D., *Professor of Physics.*
Charles G. Patten, Ph.D., *Professor of Physics.*
Kenneth R. Greider, Ph.D., *Associate Professor of Physics.*
William J. Knox, Ph.D., *Associate Professor of Physics.*
William W. True, Ph.D., *Associate Professor of Physics.*
———, *Associate Professor of Physics.*
Franklin P. Brady, Ph.D., *Assistant Professor of Physics.*
Glen W. Erickson, Ph.D., *Assistant Professor of Physics.*
Claude Garrod, Ph.D., *Assistant Professor of Physics.*
James P. Hurley, Ph.D., *Assistant Professor of Physics.*
Olaf S. Leifson, Ph.D., *Assistant Professor of Physics.*
James A. McCray, Ph.D., *Assistant Professor of Physics.*



Lindsay R. Dodd, Ph.D., *Lecturer in Physics.*
Neal F. Peek, M.A., *Lecturer in Physics.*
George L. Strobel, Ph.D., *Lecturer in Physics.*
Paul P. Szydluk, Ph.D., *Lecturer in Physics.*

Letters and Science List.—All undergraduate courses in physics are included in the Letters and Science List of Courses (see page 85).

Major Subject Advisers.—Mr. Brady, Mr. Erickson, Mr. Gardner, Mr. Hurley.

Bachelor of Arts Major Program

(A) Lower Division Courses.—Required: Physics 4A, 4B, 4C or the equivalent, Chemistry 1A or 7A, Mathematics 9A, 9B, 9C or their equivalent. Recommended: Mathematics 7B and a reading knowledge of French and German.

(B) Upper Division Courses.—Required: Physics 104, 105A, 105B, 108, 110A, 110B, 121, 122 and Mathematics 109. Recommended: Physics 115 and either 129 or 140.

Bachelor of Science Major Program

(A) Lower Division Courses.—Required: Physics 4A, 4B, 4C, or the equivalent, Chemistry 1A, 1B or 7A, 7B, Mathematics 9A, 9B, 9C or their equivalent. Recommended: Mathematics 7B and a reading knowledge of French and German.

(B) Upper Division Courses.—Required: Physics 104, 105A, 105B, 108, 110A, 110B, 115, 116, 121, 122, 129, 140, and Mathematics 109. Recommended: Physics 107, 112, Mathematics 127A, 127B, and 185.

Honors and Honors Program (see page 85).—The honors program in physics consists of three units of course 194H open to seniors who qualify for the honors program. Students may be graduated with honors in physics upon the 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, and 4C are for students whose major is physics and for students preparing for applications of physics in Colleges of Engineering and Chemistry. Either 4B or 4C may be taken after 4A.

All students planning to take lower division courses (except course 10) should have completed trigonometry.

- 2A. General Physics Lecture.** (3) I and II. Mr. Erickson, Mr. Peek
Lecture—3 hours.
Mechanics, properties of matter, heat, and sound.
- 2B. General Physics Lecture.** (3) I and II. Mr. Strobel, Mr. Erickson
Lecture—3 hours.
Prerequisite: course 2A.
Properties of light, electricity, magnetism, and atomic and nuclear physics.
- 3A. General Physics Laboratory.** (1) I and II. Mr. Erickson, Mr. Peek
Laboratory—3 hours.
Mechanics, properties of matter, heat, and sound. Experimental work planned to accompany the lectures in course 2A.
- 3B. General Physics Laboratory.** (1) I and II. Mr. Strobel, Mr. Erickson
Laboratory—3 hours.
Properties of light, electricity, magnetism, and atomic and nuclear physics. Experimental work planned to accompany the lectures in course 2B.
- 4A. General Physics.** (4) I and II. Mr. Leifson, Mr. Gardner
Lecture—3 hours; laboratory—3 hours.
Prerequisite: Mathematics 9B or the equivalent (may be taken concurrently).
Mechanics, properties of matter.
- 4B. General Physics.** (4) I. Mr. Gardner
Lecture—3 hours; laboratory—3 hours.
Prerequisite: course 4A, Mathematics 9C (may be taken concurrently).
Electricity and magnetism.
- 4C. General Physics.** (4) II. Mr. Leifson
Lecture—3 hours; laboratory—3 hours.
Prerequisite: course 4A, Mathematics 9C (may be taken concurrently).
Heat, wave motion, sound, and light.
- 10. Basic Concepts of Physics.** (3) I. Mr. Knox
Lecture—3 hours.
Development of the principles of physics, classical and modern, with emphasis on concepts rather than applications. Includes lecture-demonstrations and problem assignments.
Not open to students who have received credit for any of 2A, 2B, 4A, 4B, 4C, or equivalent.

UPPER DIVISION COURSES

Courses 4A, 4B, 4C or their equivalent and differential and integral calculus are prerequisite to all upper division courses, except course 107.

- 104. Vector Analysis.** (2) I. Mr. McCray
Lecture—2 hours.
Elements of vector and tensor analysis with applications to physics.
- 105A. Analytic Mechanics** (3) I. Mr. Garrod
Lecture—3 hours.
Principles and applications of Newtonian mechanics.
- 105B. Analytic Mechanics.** (3) II. Mr. Garrod
Lecture—3 hours.
Continuation of 105A; introduction to Lagrange's and Hamilton's equations.

- 107. Introduction to Electronics.** (3) I. Mr. Gardner
Lecture—3 hours.
Prerequisite: course 2B, or equivalent.
Elementary principles of single-phase alternating-current circuits, characteristics of thermionic tubes and a study of simple electronic circuits.
- 108. Physical Optics.** (3) II. Mr. Jungerman
Lecture—3 hours.
The phenomena of diffraction, interference, and polarization of light, and their applications.
- 110A. Electricity and Magnetism.** (3) I. Mr. Patten
Lecture—3 hours.
Prerequisite: Mathematics 109.
Elementary and mathematical theory of electrostatics, magnetostatics, steady currents, and electron theory of solids.
- 110B. Electricity and Magnetism.** (3) II. Mr. Patten
Lecture—3 hours.
Prerequisite: course 110A.
Elementary and mathematical theory of magnetism, alternating currents, plasmas, and electromagnetic waves.
- 112. Thermodynamics and Statistical Physics.** (3) II. Mr. McCray
Lecture—3 hours.
The thermal properties of matter, with an introduction to the mathematical theory of heat conduction, the kinetic theory of matter, and thermodynamics, and statistical mechanics.
- 115. Introduction to Quantum Mechanics.** (3) I. Mr. Jungerman
Lecture—3 hours.
Prerequisite: course 105A. Recommended: course 121.
The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.
- 116. Electronics for Physicists.** (3) I. Mr. McCray
Lecture—2 hours; laboratory—3 hours.
Prerequisite: mathematics through introduction to partial differential equations and Laplace transforms, or consent of the instructor. (Course 107 is strongly recommended.)
Responses of the differentiators, integrators, and compensated attenuator to pulses and sinusoidal signals, resonant circuits, transfer function, transmission lines, feedback, pulse operational and distributed amplifiers, cathode and emitter followers, transistor switches and binaries, voltage discriminators, scalars, tunnel diodes, multichannel analyzers.
- 121. Introduction to Atomic Structure.** (3) I. Mr. Patten
Lecture—3 hours.
An introduction to atomic physics treating cathode and positive rays, the electron, thermionic emission, the photoelectric effect, the structure of the atom, and the interpretation of spectra and X rays.
- 122. Advanced Physics Laboratory.** (1-2) II. Mr. Knox
Laboratory.
Prerequisite: course 121.
Experimental techniques and measurements in physical optics and in atomic, nuclear, and solid-state physics.

- 129. Nuclear Physics.** (3) II. Mr. Draper
Lecture—3 hours.
Prerequisite: courses 115, 121.
Survey of basic nuclear properties and concepts requiring only rudimentary knowledge of quantum mechanics.
- 140. Introduction to Solid-State Physics.** (3) II. Mr. Leifson
Lecture—3 hours.
Prerequisite: course 115.
A survey of the properties of solids. Types of crystals, mechanical properties, lattice vibrations; thermal, electrical, and magnetic properties of metals and non-metals; band theory of solids, semi-conductors; ferromagnetism, superconductivity; lattice defects.
- 194H. Special Study for Honors Students.** (3) I and II. The Staff
Prerequisite: open only to seniors who qualify for the honors program.
Independent research and/or reading on selected topics.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff
All special work of upper division grade not included in courses announced above.

GRADUATE COURSES

- 205. Theoretical Mechanics.** (3) I. Mr. Draper
Lecture—3 hours.
Prerequisite: course 105B or the equivalent.
The generalized methods of Lagrange, Hamilton, and Jacobi. Advanced theories leading to the formulation of quantum mechanics.
- 210A. Theory of Electricity and Magnetism.** (3) I. Mr. Greider
Lecture—3 hours.
Prerequisite: course 110B, or the equivalent; a working knowledge of differential equations.
Classical description of the electromagnetic field, including boundary value problems, conservation laws, and plane electromagnetic waves.
- 210B. Theory of Electricity and Magnetism.** (3) II. Mr. Greider
Lecture—3 hours.
Prerequisite: course 210A or the equivalent.
Classical description of the electromagnetic field, including radiating systems, special theory of relativity, multipole fields, and electron theory.
- 215A. Quantum Mechanics.** (3) II. Mr. True
Lecture—3 hours.
Prerequisite: course 115.
Development and interpretation of the Schrödinger wave equation and Heisenberg matrix mechanics; approximation methods; applications to atomic, molecular, and solid-state problems.
- 215B. Quantum Mechanics.** (3) I. Mr. True
Lecture—3 hours.
Prerequisite: course 215A.
Radiation theory; scattering theory, including multiple scattering leading to elementary many-body approximations. Dirac wave equations leading to elementary field theory.

- 219. Statistical Mechanics.** (3) I. Mr. Hurley
 Lecture—3 hours.
 Prerequisite: courses 112, 115.
 Classical and quantum statistics. Theory of perfect and imperfect gases. Bose-Einstein and Fermi-Dirac statistics with applications to low temperature phenomena and the properties of materials. Statistical interpretation of thermodynamics.
- 229A. Nuclear Theory.** (3) I. Mr. Brady
 Lecture—3 hours.
 Prerequisite: course 215A.
 Review and survey of basic nuclear properties. Two-nucleon systems, nuclear forces, and models.
- 229B. Nuclear Theory.** (3) II. Mr. Brady
 Lecture—3 hours.
 Prerequisite: course 229A.
 Nuclear reactions; electromagnetic interactions of nuclei; beta decay; introduction to meson theory of nuclear forces.
- 229C. Advanced Nuclear Theory.** (3) I. _____
 Lecture—3 hours.
 Prerequisite: course 229B, or consent of the instructor.
 Advanced topics in theoretical nuclear physics of current interest such as beta decay, reaction theory, and nuclear models.
- 230. Quantum Theory of Fields.** (3) II. Mr. Erickson
 Lecture—3 hours.
 Prerequisite: course 215B.
 Techniques and applications of second quantization; Feynman diagrams; quantum electrodynamics; renormalization; formal scattering theory. Selected advanced topics, such as dispersion relations and axiomatic formulations.
- 239. Quantum Many-Body Systems.** (3) II. Mr. Garrod
 Lecture—3 hours.
 Prerequisite: courses 215B, 219.
 The quantum theory of many-particle systems. Theoretical analysis of superfluids, superconductors, and nuclear matter, band theory of solids, and other topics. Perturbation and variational techniques in many-particle problems.
- 242. Plasma Physics.** (3) II. _____
 Lecture—3 hours.
 Prerequisite: course 210B (may be taken concurrently). Recommended: course 219.
 Motion of charged particles in electromagnetic fields; kinetic theory; macroscopic equations; boundary layer problems; linear and nonlinear oscillations; diffusion; stability.
- 290. Seminar.** (1-3) I and II. Mr. Knox
 Advanced study in various fields of modern physics. Topics will vary from year to year.
- 291. Seminar in Nuclear Physics.** (1-2) I and II. Mr. Draper, Mr. Jungerman
 Seminar—1-2 hours.
- 292. Seminar in Theoretical Physics.** (1-2) I and II. The Staff
 Seminar—1-2 hours.
- 299. Research.** (1-9) I and II. The Staff

PHYSIOLOGICAL SCIENCES

Stuart A. Peoples, M.D., *Acting Chairman of the Department.*
Department Office, 2165 Haring Hall

Arthur L. Black, Ph.D., *Professor of Physiological Chemistry.*
Leo K. Bustad, D.V.M., Ph.D., *Professor of Radiobiology.*
Louis W. Holm, Ph.D., *Professor of Physiology.*
Stuart A. Peoples, M.D., *Professor of Comparative Pharmacology.*
Leon H. Schmidt, Ph.D., *Professor of Comparative Pharmacology.*
Victor W. Burns, Ph.D., *Associate Professor of Physiological Sciences.*
Richard A. Freedland, Ph.D., *Associate Professor of Physiological Chemistry.*
Douglas G. Stuart, Ph.D., *Associate Professor of Physiology.*
Harold R. Parker, D.V.M., Ph.D., *Assistant Professor of Physiology.*
Norman W. Scholes, Ph.D., *Assistant Professor of Pharmacology.*



Allen C. Andersen, V.M.D., Ph.D., *Lecturer in Radiopathology.*
Rocco J. Della Rosa, Ph.D., *Lecturer in Radiobiology.*
Marvin Goldman, Ph.D., *Lecturer in Radiobiology.*

UPPER DIVISION COURSES

101. **Physiological Chemistry.** (5) II. Mr. Black, Mr. Freedland
Lecture—5 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.

101L. **Physiological Chemistry Laboratory.** (2) II. Mr. Freedland
Laboratory—6 hours.

Prerequisite: course 101 (should be taken concurrently).

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.

123. **Comparative Pharmacology.** (4) I. Mr. Peoples, Mr. Scholes
Lecture—2 hours; laboratory—6 hours.

Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the instructor.

The action of drugs on the physiological mechanism of domestic animals.

124. **Comparative Pharmacology and Therapeutics.** (4) II. Mr. Peoples, Mr. Fowler, Mr. Scholes
Lecture—3 hours; laboratory—3 hours.

Prerequisite: course 123 or consent of the 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.

140. **Mammalian Physiology.** (6) II. Mr. Holm, Mr. Parker, Mr. Stuart
Lecture—6 hours.

Prerequisite: Physiology I and 1L or Biology I and Zoology 2; Physics 2A, 2B; Chemistry 1A, 1B, 8.

A comprehensive survey of mammalian physiology.

140L. Laboratory in Mammalian Physiology. (3) II.

Laboratory—9 hours. Mr. Holm, Mr. Parker, Mr. Stuart
Prerequisite: course 140 or equivalent (may be taken concurrently).

Laboratory exercises designed to illustrate physiological interactions among systems in a variety of mammalian forms.

199. Special Study for Advanced Undergraduates. (1-5) I and II.

The Staff (Mr. Peoples in charge)

GRADUATE COURSES**205. Intermediary Metabolism of Animals. (3) II. Mr. Black, Mr. Freedland**

Lecture—3 hours.

Prerequisite: biochemistry and physiology or consent of the instructor.

A survey of chemical pathways of metabolism with emphasis on studies in intact animals. Biosynthesis of major tissue constituents such as carbohydrates, amino acids and proteins, lipids, nucleic acids, and porphyrins. Hormonal control of metabolic reactions.

Offered in odd-numbered years.

225. Fundamentals of Radiation Biology. (3) II.

Lecture—3 hours.

Mr. Andersen, Mr. Della Rosa, Mr. Goldman

Prerequisite: one year of physics, introductory biochemistry, introductory physiology. Recommended: first course in analytical geometry and calculus.

A survey of effects of ionizing radiations on biological systems with emphasis upon mammals. Special problems of radiological physics, radiation chemistry, physiology, pathology, and radioactivity in the biosphere are studied.

Offered in odd-numbered years.

243. Use of Isotopes as Tracers in Biological Research. (2) I.

(2) I.

The Staff (Mr. Burns in charge)

Laboratory—6 hours.

Discussion of the properties of isotopes and their use as tracers in biological systems.

243L. Laboratory in Use of Isotopes as Tracers in Biological Research.

(2) I.

The Staff (Mr. Burns in charge)

Laboratory—6 hours.

Laboratory practice in measuring and handling radioisotopes and their application in biological research.

265. Experimental Physiology. (3) I.

Mr. Holm

Lecture—1 hour; laboratory—6 hours.

Prerequisite: course 140-140L or Animal Husbandry 110; Animal Husbandry 102; and consent of the instructor.

Selected lectures and experiments on the physiology of the nervous system, neutrality regulation, cardiac function and rumen function. Preparation and study of certain endocrine deficiencies and excesses.

290. Seminar. (1) I and II.

Seminar—1 hour.

The Staff

299. Research. (1-9) I and II.

The Staff

PHYSIOLOGY

For additional courses in physiology see "Animal Physiology," page 125, and "Zoology," page 383.

PLANT NUTRITION

For courses in plant nutrition see "Soils and Plant Nutrition," page 363.

PLANT PATHOLOGY

Lysle D. Leach, Ph.D., *Chairman of the Department.*
Department Office, 350 Hutchison Hall

James E. DeVay, Ph.D., *Professor of Plant Pathology.*
W. Harley English, Ph.D., *Professor of Plant Pathology.*
Raymond G. Grogan, Ph.D., *Professor of Plant Pathology.*
William B. Hewitt, Ph.D., *Professor of Plant Pathology.*
Byron R. Houston, Ph.D., *Professor of Plant Pathology.*
Lysle D. Leach, Ph.D., *Professor of Plant Pathology.*
George Nyland, Ph.D., *Professor of Plant Pathology.*
Edward E. Wilson, Ph.D., *Professor of Plant Pathology.*
Edward E. Butler, Ph.D., *Associate Professor of Plant Pathology.*
Robert N. Campbell, Ph.D., *Associate Professor of Plant Pathology.*
Joseph M. Ogawa, Ph.D., *Associate Professor of Plant Pathology.*
Thomas A. Shalla, Ph.D., *Associate Professor of Plant Pathology.*
Donald E. Mathre, Ph.D., *Assistant Professor of Plant Pathology.*



Tsune Kosuge, Ph.D., *Lecturer in Plant Pathology.*

Departmental Major Adviser.—Mr. English.

Bachelor of Science Major Program and Graduate Study. See page 60.

UPPER DIVISION COURSES

120. Plant Diseases. (4) I and II.

I. Mr. English; II. Mr. Campbell, Mr. Mathre

Lecture—2 hours; laboratory—6 hours.

Prerequisite: Botany 1. Recommended: Bacteriology 1.

A general course on the nature, cause, and control of plant diseases.

122. Plant Pathology Methods. (3) I.

Mr. Kosuge

Lecture—1 hour; laboratory—6 hours.

Prerequisite: course 120.

Elementary methods and techniques used in the study of plant diseases.

125. Diseases of Field and Vegetable Crop Plants. (3) I.

Mr. Houston

Lecture—1 hour; laboratory—6 hours.

Prerequisite: course 120.

The pathology of important field and vegetable crop plants. Diagnosis, host reaction, factors influencing inception and severity of the disease, dissemination and control.

Frequent field trips are required.

126. Diseases of Fruit, Nut, and Vine Crop Plants. (3) II.

Mr. Wilson

Lecture—1 hour; laboratory—6 hours.

Prerequisite: course 120.

The pathology of important fruit, nut, and vine crop plants. Diagnosis, host reaction, factors influencing inception and severity of the disease, dissemination and control.

Frequent field trips are required.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff

GRADUATE COURSES

- 202. Research Techniques and Instrumentation in Plant Pathology. (4) I.**
Lecture—2 hours; laboratory—6 hours. Mr. Nyland.
Prerequisite: course 120.
Principles and practices of advanced techniques used in plant pathology research.
- 205. Advanced Study of Field and Vegetable Crop Diseases. (4) I.**
Lecture—2 hours; laboratory—6 hours. Mr. Grogan
Prerequisite: course 120; Botany 119.
A clinical study of the factors affecting disease development and severity, with emphasis on ecology and the techniques involved in diagnosis. Frequent field trips are required.
- 206. Advanced Study of Fruit and Nut Diseases. (4) II.**
Lecture—2 hours; laboratory—6 hours. Mr. Ogawa
Prerequisite: course 120; Botany 119.
A clinical study of the factors affecting initiation, development and control of selected fungus, bacterial, and virus diseases of perennial fruit and nut plants. Methods of control and modes of fungicidal and bactericidal action of control chemicals.
- 210. Physiology of Plant Pathogens. (2) II.** Mr. DeVay
Lecture—2 hours.
Prerequisite: course 202; Biochemistry 101; Chemistry 5. Recommended: Botany 120A, 120B.
Current concepts of the physiology of plant pathogens and host-pathogen relationships.
- 210L. Physiology of Plant Pathogens. (2) II.** Mr. DeVay
Laboratory—6 hours.
Prerequisite: course 210 (may be taken concurrently). Recommended: Botany 121A, 121B or Biochemistry 101L.
Laboratory experimentation on plant pathogens and host-pathogen relationships.
- 224. Pathogenic Fungi. (4) II.** Mr. Butler
Lecture—2 hours; laboratory—6 hours.
Prerequisite: Botany 119.
Morphology and taxonomy of fungi, with special emphasis on plant pathogens.
- 226. Plant Virology. (4) I.** Mr. Shalla
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 120.
Viruses as causal agents of plant diseases; the nature, morphology, chemical, physical and serological properties of plant viruses; methods of transmission, including insect vector relationships; application of techniques and equipment used in research.
- 235. Advanced Plant Pathology. (4) II.** Mr. Hewitt, Mr. Leach
Lecture—3 hours; discussion—1 hour.
Prerequisite: consent of the instructor.
A study of the factors influencing pathogenicity and of the reaction of host plants to disease.
- 290. Seminar. (1) I and II.** Mr. Kosuge
Seminar—1 hour.
- 299. Research. (1-9) I and II.** The Staff

POLITICAL SCIENCE

Clyde E. Jacobs, Ph.D., *Chairman of the Department.*

Department Office, 227 Voorhies Hall

Charles M. Hardin, Ph.D., *Professor of Political Science.*

Clyde E. Jacobs, Ph.D., *Professor of Political Science.*

Lloyd D. Musolf, Ph.D., *Professor of Political Science.*

Vernon J. Puryear, Ph.D., *Professor of Political Science.*

Paul E. Zinner, Ph.D., *Professor of Political Science.*

John R. Owens, Ph.D., *Associate Professor of Political Science.*

Donald S. Rothchild, Ph.D., *Associate Professor of Political Science.*

Gerald Friedberg, Ph.D., *Assistant Professor of Political Science.*

John F. Gallagher, Ph.D., *Assistant Professor of Political Science.*

† Alexander J. Groth, Ph.D., *Assistant Professor of Political Science.*

Alvin D. Sokolow, Ph.D., *Assistant Professor of Political Science.*

Marvin Zetterbaum, Ph.D., *Assistant Professor of Political Science.*

F. William Biglow, M.A., *Lecturer in Political Science.*



Phyllis Louellyn Cohan, M.A., *Associate in Political Science.*

Edmond Costantini, M.A., *Acting Assistant Professor of Political Science.*

Joyce K. Kallgren, M.A., *Acting Assistant Professor of Political Science.*

Dennis A. Livingston, A.B., *Acting Assistant Professor of Political Science.*

Nancy W. Percy, M.A., *Associate in Political Science.*

Mathew F. Stolz, M.A., *Lecturer in Political Science.*

Louis F. Weschler, M.A., *Acting Assistant Professor of Political Science.*

Letters and Science List.—All undergraduate courses in Political Science are included in the Letters and Science List of Courses. (See page 85.)

Department Major Advisers.—Miss Cohan, Mr. Costantini, Mr. Friedberg, Mr. Gallagher, Mr. Hardin, Mr. Jacobs, Mrs. Kallgren, Mr. Livingston, Mr. Musolf, Mr. Owens, Mr. Puryear, Mr. Rothchild, Mr. Sokolow, Mr. Weschler, Mr. Zetterbaum, Mr. Zinner.

Graduate Advisers.—Mr. Owens, Mr. Puryear.

The American History and Institutions Requirement may be satisfied by any two of the following courses: 1A, 1B, 100, 102, 105, 106, 113, 128A, 163, 164, 166. See also page 38.

The Major Program

(A) Lower Division Courses.—Required: courses 1A, 1B, 2, 3, and either History 4A, 4B or History 17A, 17B; and a minimum average grade of C in these courses. Economics 1A and Philosophy 6 or 20A are recommended as preparation for the major.

(B) Upper Division Courses.—Required: 24 units as follows:

- (1) 18 units in Political Science. This must include at least one course from each of four of the six groups offered: American Government, Political Theory, International Relations, Comparative Government, Public Law and Political Parties.
- (2) 6 additional units in political science or related subjects chosen in consultation with the adviser.

Political Science students must maintain at least a grade C average in the major.

The Master of Arts and Doctor of Philosophy Degrees in Political Science.—The Department offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees in Political Science. Information concerning admission to candidacy for these degrees and requirements for completion may be obtained at the department office.

† Absent on leave, 1965–1966.

LOWER DIVISION COURSES

- 1A. American Government.** (3) I and II. The Staff
Lecture—2 hours; recitation—1 hour.
National, state, and local government in the United States.
- 1B. American Government.** (3) I and II. The Staff
Lecture—2 hours; recitation—1 hour.
National, state, and local government in the United States.
- 2. Introduction to Government (Comparative Government).** (3) I and II.
Lecture—2 hours; recitation—1 hour. Mr. Puryear, Mr. Biglow
Constitutional principles, governmental institutions, and political problems of selected European governments.
- 3. International Relations.** (3) I and II. Mr. Livingston, Mr. Puryear
Lecture—2 hours; recitation—1 hour.
Rise and development of the Western State systems; problems of nationalism and imperialism, particularly in connection with the peace settlement following World War II.

UPPER DIVISION COURSES

- 100. American National Government.** (3) I. Mr. Costantini
Lecture—3 hours.
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; government and science.
- 101. Contemporary Political Science.** (3) II. Mr. Friedberg
Lecture-recitation—3 hours.
History, nature, and methodology of the discipline; and the problems, schools of thought, and trends within the field at present.
- 102. State Government and American Federalism.** (3) I. Mr. Sokolow
Lecture—2 hours; discussion—1 hour.
Prerequisite: not open to students who have credit for course 104.
State constitutions, institutions, political patterns, and public programs; the challenge of contemporary problems; state-national conflict and cooperation in the American federal system.
- 103. Local Government.** (3) II. Mr. Sokolow
Lecture—2 hours; discussion—1 hour.
Patterns, programs, problems, and legal powers of government in counties, municipalities, and special districts; professional management and non-partisan politics; community power structures; local autonomy.
- *104. California State and Local Government.** (3) II. Mr. Gallagher
Lecture—2 hours; discussion—1 hour.
Prerequisite: not open to students who have credit for course 102.
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.** (3) II. Mr. Owens
Lecture—3 hours.
An analysis of the legislative process in the United States with emphasis on Congressional and state legislative functions, organization, and practices.

- *106. The Presidency.** (3) I. Mr. Hardin
Lecture—3 hours.
The office, powers, and role of the President of the United States.
- 108. Metropolitan and Regional Problems.** (3) I. Mr. Weschler
Lecture and discussion—3 hours.
The organization, functions, and politics of government in the metropolitan and regional setting; special emphasis on the emerging forces and problems related to urbanization and regional growth.
- 112. Contemporary Democratic Theory.** (3) I. Mr. Zetterbaum
Lecture—2 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.
- *113. American Political Thought.** (3) II. Mr. Friedberg
Lecture-discussion—3 hours.
An investigation of several prominent interpretations of the American intellectual experience tested against the history of American political thought. Interpretations to be investigated will include those of Hartz, Bell, Mills, Boorstin, Lipset, and others.
- 115. Basic Problems of Political Theory.** (3) II. Mr. Zetterbaum
Lecture—2 hours; discussion—1 hour.
An inquiry into the possibility of an objective theoretical understanding of the political sphere not modeled on modern natural science, together with a critique from the perspectives of scientism, historicism, and analytic philosophy.
- 117A. Marxism.** (3) I. Mr. Friedberg
Lecture—2 hours; discussion—1 hour.
The forerunners of Marx; the writings of Marx.
- 117B. Marxism.** (3) II. Mr. Friedberg
Lecture—2 hours; discussion—1 hour.
Engels and later socialists: Kautsky, Bernstein, and Lenin. Marxian socialism in Europe and America after 1900. Contemporary socialism.
- 118A. History of Political Theory.** (3) I. Mr. Zetterbaum
Lecture—2 hours; recitation—1 hour.
Critical analyses of the works of major political philosophers. Classical and medieval political philosophy—Plato, Aristotle, Cicero, St. Thomas.
- 118B. History of Political Theory.** (3) II. Mr. Zetterbaum
Lecture—2 hours; recitation—1 hour.
Critical analyses of the works of major political philosophers. Modern political philosophy—Machiavelli, Hobbes, Locke, Rousseau, Burke, Nietzsche.
- 119. Recent Political Theory: Democracy, Fascism, and Communism.** (3) I. Mr. Friedberg
Lecture—2 hours; recitation—1 hour.
Examination of representative works of the principal competing modern ideologies, including those of Mill, Dewey, Nietzsche, Marx, Engels and Lenin.
- 120. Science and International Relations.** (3) II. Mr. Livingston
Lecture—3 hours.
The impact of science and technology upon the international legal and political order.

- 122A. International Law. (3) II.** Mr. Livingston
Lecture—3 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.
- *122B. International Law. (3) II.** Mr. Livingston
Lecture—3 hours.
Neutrality, belligerency, and war in the international community. Pacific settlement of disputes.
- 124. International Organization. (3) I.** Mr. Livingston
Lecture—2 hours; recitation—1 hour.
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.
- 128A. Recent American Foreign Policy. (3) I.** Mr. Puryear
Lecture—3 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.
- 128B. The Conduct of American Foreign Relations. (3) II.** Mr. Puryear
Lecture—2 hours; recitation—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.
- 131. Soviet Foreign Policy. (3) I.** Mr. Zinner
Lecture—2 hours; recitation—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.
- 132. The Foreign Policy of the United States in the Far East. (3) I.**
Lecture—3 hours. Mrs. Kallgren
Prerequisite: recommended course 3.
The role of the United States in international politics of the Far East.
- 133. International Relations in the Far East. (3) II.** Mrs. Kallgren
Lecture—3 hours.
Prerequisite: recommended course 3.
Contemporary developments in the Far East, and selected issues of world significance.
- 134. International Relations in Africa. (3) I.** Mr. Rothchild
Lecture—3 hours.
Inter-African state relations, pan-Africanism, regional integration, policies toward South Africa, and relations between African and major non-African powers.
- *139. International Relations in Western Europe. (3) II.** _____
Lecture—3 hours.
Study of the emerging unity in Western Europe and its implications for the North Atlantic area.

- *140. Democracy and Dictatorship. (3) I.** Mr. Zinner
Lecture—2 hours; discussion—1 hour.
Prerequisite: course 2 or the equivalent.
Analytical study of differences and similarities in the political process under democratic and dictatorial government.
- 141A. Soviet and East European Governments. (3) I.** Mr. Zinner
Lecture—2 hours; recitation—1 hour.
The governmental systems of the Soviet Union and the East European satellites; background seizure of power, techniques of totalitarian control.
- 141B. Soviet and East European Governments. (3) II.** Mr. Zinner
Lecture—2 hours; recitation—1 hour.
The governmental systems of the Soviet Union and the East European satellites; background seizure of power, techniques of totalitarian control.
- 144. Government in Great Britain and the British Commonwealth. (3) I.**
Lecture—2 hours; recitation—1 hour. Mr. Biglow
The democratic process in Britain; party politics; the cabinet system; the colonies; the evolution of the British Commonwealth.
- *145. Government and Politics in Emergent Nations. (3) II.** Mr. Zinner
Lecture—2 hours; discussion—1 hour.
Prerequisite: course 2 or the equivalent.
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.
- 146A-146B. African Governments and Politics. (3-3) Yr.** Mr. Rothchild
Lecture—3 hours.
Prerequisite: course 146A is not prerequisite to 146B.
An analysis of political systems in Africa south of the Sahara.
- 147A. Western European Government: France and Italy. (3) I.**
Lecture—3 hours. Mr. Biglow
The evolution and contemporary nature of French and Italian political institutions.
- 147B. Western European Government: Germany. (3) II.** Mr. Biglow
Lecture—3 hours.
Comparative study of the politics and institutions of constitutional and totalitarian government in Germany since 1930. Current problems of a divided Germany.
- 148A. Government and Politics in East Asia. (3) I.** Mrs. Kallgren
Lecture—3 hours.
Government and politics in China.
- 148B. Government and Politics in East Asia. (3) II.** Mrs. Kallgren
Lecture—3 hours.
Government and politics in Japan and Korea.
- 149. International Communism. (3) II.** Mr. Zinner
Lecture—2 hours; recitation—1 hour.
The international communist movement; Leninist organizational precepts; relations among Communist parties (the Comintern and Cominform); centralized direction vs. local autonomy; problems of leadership and social composition; the Communist parties as adjuncts of Soviet foreign policy.

- 150. Jurisprudence. (3) II.** Mr. Stolz
 Lecture—3 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.
- 151. Civil Rights and the Constitution. (3) II.** _____
 Lecture—3 hours.
 Prerequisite: course 1A.
 The constitutional rights and political possibilities of minority groups. Citizenship in the American federal system.
- 156. Administrative Law. (3) I.** Mr. Musolf
 Lecture—2 hours; recitation—1 hour.
 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.
- 157A. American Constitutional Law. (3) I.** Mr. Jacobs
 Lecture—1 hour; recitation—2 hours.
 Prerequisite: course 1A or History 17A and 17B.
 Analysis of judicial cases and related materials illustrating the historical and current interpretations of the Constitution.
- 157B. American Constitutional Law. (3) II.** Mr. Jacobs
 Lecture—1 hour; recitation—2 hours.
 Prerequisite: course 157A.
 Analysis of judicial cases and related materials illustrating the historical and current interpretations of the Constitution.
- 161. Political Behavior. (3) II.** Mr. Owens
 Lecture—2 hours; recitation—1 hour.
 Prerequisite: course 1A.
 The individual and group determinants of political belief and action. Political institutions considered in relation to individual values and behavior.
- 163. Political Parties. (3) I.** Mr. Owens
 Lecture—2 hours; recitation—1 hour.
 Nature and function of political parties; their origin, development, structure, economic and social composition, internal management and control; relation of parties and pressure groups to legislation and administration; analysis of pressure politics as distinguished from party politics.
- 164. Group Politics. (3) I.** Mr. Hardin
 Lecture—3 hours.
 An analysis of class, sectional, ethnic, religious, economic and other interests in relation to constitutional government. The problems of balancing liberty and order and of reconciling claims of diversity with those of uniformity.
- 165. Public Opinion. (3) II.** Mr. Constantini
 Lecture—3 hours.
 Prerequisite: course 1A.
 The nature and function of public opinion; the formation of opinion with emphasis on the role of propaganda; the distribution of political attitudes among the public; the impact of public opinion.

166. Public Policy and the Governmental Process. (3) II. Mr. Gallagher
Lecture—2 hours; recitation—1 hour.

An examination of the processes of formulating public policy. Methods of policy making by executive, legislative, judicial, and party agencies illustrated with case studies from agriculture, labor, civil rights, and other areas.

*168. Politics of Water Development. (3) II. Mr. Hardin
Lecture—3 hours.

Water policy and administration in the United States with special emphasis on California; international problems relating to the control, development, distribution, and use of water resources.

170. Federal Government and Regionalism. (3) II. Mr. Rothchild
Lecture—3 hours.

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 emergent nations will be considered.

181. Elements of Public Administration. (3) I. Mr. Gallagher
Lecture—2 hours; recitation—1 hour.

The role of public administration in modern government; the nature of administrative agencies; human behavior in the administrative process; executive leadership and decision making; bureaucracy and bureaucratic accountability in a democratic society.

183. Administrative Behavior. (3) II. Mr. Musolf
Lecture—3 hours.

The implications for American public administration of evolving concepts about behavior in organizations, especially those concepts based upon human-relations research.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff

GRADUATE COURSES

213. Problems in American Politics. (3) II. Mr. Friedberg
Seminar—2 hours.

Selected problems with emphasis on ideology, value, and consensus.

218. Political Theory. (3) I. Mr. Zetterbaum
Seminar—2 hours.

Prerequisite: consent of the instructor.

223. International Relations. (3) I. Mr. Puryear
Seminar—2 hours.

Prerequisite: consent of the instructor.
Selected problems of international politics.

*224. International Organization. (3) II. _____
Seminar—2 hours.

Prerequisite: consent of the instructor.

230. American Foreign Policy. (3) II. Mr. Puryear
Seminar—2 hours.

241A. Soviet and East European Governments. (3) I. Mr. Zinner
Seminar—2 hours.

Prerequisite: consent of the instructor.

* Not to be given, 1965-1966.

- 241B. Soviet and East European Governments.** (3) II. Mr. Zinner
Seminar—2 hours.
Prerequisite: consent of the instructor.
- 246. Government in Africa.** (3) II. Mr. Rothchild
Seminar—2 hours.
- *247A. Western European Governments.** (3) I. Mr. Groth
Seminar—2 hours.
Prerequisite: consent of the instructor.
Contemporary problems, with emphasis on France and Italy.
- *247B. Western European Governments.** (3) II. Mr. Groth
Seminar—2 hours.
Prerequisite: consent of the instructor.
Contemporary problems, with emphasis on Germany.
- 248. The Far East.** (3) II. Mrs. Kallgren
Seminar—2 hours.
Selected contemporary problems of government and international relations in the Far East.
- *257. Comparative Public Law.** (3) I. _____
Seminar—2 hours.
Prerequisite: consent of the instructor.
- 261. Political Behavior.** (3) II. Mr. Owens
Seminar—2 hours.
Prerequisite: consent of the instructor.
- 280. Public Administration.** (3) II. Mr. Musolf
Seminar—2 hours.
Prerequisite: consent of the instructor.
An examination of American administrative values.
- 291. American Public Law** (3) I. Mr. Jacobs
Seminar—2 hours.
Prerequisite: consent of the instructor.
Selected current topics.
- 295. Political Parties.** (3) I. Mr. Hardin
Seminar—2 hours.
Selected topics.
- 296. State and Local Government.** (3) I. Mr. Weschler
Seminar—2 hours.
Selected institutions, processes, and problems.
- 299. Research.** (1-6) I and II. The Staff
- 299D. Directed Reading.** (1-6) I and II. The Staff
Primarily for Master of Arts candidates who elect Plan II (non-thesis plan).

PROFESSIONAL COURSE

- 400A. Field Work in Political Science.** (1-4) I. The Staff
Prerequisite: consent of the instructor.
Directed study and internship in a governmental agency, office, or political party.
- 400B. Field Work in Political Science.** (1-4) II. The Staff
Prerequisite: consent of the Instructor.
Directed study and internship in a governmental agency, office, or political party.

POMOLOGY

Dillon S. Brown, Ph.D., *Chairman of the Department.*

Department Office, 1039 Wickson Hall

Royce S. Bringhurst, Ph.D., *Professor of Pomology.*
Reid M. Brooks, Ph.D., *Professor of Pomology.*
Dillon S. Brown, Ph.D., *Professor of Pomology.*
Lawrence L. Claypool, Ph.D., *Professor of Pomology.*
Julian C. Crane, Ph.D., *Professor of Pomology.*
William H. Griggs, Ph.D., *Professor of Pomology.*
Carl J. Hansen, M.S., *Professor of Pomology.*
Hudson T. Hartmann, Ph.D., *Professor of Pomology.*
Claron O. Hesse, Ph.D., *Professor of Pomology.*
Frank W. Allen, M.S., *Professor of Pomology, Emeritus.*
Luther D. Davis, Ph.D., *Professor of Pomology, Emeritus.*
E. Louis Proebsting, Ph.D., *Professor of Pomology, Emeritus.*
Warren P. Tufts, Ph.D., *Professor of Pomology, Emeritus.*
Dale E. Kester, Ph.D., *Associate Professor of Pomology.*
Edward C. Maxie, Ph.D., *Associate Professor of Pomology.*



Muriel V. Bradley, Ph.D., *Lecturer in Pomology.*
Peter B. Catlin, Ph.D., *Lecturer in Pomology.*
Paul E. Hansche, Ph.D., *Lecturer in Pomology.*
Omund Lilleland, Ph.D., *Lecturer in Pomology.*
Harold P. Olmo, Ph.D., *Professor of Viticulture.*
Roger J. Romani, Ph.D., *Lecturer in Pomology.*
Kay Ryugo, Ph.D., *Lecturer in Pomology.*
Eugene F. Serr, Jr., B.S., *Lecturer in Pomology, Emeritus.*
Noel F. Sommer, Ph.D., *Lecturer in Pomology.*
Kiyoto Uriu, Ph.D., *Lecturer in Pomology.*

Departmental Major Advisers.—Mr. Bringhurst, Mr. Crane.

Bachelor of Science Major Program and Graduate Study. See page 60.

LOWER DIVISION COURSES

- I. Introduction to Pomology. (2) I.** Mr. Hansen
Lecture—2 hours.
A survey of the fruit industry and an introduction to the principles underlying the behavior of fruit plants.
- II. Introduction to Pomology Laboratory. (1) I.** Mr. Kester
Laboratory—3 hours.
Prerequisite: course 1 (may be taken concurrently).
Application of the principles underlying the behavior of fruit plants.
- 3. Citrus and Other Subtropical Fruits. (2) II.** Mr. Hesse
Lecture—2 hours.
The production of the evergreen 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.

- 9. Principles of Plant Propagation.** (2) II. Mr. Hartmann
Lecture—1 hour; laboratory—3 hours.
Prerequisite: Botany 1.
Principles of propagating horticultural plants with special emphasis on anatomical and physiological relationships.

UPPER DIVISION COURSES

- 100. Fruit and Nut Plants.** (3) I. Mr. Bringhurst
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Botany 1.
Origin, history, distribution, and adaptation of fruit and nut plants; their structure and function in relation to environment and cultural practices.
- 101. Development of Buds, Flowers, and Fruits.** (3) II. Mr. Griggs
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Botany 1.
The nature and development of buds, flowers, and fruits in relation to the culture of fruit and nut plants and their environment.
- 110. Fruit Morphology.** (3) I. Mr. Brooks
Lecture—1 hour; laboratory—6 hours.
Prerequisite: Botany 1.
The development of flower, fruit, and seed structures of representative fruit types.
- 112. Handling, Storage, and Transit of Fruits.** (3) I. Mr. Claypool
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 101; Botany 111.
Fundamentals of fruit-handling operations, cooling, storage, and transportation; emphasis on physiological principles underlying fruit maturity and post-harvest practices.
- 114. Fruit Breeding.** (3) II. Mr. Olmo
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 101; Genetics 100.
The genetics and cytology of fruit species in relation to varietal improvement, including a study of sterility, incompatibility, interspecific hybridization, and clonal selection in fruit varieties.
- 116. Physiology of Fruit Plants.** (3) II. The Staff (Mr. Uriu in charge)
Lecture—3 hours.
Prerequisite: courses 100 and 101; Botany 111.
Physiological processes in the growth and development of fruit plants; metabolic relationships; influence of environment and culture.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

GRADUATE COURSES

- 201. Biochemistry and Physiology of Fruits.** (2) II. Mr. Maxie
Lecture—2 hours.
Prerequisite: Botany 111 and Biochemistry 101, or consent of the instructor.
Biochemical and physiological phenomena of growth, maturation, ripening, and senescence of fruit. (Open to qualified upper division students.)

GRADUATE COURSES

290. **Seminar.** (1) I and II. The Staff
Seminar—1 hour.
291. **Seminar in Postharvest Physiology.** (1) I and II. Mr. Maxie
Seminar—1 hour.
Prerequisite: consent of the instructor.
An intensive study of selected topics in the field of postharvest physiology of fruits and vegetables. This seminar will be conducted jointly with Vegetable Crops 291.
299. **Research.** (1-6) I and II. The Staff

POULTRY HUSBANDRY

Wilbor O. Wilson, Ph.D., *Chairman of the Department.*
Department Office, 109 Poultry Husbandry Building

- Charles R. Grau, Ph.D., *Professor of Poultry Husbandry.*
Frank H. Kratzer, Ph.D., *Professor of Poultry Husbandry.*
Samuel Lepkovsky, Ph.D., *Professor of Poultry Husbandry (Berkeley campus).*
Lewis W. Taylor, Ph.D., *Professor of Poultry Husbandry (Berkeley campus).*
Wilbor O. Wilson, Ph.D., *Professor of Poultry Husbandry.*
Vigfus S. Asmundson, Ph.D., *Professor of Poultry Husbandry, Emeritus.*
Ursula H. Abbott, Ph.D., *Associate Professor of Poultry Husbandry.*
Hans Abplanalp, Ph.D., *Associate Professor of Poultry Husbandry.*
Ray E. Burger, Ph.D., *Associate Professor of Poultry Husbandry and Associate Professor of Physiology.*
Daniel W. Peterson, Ph.D., *Associate Professor of Poultry Husbandry.*
Edward E. Kreickhaus, Ph.D., *Assistant Professor of Poultry Husbandry and Assistant Professor of Psychology.*
Frank X. Ogasawara, Ph.D., *Assistant Professor of Poultry Husbandry and Assistant Professor of Physiology.*
Barry W. Wilson, Ph.D., *Assistant Professor of Poultry Husbandry and Assistant Professor of Physiology.*

- A. Wade Brant, Ph.D., *Lecturer in Food Science and Technology.*
Leo C. Norris, Ph.D., *Lecturer in Poultry Husbandry.*
Departmental Major Adviser.—Mr. Ogasawara.
Bachelor of Science Major Program and Graduate Study. See page 53.

LOWER DIVISION COURSES

- 10. Poultry Production. (3) I.** Mr. Ogasawara
Lecture—3 hours.
A survey of principles and practices involved in poultry production. Designed for students not specializing in avian sciences.
- 11. Laboratory in Poultry Production. (1) I.** Mr. Ogasawara
Laboratory—3 hours.
Prerequisite: course 10 (may be taken concurrently).
Laboratory studies in poultry biology and techniques of poultry production.
- 12. Survey of Poultry and Allied Industries. (2) II.**
The Staff (Mr. Peterson, Mrs. Abbott in charge)
Lecture—1 hour; discussion—1 hour.
A survey of industries based on or related to poultry and poultry products, the hatchery industry, the feed industry, egg and meat production; technology of eggs and meat; related specialized enterprises.

UPPER DIVISION COURSES

- 103. Experimental Basis of Animal Improvement. (2) I.** Mr. Abplanalp
Lecture—2 hours.
Prerequisite: Genetics 100.
Review of experiments in selection and animal breeding, with reference to their applications in poultry.

- 103L. Laboratory in Poultry Breeding. (1) I.** Mr. Abplanalp
Laboratory—3 hours.
Prerequisite: Genetics 100; course 103 (may be taken concurrently).
Problems in quantitative genetics with applications to practical poultry breeding procedures. Exercises in the analysis, interpretation, and use of breeding records.
- 104. Introduction to Avian Anatomy and Physiology. (2) I.** Mr. B. W. Wilson
Lecture—2 hours.
Prerequisite: Physiology 1 and 1L; Zoology 1B.
Adaptations of birds to terrestrial, aerial, and aquatic life; the functional anatomy of the skeletal, nervous, integumentary, circulatory, and muscular systems.
- 105. Avian Nutrition. (3) II.** Mr. Grau
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Biochemistry 101 or equivalent.
A study of the fundamentals of nutrition specifically related to avian organisms. Introduction to methods used in nutritional evaluations.
- 106. Poultry Feeds and Feeding. (2) II.** Mr. Kratzer
Lecture—1 hour; laboratory—3 hours.
Prerequisite: course 105 (may be taken concurrently).
A study of the manufacture, composition, and use of poultry feedstuffs.
- 107. Avian Physiology. (2) II.** Mr. Burger
Lecture—2 hours.
Prerequisite: Physiology 1 and 1L or Animal Husbandry 110 or equivalent; Zoology 1B.
Physiology of the various systems of birds with emphasis on reproduction, digestion, metabolism, and endocrinology.
- 108. Avian Physiology Laboratory. (2) I.** Mr. Burger
Lecture—1 hour; laboratory—3 hours.
Prerequisite: course 107 (may be taken concurrently); consent of the instructor.
Selected problems in the physiology of birds.
- 109. Genes and Gene Action in Poultry. (2) I.** Mrs. Abbott
Lecture—2 hours.
Prerequisite: Genetics 100.
Gene, genotype, and developmental environment in relation to avian mutations; emphasis on developmental genetics of avian and other species.
- *112. Poultry Meat Production. (3) II.** _____
Lecture—3 hours.
Prerequisite: senior standing in animal science or consent of the instructor.
The relation of heredity, nutrition, physiology and environment to the breeding, feeding and management of poultry for meat production with particular reference to turkeys and chickens.
- 121. Poultry Products Technology. (2) I.** Mr. Peterson, Mr. Stewart, Mr. Brant
Lecture—2 hours.
Prerequisite: consent of the instructor.
Physical, chemical, and nutritional composition of poultry products; quality criteria and standards; physical, chemical, and microbiological factors influencing keeping quality.

- 149. Environmental Physiology of Domestic Animals.** (2) I. Mr. W. O. Wilson
Lecture—2 hours.
Prerequisite: Zoology 1B.
The relation of environmental factors on physiological processes related to animal production.
Offered in odd-numbered years.
- 198. Directed Group Study.** (1-2) I and II. The Staff
Prerequisite: consent of the instructor.
Selected topics in the avian sciences.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff (Mr. W. O. Wilson in charge)
Prerequisite: courses basic to problem elected; consent of the instructor.
Problems may be elected relating to the nutrition, breeding, incubation, physiology, and egg quality of chickens or turkeys.

GRADUATE COURSES

- *202. Experimental Incubation and Avian Teratology.** (4) I. Mrs. Abbott, Mr. Taylor
Lecture—2 hours; laboratory—6 hours.
Prerequisite: Zoology 100 and 100L; Chemistry 8. Recommended: Zoology 107.
Problems of embryonic development, causes of embryonic mortality and terata in poultry, and principles of artificial incubation.
- 203. Quantitative Genetics and Animal Breeding.** (3) I. Mr. Abplanalp
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Mathematics 105A, 105B or the equivalent. Recommended: Mathematics 16A.
The genetic theory of selection, population structure and induced variation, and its implications in the design of animal breeding experiments.
- 290. Seminar.** (1) I and II. The Staff (Mr. W. O. Wilson in charge)
Seminar—1 hour.
Reports and discussion of recent advances and selected topics of current interest in avian genetics, physiology, and nutrition, and poultry-products technology.
- 298. Group Study.** (1-2) I and II. The Staff
Group study of advanced topics in the avian sciences.
- 299. Research.** (1-9) I and II. The Staff

RELATED COURSES

- Fundamentals of Farm Management** (Agricultural Economics 140)
Principles of Poultry Diseases (Avian Medicine 112)
Animal Hygiene (Veterinary Microbiology 111)
Advanced General Nutrition (Nutrition 201A, 201B)
Concepts of Animal Nutrition (Nutrition 250)

* Not to be given, 1965-1966.

PSYCHOLOGY

‡Stanley Coopersmith, Ph.D., *Chairman of the Department.*
William F. Dukes, Ph.D., *Acting Chairman of the Department.*
Department Office, 356 Voorhies Hall.

William F. Dukes, Ph.D., *Professor of Psychology.*
‡Stanley Coopersmith, Ph.D., *Associate Professor of Psychology.*
Robert Sommer, Ph.D., *Associate Professor of Psychology.*
Jarvis R. Bastian, Ph.D., *Assistant Professor of Psychology.*
Gordon H. Bermant, Ph.D., *Assistant Professor of Psychology.*
Jay S. Caldwell, Ph.D., *Assistant Professor of Psychology.*
Benjamin L. Hart, Ph.D., D.V.M., *Assistant Professor of Psychology and Assistant Professor of Anatomy.*
Rudolf Kalin, Ph.D., *Assistant Professor of Psychology.*
Dale F. Lott, Ph.D., *Assistant Professor of Psychology.*
Thomas Natsoulas, Ph.D., *Assistant Professor of Psychology.*
Theodore E. Parks, Ph.D., *Assistant Professor of Psychology.*
Andrew K. Solarz, Ph.D., *Assistant Professor of Psychology.*



Richard A. Cahoon, Ph.D., *Lecturer in Psychology.*
Herbert O. Dörken, Ph.D., *Lecturer in Psychology.*
Michael H. Kelliecutt, B.S., *Associate in Psychology.*
Marion P. Kibbe, Ph.D., *Lecturer in Psychology.*
Sumner B. Morris, Ed.D., *Lecturer in Psychology.*
Robert M. Murphy, B.S., *Acting Assistant Professor of Psychology.*
Edward D. Turner, A.B., *Acting Assistant Professor of Psychology.*
‡Wilson M. Van Dusen, Ph.D., *Lecturer in Psychology.*
Morris H. Woskow, Ph.D., *Lecturer in Psychology and Lecturer in Food Science and Technology.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

Departmental Major Advisers.—Mr. Bastian, Mr. Bermant, Mr. Caldwell, Mrs. Kibbe, Mr. Natsoulas, Mr. Parks, Mr. Solarz, Mr. Sommer.

The Major Program

(A) Lower Division Courses.—Required: (1) courses 1 and 2; (2) course 3; (3) 6 units of biological science, composed of one of these three combinations: Biology 1 and Zoology 2, Biology 1 and Physiology 1, or Zoology 10 and Physiology 1; (4) 6 units of sociology and/or cultural anthropology. Requirements should be completed before the beginning of the junior year and must be completed before the beginning of the senior year.

(B) Upper Division Courses.—Twenty-four units of advanced work in psychology (courses numbered above 99) with the following specific requirements: (1) course 196 (to be taken during the senior year); (2) course 106; (3) three courses from one of the following groups and two courses from the other: (Group A) 108, 130, 131, 132, 134, 150A; (Group B) 112, 145, 147, 165, 168.

Before graduation the student must complete 6 units of philosophy. These may be taken at any time during the four years, and may be either lower or upper division courses.

‡ Absent on leave, fall semester, 1965–1966.

Honors and Honor Program (see page 85).—The honor program comprises course 194H, which includes an honors thesis, to be taken normally during the senior year.

Graduate Study.—The Department of Psychology offers a program of study and research leading to the M.A. degree.

LOWER DIVISION COURSES

1. Introduction to Psychology: General Processes. (3) I and II. The Staff
Lecture—3 hours.

The general processes and principles of behavior, the facts on which they are based, and the methods used to study them; emphasis on motivation, emotion, frustration and conflict, learning, remembering, thinking, language, attending, and perceiving.

2. Introduction to Psychology: Individual Differences. (3) I and II. The Staff
Lecture—3 hours.

Differences in behavior, the factors contributing to their development, and the methods used to investigate them; emphasis on abilities, interests, aptitudes, intelligence, and personality.

3. Quantitative Description of Behavior. (3) I and II. I. Mr. Turner, II. ———
Lecture—3 hours.

Prerequisite: course 1 or 2 (may be taken concurrently); two years of high school algebra or the equivalent.

Principles and problems of measurement in psychology; methods of ordering and comparing measurements; inference and prediction from psychological data. Primarily for Psychology majors.

33. Personal and Social Adjustment. (3) I and II. I. Mr. Morris; II. Mr. Cahoon
Lecture—3 hours.

Prerequisite: course 1 or 2.

A continuation of courses 1 and 2, intended primarily for students who will not major in psychology. The dynamics of normal personality development. Family relationships, social adjustment, and self-evaluation are emphasized.

UPPER DIVISION COURSES

106. Experimental Psychology. (4) I and II. Mr. Caldwell
Lecture—2 hours; laboratory—6 hours.

Prerequisite: courses 1, 2 and 3.

Laboratory investigation of selected problems, including the design, execution, and formal reporting of experiments.

107. Design and Analysis in Psychological Research. (3) II. Mr. Turner
Lecture—3 hours.

Prerequisite: course 3 or Math 13.

Experimental design and inference in psychological investigation.

108. Physiological Psychology. (3) I and II. Mr. Hart
Lecture—2 hours; laboratory—2-3 hours.

Prerequisite: course 1 or 2; Zoology 2 or Physiology 1.

An analysis of some of the contributions of neuroanatomy, neurophysiology and neurochemistry toward a mechanistic understanding of human and animal behavior. A reductionistic approach within a behavioristic framework.

- 112. Developmental Psychology.** (3) I and II. Mrs. Kibbe
Lecture—3 hours.
Prerequisite: course 1 or 2; not open for credit to students who have received credit for Home Economics 131.
An ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction.
- 120. History of Psychology.** (3) I. Mr. Dukes
Lecture—3 hours.
Prerequisite: course 1 or 2.
The historical development of psychological theories and research.
- 130. Learning.** (3) I and II. Mr. Parks
Lecture—2 hours; laboratory—2 hours.
Prerequisite: course 1 and 2.
Consideration of major theories of learning and memory with critical examination of relevant experimental data.
- 131. Perception.** (3) I and II. I. Mr. Turner, II. Mr. Natsoulas
Lecture—2 hours; laboratory—2 hours.
Prerequisite: course 1 or 2.
The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.
- 132. Language and Cognition.** (3) I. Mr. Bastian
Lecture—3 hours.
Prerequisite: 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.
- 134. Motivation.** (3) I and II. ———
Lecture—2 hours; laboratory—2 hours.
Prerequisite: course 1 or 2.
Factors activating and directing behavior; contemporary theories of motives; pertinent data from laboratory, clinic, and field observation.
- 135. Psychology of Consciousness.** (3) I. Mr. Natsoulas
Lecture—3 hours.
Prerequisite: course 1 or 2.
Consideration of major theories of consciousness, with critical examination of relevant experimental, clinical, and field data.
- 145. Social Psychology.** (3) I and II. Mr. Sommer
Lecture—3 hours.
Prerequisite: course 1 or 2.
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.
- 147. Personality Theory and Assessment.** (3) I. Mr. Kalin
Lecture—2 hours; laboratory—2 hours.
Prerequisite: 6 units of advanced work in psychology (courses numbered above 99).
A systematic consideration of contemporary theories in the field of personality, together with an exploration and evaluation of some of the principal methods of collecting relevant empirical evidences.

- 150A. Comparative Psychology.** (3) I. Mr. Bermant
Lecture—2 hours; laboratory—2 hours.
Prerequisite: course 1 or 2, or Zoology 2.
Comparative analysis of sensory and response systems, and of various processes such as motivation, intelligence, problem solving, and imprinting, in representative vertebrates and invertebrates.
- 150B. Comparative Psychology.** (3) II. Mr. Bermant
Lecture—2 hours; laboratory—2 hours.
Prerequisite: course 150A.
Comparative analysis of social behaviors in representative vertebrates and invertebrates: dominance-submission, territoriality communication, and parent-infant relationships.
- 165. Clinical Psychology: Techniques and Problems in Diagnosis.** (3) I. Mr. Dörken
Lecture—2 hours; laboratory—2 hours.
Prerequisite: courses 1 and 2; 145 or 168; 3 units of statistics.
The interview and psychological test as diagnostic instruments. An examination of underlying theory and methods of construction and standardization; and an evaluation of empirical results. Laboratory work in interviewing and testing.
- 168. Abnormal Psychology.** (3) I and II. Mr. Sommer
Lecture—3 hours.
Prerequisite: course 1 or 2.
A descriptive and functional account of behavior disorders with primary consideration given to neurotic and psychotic behavior. Methods and theories of psychotherapy.
- 191. Phenomenological Approach to Personality** (3) I. Mr. Van Dusen
Lecture—1 hour; discussion—2 hours.
Prerequisite: consent of the instructor.
Approaches to the phenomenology of individual experience, group processes, fantasies, dreams, aesthetic and religious experience, the hypnagogic and other states through observation, interview, and projective tests. The relationship to literature, social sciences and the scientific method.
- 194H. Special Study for Honors Students.** (3) I and II. The Staff
Prerequisite: 15 units in psychology and honors status.
Independent investigation of an empirical problem. A written report in thesis form required. May be repeated once for credit.
- 196. Advanced General Psychology.** (3) I and II.
Seminar—3 hours. I, Mr. Bastian; II, Mr. Duker
Prerequisite: 12 units of advanced work in psychology (courses numbered above 99).
Exploration of the present status of systematic psychology. An integrative treatment of the major areas, problems, and methodologies. Required of all majors in their senior year.
- 199. Special Study for Advanced Undergraduates.** (1-3) I and II.
Investigation of special problems. The Staff (Mr. Duker in charge)

GRADUATE COURSES

- 201A. Proseminar in General Psychology.** (3) I. The Staff
Seminar—3 hours.
Prerequisite: 18 units of upper division psychology or consent of the instructor.
An intensive consideration of major areas and problems in general experimental psychology.

- 288. Research Preceptorship.** (3) I and II. The Staff
Laboratory and discussion—6 to 9 hours.
Advanced research by the student in collaboration with one member of the staff.
- 290. Seminar.** (3) I and II. The Staff
Seminar—3 hours.
Advanced study in the areas of modern psychology. The subjects will vary from year to year and will be announced at the beginning of each semester.
(a) The Psychology of Architecture, II, Mr. Sommer
(b) Experimental Personality, I, Mr. Kalin
(c) Psychobiology, I, Mr. Lott; II, ———
(d) Comparative and Physiological Psychology of Reproductive Behavior, I, ———; II, ———
- 299. Research.** (1-6) I and II. The Staff
Laboratory, library, or field work as the problem requires.
- 299D. Directed Readings.** (1-3) I and II. The Staff

PUBLIC HEALTH

William R. Pritchard, D.V.M., Ph.D., J.D., *Acting Chairman
of the Department.*

Department Office, 1018 Haring Hall

William R. Pritchard, D.V.M., Ph.D., J.D., *Professor of Veterinary Medicine.*

Walter W. Sadler, D.V.M., M.P.H., *Professor of Veterinary Public Health.*

John B. Enright, Ph.D., *Associate Professor of Veterinary Public Health.*



Frederick N. Cooper, B.S., *Lecturer in Public Health.*

John H. Jones, M.D., *Lecturer in Public Health.*

Hans P. Riemann, D.V.M., Ph.D., *Lecturer in Public Health.*

UPPER DIVISION COURSES

199. **Special Study for Advanced Undergraduates. (1-5) I and II.**

The Staff (Mr. Pritchard in charge)

GRADUATE COURSES

240. **Public Health for Veterinarians. (5) II.**

Lecture—5 hours. Mr. Cooper, Mr. Enright, Mr. Sadler, Mr. Riemann

Prerequisite: third-year standing in the School of Veterinary Medicine.

A study of those aspects of public health that are of concern to the veterinarian with particular reference to the zoonoses and the control of diseases spread through meat, milk, and other foods.

290. **Seminar. (1) I and II.**

The Staff (Mr. Pritchard in charge)

Seminar—1 hour.

299. **Research. (1-6) I and II.**

The Staff (Mr. Pritchard in charge)

RANGE MANAGEMENT

Henry J. Vaux, Ph.D., *Chairman of the Committee (Berkeley campus).*

R. Merton Love, Ph.D., *Vice-Chairman of the Committee.*

Committee Office, 131 Hunt Hall

Committee in Charge

Harold H. Biswell, Ph.D., *Professor of Forestry (Berkeley campus).*

Beecher Crampton, M.A., *Lecturer in Agronomy.*

Harold F. Heady, Ph.D., *Professor of Forestry (Berkeley campus).*

Glen P. Lofgreen, Ph.D., *Professor of Animal Husbandry.*

R. Merton Love, Ph.D., *Professor of Agronomy (Vice Chairman of the Committee).*

Henry J. Vaux, Ph.D., *Professor of Forestry (Berkeley campus).*

†William C. Weir, Ph.D., *Professor of Animal Husbandry.*

§William A. Williams, Ph.D., *Professor of Agronomy.*

Instruction in Range Management is not organized as a single administrative unit in the University, but the relevant courses are offered by a number of departments, and are coordinated by the committee in charge.

Group Major Advisers.—Mr. Love, Mr. Williams.

Bachelor of Science Major Program and Graduate Study. See page 62.

LOWER DIVISION COURSE

1. Introduction to Range Management. (3) I. Mr. Biswell
Lecture—3 hours.

Basic principles of range management and their relationships to the management of wildlands for livestock production, wildlife, water, recreation and timber.

UPPER DIVISION COURSES

100. Range Plants. (3) I. Mr. Crampton
Lecture—1 hour; laboratory—6 hours.

Prerequisite: Botany 1.

Systematic relationships and identification of range grasses, legumes, forbs and shrubs; their distribution, environmental requirements, and use. One Saturday field trip.

103. Grassland Inventory, Analysis, and Planning. (3) II. Mr. Heady
Lecture—1 hour; laboratory—6 hours.

Prerequisite: course 100 or consent of the instructor.

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.

105. Summer Field Course. (4) Mr. Love
Lecture—8 hours; laboratory—24 hours.

Prerequisite: consent of the instructor.

Four weeks devoted to field studies of range condition and methods of utilization in various parts of the state. Required of all students with a major in range management.

† Absent on leave, 1965-1966.

§ Absent on leave, spring semester, 1966

- 133. Grassland Ecology.** (3) II. Mr. Heady
Lecture—3 hours.
Prerequisite: course in plant ecology or consent of the instructor.
Composition, structure, development and habitat factors of native North American grasslands. Principles of grassland management for forage production.
Offered in even-numbered years.
- 198. Directed Group Study.** (1-5) I and II. The Staff
Prerequisite: consent of instructor.
Directed group study of selected topics in range management for advanced undergraduates.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff
Prerequisite: senior standing and consent of the instructor.

GRADUATE COURSES

- 290. Seminar.** (1-2) I and II. The Staff
Seminar—number of hours and units of credit to be announced and will depend on subject matter covered.
- 299. Research.** (1-9) I and II. The Staff

RELATED COURSES

- Forage Crops** (Agronomy 112)
Introduction to Animal Husbandry (Animal Husbandry 7)
Introduction to Animal Husbandry Laboratory (Animal Husbandry 7L)
Feeds and Feeding (Animal Husbandry 103)
Meat Production (Animal Husbandry 118)
Plant Ecology (Botany 117)

RUSSIAN

For courses in Russian, see "German and Russian" on page 260.

SOCIOLOGY

Bennett M. Berger, Ph.D., *Chairman of the Department.*
Department Office, 308 Voorhies Hall

Bennett M. Berger, Ph.D., *Professor of Sociology.*
Edgar Z. Friedenberg, Ph.D., *Professor of Sociology.*
Edwin M. Lemert, Ph.D., *Professor of Sociology.*
———, *Professor of Sociology.*
Cesar Graña, Ph.D., *Associate Professor of Sociology.*
Guenther Roth, Ph.D., *Associate Professor of Sociology.*
Kenneth C. W. Kammeyer, Ph.D., *Assistant Professor of Sociology.*
Robert H. Maisel, Ph.D., *Assistant Professor of Sociology.*
———, *Assistant Professor of Sociology.*

Leonard Cain, Ph.D., *Lecturer in Sociology.*
Bruce Hackett, M.A., *Acting Assistant Professor of Sociology.*
J. Rolf Kjolseth, M.A., *Acting Assistant Professor of Sociology.*
Stanford M. Lyman, Ph.D., *Lecturer in Sociology.*
John F. Scott, M.A., *Lecturer in Sociology.*
Winslow Rouse, Ph.D., *Lecturer in Sociology.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 85).

Departmental Major Advisers.—(a) Undergraduate: Mr. Friedenberg, Mr. Maisel, Mr. Scott, (b) Pre-Social Welfare: Mr. Lemert, (c) Graduate: Mr. Berger, Mr. Graña, Mr. Lemert.

The Major Program

(A) Lower Division Courses.—Sociology 1, 2, and 18 or its equivalent are required; also required are six units selected from Anthropology 2, Economics 1A and 1B, and Psychology 1 and 2. Also recommended are Anthropology 1 and Philosophy 12, 20A–20B.

(B) Upper Division Courses.—24 units of sociology including 105 and 165A, 165B are required. Recommended courses in other departments are Anthropology 102, 119, 124, 128; History 101; Philosophy 107, 151, 156; Political Science 150, 161; Psychology 145; Mathematics 105A–105B.

(C) Pre-Social Welfare students. Lower Division Courses: Sociology 1, 3, 18 and Psychology 1, and 2 are required. Recommended are Anthropology 2, Sociology 2, Economics 1A, 1B, Philosophy 12, Political Science 1A, 1B.

Upper Division Courses: Sociology 105, 120, 165A or 165B, 185 and Psychology 112, 147, 165, 168 are required. Also required are six additional units selected from Sociology 130, 131, 140, 150, 152, 170; Psychology 145; Economics 105. Also recommended are Anthropology 119, 128; Economics 116, 130, 150A, 150B; Home Economics 136, 138; Political Science 103, 104, 181.

The department will certify the completion of a major program only if a grade of at least C is maintained in upper division courses taken in the department. Students who do not maintain such an average may be dismissed from the sociology major.

Graduate Study.—The department offers a program of study leading to the M.A. degree in Sociology. Further information regarding graduate study may be obtained at the department office.

LOWER DIVISION COURSES

1. **Introduction to Sociology.** (3) I and II.

Mr. Kjolseth

Lecture—3 hours.

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.** (3) I and II. Mr. Scott
Lecture—3 hours.
A study of social organization and institutions, with attention to the application of concepts and related research findings.
- 3. Social Problems.** (3) I and II. Mr. Maisel, Mr. Lemert
Lecture—3 hours.
A general sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement.
- 18. Interpretation of Quantitative Sociological Data.** (3) II. Mr. Kammeyer
Lecture—3 hours.
Prerequisite: sophomore standing.
Historical and current trends in quantitative social research. Interpretation of measures, tables, and graphs of the type most frequently encountered in current sociological studies. Designed for majors in sociology.
- 25. Sociology of Popular Culture.** (3) II. Mr. Graña
Lecture—3 hours.
The historical emergence of popular culture. "High" culture, "folk" culture and "mass" culture; the democratization of cultural values; the organization of popular tastes; characteristic art forms of popular culture: literature, music, the graphic arts. The social structure of audiences.

UPPER DIVISION COURSES

- 105. Introduction to Methods of Sociological Study.** (3) I. Mr. Kammeyer
Lecture—3 hours.
Prerequisite: 6 units of sociology; a course in statistics approved by the department (may be taken concurrently).
Examination of methodological problems and technical procedures: selection and definition of problems of investigation; selection, description, classification, and analysis of data.
- 108. Advanced General Sociology.** (3) I. Mr. Berger
Lecture—3 hours.
Prerequisite: 6 units of sociology or consent of the instructor.
The place of sociology among the sciences and the humanities; critical analysis of basic concepts of sociology and their application to specific problems; the bearing of such analysis on problems of social order and social change.
- 118. Political Sociology.** (3) II. Mr. Roth
Lecture—3 hours.
Prerequisite: course 1 or consent of the 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.
- 120. Social Disorganization and Sociopathic Behavior.** (3) I. Mr. Lemert
Lecture—3 hours.
Prerequisite: courses 1 and 2 and upper division standing.
A survey of the incidence and forms of social disorganization. An analysis of selected deviant and sociopathic behaviors.
- 122. Sociology of Adolescence.** (3) II. Mr. Friedenberg
Lecture and discussion—3 hours.
Prerequisite: 6 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.** (3) I. Mr. Friedenberg
Lecture—3 hours.
Prerequisite: 6 units in the social sciences or consent of the instructor.
The institutional structure and social organization of the United States.
- 124. Sociology of Educational Institutions.** (3) I. Mr. Friedenberg
Lecture and discussion—3 hours.
Prerequisite: 3 units of Sociology.
Public schools as arenas of intergroup conflict and as instruments of social mobility. The meaning of local autonomy in the context of prevailing arrangements for certification and public support. The relevance of public education to the ethos and mythos of American society.
- 125. Sociology of Intellectual Life.** (3) I. Mr. Graña
Lecture—3 hours.
Prerequisite: Upper division standing and consent of the 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.
- 126. Social Structure and Personality.** (3) I. Mr. Scott
Lecture—3 hours.
Prerequisite: Courses 1 and 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.** (3) I and II. Mr. Cain, Mr. Lyman
Lecture—3 hours.
Prerequisite: 6 units of social science or consent of the instructor.
A study of contacts and interaction between racial and ethnic groups; sources and effects of prejudice and discrimination; programs for reducing intergroup tensions.
- 131. Sociology of the Family and Kinship.** (3) II. Mr. Scott
Lecture—3 hours.
Prerequisite: course 1 or consent of the instructor.
The relation of family forms to social stratification, ethnic groups, and industrialization; universal and variable functions of reproductive institutions; current trends in family structure of industrial societies; the influence of fertility, divorce rates, and age-grading on those trends.
- 140. Social Stratification.** (3) I. Mr. Hackett
Lecture—3 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.
- 141. Industrialization and Social Change.** (3) II. Mr. Roth
Lecture—3 hours.
Prerequisite: 3 units of Sociology.
The interrelations between technological and social change, the social conditions of economic development and the social implications of automation in highly industrialized countries.

- 142. Comparative Institutions and Social Structures.** (3) I. Mr. Roth
Lecture—3 hours.
Prerequisite: 6 units of Sociology.
The central institutions and cultural legacies of the principal complex societies. Western nations will be compared with the USSR and newly developing states with respect to their patterns of institutional persistence and change.
- 144. Rural Society.** (3) II. _____
Lecture—3 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.
- 146. Sociology of Religion.** (3) I. Mr. Graña
Lecture—3 hours.
Prerequisite: 6 units of sociology or consent of the instructor.
The relationship between social structure and religious life. Social class, political behavior, and religious affiliation. The passage from "sacred" to "secular" ways of life. Religion and social change in advanced societies. Churches as social organizations. "Established" churches and religious "cults."
- 148. Collective Dynamics and Social Movements.** (3) II. _____
Lecture—3 hours.
Prerequisite: course 1 or consent of the instructor.
Non-institutionalized forms of group behavior; social contagions, fashion movements, public opinion formation, reform and revolutionary movements. Their relations to social change in mass societies.
- 150. Criminology.** (3) I. Mr. Lemert
Lecture—3 hours.
Prerequisite: courses 1 and 2 and upper division standing.
The sociological analysis of criminal behavior in relation to social structure and the criminalization process.
- *152. Juvenile Delinquency.** (3) II. Mr. Lemert
Lecture—3 hours.
Prerequisite: 6 units of social science or consent of the instructor.
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.
- 160. Work and Leisure.** (3) II. Mr. Berger
Lecture—3 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.
- 165A. Sociological Theory.** (3) I. Mr. Maisel
Lecture—3 hours.
Prerequisite: 6 units of sociology.
Sociological theories of the 19th century. Conservative and liberal traditions of sociological thought. "Classical" sociological theory. Among the thinkers discussed are Comte, St. Simon, Marx, and Durkheim.

165B. Sociological Theory. (3) II. Mr. Maisel

Lecture—3 hours.

Prerequisite: 6 units of sociology.

Major sociological theorists from the late 19th century to the present. Among the thinkers discussed are Weber, Simmel, Mead, Dewey, Freud, and Parsons.

170. Population. (3) I. Mr. Kammeyer

Lecture—3 hours.

Prerequisite: 6 units of social science or consent of the 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.

175. Sociology of Communication. (3) II. Mr. Friedenber

Lecture and discussion—3 hours.

Prerequisite: 3 units of Sociology.

Sociological analysis of sources and consequences of oral and written communicative styles. Literacy and mass society. Institutionalization of personal and bureaucratic modes of address.

180. Complex Social Organizations. (3) II. Mr. Hackett

Lecture—3 hours.

Prerequisite: course 1 or consent of the 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.

185. The Field of Social Welfare. (3) II. _____

Lecture—3 hours.

Prerequisite: courses 1 and 2: upper division standing or consent of the instructor.

A sociological analysis of social work as an institution. Attention given to agency organization and functions.

199. Special Study for Advanced Undergraduates. (1-3) I and II.

Open to seniors only.

The Staff (Mr. Lemert in charge)

GRADUATE COURSES

205. Methodological Critique of Research. (2) II. Mr. Kammeyer

Lecture and discussion—2 hours.

Prerequisite: course 105, 18, or consent of the 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.

220. Deviance, Law, and Social Control. (2) I. Mr. Lemert

Lecture and discussion—2 hours.

Prerequisite: course 120 or consent of the instructor.

The relation of crime, mental disorder, and other forms of deviance to cultural values, norms, and legal institutions; formal and informal means for the social control of deviance.

- 226. Social Interaction and Personality.** (2) I. Mr. Maisel
Lecture and discussion—2 hours.
Prerequisite: course 126 or consent of the instructor.
The influence of social structure, personality, and social interaction in face-to-face social situations; the relations of role-taking and personal autonomy to the development of the self; social-psychological processes in intimate and small-group situations.
- 252. Sociology of Art.** (2) II. Mr. Graña
Lecture and discussion—2 hours.
Prerequisite: course 25 and 125 or consent of the 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.
- 265. Sociological Theory.** (2) I. Mr. Roth
Lecture and discussion—2 hours.
Prerequisite: courses 165A and 165B or consent of the 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.
- 290. Seminar.** (2) I and II. The Staff
Seminar—2 hours.
Analysis of current thought on a specific problem in sociology. The content of the course will vary from year to year.
- 299. Individual Study.** (1-6) I and II. The Staff, Mr. Berger in charge
Directed reading and periodic conferences on a topic not offered in the regular curriculum.

PROFESSIONAL COURSE

- *401. Institutional Field Work.** (1-3) I and II. _____
Study of formal and informal organization of institutions. Administrative and therapeutic procedures considered. Students will gain experience in different departments of correctional institutions and submit an analysis of a phase of institutional operation based upon a program of related reading.

* Not to be given, 1965-1966.

SOILS AND PLANT NUTRITION

C. C. Delwiche, Ph.D., *Chairman of the Department.*

Department Office, 139B Hoagland Hall

Daniel G. Aldrich, Ph.D., *Professor of Soils (Irvine Campus).*

Francis E. Broadbent, Ph.D., *Professor of Soil Microbiology.*

C. C. Delwiche, Ph.D., *Professor of Soil Science.*

†Emanuel Epstein, Ph.D., *Professor of Plant Nutrition.*

Frank F. Harradine, Ph.D., *Professor of Soil Morphology.*

Victor V. Rendig, Ph.D., *Professor of Soils and Plant Nutrition.*

Perry R. Stout, Ph.D., *Professor of Soil Science.*

Lannes E. Davis, Ph.D., *Professor of Soils, Emeritus.*

James A. Vomocil, Ph.D., *Associate Professor of Soil Physics.*

Lynn D. Whittig, Ph.D., *Associate Professor of Soil Science.*

Richard G. Bureau, Ph.D., *Assistant Professor of Soil Science.*

John L. McMurdie, Ph.D., *Assistant Professor of Soil Physics.*



Eugene L. Begg, B.S., *Lecturer in Soil Morphology.*

James W. Biggar, Ph.D., *Lecturer in Water Science.*

Arthur L. Brown, Ph.D., *Lecturer in Soils and Plant Nutrition.*

Theodore C. Broyer, B.S., *Professor of Plant Physiology (Berkeley campus).*

William J. Chancellor, Ph.D., *Associate Professor of Agricultural Engineering.*

James A. Cook, Ph.D., *Professor of Viticulture.*

Lloyd D. Doneen, Ph.D., *Professor of Water Science.*

William J. Flocker, Ph.D., *Lecturer in Vegetable Crops.*

Robert M. Hagan, Ph.D., *Professor of Water Science.*

Delbert W. Henderson, Ph.D., *Associate Professor of Water Science.*

Ray C. Huffaker, Ph.D., *Lecturer in Agronomy.*

†Jerome J. Jurinak, Ph.D., *Lecturer in Soil Chemistry.*

John C. Lingle, Ph.D., *Associate Professor of Vegetable Crops.*

James N. Luthin, Ph.D., *Professor of Water Science.*

Duane S. Mikkelsen, Ph.D., *Professor of Agronomy.*

Donald R. Nielsen, Ph.D., *Associate Professor of Water Science.*

H. Michael Reisenauer, Ph.D., *Lecturer in Soils and Plant Nutrition.*

Departmental Major Adviser.—Mr. Bureau.

Bachelor of Science Major Program and Graduate Study. See page 63.

PLANT NUTRITION

UPPER DIVISION COURSE

116. Principles of Plant Nutrition. (3) II.

Mr. Broyer

Lecture—2 hours; laboratory—3 hours.

Prerequisite: Botany 111; Chemistry 5.

Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; functions of inorganic nutrients; deficiencies and toxicities; relation to animal nutrition; experimental techniques, including solution culture and use of radioisotopes.

† Absent on leave, 1965–1966.

SOIL SCIENCE

No student will be accepted as a major student in soil science who has not attained at least an average of grade C in the required courses in chemistry, physics, botany, bacteriology, and the geological sciences.

LOWER DIVISION COURSE**1. Introduction to Soil Science. (3) I. Mr. Whittig**

Lecture—2 hours; laboratory—3 hours.

Prerequisite: Chemistry 1A.

Elementary principles of soil-plant interrelations; development of soil as a natural body; physical, chemical, and biological properties of soils; soil moisture; effect of management practices on soil properties; composition and use of fertilizers.

UPPER DIVISION COURSES**104. Soil Chemistry. (3) I. Mr. Burau**

Lecture—2 hours; laboratory—3 hours.

Prerequisite: course 1; Chemistry 5, 8.

Mineral and organic constituents of soils and their chemical reactions; the interactions of the liquid and solid phases including ion exchange and other colloidal phenomena; the chemical reactions involved in aggregation and structure formation; chemical factors of soil formation.

105. Summer Field Course. (5) Mr. Begg, Mr. Huntington

Lecture—8 hours; Laboratory—48 hours.

Prerequisite: course 118.

Field study of soil characteristics, development, and morphology of soils. Field work in soil surveying including mapping and classifying soils; and the preparation of soil reports. Field practice in identifying and judging the probable value of the dominant soils of the state for agricultural, grazing, and forest use.

107. Principles of Soil Physics. (3) II. Mr. Vomocil

Lecture—2 hours; laboratory—3 hours.

Prerequisite: course 1; Physics 2B.

Introduction to physical properties and behavior of mineral and organic soil particles and structural units; effect of environmental factors and cultural treatments on structure; soil-water relations; laboratory evaluation of effect of treatments on aggregation, permeability and strength.

108. Soil and Plant Relations. (2) II. Mr. Rendig

Lecture—2 hours.

Prerequisite: course 1; Chemistry 8.

Physicochemical properties of soils in relation to plant growth, occurrence and availability of plant nutrients, mechanisms of nutrient uptake.

109. Soil Fertility. (2) I. Mr. Reisenauer

Lecture—2 hours.

Prerequisite: course 1; Chemistry 1B.

The nature of fertilizers and soil amendments, their properties, methods of application, and reaction upon soils and plants.

111. Soil Microbiology and Soil Biochemistry. (3) I. Mr. Broadbent

Lecture—2 hours; laboratory—3 hours.

Prerequisite: course 1; Bacteriology 1; Chemistry 8.

Microorganisms occurring in soils, biochemical activities of the soil population, and the formation and properties of soil organic matter.

- 118. Soil Morphology and Survey. (3) II.** Mr. Harradine
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 1; Geology 1A.
Soil-forming factors and processes; study of the soil profile; soil survey practices; relationship between soil groups and agricultural use.
Field trips required.
- 123. Soil Analysis. (3) II.** Mr. Brown
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 1; Chemistry 5.
Methods of chemical analysis of soils, fertilizers, and plant material, including those useful in evaluating fertility and alkali problems.
- 135. Soil Management and Conservation. (2) II.** Mr. Reisenauer
Lecture—2 hours.
Prerequisite: senior standing in soil science or irrigation science.
Effect of various soil management and conservation practices including irrigation, reclamation, fertilization, tillage, and cropping on the physical, chemical and microbiological properties of soils and their relationship to crop production.
- 198. Directed Group Study. (1-5) I and II.** The Staff
Directed group study in soil science for advanced undergraduates.
- 199. Special Study for Advanced Undergraduates. (1-5) I and II.** The Staff

GRADUATE COURSES

- 207. Soil Physics. (3) II.** Mr. McMurdie
Lecture—3 hours.
Prerequisite: course 107. Recommended: Mathematics 109.
Physical processes occurring in soils; selected topics in the soil-plant relationship.
- 214. Soil Mineralogy. (3) II.** Mr. Whittig
Lecture—1 hour; laboratory—6 hours.
Nature, properties, and occurrence of the more common minerals in soils and rocks. Application of methods of mineral analysis in study of formation and properties of soils. X-ray, thermal, surface area, petrographic, and elemental analyses of mineral fractions.
Offered in odd-numbered years.
- *215. Physical Chemistry of Soils. (2) I.** Mr. Jurinak
Lecture—2 hours.
Prerequisite: course 104; Chemistry 110B, or 109 with consent of the instructor.
Physicochemical, colloidal, and surface aspects of the soil system.
Offered in odd-numbered years.
- 216. Advanced Soil Biology. (2) I.** Mr. Broadbent, Mr. Broyer, Mr. Rendig
Lecture—2 hours.
Prerequisite: courses 108, 111; Plant Nutrition 116.
Chemistry of plant residues and their decomposition by soil microorganisms; soil organic matter and its properties. Influence of soil conditions on plant growth and composition. The ionic environment of cells and tissues; permeability of cell membranes; ion absorption and transport.
Offered in even-numbered years.

290. Seminar. (1) I.

Mr. Delwiche

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.

299. Research. (1-6) I and II.

The Staff

RELATED COURSES

Use of Isotopes as Tracers in Biological Research. (Animal Physiology 243, 243L)

Water-Soil-Plant Relationships (Water Science 100)

SPANISH

Donald G. Castanien, Ph.D., *Chairman of the Department.*
Department Office, 622 Sproul Hall

_____, *Professor of Spanish.*

Iver N. Nelson, Ph.D., *Professor of Spanish, Emeritus.*
Donald G. Castanien, Ph.D., *Associate Professor of Spanish.*
Didier T. Jaén, Ph.D., *Assistant Professor of Spanish.*
†Daniel S. Keller, Ph.D., *Associate Professor of Spanish.*
Oliver T. Myers, Ph.D., *Assistant Professor of Spanish.*
Robert M. Scari, Ph.D., *Assistant Professor of Spanish.*



David H. Allen, Jr., M.A., *Lecturer in Spanish.*
Roberto Assardo, M.A., *Acting Assistant Professor of Spanish and Portuguese.*
Jerry R. Craddock, B.A., *Acting Assistant Professor of Spanish.*
Dale E. Euwall, M.A., *Acting Assistant Professor of Spanish.*
Roberta Fox, M.A., *Associate in Spanish.*
Robert E. Kelsey, A.B., *Acting Assistant Professor of Spanish.*
Skaidrite Ranne, M.A., *Associate in Spanish.*
Edwin T. Williams, M.A., *Acting Assistant Professor of Spanish.*

FOREIGN LANGUAGES

PROFESSIONAL COURSE

300. The Teaching of a Modern Foreign Language. (2) II. The Staff
Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

Analysis and discussion of a variety of teaching techniques by representatives of modern foreign languages and linguistics; orientation in language laboratory operation; practice in evaluating oral and written performance in language classes.

SPANISH

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 85.

Departmental Major Advisers.—Mr. Kelsey, Mr. Myers, Mr. Scari

Graduate Adviser.—Mr. Castanien

The Major Program

(A) Lower Division Courses.—Four years of high school Spanish, or courses 1, 2, and 3, and 4; course 26A–26B. Recommended: one year of college Latin or the equivalent.

(B) Upper Division Courses.—Required: 24 units of upper division courses including 190 (3 units). The remaining units may be from any of the upper division courses. Students who fail to maintain an average grade of at least C in the Spanish courses taken in the upper division will be excluded from the major.

Honors and Honors Program (see page 85).—The honors program comprises two semesters of study under course 194H, which will include a research paper and a comprehensive examination.

† Absent on leave, 1965–1966.

The Master of Arts Degree in Spanish

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.

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. Students whose native tongue is Spanish will not normally be admitted to any lower division course.

1. **Elementary Spanish—Beginning.** (4) I and II. The Staff
 Recitation—3 hours; laboratory—2 hours.
 This course corresponds to the first two years of high school Spanish.
 No credit will be allowed if the student has completed two or more years of high school Spanish.
2. **Elementary Spanish—Continued.** (4) I and II. The Staff
 Recitation—3 hours; laboratory—2 hours.
 Prerequisite: course 1 or two years of high school Spanish. Only two units of credit will be allowed if the student has completed three or more years of high school Spanish.
3. **Intermediate Spanish.** (4) I and II. The Staff
 Recitation—3 hours; laboratory—2 hours.
 Prerequisite: course 2 or three years of high school Spanish, or the equivalent.
4. **Intermediate Spanish Conversation and Reading.** (4) I and II. The Staff
 Recitation—3 hours; laboratory—2 hours.
 Prerequisite: course 3 or four years of high school Spanish.
 Spoken Spanish stressed through class discussion of a variety of selected readings.
- 26A. **Introduction to Spanish Literature.** (3) I and II. The Staff
 Lecture—3 hours.
 Prerequisite: course 4 or equivalent.
- 26B. **Introduction to Spanish Literature.** (3) I and II. The Staff
 Lecture—3 hours.
 Prerequisite: course 26A.

UPPER DIVISION COURSES

Prerequisite for all courses except 150: course 4 or its equivalent.

- 101A. **Grammar and Composition.** (3) I. The Staff
 Lecture—3 hours.
 Prerequisite: course 4 or equivalent.
- 101B. **Grammar and Composition.** (3) II. The Staff
 Lecture—3 hours.
 Prerequisite: course 4 or equivalent.

- *104A. **History of Spanish-American Literature: Colonial Period to *Modernismo*.** (3) I. Mr. Keller
Lecture—3 hours.
Offered in even-numbered years.
- *104B. **History of Spanish-American Literature: *Modernismo* to the Present.**
(3) II. Mr. Keller
Lecture—3 hours.
Offered in odd-numbered years.
- *105. **Peninsular Drama from the Romantic Movement to the Present.** _____
(3) I.
Lecture—3 hours.
Offered in even-numbered years.
109. **Spanish Drama of the Golden Age.** (3) I. Mr. Kelsey
Lecture—3 hours.
Offered in odd-numbered years.
111. **Cervantes.** (3) I. Mr. Castanien
Lecture—3 hours.
Offered in odd-numbered years.
- *115A. **Spanish Lyric Poetry: Middle Ages to 1700.** (3) I. _____
Lecture—3 hours.
Offered in even-numbered years.
- *115B. **Spanish Lyric Poetry: 1700 to Present.** (3) II. _____
Lecture—3 hours.
Offered in odd-numbered years.
- *119. **The Spanish Novel of the Nineteenth Century.** (3) I. _____
Lecture—3 hours.
Offered in even-numbered years.
- 120A. **Twentieth-Century Spanish Literature to 1936.** (3) I. Mr. Williams
Lecture—3 hours.
Offered in odd-numbered years.
- 120B. **Twentieth-Century Spanish Literature from 1936.** (3) II. _____
Lecture—3 hours.
Offered in even-numbered years.
121. **Spanish Literature of the Renaissance.** (3) II. _____
Lecture—3 hours.
Offered in even-numbered years.
122. **Spanish-American Fiction of the Twentieth Century.** (3) I. Mr. Assardo
Lecture—3 hours.
Offered in odd-numbered years.
- 131A. **Modern Spanish Syntax.** (3) I. Mr. Myers
Lecture—3 hours.
Prerequisite: course 101A-101B.
- 131B. **Modern Spanish Syntax.** (3) II. Mr. Myers
Lecture—3 hours.
Prerequisite: course 101A-101B.

- 134. Survey of Spanish Culture.** (3) II. _____
Lecture—3 hours.
The growth and development of Spain's culture and civilization from ancient times to the present.
- 140. Medieval Language and Literature.** (3) II. Mr. Myers
Lecture—3 hours.
Prerequisite: one semester of upper division Spanish or consent of the instructor.
Reading, analysis and discussion of representative works in Old Spanish.
Offered in even-numbered years.
- *150. Masterpieces of Spanish Literature.** (3) I. _____
Lecture—3 hours.
Prerequisite: English 1B.
Reading, lectures, and discussion in English. May not be counted as part of the major in Spanish.
Offered in odd-numbered years.
- *151. Study of a Major Writer.** (3) II. The Staff
Lecture—3 hours.
With the consent of the instructor, this course may be repeated for credit.
- 190. History of Spanish Literature.** (3) II. Mr. Castanien
Lecture—3 hours.
Prerequisite: Open to majors with senior standing, or consent of instructor.
The history of Spanish literature from the beginnings to the present.
- 194H. Special Study for Honors Students.** (3) I and II. The Staff
Prerequisite: open only to honors students.
Guided research leading to an honors thesis.
- 199. Special Study for Advanced Undergraduates.** (1-3) I and II. The Staff

GRADUATE COURSES

- 230. History of the Spanish Language.** (3) I. Mr. Myers
Seminar—3 hours.
Prerequisite: Latin 1 or the equivalent.
- *231. Spanish Literature of the Golden Age.** (3) II. Mr. Castanien
Seminar—3 hours.
- *234. Twentieth-Century Spanish Poetry.** (3) I. _____
Seminar—3 hours.
Offered in even-numbered years.
- *235. Twentieth-Century Spanish Prose.** (3) I. _____
Seminar—3 hours.
Offered in odd-numbered years.
- *236. Spanish American Poetry and Drama of the National Period.** (3) II. Mr. Keller
Seminar—3 hours.
Offered in odd-numbered years.
- 237. The Spanish American Novel of the National Period.** (3) II. _____
Seminar—3 hours.
Offered in even-numbered years.
- 239. Nineteenth-Century Spanish Literature.** (3) I. Mr. Scari
Seminar—3 hours.
- 299. Research.** (1-4) I and II. The Staff

* Not to be given, 1965-1966

SPEECH

For courses in speech see "Dramatic Art and Speech" on page 179.

SUBJECT A

Department Office, 176 Voorhies Hall

Leonard G. Homann, A.B., *Instruction Supervisor in Subject A.*

Subject A. English Composition. (No credit) I and II.

Required of all students who do not pass the examination in Subject A. The Staff Fee, \$35. To those students who maintain an average grade of A during the first seven weeks of the semester and pass a special examination with a grade of A, half of the fee will be refunded; they may discontinue attending the course.

TEXTILE SCIENCE

For courses in textile science, see "Home Economics" on page 276.

VEGETABLE CROPS

Oscar A. Lorenz, Ph.D., *Chairman of the Department*
Department Office, 150 Hunt Hall

Glen N. Davis, Ph.D., *Professor of Vegetable Crops.*
James F. Harrington, Ph.D., *Professor of Vegetable Crops.*
Oscar A. Lorenz, Ph.D., *Professor of Vegetable Crops.*
John H. MacGillivray, Ph.D., *Professor of Vegetable Crops.*
Leonard L. Morris, Ph.D., *Professor of Vegetable Crops.*
Harlan K. Pratt, Ph.D., *Professor of Vegetable Crops.*
† Charles M. Rick, Jr., Ph.D., *Professor of Vegetable Crops.*
Paul G. Smith, Ph.D., *Professor of Vegetable Crops.*
James E. Knott, Ph.D., Sc.D., (hon.c.), *Professor of Vegetable Crops,*
Emeritus.
John C. Lingle, Ph.D., *Associate Professor of Vegetable Crops.*
Arthur R. Spurr, Ph.D., *Associate Professor of Vegetable Crops.*

William J. Flocker, Ph.D., *Lecturer in Vegetable Crops.*
Frederick D. Howard, Ph.D., *Lecturer in Vegetable Crops.*
Lawrence Rappaport, Ph.D., *Lecturer in Vegetable Crops.*
Masatoshi Yamaguchi, Ph.D., *Lecturer in Vegetable Crops.*

Departmental Major Adviser.—Mr. Davis.

Bachelor of Science Major Program and Graduate Study. See page 61.

LOWER DIVISION COURSES

- 1. Vegetable Production.** (2) II. Mr. Flocker
Lecture—2 hours.
Principles involved in vegetable production; survey of the vegetable industry.
- 1L. Vegetable Crops Production Laboratory.** (1) II. Mr. Flocker
Laboratory—3 hours.
Prerequisite: course 1 (may be taken concurrently).
Application of the principles underlying vegetable production techniques of seeding, propagation, and culture of vegetables.
One or more field trips.

UPPER DIVISION COURSES

- 101. Major California Vegetable Crops.** (3) I. Mr. Lingle
Lecture—3 hours.
Prerequisite: course 1, or consent of the instructor.
Adaptation, distribution, growth habits, and methods of production and handling of the principal California vegetable crops. The application of pertinent experimental evidence to production problems is stressed.
- 105. Systematic Olericulture.** (2) I. Mr. Smith
Laboratory—6 hours.
Prerequisite: course 1; Botany 1.
Origin, history, types, classification, nomenclature, and adaptation of the more important American vegetable varieties; minor vegetable crops; trends in development of new varieties. One or more field trips.
- 112. Handling, Storage, and Transit of Vegetables.** (3) I. Mr. Morris
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 1; Botany 111; or consent of the instructor.

† Absent on leave, 1965–1966

Physiological processes contributing to the postharvest deterioration of vegetables and their relation to practices involved in harvesting, packing, transit, storage, and marketing. One or more field trips.

118. Vegetable-Seed Production. (2) II. Mr. Harrington

Lecture—2 hours.

Prerequisite: course 1; Botany 111. Recommended: course 105.

Principles of vegetable seed production; physiological factors affecting induction of seeding, seed development, viability and longevity of seeds. One or more field trips.

190. Proseminar. (1) II. Mr. Lorenz

Seminar—1 hour.

Prerequisite: consent of instructor.

Current problems and research in vegetable production.

198. Directed Group Study. (1-5) I and II. The Staff (Mr. Davis in charge)

Prerequisite: consent of instructor.

Directed group study of selected topics in vegetable crops for advanced undergraduates.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff

GRADUATE COURSES

220. Vegetable Breeding. (3) I. Mr. Rick

Lecture—2 hours; laboratory—3 hours.

Prerequisite: course 1; Genetics 100. Recommended: course 105.

Genetics, cytology, reproductive mechanisms, floral morphology, and field-plot techniques as related to the improvement of the vegetable crop species. One or more field trips.

221. Vegetable Physiology. (3) II. ———, Mr. Pratt

Lecture—2 hours; laboratory—3 hours.

Prerequisite: course 1, Botany 111.

Physiological principles involved in the production of vegetable crop species.

290. Seminar. (1) I and II. The Staff (Mr. Spurr in charge)

Seminar—1 hour.

291. Seminar in Postharvest Physiology. (1) I and II. The Staff (Mr. Pratt in charge)

Seminar—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.

298. Group Study. (1-5) I and II. The Staff (Mr. Yamaguchi in charge)

Discussion—1-5 hours.

Current concepts, techniques, and procedures applicable to research and to the production of vegetables.

299. Research. (1-9) I and II. The Staff

VETERINARY MEDICINE

For courses in veterinary medicine, see "Clinical Sciences," page 169.

VETERINARY MICROBIOLOGY

John W. Osebold, D.V.M., Ph.D., *Chairman of the Department.*
Department Office, 2004 Haring Hall

- † James R. Douglas, Ph.D., *Professor of Parasitology.*
Delbert G. McKercher, D.V.M., Ph.D., *Professor of Veterinary Virology.*
John W. Osebold, D.V.M., Ph.D., *Professor of Immunology.*
Clyde Stormont, Jr., Ph.D., *Professor of Immunogenetics.*
Hugh S. Cameron, D.V.M., Ph.D., *Professor of Veterinary Microbiology,*
Emeritus.
Jacob Traum, D.V.M., *Professor of Veterinary Medicine, Emeritus.*
Norman F. Baker, D.V.M., Ph.D., *Associate Professor of Parasitology.*
Ernst L. Biberstein, D.V.M., Ph.D., *Associate Professor of Microbiology.*
- ◇
- Michel M.-J. Lavoipierre, M.B., Ch.B., *Lecturer in Parasitology.*
Stewart H. Madin, D.V.M., Ph.D., *Professor of Public Health and Bacteriology (Berkeley Campus).*
Richard N. Rossan, Ph.D., *Lecturer in Parasitology.*

UPPER DIVISION COURSES

111. Animal Hygiene. (3) II.

Lecture—3 hours.

Prerequisite: Bacteriology 1.

The causes, prevention, control, and eradication of animal diseases important in economic livestock production and public health.

121. Microbiology. (10) I.

Mr Osebold, Mr. McKercher

Lecture—5 hours; laboratory—15 hours.

Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the instructor.

The principles of immunity, and a study of the bacterial, mycotic, and viral disease-producing agents of importance in veterinary medicine.

124. Veterinary Parasitology. (6) II.

Mr. Baker, Mr. Lavoipierre

Lecture—3 hours; laboratory—9 hours.

Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the instructor.

The protozoan, helminth, and arthropod parasites of domesticated animals with emphasis on biology, life history, identification, and control.

125. Veterinary Medical Genetics. (1) II.

Mr. Stormont

Lecture and demonstration—1 hour.

Prerequisite: Genetics 100 or its equivalent. Recommended: general bacteriology or microbiology.

Inheritance of resistance to disease; breeding for resistance to disease; blood groups and their applications in clinical medicine and breeding programs; lethal and sublethal traits in farm animals.

127. Medical Microbiology. (5) II.

Mr. Biberstein

Lecture—3 hours; laboratory—6 hours.

Prerequisite: Bacteriology 1; Biology 1 (Zoology 2 recommended); Chemistry 8.

The pathogenic microorganisms (exclusive of protozoa) affecting man; immunological phenomena especially as related to human disease.

Offered in odd-numbered years.

† Absent on leave, 1965–1966.

- 199. Special Study for Advanced Undergraduates. (1-5) I and II.**
The Staff (Mr. Douglas in charge)

GRADUATE COURSES

- 270. Advanced Immunology. (4) II.** Mr. Osebold
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 121 or 127 or consent of the instructor.
Dynamics of infection and resistance: host responses to invasion of foreign substances, antibody production and manifestations of antigen-antibody reactions, immunochemistry. Immunological considerations of the groups of disease agents.
Offered in even-numbered years.
- 290. Seminar. (1) I and II.** Mr. Biberstein
Seminar—1 hour.
- 299. Research. (1-6) I and II.** The Staff

VITICULTURE AND ENOLOGY

James A. Cook, Ph.D., *Chairman of the Department.*
Department Office, 1023 Wickson Hall

Maynard A. Amerine, Ph.D., *Professor of Enology.*
Harold W. Berg, M.S., *Professor of Enology.*
James A. Cook, Ph.D., *Professor of Viticulture.*
James F. Guymon, Ph.D., *Professor of Enology.*
Klayton E. Nelson, Ph.D., *Professor of Viticulture.*
Harold P. Olmo, Ph.D., *Professor of Viticulture.*
Robert J. Weaver, Ph.D., *Professor of Viticulture.*
A. Dinsmoor Webb, Ph.D., *Professor of Enology.*
Albert J. Winkler, Ph.D., *Professor of Viticulture, Emeritus.*
†Lloyd A. Lider, Ph.D., *Associate Professor of Viticulture.*
Ralph E. Kunkee, Ph.D., *Assistant Professor of Enology.*



§Frederick T. Addicott, Ph.D., *Professor of Agronomy.*
W. Mark Kliever, Ph.D., *Lecturer in Viticulture.*
George L. Marsh, M.S., *Professor of Food Science and Technology.*
Cornelius S. Ough, B.S., *Lecturer in Enology.*
Vernon L. Singleton, Ph.D., *Lecturer in Enology.*

Departmental Major Advisers.—Viticulture, Mr. Lider; Food Science (Enology), Mr. Webb; Agricultural Production (Enology), Mr. Webb.

Bachelor of Science Major Program and Graduate Study (Viticulture). See page 60.

Bachelor of Science Major Program and Graduate Study (Enology). See page 55.

VITICULTURE

LOWER DIVISION COURSES

1. Introduction to Grape Growing. (2) I. Mr. Olmo
Lecture—2 hours.

An elementary survey of the grape industry. Botany and distribution of the vine, climatic requirements, cultural practices, utilization of crop, and the principal diseases and insects.

***2. Grape Production. (2) I.** Mr. Lider
Lecture—1 hour; laboratory—3 hours.

Prerequisite: course 1 (may be taken concurrently).

A course covering the principal varieties and the principles and practices involved in the production of table, raisin, and wine grapes. Not open for credit to students in the major.

Offered in odd-numbered years.

3. Introduction to Wine Making. (2) II. Mr. Singleton, Mr. Amerine
Lecture—2 hours.

An introduction to the wine industry, including fermentation, wine types, handling and diseases, and economic problems of the industry.

* Not to be given, 1965–1966.

† Absent on leave, fall semester, 1965–1966

§ Absent on leave, spring semester, 1966

UPPER DIVISION COURSES

- 105. Systematic Viticulture and Principles of Fruit Handling.** (3) I. Mr. Nelson, Mr. Lider
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 1 or permission of the instructor.
Botanical classification of the grape; the principal varieties, rootstocks, and species; production factors affecting maturity and quality of the fruit for raisins, wine and table grapes; harvesting, handling, and marketing of table grapes; raisin making, costs and returns.
- 108. Plant Hormones and Regulators.** (2) I. Mr. Weaver, Mr. Addicott
Lecture—2 hours.
Prerequisite: Biochemistry 101; Chemistry 5; or consent of instructor.
Recommended: Botany 120A, 120B.
History, occurrence, 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.
- 116. General Viticulture.** (4) II. Mr. Cook, Mr. Lider
Lecture—3 hours; laboratory—3 hours.
Prerequisite: course 1 or permission of the instructor.
Plant structure and physiology; principles underlying propagation, pruning, grafting and cultivation; and factors influencing fruit development and quality.
- 124. Enology: Wine Processing and Analyses.** (3) II. Mr. Berg, Mr. Amerine
Lecture—1 hour; laboratory—6 hours.
Prerequisite: Bacteriology 1; Chemistry 5. Recommended: courses 1 and 3 and Food Science 107.
Introduction to enology: wine types and analyses, nonbacterial disorders and their control, fining, filtration, and the preparation of vermouths and sparkling wines.
- 125. Enology: Wine Preparation.** (3) I. Mr. Webb
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 105; Bacteriology 1; Chemistry 5, 8.
The principles and practices of making the various standard types of wine, with special reference to the varieties used, and the method of vinification required for each.
- 140. Principles of Distillation and Brandy Technology.** (3) II. Mr. Guymon
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Chemistry 5, 8.
The distillation process, theory, calculations and technological aspects, mass and energy transfer relationships, with emphasis upon the alcohol-water system and the distillation of wines; brandy types, analysis, production factors and legal aspects.
Offered in even-numbered years.
- 190. Proseminar in Viticulture.** (1) I. Mr. Olmo
Lecture—1 hour.
Prerequisite: consent of the instructor.
Reports and discussions of recent advances in viticulture.
- 191. Proseminar in Enology.** (1) II. Mr. Amerine, Mr. Webb
Lecture—1 hour.
Prerequisite: consent of the instructor.
Reports and discussions of recent advances in enology.

198. Directed Group Study. (1-5) I and II. The Staff
 Prerequisite: consent of the instructor.
 Directed group study of selected topics in viticulture and enology for advanced undergraduates.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff

GRADUATE COURSES

217. Microbiology of Wine Production. (2) II. Mr. Kunkee
 Lecture—1 hour; laboratory—3 hours.

Prerequisite: Bacteriology 1, and an upper division course in bacteriology or Food Science 105; Chemistry 5, 8. Recommended: course 3 or 124 or 125.
 Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging, and spoilage of wine.

290. Seminar. (1) II. Mr. Webb
 Seminar—1 hour.
 Prerequisite: consent of the instructor.

299. Research. (1-6) I and II. The Staff

RELATED COURSES

Introduction to Food Science (Food Science 1)

Analysis of Foods by Sensory Methods (Food Science 107)

Fruit Breeding (Pomology 114)

WATER SCIENCE AND ENGINEERING

Verne H. Scott, Ph.D., *Chairman of the Department.*
Department Office, 113 Veihmeyer Hall

- Robert H. Burgy, M.S., *Professor of Water Science and Professor of Civil Engineering.*
Lloyd D. Doneen, Ph.D., *Professor of Water Science.*
Robert M. Hagan, Ph.D., *Professor of Water Science.*
Delbert W. Henderson, Ph.D., *Professor of Water Science.*
James N. Luthin, Ph.D., *Professor of Water Science and Professor of Civil Engineering.*
Verne H. Scott, Ph.D., *Professor of Water Science and Professor of Civil Engineering.*
Frank Adams, M.A., LL.D., (hon.c.), *Professor of Irrigation, Emeritus.*
Frank J. Veihmeyer, C.E., Ph.D., *Professor of Irrigation, Emeritus.*
Jaime Amorocho, Ph.D., *Associate Professor of Water Science and Associate Professor of Civil Engineering.*
†Donald R. Nielsen, Ph.D., *Associate Professor of Water Science.*
Theodore C. Hsiao, Ph.D., *Assistant Professor of Water Science.*
Theodor S. Strelkoff, Ph.D., *Assistant Professor of Water Science and Assistant Professor of Civil Engineering.*



- James W. Biggar, Ph.D., *Lecturer in Water Science.*
David E. Elrick, Ph.D., *Visiting Associate Professor of Water Science.*
William E. Hart, M.S., *Lecturer in Water Science.*
William O. Pruitt, Jr., M.S., *Lecturer in Water Science and Lecturer in Civil Engineering.*
Departmental Major Advisers.—Mr. Biggar, Mr. Burgy, Mr. Henderson.
Adviser for Engineering.—Mr. Scott.
Adviser for Plant Physiology.—Mr. Hagan.
Adviser for Soil Science.—Mr. Luthin.
Bachelor of Science Major Program and Graduate Study. See page 59.

WATER SCIENCE

LOWER DIVISION COURSE

1. **Water and Man.** (3) II. Mr. Hagan
Lecture—3 hours.
Prerequisite: sophomore standing or consent of the instructor.
Water as a factor in civilization and man's environment; water supply and utilization problems emphasizing irrigation, drainage, and other water management considerations in developing areas. A cultural and technical course providing an introduction to water science and engineering.

UPPER DIVISION COURSES

100. **Water-Soil-Plant Relationships.** (3) I. Mr. Hagan
Lecture—3 hours.
Prerequisite: consent of the instructor.
Basic principles underlying irrigation in its soil and plant relationships. Movement of irrigation water in soil, soil-moisture availability, soil moisture measurement, relation of soil moisture to plant growth, irrigation requirements for principal crops, and scheduling irrigations for maximum efficiency.

† Absent on leave, 1965-1966

110. **Irrigation Principles and Practices.** (4) I. Mr. Henderson
Lecture—3 hours; laboratory—3 hours.

Prerequisite: Physics 2A or 10; consent of the instructor if the student has received credit in course 1.

A general course for students not majoring in irrigation. Irrigation as a factor in agriculture, principles of irrigation practice, development of the farm irrigation water supply, preparation of land for irrigation, design of farm irrigation systems, and water requirements of crops.

115. **Water Quality and Salinity as Factors in Irrigation.** (3) I. Mr. Doneen
Lecture—2 hours; laboratory—3 hours.

Prerequisite: Chemistry 1B. Recommended: Chemistry 5; Soil Science 1. Water quality, water analysis, salinity, soil reclamation, infiltration problems, and soil amendments.

118. **Hydraulics.** (4) I. Mr. Amorocho
Lecture—3 hours; laboratory—3 hours.

Prerequisite: Physics 2B; Mathematics 16B. Basic principles of hydraulics including flow in pipelines and open channels. Use, operation and design of water measuring devices and water control structures used on irrigated farms.

135. **Irrigation Management and Water Conservation.** (2) II. Mr. Henderson
Lecture—2 hours.

Prerequisite: senior standing in irrigation science or soil science. Water as an agricultural resource; water management on range, terrace, valley, and basin lands; irrigation practices as related to soil, drainage, and salinity conditions; interrelations of irrigation with tillage, fertilization, and other cultural practices.

140. **Drainage of Agricultural Lands.** (2) II. Mr. Luthin
Lecture—2 hours.

Prerequisite: courses 100 and 118. 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.

150. **Water Rights and Irrigation Institutions.** (3) I. _____
Lecture—3 hours.

Water rights: kinds, acquirements, adjudication, administration, loss, and evaluation. Irrigation enterprises: kinds, organization, financing, public regulation, operation, and usefulness under different conditions.

160. **Farm Irrigation Systems.** (3) II. Mr. Hart
Lecture—3 hours.

Prerequisite: senior standing in irrigation science or engineering. Design, construction, operation and maintenance of farm irrigation systems including appurtenant structures. Preparation of land for irrigation. Analysis of irrigation systems and water application practices.

170. **Irrigation and Drainage Laboratory.** (2) II. Mr. Hart
Lecture—1 hour; laboratory—3 hours.

Prerequisite: courses 100 and 160 (160 may be taken concurrently), or consent of the instructor.

Laboratory and field exercises on ground water, wells, and pumping plants; water-soil-plant relationships; farm irrigation system design and operation; evaluation of water application methods; drainage investigation techniques; layout of farm drainage systems. Occasional field trips.

190. **Irrigation Proseminar.** (1) II. _____
Lecture—1 hour.
Prerequisite: consent of instructor.
Current problems in irrigation.
198. **Directed Group Study.** (1-5) I and II. The Staff
Group study of selected problems in irrigation.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

GRADUATE COURSES

200. **Advanced Water-Plant Relationships.** (2) II. Mr. Hsiao
Lecture—2 hours.
Prerequisite: consent of instructor.
Selected topics in water relations including the availability of soil moisture for plant growth; influence of water potential on plant metabolism; water uptake, movement, and distribution in plants; transpiration and water use; nutrient uptake.
215. **Advanced Topics in Water Quality.** (2) II. Mr. Biggar
Lecture—2 hours.
Prerequisite: consent of instructor.
An advanced course on irrigation water quality emphasizing physiochemical principles governing interactions of ionic constituents in water with soils and plants. Topics include hydrodynamic dispersion phenomena during leaching, percolating waters and ground-water quality, and irrigation disposal of waste waters.
250. **Physics of Soil Water.** (2) I. Mr. Elrick
Lecture—2 hours.
Prerequisite: Mathematics 109 or and consent of instructor.
An advanced course on physics of soil water with emphasis on unsaturated flow problems in soils including hydrodynamics of viscous fluids, miscible and immiscible displacement theories, and methods for solving differential forms of flow equations.
290. **Seminar.** (1) I and II. Mr. Elrick
Seminar—1 hour.
Required of all graduate students in irrigation science. Discussions of advanced problems in irrigation.
298. **Group Study.** (1-6) I and II. The Staff
Group study on advanced topics in irrigation.
299. **Research.** (1-6) I and II. The Staff
Individual research in irrigation science.



For additional courses in irrigation, drainage, and water resources engineering, see the Engineering course section, pages 215-219.

ZOOLOGY

Herman T. Spieth, Ph.D., *Chairman of the Department.*
Milton Hildebrand, Ph.D., *Vice-Chairman of the Department.*
Department Office, 247 Animal Science Building

Milton Hildebrand, Ph.D., *Professor of Zoology.*
Everett W. Jameson, Jr., Ph.D., *Professor of Zoology.*
Milton A. Miller, Ph.D., *Professor of Zoology.*
†Lauren E. Rosenberg, Ph.D., *Professor of Zoology.*
Herman T. Spieth, Ph.D., *Professor of Zoology.*
Kenneth E. F. Watt, Ph.D., *Professor of Zoology.*
Loye H. Miller, Ph.D., LL.D., *Professor of Biology, Emeritus.*
Tracy I. Storer, Ph.D., LL.D., *Professor of Zoology, Emeritus.*
Charles R. Goldman, Ph.D., *Associate Professor of Zoology.*
Robert L. Rudd, Ph.D., *Associate Professor of Zoology.*
George W. Salt, Ph.D., *Associate Professor of Zoology.*
Dennis Barrett, Ph.D., *Assistant Professor of Zoology.*
Ronald J. Baskin, Ph.D., *Assistant Professor of Zoology.*
Ernest J. DuPraw, Ph.D., *Assistant Professor of Zoology.*
Warren G. Kinzey, Ph.D., *Assistant Professor of Zoology and Assistant Professor of Anthropology.*
Stephen L. Wolfe, Ph.D., *Assistant Professor of Zoology.*



Norman F. Baker, D.V.M., Ph.D., *Associate Professor of Parasitology.*
James R. Douglas, Ph.D., *Professor of Parasitology.*
George E. Goslow, A.B., *Associate in Zoology.*
William J. Hamilton, III, Ph.D., *Lecturer in Zoology.*
Clarence I. Haydock, M.A., *Associate in Zoology.*
Ann E. Kammer, M.S., *Acting Assistant Professor of Zoology.*
William M. Longhurst, Ph.D., *Lecturer in Zoology.*

BIOLOGY

Letters and Science List.—Biology 1, 2.

LOWER DIVISION COURSES

1. Principles of Biology. (4) I and II.

Mr. Hungate, Mr. Ketellapper, Mr. Wolfe

Lecture—3 hours; laboratory—3 hours.

Prerequisite: Chemistry 1A or a passing score in a qualifying examination in chemistry.

An interdisciplinary course designed for majors in the biological sciences. Emphasis will be given to the unity of basic biological principles as related to cell structure and function, reproduction, genetics, growth and differentiation, evolution, ecology, and taxonomy.

*2. Biological Diversity. (4) II.

The Staff from Bacteriology, Botany, Zoology

Lecture—2 hours; laboratory—6 hours.

Prerequisite: course 1.

A survey of representative microorganisms, plants, and animals stressing diversity, classification, structure, and function.

† Absent on leave, 1965–1966

* Not to be given, 1965–1966

PHYSIOLOGY

Letters and Science List.—Physiology 1, 1L.

LOWER DIVISION COURSES

- I. Introductory Physiology Lecture.** (3) I. Mr. Baskin
Lecture—2 hours; discussion—1 hour.
Prerequisite: high school chemistry.
The physiology of muscle, nerve, central nervous system, sensation, circulation, respiration, excretion, and digestion.
- 1L. Introductory Physiology Laboratory.** (2) I. Mr. Baskin
Laboratory—6 hours.
Prerequisite: course 1 completed or in progress.

ZOOLOGY

Letters and Science List.—All undergraduate courses in zoology except course 104 are included in the Letters and Science List of Courses (see page 85).

Departmental Major Advisers.—Mr. Goldman, Mr. Jameson, Miss Kammer, Mr. Watt.

Bachelor of Arts Major Program

(A) Lower Division Courses.—Biology 1 and Zoology 2; Chemistry 1A and 1B or 8.

(B) Upper Division Courses.—24 units of upper division courses in zoology (not more than 4 units of courses in the 190 series may be counted in this requirement). Students in the A.B. program are required to complete a course in four of the five following core areas:

1. *Vertebrate Embryology with laboratory, or Vertebrate Comparative Anatomy.*—Zoology 100, 100L, or 106.
2. *Invertebrate Zoology.*—Zoology 112.
3. *Genetics.*—Genetics 100.
4. *Physiology with laboratory.*—Zoology 142 and 142L, Zoology 150, Animal Husbandry 110, Poultry Husbandry 107 and 108, or Animal Physiology 100 and 100L.
5. *Cell Biology.*—Zoology 121, 121L, or Botany 130.

Any courses taken outside the department in partial satisfaction of the core course requirement will be counted toward the satisfaction of the 24 unit requirement.

Within the major program there are four principal areas of concentration for which electives are recommended as follows:

1. *Preparation for Graduate Study.*—Elementary courses in Botany, Biochemistry, Chemistry, a second foreign language, Physics, Calculus, and Statistics, with attention to the requirements for advanced degrees.
2. *Preparation for Careers as Teachers.*—To provide desirable breadth of training, additional courses in Botany, Bacteriology, Cell Biology, Chemistry, and Physics, Entomology, Field Zoology, and Physiology.
3. *Preparation for Careers as Technicians.*—Courses 104, 107, 110 and suitable electives in Biochemistry, Parasitology and Physiology.
4. *Preparation for Careers in Wildlife.*—The A.B. program may serve as preparation for careers in wildlife but the B.S. program (see later) is specifically designed for that purpose. Hence, students in the A.B. program interested in wildlife careers should select as many electives as possible from the courses listed under the B.S. program.

Bachelor of Science Major Program

The B.S. program is an interdisciplinary major for students with professional orientation in the field of wildlife.

(A) Lower Division Courses.—Required: Biology 1, Zoology 2; Botany 1; Chemistry 1A, 8; Entomology 1; Mathematics 13. Recommended: Bacteriology 1; Geology 1A; Physics 2A; Mathematics 16B, 36, 41; Chemistry 5.

(B) Upper Division Courses.—At least 24 units, 12 of which must be in upper division zoology courses. Not more than 4 units of courses in the 190 series may be counted in satisfying the upper division course requirement.

Required: Genetics 100; Zoology 116.

Elective groups: 12 units of upper division electives including courses from at least four of the following groups.

Group 1. *Limnology and Oceanography*.—Zoology 140, 140L, 144.

Group 2. *Physiology, Nutrition, and Biochemistry*.—Zoology 142, 142L; Animal or Poultry Husbandry 105; Animal Husbandry 110; Biochemistry 101.

Group 3. *Biometry*.—Mathematics 105B, 109.

Group 4. *Parasitology and Bacteriology*.—Bacteriology 100, 104; Veterinary Microbiology 124.

Group 5. *Vertebrate Zoology*.—Zoology 133, 134, 106.

Group 6. *Ecology*.—Zoology 125, 125L; Botany 117.

Honors and Honors Program (see page 85).—The honors program comprises courses 194H and 195H. These two courses will be accepted as part of the 24-unit requirement in upper division courses.

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.

LOWER DIVISION COURSES

2. **General Zoology.** (5) II. The Staff

Lecture—3 hours; laboratory—6 hours.

Prerequisite: Biology 1.

A survey of the diversity of animal life and the basic principles of adaptation, evolution, and integration in animals.

10. **General Biology.** (3) II. Mr. Spieth

Lecture—3 hours; demonstration section—1 hour.

Not open for credit to students who have had course 1A or Biology 1, but students who have taken course 10 may elect Biology 1 for credit. Open without prerequisite to all students, but designed for those not specializing in animal biology.

Consideration of the main facts and principles of animal biology, with emphasis on animal biology and special reference to evolution, heredity, and the bearing of biology upon human life.

25. **General Human Anatomy.** (3) II. Mr. Kinzey

Lecture—2 hours; laboratory—3 hours.

Prerequisite: Biology 1 or course 10 or Physiology 1; and sophomore standing.

A basic study of human anatomy with demonstration and laboratory study of prepared human dissections, models, and microscopic materials. Not open to premedical students.

UPPER DIVISION COURSES

100. **Vertebrate Embryology.** (2) I. Mr. Hildebrand

Lecture—2 hours.

Prerequisite: course 1B or 2.

Embryologic development of the vertebrates, including amphibian, chick, and mammal.

- 100L. Vertebrate Embryology Laboratory.** (2) I. Mr. Hildebrand
Laboratory—6 hours.
Prerequisite: course 100, which should be taken concurrently.
- 103. Experimental Embryology.** (2) II. Mr. Barrett
Lecture—2 hours.
Prerequisite: course 100.
Mechanisms of growth and differentiation of embryonic, malignant and regenerating tissues.
- 103L. Experimental Embryology Laboratory.** (2) II. Mr. Barrett
Laboratory—6 hours.
Prerequisite: course 103 (may be taken concurrently).
The application of transplantation, organ and tissue culture, and selected chemical techniques to developmental problems.
- 104. Principles of Microscopy.** (3) II. Mr. DuPraw
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 1B or 2.
History, theory and application of methods in microscopy, including sectioning and staining, phase contrast microscopy, fluorescence microscopy, photomicrography, autoradiography, and preparations for the electron microscope.
- 106. Analysis of Vertebrate Structure.** (4) II. Mr. Hildebrand
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 1B or 2. Recommended: courses 100, 100L.
The interpretation of vertebrate structure in terms of phylogeny and function.
- 107. Microanatomy.** (4) I. Mr. Rosenberg
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 1B or 2.
The finer structure and activities of organs, tissues, and cells of vertebrates, with emphasis on those of mammals.
- *110. Protozoology.** (4) II. Mr. Rosenberg
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 1A or Biology 1 and junior standing.
Structure, life history, and ecology of the groups of protozoa with emphasis on relationships to biological problems.
- 112. Invertebrate Zoology.** (4) II. Mr. Miller
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 1A or Biology 1 and junior standing.
Anatomy, classification and natural history of representative invertebrate animals, excluding protozoans and insects.
- 116. Principles of Animal Resource Management.** (3) I. Mr. Watt
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 1A or Biology 1; Mathematics 13, 16A.
Population dynamics and management of marine, freshwater, and terrestrial animal resources; analysis and solution of problems in maximization of animal resource production.
- 121. Cell Biology.** (3) I. Mr. DuPraw
Lecture—3 hours.
Prerequisite: Biochemistry 101 and Genetics 100, or the equivalent; or consent of the instructor.
The mechanics of living systems. A combined ultrastructural, physiological,

and biochemical analysis of subcellular organization, including such topics as nucleic acid "code," synthesis of specific macromolecules, contractility, photosynthesis and respiration, cell division, molecular structure of organelles, and cell regulatory mechanisms.

- 121L. Cell Biology Laboratory. (2) I.** Mr. DuPraw
 Laboratory—6 hours.
 Prerequisite: course 104 or the equivalent; course 121 (should be taken concurrently); consent of the instructor.
 Exercises illustrating principles of cell biology; individual programs of research, employing one or more advanced techniques.
- 125. Animal Ecology. (2) I.** Mr. Salt
 Lecture—2 hours.
 Prerequisite: A natural history or field course in biology.
 Theory of relationships between animals and their environments.
- 125L. Field Ecology. (2) I.** Mr. Salt
 Laboratory—6 hours.
 Prerequisite: course 125 (may be taken concurrently).
 Laboratory and field investigations of ecological phenomena.
- *126. Chemical Embryology. (2) I.** _____
 Lecture—2 hours.
 Prerequisite: course 100; Chemistry 1B or 8. Recommended: course 103.
 Molecular aspects of embryonic development and regeneration.
- 133. Biology of the Cold-Blooded Vertebrates. (4) I.** Mr. Jameson
 Lecture—2 hours; laboratory—6 hours.
 Prerequisite: course 1B or 2.
 Fishes, amphibians and reptiles; identification and classification; ecologic and geographic distribution; field study of habits and life histories; emphasis on species in California and western North America.
 Offered in odd-numbered years.
- 134. Biology of Birds and Mammals. (4) II.** Mr. Rudd
 Lecture—2 hours; laboratory—6 hours.
 Prerequisite: course 1B or 2.
 Identification, ecologic and geographic distribution; field study of habits and life histories; emphasis on species in California and western North America.
 Field trips included.
 Offered in spring semester of even-numbered years.
- 140. Limnology. (2) II.** Mr. Goldman
 Lecture—2 hours.
 Prerequisite: junior standing in one of the biological sciences. (Laboratory strongly recommended in conjunction with lecture course.)
 The biology and productivity of inland waters with emphasis on the physical and chemical environment.
- 140L. Limnology Laboratory. (2) II.** Mr. Goldman
 Laboratory—6 hours.
 Prerequisite: course 140 (may be taken concurrently).
 Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology.

- 142. Invertebrate Physiology.** (2) II. Miss Kammer
Lecture—2 hours.
Prerequisite: course 112 (may be taken concurrently); Chemistry 1A; Physics 2B. Recommended: Animal Physiology 100.
Comparison of the physiology of invertebrate organ systems.
- 142L. Invertebrate Physiology Laboratory.** (2) II. Miss Kammer
Laboratory—6 hours.
Prerequisite: course 142 (may be taken concurrently).
Studies and experiments on the physiological mechanisms of invertebrate organ systems.
- 144. Oceanography.** (3) I. Mr. Goldman
Lecture—2 hours; laboratory—3 hours.
Prerequisite: a course in biology; Chemistry 1A; Physics 1A; junior standing.
Biological, chemical, physical, and geological aspects of the marine environment. Consideration will be given to biological communities, productivity, the distribution of currents and tides, the origin of ocean basins, and marine sedimentation.
- 147. Zoogeography.** (2) I. Mr. Jameson
Lecture—2 hours.
Prerequisite: course 1A, Biology 1, or Entomology 1.
Movements of terrestrial animals. The role of geologic, climatic, and biologic changes in the geographic distribution of animals.
- 148. Animal Phylogeny and Evolution.** (3) II. Mr. Rudd
Lecture—3 hours.
Prerequisite: course 1A, Biology 1, or Entomology 1. Recommended: course 147 and Genetics 100.
The origins and relationships of the major groups of animals, with emphasis on the analysis of variation and the mechanics of evolutionary change.
- 150. Muscle Physiology.** (3) II. Mr. Baskin
Lecture—2 hours; laboratory—3 hours.
Prerequisite: an upper division course in animal physiology and Mathematics 9B or 16B; or consent of instructor.
The physical and chemical aspects of muscle function.
- 194H. Special Study for Honors Students.** (2-3) I and II. The Staff
- 195H. Honors Thesis in Zoology.** (1) I and II. The Staff
Prerequisite: course 194H and second-semester senior standing.
A comprehensive paper incorporating the studies undertaken in Zoology 194H.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

GRADUATE COURSES

- 202. Biomathematics.** (3) II. Mr. Watt
Lecture—2 hours; laboratory—3 hours.
Prerequisite: Mathematics 16B, 105A, and 105B or consent of the instructor.
Mathematical aspects of physiology, ecology, and epidemiology; development and testing of models, mathematical description of biological systems; measurement, analysis, simulation and optimization in biology.
Offered in odd-numbered years.

- 223. Seminar in Fisheries Management.** (2) II. Mr. Watt
Seminar—2 hours.
Prerequisite: course 116; Mathematics 16B, 105B.
Analysis of fish population problems, including review of recent research.
Offered in even-numbered years.
- 230. Advanced Cytology.** (2) II. Mr. Wolfe
Seminar—2 hours.
Prerequisite: consent of the instructor.
Discussion of topics of current interest in the ultrastructure of cells.
- 231. The Ultrastructure of Self-Replicating Systems.** (2) II. Mr. Wolfe
Lecture—2 hours.
Prerequisite: recommended—cytology, cell biology or cytogenetics; Genetics 100.
Structure and function of self-replicating subcellular organelles illustrated primarily in metazoan animals.
- 250. Recent Developments in Zoology.** (1) II. The Staff
Lecture—1 hour.
Prerequisite: graduate standing in Zoology.
A review of current zoological research.
- 289. Seminar in Analysis of Vertebrate Structure.** (1) I. Mr. Hildebrand
Seminar—1 hour.
Prerequisite: course 106.
Reports and discussion on advanced topics in vertebrate morphology.
- *291. Seminar in Protozoology.** (1) II. Mr. Rosenberg
Seminar—1 hour.
Prerequisite: course 110 or consent of the instructor.
Reports and discussion on selected topics in the field of protozoology.
- 292. Seminar on Development.** (1) I. Mr. DuPraw
Seminar—1 hour.
Prerequisite: consent of the instructor.
Reports and discussion on embryology, morphogenesis, and developmental mechanisms.
- 293. Seminar in Invertebrate Zoology.** (1) I. Mr. Miller
Seminar—1 hour.
Prerequisite: course 112 or consent of the instructor.
Reports and discussion on selected topics in invertebrate zoology with emphasis on recent advances.
- 294. Seminar in Animal Ecology.** (1) I. Mr. Rudd, Mr. Salt
Seminar—1 hour.
Prerequisite: course 125 or consent of the instructor.
Discussion of advanced topics in the field of animal ecology.
- 295. Seminar in Limnology.** (1) II. Mr. Goldman
Seminar—1 hour.
Prerequisite: course 140 or consent of the instructor.
Reports and discussion on recent developments in limnology and related advances in oceanography.
- *296. Seminar in Parasitology.** (1) I and II. Mr. Baker, Mr. Douglas
Seminar—1 hour.
Prerequisite: consent of the instructor.
Reports and discussion of fundamental principles and selected topics in parasitology.

* Not to be given, 1965-1966.

297. Seminar on Systematic Zoology and Evolution. (1) II.

Seminar—1 hour.

Mr. Rudd, Mr. Hildebrand

Prerequisite: consent of the instructor.

Reports and discussion on 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.

299. Research. (1-6) I and II.

The Staff

RELATED COURSES

General Cytology (Botany 130)**Genetics** (All courses)**Animal Physiology** (All courses)**Mammalian Physiology** (Physiological Sciences 140 and 140L)**Avian Physiology** (Poultry Husbandry 107 and 108)**Elements of Animal Nutrition** (Animal Husbandry 105)**Metabolism and Food Utilization** (Animal Husbandry 120)**Intermediary Metabolism of Animals** (Physiological Sciences 205)**Biochemical Aspects of Endocrinology** (Animal Husbandry 230)**Advanced Immunology** (Veterinary Microbiology 270)**Fundamentals of Radiation Biology** (Physiological Sciences 225)**Bacteriology and Microbiology** (All courses)**Graduate Seminar in Microbiology** (Veterinary Microbiology 290)**Principles and Techniques of Nematode Taxonomy and Morphology**
(Nematology 220)**Nematode Taxonomy and Comparative Morphology** (Nematology 225)**Introduction to Entomology** (Entomology 1)**Natural History of the Insects** (Entomology 10)**Structure and Function in Insects** (Entomology 106)**Systematic Entomology** (Entomology 112)**Insect Ecology** (Entomology 127)**Graduate Seminar in General Entomology** (Entomology 290)**Invertebrate Paleontology** (Geological Sciences 111)

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