

UNIVERSITY

OF

CALIFORNIA

GENERAL

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DAVIS



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Fall and Spring Semesters 1962-1963

August 1, 1962

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General Catalogue

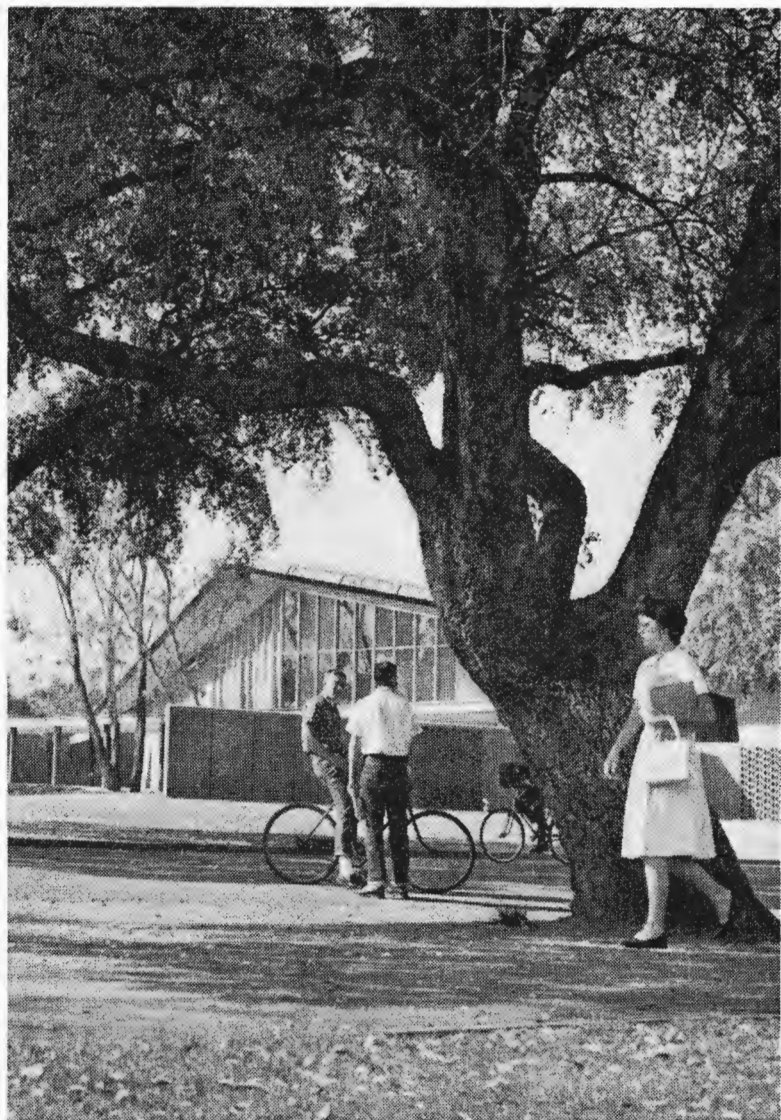
DAVIS

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UNIVERSITY OF CALIFORNIA, DAVIS



Freeborn Hall

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University Calendar

1962-1963

Davis Campus

Fall Semester 1962-1963

- Aug. 1, Wednesday Credentials and applications for admission to graduate standing for fall semester 1962 must be filed with the Dean of the Graduate Division on or before this date.
- Aug. 15, Wednesday 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. 24, Friday Applications for readmission to undergraduate and graduate status for fall semester 1962 must be filed with the Registrar on or before this date.
- Sept. 3, Monday Labor Day—academic and administrative holiday.
- Sept. 10, Monday Fall semester begins.
- Sept. 10, Monday }
Sept. 15, Saturday } Orientation and testing.
- Sept. 13, Thursday }
Sept. 14, Friday } Registration.
- Sept. 17, Monday Instruction begins.
- Sept. 28, Friday Candidates who expect to complete work for master's degrees to be conferred in January 1963 must file for candidacy on or before this date.
- Oct. 1, Monday Candidates who expect to complete work for A.B. and B.S. degrees to be conferred in January 1963, must file announcement of candidacy with the Registrar on or before this date.
- Oct. 5, Friday Candidates who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1963 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. 12, Friday Petitions to drop courses without scholarship penalty must be filed with the Registrar on or before this date.
- Oct. 31, Wednesday Applications to take engineering examinations required for admission in the spring semester 1963 must be filed on or before this date.
- Nov. 2, Friday Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in January 1963 must be filed in final form with the committees in charge on or before this date.
- Nov. 10, Saturday Engineering examinations, lower division and upper division.
- Nov. 22, Thursday }
Nov. 23, Friday } Thanksgiving holiday—academic and administrative holiday.
- Nov. 22, Thursday }
Nov. 24, Saturday } Fall recess—an academic holiday.
- Dec. 14, Friday Theses for master's degrees to be conferred in January 1963 must be filed in final form with the committees in charge on or before this date.
- Dec. 15, Saturday Applications for admission to undergraduate standing, including applications for intercampus transfer, for spring semester 1963 must be filed, with complete credentials, with the Registrar on or before this date.
- Dec. 17, Monday }
Jan. 1, Tuesday } Christmas recess—an academic holiday.

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

1963

Jan. 2, Wednesday	Instruction resumes. Credentials and applications for admission to graduate standing for spring semester 1963 must be filed with the Dean of the Graduate Division on or before this date.
Jan. 4, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in January 1963 must be filed on or before this date.
Jan. 11, Friday	Applications for readmission to undergraduate and graduate status for spring semester 1963 must be filed with the Registrar on or before this date.
Jan. 12, Saturday	Instruction ends.
Jan. 14, Monday	} Final examinations.
Jan. 23, Wednesday	
Jan. 15, Tuesday	Applications for graduate change of station for spring semester 1963 must be filed, with complete credentials, with the Registrar on or before this date.
Jan. 23, Wednesday	Fall semester ends. Theses for master's degrees to be conferred in January 1963 must be filed on or before this date.

Spring Semester 1963

Jan. 28, Monday	Spring semester begins.
Jan. 28, Monday	} Orientation and testing.
Feb. 2, Saturday	
Jan. 31, Thursday	} Registration.
Feb. 1, Friday	
Feb. 1, Friday	Applications for 1963-1964 undergraduate scholarships for current students must be filed on or before this date.
Feb. 4, Monday	Instruction begins.
Feb. 15, Friday	Candidates who expect to complete work for the master's degrees to be conferred in June 1963 must file application for candidacy on or before this date.
Feb. 18, Monday	Applications for fellowships and graduate scholarships for 1963-1964 must be filed on or before this date.
Feb. 18, Monday	Candidates who expect to complete the work for A.B. and B.S. degrees in June 1963 must file announcement of candidacy with the Registrar on or before this date.
Feb. 22, Friday	Washington's birthday—academic and administrative holiday. Candidates who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in January 1964 must file applications for candidacy on or before this date.
Feb. 25, Monday	Petitions to enroll or add courses to study lists must be filed with the Registrar on or before this date.
Feb. 28, Thursday	Applications for admission to the School of Veterinary Medicine must be filed with the Registrar on or before this date.
Mar. 1, Friday	Applications for 1963-1964 undergraduate scholarships for new students must be filed on or before this date. Petitions to drop courses without scholarship penalty must be filed with the Registrar on or before this date.
Mar. 15, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1963 must be filed in final form with the committee in charge on or before this date.
April 8, Monday	} Spring recess—an academic holiday.
April 13, Saturday	
May 7, Tuesday	Theses for master's degrees to be conferred in June 1963 must be filed in final form with the committees in charge on or before this date.
May 16, Thursday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1963 must be filed on or before this date.

May 25, Saturday	Instruction ends.
May 27, Monday	} Final examinations.
June 6, Thursday	
May 30, Thursday	Memorial Day—academic and administrative holiday.
June 6, Thursday	Spring semester ends.
	Theses for master's degrees to be conferred in June 1963 must be filed on or before this date.

First Summer Session 1963

June 17, Monday	Registration and first day of instruction.
July 4, Thursday	Independence Day—academic and administrative holiday.
July 26, Friday	First Summer Session instruction ends.

Special Summer Session 1963

July 1, Monday	Registration and first day of instruction.
July 4, Thursday	Independence Day—academic and administrative holiday.
Aug. 9, Friday	Special Summer Session instruction ends.

Second Summer Session 1963

July 29, Monday	Registration and first day of instruction.
Sept. 2, Monday	Labor Day—academic and administrative holiday.
Sept. 6, Friday	Second Summer Session instruction ends.



Memorial Union

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Lieutenant-Governor of California
State Capitol, Sacramento 14
- JESSE M. UNEHU, A.B.
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State Capitol, Sacramento 14
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San Francisco 4
- ROBERT E. ALSHULER, A.B.
President of the Alumni Association of
the University of California
3670 Wilshire Blvd, Los Angeles 5
- CLARK KEER, Ph.D., LL.D.
President of the University
714 University Hall, Berkeley 4
2147 Administration bldg,
Los Angeles 24

APPOINTED REGENTS

The term of the appointed Regents is sixteen years, and terms expire March 1 of the years indicated in parentheses.

- EDWIN W. PAULEY, B.S., LL.D. (1970)
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Los Angeles 25
- CORNELIUS J. HAGBERTY (1966)
A.F.L.-C.I.O. bldg, 815 Sixteenth at NW
Washington 6, D.C.
- DONALD H. McLAUGHLIN, B.S., M.A.,
Ph.D., D.Eng. (1966)
100 Bush st, San Francisco 4
- GERALD H. HAGAR, A.B., J.D. (1964)
1520 Central bldg, 14th and Broadway,
Oakland 12
- EDWARD W. CARTER, A.B., M.B.A., LL.D.
(1968)
14th Floor, United California Bank bldg,
600 S Spring st, Los Angeles 14
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(1970)
202 W First st, Los Angeles 53
- MRS. RANDOLPH A. HEARST (1974)
238 W Santa Inez av, Hillsborough
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2700 35th pl NW, Washington 7, D.C.

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590 University Hall, Berkeley 4
- John P. Sparrow, A.B., LL.B.
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590 University Hall, Berkeley 4
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Assistant Counsel
590 University Hall, Berkeley 4
- Milton H. Gordon, A.B., LL.B.
Assistant Counsel and Assistant
Secretary
590 University Hall, Berkeley 4
- Mark Owens, Jr., A.B., LL.B.
Assistant Counsel
and Attorney in Residence Matters
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- Donald L. Reidhaar, A.B., LL.B.
Assistant Counsel
590 University Hall, Berkeley 4

University of California

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_____, *Associate Dean of the School of Veterinary Medicine.*

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Lawrence J. Andrews, Ph.D., *Acting Dean of the College of Letters and Science.*

William F. Dukes, Ph.D., *Associate Dean of the College of Letters and Science.*

† Absent on leave, 1962-1963.

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 and provosts) 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, Provosts, 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

Northern Section 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 75 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 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 3,000-acre Davis campus is essentially a residential campus with 1,400 students living in new University halls. Flat terrain makes bicycles a favorite mode of travel, both on campus and in town.

The city of Davis, a college town of 10,000, 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.

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	Animal Science
Agricultural Economics	Animal Husbandry
Agricultural Education	Animal Physiology
Agricultural Production	Genetics
Agricultural Economics	Poultry Husbandry
Agronomy	Entomology and Parasitology
Animal Husbandry	Food Science
Dairy Industry	Home Economics
Enology	Design
Food Technology	Dietetics
General Agriculture	Foods
Irrigation	General Home Economics
Landscape Horticulture	Nutrition
Pest Control	Textile Science
Pomology	Irrigation Science
Range Management	Plant Science
Soils and Plant Nutrition	Agronomy
Vegetable Crops	Genetics
Viticulture	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
 Biological Sciences
 Botany
 Chemistry
 Dramatic Art and Speech
 Economics
 English
 French
 Geography
 Geological Sciences
 German
 History
 International Relations
 Mathematics
 Microbiology
 Music
 Philosophy

Physical Education
 Physical Sciences
 Physics
 Political Science
 Preprofessional Training
 Predental
 Prelegal
 Premedical
 Premedical Technology
 Prenursing
 Preoptometry
 Prepharmacy
 Prephysical Therapy
 Presocial Welfare
 Psychology
 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 of 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 25).

DEGREES AWARDED

Approximately 200,000 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 curricula 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.

SUMMER SESSIONS

In 1963 there will be two regular six-week Summer Sessions beginning on June 17 and on July 29. The first regular Summer Session will offer a number of lower division courses, upper division and graduate courses, many of which will be of interest to teachers and teacher candidates. The second Summer Session will offer courses primarily for teacher candidates who have been admitted to internship programs and to 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 200 series will be available for qualified students in both regular sessions.

A special Summer Session is offered during the period July 1 to August 9 to provide: 1. Upper division and graduate courses in agriculture and education for interested agricultural students, vocational agriculture teachers, and agricultural extension personnel. 2. Special study courses numbered 199 for advanced undergraduates and/or graduate research courses in the 200 series.

Summer sessions are also conducted on the Berkeley, Los Angeles, 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, as a special educational service agency of the University, makes available educational facilities to adults who seek training in some form of higher education. The program includes classes, conferences, correspondence courses, and special activities in a wide range of subject fields and interests. During the past few years, there has developed an increasingly large program of courses designed for those in the professions and those with advanced training. In addition, University Extension offers a large number of courses designed primarily for intellectual and cultural interests in the arts, social sciences, and other fields.

The educational services of University Extension are organized around three primary aims: to help men and women advance professionally; to aid them in meeting their responsibilities as citizens; to assist in their pursuit of intellectual interests.

Five principal methods of instruction are used:

1. Classes are organized in cities and communities wherever a sufficient number of people indicate an interest in a particular subject.

2. Conferences, institutes, and workshops for periods ranging from one day to several weeks, provide intensive instruction for groups interested in pursuing specialized knowledge.

* For information concerning admission to the University through University Extension, see page 22.

3. Lectures, singly or in series, are provided for committees, clubs, organizations, or communities which make the necessary arrangements for securing this service.

4. Correspondence courses offer lessons, study materials, and University guidance by mail.

5. Visual education aids in the form of motion picture films are available from film libraries maintained by University Extension in Berkeley and Los Angeles.

For information regarding any of these services, contact University Extension on any of the following University campuses: Davis, Berkeley, Los Angeles, Riverside, or Santa Barbara.



Academic Office Building

Admission to the University

The admission requirements of the University are based on two principles: that the best assurance of success in the University is shown by high quality of scholarship in previous work and that the study of certain specified subjects will give the student both good preparation for the work of the University and reasonable freedom in choosing his field of specialization. These principles apply to admission to either freshman or advanced standing.

APPLICATION FOR ADMISSION

Applications should be filed with the Office of Admissions, Room 5, Memorial Union. An application form, supplied upon request by the Office of Admissions, should be filed between October 1 and July 15 for the fall semester and between March 1 and December 15 for the spring semester.

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 there. Since applications will be processed and acted upon in only one Office of Admissions, applications to more than one campus should not be filed.

If, after an application has been filed, the applicant decides to register on a different campus, he should write to the Director of Admissions, 521 University Hall, University of California, Berkeley 4, indicating the campus where he filed his application, 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 should be received at least three weeks before registration.

APPLICATION FEE

Each applicant for admission is required to pay a nonrefundable fee of \$5 when an application is filed. Remittance by bank draft or money order payable to The Regents of the University of California should be attached to the application.

TRANSCRIPTS OF RECORD

Official transcripts of record should be sent by the applicant's high school and by each college attended directly to the Office of Admissions. Transcripts should include a statement of good standing or honorable dismissal from the last college attended. A preliminary transcript should show work in progress. *The applicant is responsible for requesting these transcripts to be sent to the Office of Admissions.*

NOTIFICATION OF ELIGIBILITY

So that students may be informed as early as possible about eligibility, they are urged to apply early in the application period and request promptly to have transcripts of record and, if required, Scholastic Aptitude Test scores, sent to the Office of Admissions.

The time between receipt of an application by the Office of Admissions and notification to the applicant about his eligibility will vary. Students applying as first-semester freshmen should ask the high school to submit preliminary transcripts showing the complete record through the next-to-last semester before graduation and listing courses in progress during the final semester.

Those applying after April 1 for the fall semester or after December 1 for the spring semester should not expect answers until at least four weeks after final transcripts reach the Office of Admissions. Those applying before these dates may receive notification somewhat more promptly.

Students applying for admission in advanced standing may expect notification about four weeks after final transcripts have been received. The receipt of preliminary transcripts may shorten this interval, and applicants for the spring semester should arrange for the submitting of preliminary transcripts showing work in progress, since provisional admission may be possible.

VACCINATION CERTIFICATE

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 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 sent routinely to all new students. Vaccination should be completed before registration.

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*. The intercampus transfer application forms and application for transcript of record forms may be obtained from the Office of the Registrar and must be filed with that office by August 15 for the fall semester and by December 15 for the spring semester.

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 Office of Admissions or the University Dean of Educational Relations, 521 University Hall, University of California, Berkeley 4.

All students should pursue a full program of academic subjects during their senior year in high school.

A statement of the requirements for the bachelor's degree is contained in this bulletin and in the *Announcement* of each school or college of the University. A copy of the desired *Announcement* may be obtained by writing to the Office of the Registrar.

Graduates of California high schools who are not eligible for admission to the University are usually advised to attend one of the California junior colleges and take courses applicable toward the requirements of the college in which they wish to enroll in the University.

ADMISSION TO FRESHMAN STANDING

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

If the applicant does not meet at the time of high school graduation the requirements given below for admission to freshman standing, he must qualify for admission to advanced standing (see page 21). An exception to this regu-

lation will be made only if the student's deficiency was the result of his having omitted one or more required high school subjects. Such a student can sometimes remove the deficiency during the summer if approval to do so is obtained in advance from the Office of Admissions.

If the applicant has attended a junior college, a four-year college, a university, extension classes of college level, or any comparable institution since graduating from high school, he is subject to regulations governing admission in advanced standing, regardless of whether he completed any courses.

Requirements for Admission to Freshman Standing

Applicants for admission to freshman standing must meet the requirements listed below. These requirements apply to California residents; for special requirements for out-of-state applicants, see page 22.

Graduation From an Accredited High School

An accredited high school in California is one that has been officially designated by the Board of Regents of the University as a school from which students will be admitted to the University primarily on the basis of their record of subjects completed and scholarship attained. The University publishes a list of accredited schools annually in September. Accreditation by the University refers to the college preparatory program of the high school and implies no judgment of other functions of the school. If the applicant comes from a high school that is not accredited, the Admissions Officer, upon request, will instruct him regarding the procedure he should follow. When residents of California have attended high schools outside California, the University determines acceptability of the high school records by consulting other accrediting agencies.

Subject Requirements

For grades required in the following subjects, see *Scholarship Requirements* below.

(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, certified by the high school principal as University preparatory.

(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 substituted 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 one of the following:

Mathematics, a total of 1 unit composed of second-year algebra, solid geometry, trigonometry, or an advanced course for which trigonometry is a prerequisite.

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*.

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

Scholarship Requirements

At least an average grade of B is required in courses taken in the tenth, eleventh, and twelfth years used to meet the *a* to *f* subject requirements. Courses taken for subject credit in the ninth year need show passing grades only.* 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 grade may not be used to compensate for D, E, or F grades. Courses completed in the tenth, eleventh, and twelfth years in which a grade of D is received will not be counted in satisfaction of the subject requirement.

Courses taken in the tenth, eleventh, and twelfth years in which a grade of C or lower is received may be repeated to raise grades in an amount not to exceed 2 units of the *a* to *f* pattern, if approved by the principal of an accredited high school from which the student graduates. Only the first repetition may be used to satisfy scholarship requirements, but additional repetitions are allowed to satisfy a subject requirement.

Minor Deficiencies

The Admissions Officer has authority and responsibility for waiving minor deficiencies when justified by unusual academic records or recommendations.

Admission by Examination

High school graduates who are ineligible on their high school records and who have had no college work subsequent to graduation from high school (except during a summer session between high school graduation and registration in the University) 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. Arrangements to take the test should be made with the Educational Testing Service, P.O. Box 27896, Los Angeles 27, California, or P.O. Box 592, Princeton, New Jersey. The fee for the Scholastic Aptitude Test is 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.*

Scholastic Aptitude and Achievement Test Dates

Test Dates

Saturday, December 1, 1962
 Saturday, January 12, 1963
 Saturday, March 2, 1963
 Saturday, May 18, 1963
 Wednesday, August 14, 1963

Application Deadlines

November 3, 1962
 December 15, 1962
 February 2, 1963
 April 20, 1963
 July 17, 1963

Since applications to take tests must be submitted at least four weeks before the date of the test, applicants should communicate with Educational Testing Service early in the year. Scores for the August tests are received too late for consideration for admission to the fall semester, and January tests are too late for admission to the spring semester.

* Effective with respect to applicants for admission in the fall semester of 1964 and thereafter, subject requirements in the *a* to *f* pattern may be satisfied only by courses in which a grade of C or higher has been assigned.

To qualify by examination the applicant must take the tests after completion of the first half of the eleventh grade. Test results must be forwarded directly from Educational Testing Service to the Office of Admissions.

To qualify for admission by examination, the applicant must take the Scholastic Aptitude Test and three Achievement Tests, one in English Composition, one chosen from Mathematics or Science, and one chosen from Foreign Language or Social Science. On the Scholastic Aptitude Test he must achieve a total score of at least 1000 and on the three Achievement Tests a total score of at least 1650 with no score in any Achievement Test of less than 500, regardless of the total score.

For examinations for out-of-state students, see page 23.

ADMISSION TO ADVANCED STANDING

An applicant who has attended 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

Applicants for admission to advanced standing must meet the requirements listed below. These requirements apply to California residents; for special requirements for out-of-state students, see page 23.

Satisfaction of High School Requirements

Students must satisfy, through either high school or college courses, the subjects required for admission of high school graduates to freshman standing (see page 18). The applicant must therefore have included in his college program courses acceptable for removing high school subject shortages caused by omission or by grades of D, E, or F. These courses may be taken in any approved college.

An applicant who was eligible for admission in freshman standing or whose only deficiency arose from not having studied one or more required high school subjects may be admitted at any time if he has satisfied the subject requirements for admission of high school graduates and his advanced standing work in institutions of college level has met the minimum scholarship standard required of transferring students, in no case lower than C average in the last college attended and a C average in all college work attempted.

Deficiencies in subject requirements will be waived in an amount not exceeding two high school units if the applicant presents at least 56 units acceptable for advanced-standing credit with a grade-point average of 2.4 or higher in all advanced-standing credit accepted.

Minimum Scholarship Requirements

The applicant's record in institutions of college level must have met the minimum scholarship standard required of transferring students, in no case lower than a 2.0 average in transfer courses in the last college attended and an over-all 2.0 average in all transfer courses attempted. If the applicant was ineligible at the time of high school graduation because of low scholarship or a combination of low scholarship and incomplete subject preparation, he must present a minimum of 56 units of transfer courses with a grade-point average of at least 2.4.

The applicant must also be entitled to return as a student in good standing to the last college attended.

Scholarship standard is expressed by a system of grade points and grade-point averages in courses acceptable for transfer to the University of California. The grade points are computed as follows: 1 unit of A counts 4 grade points; 1 unit of B counts 3 grade points; 1 unit of C counts 2 grade points; 1 unit of D counts 1 grade point; and units of E and F yield no grade points. 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.

Credit for Work Taken in Other Colleges

The University grants credit for courses appropriate to the curriculum in the University that have been completed in other accredited colleges and universities. This credit is subject to the restrictions of the senior residence requirement of the University.

As an integral part of the system of public education of California, the University accepts, usually 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 courses in one of the many excellent California public junior colleges. After a student has earned 70 units acceptable toward a degree (except credit allowed for military service and training) no further unit credit will be granted for courses completed at a junior college.

No applicant may receive transfer credit in excess of an average of 18 units per semester.

Extension courses taken at an institution other than the University may not be acceptable. The decision regarding their acceptability rests with the Admissions Officer. Students who plan such a program with the intention of applying it toward a degree at the University should have the approval of the Office of Admissions in advance.

Removal of Scholarship Deficiencies by Applicants from Other Colleges

Applicants from other collegiate institutions whose college records fail to show a satisfactory scholarship average but who are otherwise eligible may be admitted only when the deficiency has been removed by additional work completed with grades high enough to offset the shortage of grade points. Removal of deficiencies may be accomplished by work in other approved higher institutions, in summer sessions, or by courses in University Extension.

Minor Deficiencies

The Admissions Officer has authority and responsibility for waiving minor deficiencies when justified by unusual records or recommendations.

REQUIREMENTS FOR OUT-OF-STATE APPLICANTS

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

Requirements for Admission to Freshman Standing

Graduation From an Accredited High School

For schools outside California, regional or other accrediting agencies are consulted. The University makes the final decision regarding acceptability.

Subject Requirements

The same subject pattern as for California residents is required (see page 19).

Scholarship Requirements

The applicant must present evidence that he has maintained a grade-point average of 3.4 or higher on the required high school subjects. (1 unit of A counts 4 points; 1 unit of B counts 3 points; 1 unit of C counts 2 points; 1 unit of D counts 1 point; and units of E and F yield no points.)

Admission by Examination

Out-of-state applicants who are ineligible on their high school records and who have had no college work subsequent to graduation from high school (except during a summer session between high school graduation and registration in the University) may qualify for admission by examination. The requirements are the same as for in-state applicants (see page 20) 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), out-of-state applicants for admission to advanced standing must meet the following regulations.

Required Subjects and Scholarship

The applicant must have maintained a grade-point average of 2.8 or higher in college subjects acceptable for transfer credit.

The applicant is expected to have fulfilled the pattern of required high school subjects, if not before high school graduation then by having included in his college program the courses needed to remove any subject shortages. However, deficiencies in subject requirements will be waived in an amount not exceeding 2 high school units if the applicant presents 56 or more units acceptable for advanced standing credit with a grade-point average of 2.8 or higher.

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 offset this deficiency by presenting a minimum of 56 acceptable college units with a grade-point average of at least 2.8.

ADMISSION OF SPECIAL STUDENTS

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. 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 in which the applicant

plans to study. Admission is for a specified time only and a prescribed scholarship average must be maintained.

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. Graduates of high schools are expected to qualify for admission in accordance with the usual rules. A student admitted to regular status, if not a candidate for a degree, may pursue an elective or limited program with the approval of the dean of his college.

An applicant for special status must ordinarily 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. All courses are organized for regular students. 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 and who by reason of special attainments may be prepared to undertake certain courses in the University toward a definite and limited objective. Transcripts of record from all schools attended beyond the eighth grade must ordinarily be submitted. 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. 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 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 several months in advance of the opening of the semester in which the applicant hopes to gain admittance. 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 ap-

plicant's knowledge of English is tested by an oral and written 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.

College credit for the language and literature of a student from a country where the language is not English is given only for courses taken in native institutions of college level or for upper division or graduate courses taken in the University 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 sections) 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 the tests in another country should be made directly with the Educational Testing Service, P. O. Box 592, Princeton, New Jersey. A fee of \$13 is charged for these examinations and 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.

An adviser will assist foreign students in all matters pertaining to their attendance at the University. It is urged that every student from another country, upon his arrival at the University, consult the foreign student adviser.

ENGINEERING EXAMINATIONS

All students who plan to register in the College of Engineering in either the lower division or the upper division must take an engineering qualifying examination.

The Lower Division Engineering Examination is an aptitude test that contains sections on technical vocabulary, mathematical reasoning, and scientific relationships. Although it is not a condition of admission, a satisfactory score on this examination is prerequisite to the standard pattern of courses in the lower division of the College of Engineering; consequently, students who do 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 students who seek upper division status in the College of Engineering, including those from the lower division of the University.

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

The appropriate examination should be taken the semester before 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.

ADMISSION IN 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 6, Memorial Union, and must be filed, preferably twelve weeks before the date of registration, and in no case later than August 1 for the fall semester and January 2 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 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.

Transfer Within the Graduate Division

A graduate 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.* The transfer application forms may be ob-

† Veterans who expect to enroll under the provisions of Public Law 894 or Public Law 16 are not required to remit this fee with their applications.

tained from the Office of the Registrar or the Graduate Division and must be filed with the Office of the Registrar by July 15 for the fall semester and by December 15 for the spring semester.

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.

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.

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 in good standing carrying a limited amount of regular classwork may be permitted, on the basis of private study outside University classes, to take certain University examinations for the purpose of gaining advanced standing. The authorization of the proper faculty must, however, be obtained by written petition before preparation for the examinations is begun.

Students or prospective students should consult the *Registration Circular* for the dates to register and begin work. Registration later than the announced dates requires special permission. Late registration creates difficulties for students in making out their programs and retards their progress as well as that of the classes they are attending.

Students who register after the opening of the session and who later are found deficient in their work may not plead late admission as an excuse for deficiencies.

A \$10 fee is charged for late registration; this regulation applies both to old and new students.

A qualified student or applicant who fails to register on the stated registration days at the opening of the semester but who, nevertheless, appears during *the first two weeks of instruction* will usually be permitted to register. After the first week, however, he is required to obtain written approval from all the instructors in charge of his proposed courses and from the dean of his college before his registration can be completed. *In no event will a student be permitted to register or file his study list after Friday of the third 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.

A student normally registers for course work at the beginning of each semester. He may sometimes register for year courses in the second semester

without having been registered in the first semester; credit is given for the work of the second semester only.

Concurrent enrollment in resident courses and in extension courses is permitted only when the student's entire program has received the approval of the proper dean or study-list officer and the student has been registered at the University before undertaking the work.

Authority of Instructors

No student will be permitted to enter upon the study of any subject if, in the instructor's opinion, he lacks the necessary preparation to ensure competent work.

Every student must satisfy his instructors that he has the necessary preparation in course work to ensure completion and that he is performing his work in a proper manner. 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 AND PHYSICAL EXAMINATION

To safeguard the health of the student and the University community, every new student, as part of registration, must pass an examination by University Medical Examiners. Every new student must have at the time of registration a certificate of successful vaccination against smallpox within the past 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, such as uncontrollable convulsive seizures, 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. Any defects capable of remedial treatment, such as diseased tonsils or imperfect eyesight, should be corrected to prevent possible loss of time from studies.

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

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 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. Acceptance and enrollment in the upper division course will make the completion of the advanced course a prerequisite to graduation from the University, unless the student is excused by authority of the Secretary of the Army.

During the two-year period of the advanced course, the student will be paid a nominal commutation of subsistence in an amount prescribed by the Secretary of the Army.

During the third semester of the upper division (advanced) course, each student is classified according to his aptitude, qualifications, and desire for a par-

ticular 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, will qualify 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 \$1,330 for residents of California and \$1,880 for nonresidents. Expenses of about \$240 for resident students and \$465 for nonresident students are necessary during the first month after entering college.

It is possible to live simply and to participate moderately in the life of the student community on a limited budget. The best that University authorities can do to assist the student in planning his budget is to indicate certain and probable expenses.

Incidental Fee

The incidental fee is \$75 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 \$50 to \$70 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 \$8 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 student 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 4.

Students classified as nonresidents are required to pay a tuition fee of \$275 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

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. It is therein provided that a resident student is any person who has been a legal resident of the State of California for more than one year immediately preceding the opening day of the semester during which he proposes to enroll.

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.

SCHOLARSHIPS, PRIZES, LOANS

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

Scholarships and Fellowships

A circular on undergraduate scholarships may be obtained from the Registrar. Students who maintain an excellent scholarship standing are eligible to make application. Awards are made on the basis of scholarship and financial need. Recipients of undergraduate scholarships must enroll for a minimum of 12 units a semester. Applications for scholarships for any academic year (July 1-June 30) must be filed with the Committee on Undergraduate Scholarships not later than the preceding *February 1* by students already in attendance and not later than *March 1* by entering students. These dates are subject to change. Application forms are available in the office of the Dean of Students beginning the last week in November.

Information about fellowships for graduate students may be obtained from the Dean of the Graduate Division, Room 6, Memorial Union. 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 15* 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

All loans for both graduate and undergraduate students are initiated in the Office of Dean of Students. At various times numerous individuals and organizations have made contributions to student loan funds. These are administered by the University according to the wishes of the donors and are not usually available during the first semester of residence. The National Defense Education Act of 1958 is providing funds for granting loans up to \$500 per semester and to a maximum of \$5,000 per student. Prospective students and students in their first semester of residence may apply for the NDEA loans. The number of such loans available will depend upon federal allocation of funds. Repayment can be extended over eleven years after graduation or leaving the University. Loan applications should be submitted three months in advance of need. Small amounts for short periods may be obtained in less time.

STUDENT 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.

A few part-time jobs are available to students who can adjust their academic programs to the employers' needs. Usually, class schedules must be arranged before referrals for employment can be given. Men with limited time or difficult schedules may often supplement their income by doing casual work in the library, the food service, or through miscellaneous jobs on the campus and in the community. Women students have some opportunities for work in food service on the campus and for housework and babysitting in the community.

The Student and Alumni Placement Center, Room 10, Memorial Union, assists students in finding part-time employment both on and off the campus. No charge is made for this service. Personal interviews are necessary, as arrangements cannot be made satisfactorily by correspondence. Those wishing part-time work should register with the Student and Alumni Placement Center upon arrival on the campus.

Career placement services are available to terminating students, graduates, and alumni who have matriculated on one of the campuses of the University.

EDUCATIONAL PLACEMENT

Educational Placement Service recommends graduates, students, and former students for teaching in universities, colleges, junior colleges, high schools and elementary schools. The Office registers candidates and assembles information into confidential files concerning 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, arrange interviews, and make recommendations for positions. Information may be obtained at the Office of Educational Placement, Room 10, Memorial Union.

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 Room 11, Memorial Union. Offices of the United States Veterans Administration are located as follows:

San Francisco Regional Office, 49 Fourth Street, San Francisco 3, California
Los Angeles Regional Office 1380 South Sepulveda Boulevard, Los Angeles 25, California

Veterans wishing to enroll under the provisions of Public Law 550 ("Korea" G.I. Bill) 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 veterans must be prepared to pay all fees and educational costs at the time of registration, since education and training allowances are paid to the veteran 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 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 7, California; or to Room 225, 542 South Broadway, Los Angeles 13, California; or to 515 Van Ness Avenue, San Francisco 2, California.

LIVING ACCOMMODATIONS

The University maintains residence halls and dining units for men and women and apartments for married students. In providing meals and living accommodations for students, 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.

Within the framework of the ASUCD, the student government functions in the residence halls; each hall maintains its own council to act on matters concerning the welfare of the individual residents.

In accordance with the policy of the University, each student is expected to observe the commonly accepted standards of morality, behavior, and good taste. A willful disregard for the spirit of these standards may constitute sufficient cause for terminating the student's connection with the University.

Board and room in the University residence halls costs about \$420 per semester—approximately the same as for fraternities and private accommodations in the city of Davis. Rooms in the residence halls contain the necessary furniture, linen, blankets, and study lamps; the rent includes the weekly laundering of linen. Contracts for residence are on a semester basis.

Applications for residence in any of the University halls and for the married students' apartments should be addressed to the Office of Housing Services, University of California, Davis.

A residence card must be filed in the Office of the Dean of Women by every woman student before her registration can be completed. Every woman under 21 years of age not living in campus housing must have not only the permission of the Dean of Women for her college residence but also the permission of her parent or guardian, whose approval must be indicated by signature on the woman's residence card provided at registration.

Fraternities

Fraternity membership is by invitation only. These organizations provide living quarters and meals for their members. Men students who are interested in pledging a fraternity in September should not apply for residence halls. Information about fraternities may be obtained by addressing the Dean of Students.

STUDENT HEALTH SERVICE

The Student Health Service, by preventing and treating acute illnesses, conserves the time of students for their classwork and studies. This service is made possible in part by the general funds of the University and in part by the staff physicians. It is not a health insurance; the service is limited by the staff and facilities available.

Each student registering in the fall and continuing through the spring semester and each student registering in the spring semester may, at need, have such medical care as the Student Health Service is staffed and equipped to provide from the first day of the semester in which the student first registers during the academic year to the last day of the spring semester of the same academic year or to the date of official withdrawal from the University. Additional service may be provided for seven days after the last day of the semester at the discretion of the Director of the Student Health Service. Any prospective registrant who receives health service and who does not register for the next following semester shall be required to pay toward the cost of the service rendered him up to the amount of the incidental fee. Hospitalization is also included in the services offered when, in the opinion of the University Physician, this is necessary and within the limitations herein outlined.

In the event of serious illness during the semester, hospital care for a period of up to thirty days may be given on the recommendation of the University Physician. If the patient is still ill at the end of the semester, he will be released from the hospital to the care of his home or community as soon as the University Physician considers it safe. Also, if injuries or illnesses are of a nature requiring prolonged care that will obviously prevent continuance in college during the current semester, the patient will be returned to his community or home for definitive treatment.

Off-campus medical care on authorized trips will be provided if the student is unable to return safely to the Student Health Center for medical care.

No definitive surgical treatment will be undertaken (as, for example, tumors of the bone) if such treatment would prevent the student from returning to college the same semester. Charges will be made for unusual appliances or remedies not ordinarily available or for hospitalization in excess of thirty days.

The Student Health Service does not take responsibility for dealing with any chronic physical defects or illnesses present at the time of entrance to the University (for example, fitting of eyeglasses, hernias, chronic bone and joint diseases or deformities, chronic gastrointestinal disorders, fibroids of the uterus, chronically infected tonsils, tuberculosis, syphilis, malignant diseases, allergic and endocrine disorders). Except for first aid and emergency care, the Student Health Service does not take the responsibility for dental treatments and will not undertake to treat any injury or illness when treatment has been initiated elsewhere. It does not take responsibility for treating remedial defects where medical or surgical treatment is elective and not of an emergency nature and where the student's best interests will be served by treatment during vacation.

UNIVERSITY LIBRARY

The University Library on the Davis campus contains about 250,000 books and receives annually about 7,000 current periodicals and serials. These have been selected to support the teaching and research needs of the College of Agriculture, 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 several specialized departmental collections, which are primarily for laboratory or office use. Trained reference librarians are available for information and advice on a 68-hour-a-week basis.

For further information students are referred to a pamphlet, *Using Your Library*, 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. Certifications regarding enrollment, class standing, and other pertinent information will be submitted to the student's Selective Service Board upon request. 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 15 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.

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 related to college life.

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 and academic advisers upon request.

Short-term, noncredit classes in developmental reading and effective study habits are offered each semester by the staff.

Further information about the Counseling Service and appointments for counseling interviews are available through the Counseling Office, Room 10, Memorial Union.

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 Circular*, 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 on the following day. 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 the 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 examination in English composition 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 May or June 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 301.) 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.

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. Successful completion of the examination carries 3 units of course credit. Students electing to satisfy the requirement by examination are requested to do so before the senior year.

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, 176A, 176B, 178A, 178B, 179, 180, 183; Political Science 1A, 1B, 102, 105, 113, 128A, 157A, 157B, 163, 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.

CANDIDACY FOR DEGREES

Every student who intends to be a candidate for a bachelor's degree at the end of the semester must file with the Registrar, on a date to be fixed by the Registrar, an announcement of candidacy. For filing this announcement later than the appointed date, a fee of \$3 is charged. In 1962-1963 these dates are: Monday, October 1, 1962, for candidates who expect to complete their work in January 1963; and Monday, February 18, 1963, for candidates for graduation in June 1963.

During the 1963 Summer Sessions, candidates for bachelor's degrees in July should file an announcement by Monday, June 24, 1963, while candidates for September degrees should file by Monday, August 5, 1963.

† 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.

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 120-124 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.

All graduates of any one calendar year—January 1 to December 31—are considered as belonging to the "class" of that year.

For filing dates concerning graduate degrees, see the *University Calendar*. Candidates for advanced degrees will file announcement of candidacy on the dates set by the Dean of the Graduate Division.

CREDIT AND SCHOLARSHIP

In both the University and the high school 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.

High school credit offered for admission to the University is reckoned in matriculation units; each represents one year's work in a given subject in the high school.

High school credit, when offered in satisfaction of high school graduation requirements, is measured in standard secondary units; that is, the credit granted for the study of a subject throughout the school year of thirty-six to forty weeks is stated in terms of the standard secondary unit. Each unit represents approximately one-quarter of a full year's work in high school and four standard secondary units represent one full year's work in high school.

Relation Between High School Matriculation Units and University Units

One year's work in the high school is regarded as equivalent to one University semester's work of college level; that is, a student desiring to make up any high school subject deficiency by offering work of college level can in one University semester earn as much credit as in one high school year.

The value of a University course in units is 1 unit for three hours of work 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. For most courses the average student is expected to spend two hours in preparing for one hour of lecture or recitation.

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 257, Academic Office Building.

GRADES OF SCHOLARSHIP

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, four of which are passing, as follows: A, excellent; B, good; C, fair; D, barely passing; E 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 E (not passed) indicates a record below passing but one that may be raised, without repetition of the course, by success in a further examina-

tion or by performing other tasks the instructor requires. 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; E 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.

MINIMUM UNDERGRADUATE SCHOLARSHIP REQUIREMENTS

College of Agriculture and College of Letters and Science

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

Probation

A student shall be placed on probation:

1. If at the close of his first semester his record shows six or more grade points less than twice the number of units undertaken.

2. 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 for which he has received a final report.

Dismissal

A student shall be subject to dismissal:

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

2. If while on probation his grade-point average for the work undertaken during any semester falls below two (a C average).

3. If after two semesters of probationary status he has not obtained a grade-point average of two (a C average), computed on the total of all courses undertaken in the University for which he has received a final report.

A student who becomes subject to the provisions of this regulation will also be subject to such supervision as the faculty of his college or school may determine. The faculty may dismiss from the University a student under its supervision, or, by suspending the provisions of this regulation it may permit a student subject to dismissal to remain in the University or permit the return to the University of a student dismissed under this regulation.

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.

College of Engineering

The following provisions apply to all undergraduate students in the College of Engineering.

Dismissal

A student will be subject to dismissal from the University:

1. If during any semester or summer session he fails to attain at least a grade C average in all courses for which he was enrolled.

2. If at the end of any semester or summer session he has failed to attain at least a grade C average in all courses undertaken in the University.

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

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 will ordinarily be granted only 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 col-

lege 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 most 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. Leave to be absent from a final examination must be obtained by written petition to the proper faculty.

If a final examination is among the regular requirements in a course, no individual exemption can be made, except as provided in the preceding paragraph.

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 E (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.

Application for examination for advanced standing on the basis of work done before entrance to the University should be made to the Registrar upon entrance.

REMOVAL OF DEFICIENCIES

A student who receives a grade lower than C in a lower division course 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. The foregoing privilege does not apply to grades received in upper division or graduate courses. A student who receives grade E or F in an upper division or graduate course 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, the student can receive no more than two grade points per unit.

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 E 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 E 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 E 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 E 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 E 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 E, his grade in the course will remain grade E, 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 E 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 E, 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, 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.

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 six degrees of discipline: warning, probation, official censure, suspension, dismissal, and expulsion. Censure indicates that the student is in danger of exclusion from the University. Suspension is exclusion for a definite period. Dismissal is exclusion for an indefinite period, with the presumption that the student's connection with the University will be ended by it. Expulsion, the most severe academic penalty, is final exclusion from 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 System, 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. Recommendations regarding matters of student conduct may be made to the Dean of Students. Appeals of such recommendations are reviewed by the Faculty Administrative Committee on Student Conduct. The Honor Spirit is a most 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 apply to the Office of the Dean of Students for a *brief leave of absence*, which expires on a definite date. 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. Leave to be absent from a final examination should be obtained by written petition to the proper faculty.

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.

No student may transfer from one major department to another after the opening of the final semester of his senior year.

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 the general student affairs of the University as well as in activities relating to their major departments and to their special interests. The entire undergraduate student body has membership in the Associated Students, an organization that governs all student affairs on the campus and maintains the honor system. All women students are also members of the Associated Women Students. A major effort of all students is Picnic Day, an open house held each spring.

The California Aggie, a weekly newspaper; *El Rodeo*, the yearbook; and *Parados*, a literary magazine, are published by students.

Opportunity to participate in many forms of athletics is presented. The University of California, Davis, is a member of the Far Western Intercollegiate Athletic Conference and stresses both intercollegiate and intramural athletics. Sports include football, basketball, boxing, track, baseball, tennis, wrestling, golf, swimming, and skiing. The Women's Athletic Association sponsors women's sports.

The Associated Students also support other activities, including the University band, an orchestra, ensemble groups, chorus, dramatics, a rifle team, and student forums.

The California Club, an organization of student leaders, emphasizes the unity of student life on all campuses of the University. The International Club promotes friendly relations among foreign-born and native students

and studies world problems. Students maintain clubs serving those interested in various special fields. Women who have achieved a grade B average during the freshman year are eligible for Agathon, sophomore honor society. Junior and senior honoraries include Blue Key, Alpha Zeta, and Scabbard and Blade for men students, and Prytanean for women. Those with high academic achievement may qualify for Phi Beta Kappa and Phi Kappa Phi.

THE JUNIOR YEAR ABROAD

Undergraduate students may spend a year of their college career studying outside the United States. The University conducts an undergraduate program in Bordeaux, France, and 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. Thorough preparation in the language of the country selected for study is of great importance; students should have completed at least four semesters of college courses in that language.

Students interested in studying abroad during their junior year are encouraged to consult early in their academic career with the campus Adviser for Undergraduate Study Abroad.

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 students' 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.

Graduates interested in the production phase of agriculture who majored in agricultural production are prepared for employment as farm or ranch operators or managers and engage in the production of agricultural commodities. Since many farm units engage in diversified production activities, graduates are prepared for agricultural operations which may combine livestock and field crops, field crops and vegetable crops, orchards and vineyards, etc.

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. 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 or agricultural engineering, 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. 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.

HONOR STUDENTS

An honor list is prepared each semester by the Dean of the College and is made public. It includes the names of students 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 (statewide) 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 (statewide) are not eligible for consideration for the award of honors.

The above designation of minimum grade point averages shall not impair the privilege of a section of the faculty to establish higher standards for the award of honors and highest 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 University during the senior year in the college and completion of at least the final 24 units of credit.
 - 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 58) 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 emphasis in agricultural business management. 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)

- General University requirements. (see page 49)
- College of Agriculture requirements. (see page 49)
- 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 and Physical Sciences (24 units)	
Analytic geometry, calculus and/or linear algebra	3
Chemistry	5
Physics	3
Statistical methods	6
Restricted electives: Bacteriology, botany, geology, physiology, zoology; 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. Unrestrictive 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 degree124

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

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, 115A or 115B. 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.

Graduate Study—The Department of Agricultural Economics offers programs of study and research leading to a Master of Science degree in Agricultural Economics. 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 49)	
2. College of Agriculture requirements. (see page 49)	
3. Curriculum requirements. (see page 50)	
a. Agriculture and closely related subjects. (26 units)	<i>Units</i>
Upper division agricultural economics	18
Agriculture, other than agricultural economics.	8
b. Natural Sciences and Physical 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*. (27 units)	
English and/or Speech	6
Principles of economics	6
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)	28

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 above:

Agricultural Economics 100A, 100B, and 106.

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

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 a Master of Education degree. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Agricultural Education.

Curriculum in Agricultural Education

(Major: Agricultural Education)

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|---|--------------|
| 1. General University requirements. (see page 49) | |
| 2. College of Agriculture requirements. (see page 49) | |
| 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 and Physical 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 |
| <hr/> | |
| Total units required for the Bachelor of Science degree124 | |
| 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; Education 160 or 187, 320A; | |
| Entomology 124; Irrigation 110; Plant Pathology 120; Soil Science 1. | |

AGRICULTURAL PRODUCTION

This curriculum provides training in more than one field of agriculture, and is designed for students who wish to go into diversified farming or business and services related to agriculture. The student may choose two fields of interest, one primary and one secondary (see below), or he may choose general

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

agriculture which provides even less specialization. The requirements are flexible. The student is thus free to choose from numerous agricultural courses—those that will best meet his needs as well as courses in the physical and social sciences.

Curriculum in Agricultural Production

(Major: Agricultural Production)

Primary fields of interest: Agricultural Economics, Agronomy, Animal Husbandry, Dairy Industry, Enology, Food Technology, General Agriculture, Irrigation, Landscape Horticulture, Pest Control, Pomology, Range Management, Soils and Plant Nutrition, Vegetable Crops, Viticulture.

Secondary field of interest: Agricultural Economics, Agricultural Engineering, Agronomy, Animal Husbandry, Enology, Food Technology, Irrigation, Landscape Horticulture, Pomology, Poultry Husbandry, Range Management, Soils and Plant Nutrition, Vegetable Crops, Viticulture.

1. General University requirements. (see page 49)	
2. College of Agriculture requirements. (see page 49)	
3. Curriculum requirements. (see page 50)	
a. Agriculture and closely related subjects. (35 units)	<i>Units</i>
Primary field of interest (see above)	12
Secondary field of interest (see above)	9
Electives	14
b. Natural Sciences and Physical Sciences*. (31 units)	
Botany	5
Chemistry	8
Genetics	3
Physics	3
Zoology	3
Electives	9
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 aid of the adviser. (These may be used to satisfy course requirements under 1 and 2 above or requirements for the fields of interest)	18

Total units required for the Bachelor of Science degree 124

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

Agricultural Economics

Primary Field: Economics 1A, 1B, Agricultural Economics 100A, and 9 additional units of upper division courses in agricultural economics. To graduate with a primary field of interest in agricultural economics, a student must have at least a grade C average in all upper division courses taken in agricultural economics.

Secondary Field: Economics 1A, 1B; Agricultural Economics 1, and 6 additional units of upper division courses in agricultural economics.

Agricultural Engineering

Primary Field: No primary field given.

Secondary Field: Nine units chosen from the following courses: Agricultural Engineering 12, 103, 104, and 105.

* Includes mathematics except courses C and D.

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

Agronomy

Primary Field: Botany 111; Chemistry 8; Entomology 124 or Plant Pathology 120; Irrigation 110 or Soil Science 1; Agronomy 1 and 9 additional units of upper division courses in agronomy.

Secondary Field: Botany 111; Chemistry 8; Entomology 124 or Plant Pathology 120; Irrigation 110 or Soil Science 1; Agronomy 1 and 6 additional units of upper division courses in agronomy.

Animal Husbandry

Primary Field: Bacteriology 1; Chemistry 1A, 8; Biochemistry 101; Veterinary Microbiology 111; Zoology 1A, 1B; Animal Husbandry 7, 7L, 103, 110, and 112 or 118.

Secondary Field: Chemistry 1A, 8; Animal Husbandry 7, 7L, 103, and 112 or 118.

Dairy Industry: Dairy Plant Management

Primary Field: Food Science and Technology 1, 118A-118B; 6 additional units from among courses 101, 105A, 108, 130, 132 or 190 in Food Science and Technology; and 3 units of general biochemistry.

Secondary Field: No secondary field given.

Enology

Primary Field: Bacteriology 1; Botany 1; Chemistry 5; Physics 2A, 2B; Viticulture 1, 3 and 9 units selected from Viticulture 124, 125, 140, and Food Science and Technology 107.

Secondary Field: Bacteriology 1; Chemistry 5; Viticulture 1, 3 and 6 units selected from Viticulture 124, 125, 140.

Food Technology

Primary Field: Food Science and Technology 1, 114; 7 additional units from among Food Science and Technology courses 101, 105A, 105B, 107, 108, or 190; and 3 units of general biochemistry.

Secondary Field: Food Science and Technology 1 and 7 additional units in upper division courses in Food Science and Technology.

General Agriculture

Primary Field: A total of 21 units of animal and plant science. Twelve units to be chosen from either animal or plant science and 9 units for the secondary field from the other field; 6 units of agricultural economics; and 6 units of agricultural engineering which must include 3 upper division units; and completion of 5 of the following courses which may be used in partial fulfillment of the above requirements: Animal Husbandry 103; Botany 107; Entomology 124; Irrigation 10 or 110; General Plant Nematology 100; Plant Pathology 120; Soil Science 1; Veterinary Microbiology 111.

Irrigation

Primary Field: Botany 111; Mathematics 16A; Soil Science 1, 107; and 12 units of irrigation including Irrigation 10 or 110, and 100.

Secondary Field: Botany 111; Soil Science 1, 107; and 9 units of irrigation including Irrigation 10 or 110, and 100.

Landscape Horticulture

Primary Field: Botany 1, 111; Entomology 124 or Plant Pathology 120; Irrigation 10 or Soil Science 1; Pomology 9; Landscape Horticulture 1, 105A, 105B, and 4 additional upper division units in Landscape Horticulture.

Secondary Field: 9 units of upper division courses in landscape horticulture approved by the departmental adviser.

Pest Control

Primary Field: A minimum of 12 units for the primary field in entomology or plant pathology and 9 units as the secondary field in the other of the two

fields. The 12 and the 9 units to be chosen from the following courses: Entomology 1 or 5 and 5L, 124, 128, and 198; Botany 119 and/or Plant Pathology 120, 122, 125, 126, 199. In addition, students must complete 4 of the following courses: Agricultural Engineering 104; Botany 8, 107, 111, 117; Chemistry 8; General Plant Nematology 100; Soil Science 1 or 109; Zoology 116.

Pomology

Primary Field: Botany 1, 111; Chemistry 1A, 1B, 8; Physics 2A; Plant Pathology 120; Irrigation 110; Entomology 124; Soil Science 1; Pomology 2 plus 12 units in pomology, 9 of which must be upper division units.

Secondary Field: Pomology 2 plus 9 other units in pomology, 6 of which must be upper division.

Poultry Husbandry

Primary Field: No primary field given.

Secondary Field: Poultry Husbandry 10, 11, 12, 112; and Veterinary Microbiology 111.

Range Management

Primary Field: Engineering 1A; Botany 111; Range Management 1; 9 units selected from the following list of courses with the approval of the range management adviser: Agronomy 112; Animal Husbandry 7, 7L, 103, 118; Botany 108, 117; Range Management 100, 103, 133; Soil Science 1; and the following courses offered at Berkeley: Forestry 103; Range Management 101, 102, 123, 133.

Secondary Field: Range Management 1; 6 additional units selected from the listing of courses under the primary field above.

Soils and Plant Nutrition

Primary Field: Chemistry 1A, 1B, 8; Geology 1A; Physics 2A, 2B; Soil Science 1, 107, 108, or 109, 118, 124.

Secondary Field: Chemistry 1A, 1B, 8; Geology 1A; Soil Science 1 and 6 additional units selected from the soil science courses listed under the primary requirements above.

Vegetable Crops

Primary Field: Botany 111; Chemistry 8; Entomology 124; Irrigation 110; Plant Pathology 120; Soil Science 1; Vegetable Crops 1, 1L, 101 and 6 additional units in vegetable crops. Recommended: Agricultural Economics 140; Botany 107.

Secondary Field: Vegetable Crops 1, 1L, 101, and 3 additional units in vegetable crops. Recommended: Botany 107; Irrigation 110.

Viticulture

Primary Field: Botany 111; Chemistry 8; Physics 2A; Soil Science 1; Viticulture 1, 3, 105 and 116; and an additional course chosen from the following: Agricultural Engineering 103; Pomology 121; Botany 107.

Secondary Field: Viticulture 1, 3, 105 and 116.

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.

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 husbandry. 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)

1. General University requirements. (see page 49)	
2. College of Agriculture requirements. (see page 49)	
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 and Physical 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

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 100C 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.

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 Chemistry 1A, 1B, 5, and 8; Zoology 1A, 1B, and at least one of the following courses: Zoology 100 and 100L, 106, 107, 112, or 125. 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 3A-3B or 16A-16B). The 12 units of upper division major requirements includes biochemistry lecture and laboratory. Physiology courses undertaken must include at least 3 units of laboratory work.

Genetics

Chemistry 1A, 1B, 8; Botany 1; Zoology 1A, 1B, 100, 100L; Physiology 1, 1L; Mathematics 13, 105A-105B. Recommended: Botany 130; Mathematics 3A, 3B; German 1, 2.

* 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 AND PARASITOLOGY

The curriculum in this department is designed to furnish basic training for students in one of the areas of emphasis of entomology and parasitology such as agricultural entomology, systematic entomology, and apiculture.

Graduate Study—The Department of Entomology and Parasitology 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 and Parasitology.

Curriculum in Entomology

(Major: Entomology)

1. General University requirements. (see page 49)	
2. College of Agriculture requirements. (see page 49)	
3. Curriculum requirements. (see page 50)	<i>Units</i>
a. Agriculture and closely related subjects. (24 units)	
Entomology and Parasitology.	15
Electives	9
b. Natural Sciences and Physical 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 for service and leadership in the food and allied industries—for 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.

* Includes mathematics except courses C and D.

** 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 49)	
2. College of Agriculture requirements. (see page 49)	
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 and Physical 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:	
Food Science and Technology 1, 103, 105A and 110; Bacteriology 105A.	

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 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: Design, Dietetics, Foods, General Home Economics, Nutrition, Textile Science)

1. General University requirements. (see page 49)	
2. College of Agriculture requirements. (see page 49)	
3. Curriculum requirements. (see page 50)	<i>Units</i>
a. Home Economics and closely related fields	
Lower division	6-12
Upper division	19-27

* Not including Mathematics C and D.

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

	<i>Units</i>
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:	

Design

Art 3A, 3B, 14A; 2 courses in history of art; Design 6A, 6B, 8, 191, 192A-192B or 196A-196B, 193 or 195, 197; Philosophy 137 or 145, Psychology 131. A total of 20 units of upper division design courses.

Dietetics

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

Foods

Home Economics 1A, 1B, 1L, 104A, 104B, 112A, 112B, 112L; Food Science and Technology 6 units; Bacteriology 1; Chemistry 1A, 1B, 5, 8; Economics 1A, 1B; Physics 2A, 2B; Physiology 1; Psychology 1A.

General Home Economics†

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

Nutrition

Home Economics 1A, 1B, 1L, 112A, 112B, 112L, 117, 141; Bacteriology 1; Chemistry 1A, 1B, 5, 8, 101 and 102 or Biochemistry 101 and 101L; Economics 1A, 1B; Physiology 1, 1L.

Textile Science

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

* Not including Mathematics C and D.

** 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 sections in courses 1A, 1B, 6, 7, 112A, 112B, and courses 140L, 175, and Design 130L.

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 Irrigation staff.

Students wishing to emphasize the engineering aspects of irrigation, drainage, and water resources should refer to the *Announcement of the College of Engineering*.

Curriculum in Irrigation Science

(Major: Irrigation)

1. General University requirements. (see page 49)	
2. College of Agriculture requirements. (see page 49)	
3. Curriculum requirements. (see page 50)	<i>Units</i>
a. Agriculture and closely related subjects. (37 units)	
Crops and Soil Science and/or Plant Nutrition.	14
Engineering and/or Agricultural Engineering.	8
Irrigation Science	15
b. Natural Sciences and Physical 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

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 10, and 142;
 Mathematics 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.

* Includes mathematics except courses C and D.

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

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 49)	
2. College of Agriculture requirements. (see page 49)	
3. Curriculum requirements. (see page 50)	<i>Units</i>
a. Agriculture and closely related subjects (24 units)	
Entomology	4
Irrigation, 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 and Physical 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:

Agronomy

Agronomy 1; Botany 1, 111; Chemistry 1A, 1B, 8; Mathematics 13; Soil Science 1; Plant Pathology 120; Irrigation 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

Chemistry 1A, 1B, 8; Mathematics 13, 105A; Zoology 1A. Recommended: Botany 130; German 1, 2; Mathematics 3A, 3B.

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 or 2.

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

Park Administration

Botany 1, 111; Chemistry 1A, 8; Landscape Horticulture 1, 105A, 105B, 108, 111; Park Administration 110, 134, 140; Engineering 1A; Physical Education 140; Public Administration (6 units). Recommended: Agricultural Economics 18; Architecture 3N; Botany 107; Irrigation 10; Soil Science 1.

Plant Pathology

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

Pomology

Bacteriology 1; Botany 1, 111 (or 120A-120B, 121A-121B); Chemistry 1A, 1B, 8; Irrigation 110; Physics 2A, 2B; Pomology 2; Soil Science 1. Recommended: Agricultural Engineering 103; Pomology 9, 105, 106A, 106B, 112, 121; Viticulture 116.

Vegetable Crops

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

Viticulture

Botany 1, 111; Chemistry 1A, 1B, 8; Viticulture 1, 3, 105, 116. Recommended: Agricultural Engineering 103; Irrigation 110; Viticulture 124, 125 or Pomology 121.

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 60 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 49)
2. College of Agriculture requirements. (see page 49)
3. Curriculum requirements:

- a. **General**

	<i>Units</i>
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
Statistics.....	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 94.

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 agencies, 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.

* Requirement may be fulfilled after admission to the School of Veterinary Medicine.

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

** Mathematics beyond trigonometry.

Curriculum in Range Management

(Major: Range Management)

1. General University requirements. (see page 49)	
2. College of Agriculture requirements. (see page 49)	
3. Curriculum requirements. (see page 50)	<i>Units</i>
a. Agriculture and closely related subjects (25 units)	
Agronomy and Range Management.....	12
Animal Husbandry	10
Soil Science	3
Summer Field Practice Course.....	0
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).....	9

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, 133.

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 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.

* 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.

Curriculum in Soil Science

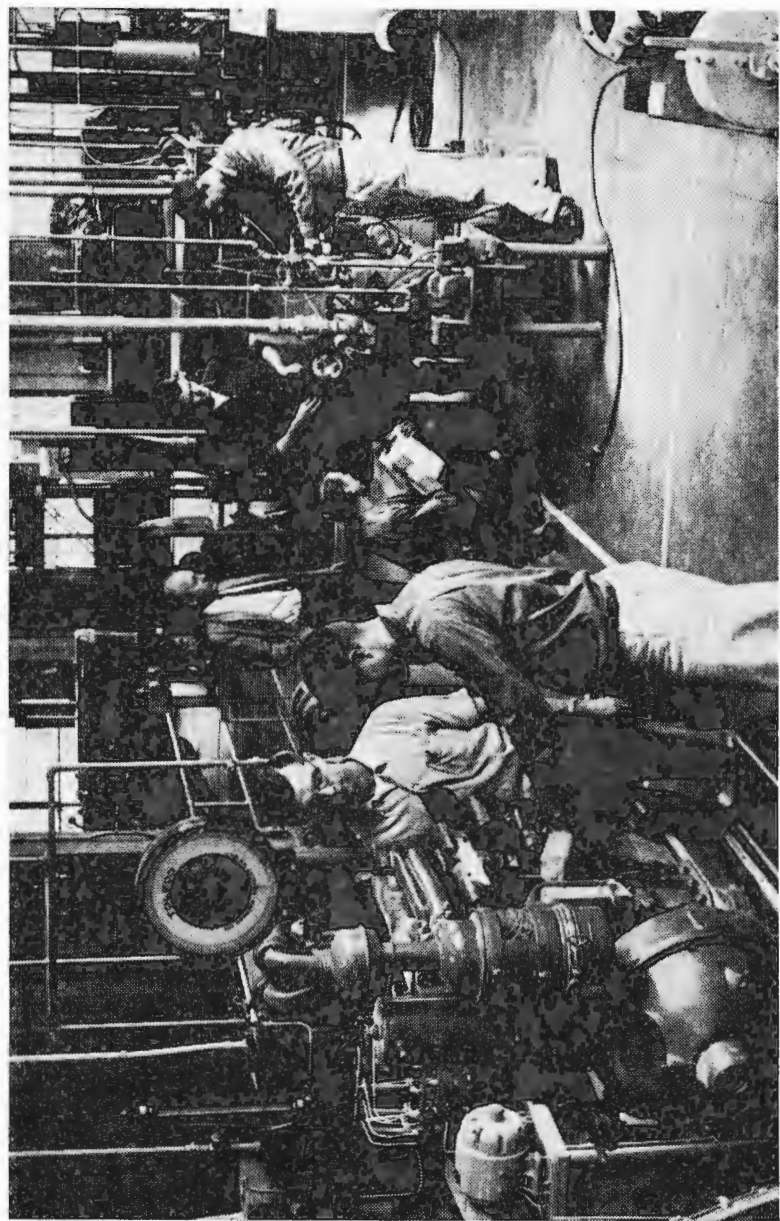
(Major: Soil Science)

1. General University requirements. (see page 49)	
2. College of Agriculture requirements. (see page 49)	
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 and Physical 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 106, Agronomy 131; Biochemistry 101-101L; Botany 120A-120B; Chemistry 5, 8, 109, 110A-110B; Engineering 1A, 10; Entomology 124; Geography 1, 3, 105; Geology 1B, 103, 104A, 112, 117; Irrigation 100, 110, 115, 135, 150, 160; Mathematics 3A, 4A-4B, 13, 16A-16B, 106, 107; Physics 2B-3B, 104, 105A-105B; Plant Nutrition 116; Plant Pathology 120.

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



Power laboratory

COLLEGE OF ENGINEERING

The University's programs in engineering education are designed to prepare students for all engineering functions and they place particular emphasis on design, development, and research. Mathematical analysis, the basic sciences, and design are stressed in preparing the student for a professional engineering career.

Engineering offerings on the Davis campus are being expanded this year to include instruction in the fields of study of agricultural, chemical, civil, electrical and mechanical engineering. The curriculum in engineering is a four-year undergraduate program leading to the degree of Bachelor of Science. Graduate programs leading to the degrees of Master of Engineering, Doctor of Engineering, Master of Science, and Doctor of Philosophy are available.

Admission

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 17-27) and must take an engineering examination (see page 68). 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, the student probably will be delayed in advancement to upper division status and in graduation.

Upper Division

Students who are admitted to the College of Engineering in lower division status will be advanced to upper division status only after they have completed the lower division program with satisfactory grades and have achieved a satisfactory score on the Upper Division Engineering Examination (taken in the last semester of the sophomore year). Students in the College of Engineering are not permitted to enroll in upper division engineering courses until they have been advanced to upper division status. Students admitted to the University in advanced standing, including those transferring from the California junior colleges or other educational institutions, will be advanced to upper division status in engineering at the time of admission provided they have completed the following minimum lower division subject and unit requirements and have achieved a satisfactory score on the Upper Division Engineering Examination:

† Or equivalent integrated courses covering the same subject material.

<i>Subject</i>	<i>Units</i>
Mathematics	12
(including differential and integral calculus, and elements of differential equations)	
Chemistry	8
Physics	10
Humanistic-social subjects*	6
Engineering†	10
(surveying or engineering measurements, graphics, properties of materials, statics)	
Unspecified subjects	10

(Three units may be nontechnical; the remainder are to be in technical and scientific subjects. They may include units, in addition to the number listed, in mathematics, chemistry, physics, and engineering. The student should select these subjects to satisfy the added lower division requirements of the curriculum he wishes to enter at the University of California. Failure to meet these added specific requirements will not prevent his entrance at the junior level, but he may have to make up any deficiencies in these requirements during the junior year.)

Total 56

Engineering Examinations

The Lower Division Engineering Examination is required of all applicants for admission to the College of Engineering prior to the junior year. This examination is an aptitude test and includes sections on technical vocabulary, mathematical reasoning, and scientific relationships. The Upper Division Engineering Examination must be passed satisfactorily by all continuing students prior to beginning the work of the junior year and by all upper division applicants prior to admission to the College of Engineering. This examination is an achievement test and includes sections on English, mathematics, chemistry, physics, and lower division engineering subjects. The examinations are the same as those required for admission to the College of Engineering at Berkeley or Los Angeles. Further information regarding these examinations may be found on page 25.

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 technical subject requirements and technical electives in the program of study.

* Exclusive of military science, physical education, Subject A, or any course equivalent to matriculation subjects.

† Must include some units in each of the four subject areas indicated.

Honors with the Bachelor's Degree

Upon the recommendation of the Committee on Undergraduate Study, a student may receive honors with the bachelor's degree for outstanding scholarship in all work undertaken after admission to the upper division. A student who, in the judgment of the committee, displays marked superiority may be recommended for the special distinction of 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 Associate 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 12 units without special approval by the Associate Dean of the College of Engineering.

LOWER DIVISION PROGRAM

The purpose of the lower division program is to provide the beginning student 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	Chemistry 1B ¹
Engineering 25	Engineering 10
Mathematics 3A	Mathematics 3B
Humanistic-Social Studies	Physics 4A
5	5
4	3
3	3
3	4
15	15
Sophomore Year	
Engineering 45	Engineering 35
Mathematics 14	Mathematics 106, 107.....
Physics 4B	Physics 4C
Humanistic-Social Studies	Humanistic-Social Studies ²
Elective	Elective
3	3
5	5
4	4
3	3
2	2
17	17

UPPER DIVISION PROGRAM

Programs of study in the various areas with the suggested technical electives are shown below. The first semester of the junior year is practically the same for all fields of study. Specialization within an area starts with the second semester of the junior year.

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 irrigation, drainage and water resources take Soil Science 1 or Irrigation 10 in the lower division, deferring 3 units of humanistic-social studies to the upper division. Likewise, students in chemical engineering should take Chemistry 5, deferring 3 units of humanistic-social studies until the upper division.

Agricultural Engineering (132 Units)

The areas of specialization are agricultural power and machinery, agricultural processing, and agricultural structures. The technical electives must include at least 9 units of engineering courses and 3 units of agricultural science.

Agricultural power and machinery treats traction and stationary power units (internal combustion and electric), and field equipment used in crop production and related activities. The design and economic aspects of power and machinery units and the relationships of these units to soils and crops are considered. This area treats the basic procedures appropriate to the design and development of engineering systems and their integration into the over-all agricultural enterprise.

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.

Agricultural structures considers the structure as a part of the over-all agricultural enterprise and is concerned with space and labor utilization and the economic value of the structure to the enterprise, as well as basic design features. The structure is also considered as a device for providing the optimum environment for such agricultural enterprises as animal production, product storage and conditioning, and crop production in greenhouses. Thus, the biological aspects and the various meteorological factors are recognized in the basic analysis and design of structures.

		Junior Year	
		<i>Fall</i>	<i>Spring</i>
Engineering 100A	3	Engineering 100B	3
Engineering 101	2	Engineering 105B	3
Engineering 102	3	Engineering 118 or	
Engineering 103	3	Engineering 131	3
Engineering 104	3	Technical Electives	3
Engineering 105A	3	Humanistic-Social Studies	3
	<hr style="width: 100%; border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> 17		<hr style="width: 100%; border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> 15
		Senior Year	
Engineering 114	3	Engineering 106	3
Engineering 115	3	Engineering 112	3
Technical Electives	8	Engineering 190	1
Humanistic-Social Studies	3	Technical Electives	6
		Humanistic-Social Studies	3
	<hr style="width: 100%; border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> 17		<hr style="width: 100%; border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> 16

Suggested technical electives are:

Agronomy 1 (or equivalent)	Introduction to Agronomy
Engineering 116	Agricultural power
Engineering 119	Dynamics of machines
Engineering 120	Advanced machine design
Engineering 121	Manufacturing processes
Engineering 122	Introduction to mechanical vibrations
Engineering 123	Engineering laboratory
Engineering 124	Engineering systems design
Engineering 125	Fluid mechanics and machinery

Engineering 132	Engineering design with metals, wood and concrete
Engineering 133	Engineering design with soils and asphalts
Engineering 136	Functional aspects of building design
Engineering 141	Intermediate fluid mechanics
Engineering 153	Momentum and energy transfer
Engineering 180	Instrumentation
Engineering 184	Experimental stress analysis
Soil Science 1	Introduction to Soil Science

Chemical Engineering (135 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 to allow for special training in an area of particular interest. For example, there is a unique opportunity for emphasizing biochemical engineering because of the extensive staff and facilities available in the biological and food sciences. By including elective courses from the Bacteriology, Biochemistry, and Food Science and Technology Departments, the student can obtain excellent preparation for graduate work or industrial employment in food processing and related biological fields.

Junior Year

<i>Fall</i>		<i>Spring</i>	
Chemistry 110A	3	Chemistry 110B	3
Engineering 100A	3	Chemistry 112A	5
Engineering 101	2	Engineering 152	3
Engineering 103	3	Technical Elective	3
Engineering 105A	3	Humanistic-Social Studies	3
Humanistic-Social Studies	3		
—		—	
	17		17

Senior Year

Chemistry 112C	3	Engineering 106	3
Engineering 104	3	Engineering 154	3
Engineering 153	3	Engineering 155B	2
Engineering 155A	1	Engineering 158	2
Engineering 156	2	Engineering 190	1
Technical Elective	3	Technical Elective	3
Humanistic-Social Studies	3	Humanistic-Social Studies	3
—		—	
	18		18

Suggested technical electives are:

Bacteriology 1	Introduction to Microbiology
Bacteriology 105A-B	Food and Industrial Bacteriology
Biochemistry 101	General Biochemistry
Biochemistry 101L	General Biochemistry Laboratory
Food Science and Technology 101	Chemistry and Biochemistry of Food Processing
Food Science and Technology 103	Physical and Chemical Methods for Food Analysis
Food Science and Technology 105A-B	Food and Industrial Microbiology Laboratory
Engineering 100B	Fundamentals of Electrical Engineering
Engineering 180	Instrumentation
Engineering 181	Introduction to Field Theory
Mathematics 128A	Numerical Analysis
Mathematics 185	Introduction to Functions of a Complex Variable
Physics 121	Introduction to Atomic Structure

Civil Engineering (133 Units)

The proposed areas of specialization in civil engineering are irrigation, drainage and water resources, and structural engineering and mechanics.

Irrigation, Drainage and Water Resources Engineering concerns hydraulics, surface and ground water hydrology, structures, systems, soils and plants in relation to the development, utilization, and disposition of water resources. Emphasis is placed on principles of planning, design, analysis, construction, and operation of irrigation and drainage and water supply structures and systems and water resources projects. Consideration is also given to water supply, water rights and institutions, water utilization and management, land preparation, water quality and pollution, and plant-soil-water relations.

Structural Engineering and Mechanics is concerned with the design and construction of various kinds of buildings and structures used in industry, commerce, agriculture, and aeronautics; involves use of wood, steel, concrete and other materials. Factors of weight, loading, wind and temperature, blasts and earthquakes are studied and brought into the design of structures and structural component parts. Consideration is also given to the operation and utilization of such structures. Included are studies on economics of construction related to capital cost and amortization, efficiency of labor, and using finished buildings, and environmental control for storage, processing and manufacturing.

Junior Year

Fall		Spring	
Engineering 100A	3	Engineering 131	3
Engineering 101	2	Engineering Geology	3
Engineering 102	3	Engineering 132	5
Engineering 103	3	Technical Elective	3
Engineering 104	3	Humanistic-Social Studies	3
Engineering 105A	3		
	<hr/>		<hr/>
	17		17

Senior Year

<i>Fall</i>		<i>Spring</i>	
Engineering 133	3	Engineering 106	3
Engineering 142	3	Engineering 147	3
Technical Electives	8	Engineering 190	1
Humanistic-Social Studies	3	Technical Electives	3
		Humanistic-Social Studies	6
	—		—
	17		16

Suggested technical electives are:

Irrigation, Drainage and Water Resources Engineering

Engineering 125	Fluid Mechanics and Machinery
Engineering 141	Intermediate Fluid Mechanics
Engineering 143	Water Resources Engineering
Engineering 144	Drainage Engineering
Engineering 145	Hydraulic Systems Design
Engineering 146	Irrigation Engineering Laboratory
Engineering 180	Instrumentation
Irrigation 100	Soil-Water-Plant Relations
Irrigation 160	Farm Irrigation Systems
Irrigation 170	Irrigation and Drainage Laboratory

Structural Engineering and Mechanics

Engineering 115	Farm Structures Design
Engineering 130	Material Mechanics Laboratory
Engineering 134	Analysis and Design of Buildings
Engineering 135	Advanced Structural Mechanics
Engineering 136	Functional Aspects of Building Design
Engineering 137	Construction Principles
Engineering 180	Instrumentation
Engineering 184	Experimental Stress Analysis

Electrical Engineering (133 Units)

The course of study in electrical engineering allows the individual student a maximum of freedom to develop himself in special areas of his choice while ensuring his attainment of a broad background in the engineering sciences. He is required to complete the common engineering core courses to provide a strong foundation for his studies in the electrical field. In addition, a specified group of upper division courses in network theory, field theory, atomic physics, electronic components and circuits, and the elements of design which are basic to any special studies in electronics, is required.

Technical electives are permitted during the senior year. They may be selected from a wide range of courses in electrical engineering, other engineering fields, mathematics, and the sciences. Typical fields of specialization are information and data processing, communications, solid state electronics, instrumentation and automatic control, circuit theory, and microwave devices and radiation.

The variety of course offerings permits the student to prepare himself for graduate study in any of the electronics fields, or to terminate at the bachelor level with a sound background in his chosen specialty.

		Junior Year	
		<i>Fall</i>	<i>Spring</i>
Engineering 100A	.....	3	Engineering 100B 3
Engineering 101	.....	2	Engineering 161 2
Engineering 102	.....	3	Engineering 181 3
Engineering 103	.....	3	Engineering 182 3
Engineering 104	.....	3	Physics 121 3
Engineering 105A	.....	3	Humanistic-Social Studies 3
		—	—
		17	17
Senior Year			
Engineering 160A	.....	3	Engineering 106 3
Engineering 162	.....	2	Engineering 160B 3
Technical Electives	.....	9	Engineering 190 1
Humanistic-Social Studies	.....	3	Technical Electives 6
		—	Humanistic-Social Studies 3
		17	—
			16

Suggested technical electives are:

Engineering 105B	Thermodynamics
Engineering 122	Introduction to Mechanical Vibrations
Engineering 124	Engineering Systems Design
Engineering 141	Intermediate Fluid Mechanics
Engineering 153	Momentum and Energy Transfer
Engineering 163	Information and Data Systems
Engineering 165A-B	Solid State Materials and Components
Engineering 166	Principles of Feedback
Engineering 167	Network Theory
Engineering 168	Electromechanical Devices
Engineering 171A-B	Electromagnetic Fields and Waves
Engineering 180	Instrumentation
Engineering 184	Experimental Stress Analysis
Mathematics 128A-B	Numerical Analysis
Mathematics 129	Theory of Automatic Digital Computers
Mathematics 131A-B	Statistics
Mathematics 185	Introduction to Functions of a Complex Variable

Mechanical Engineering (132 Units)

Mechanical engineering is concerned with the invention, development, design 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-fluid-power or machine design.

Junior Year				
<i>Fall</i>			<i>Spring</i>	
Engineering 100A	.....	3	Engineering 100B	..... 3
Engineering 101	.....	2	Engineering 105B	..... 3
Engineering 102	.....	3	Engineering 118	..... 3
Engineering 103	.....	3	Technical Elective	..... 3
Engineering 104	.....	3	Humanistic-Social Studies	..... 3
Engineering 105A	.....	3		
		17		15
Senior Year				
Engineering 123	.....	3	Engineering 106	..... 3
Engineering 153	.....	3	Engineering 190	..... 1
Technical Electives	.....	9	Technical Electives	..... 9
Humanistic-Social Studies	.....	3	Humanistic-Social Studies	..... 3
		18		16

Suggested technical electives are:

Heat-Fluid-Power

Engineering 116	Agricultural Power
Engineering 125	Fluid Mechanics and Machinery
Engineering 141	Intermediate Fluid Mechanics
Engineering 154	Transport Processes
Engineering 180	Instrumentation
Engineering 181	Field Theory

Machine Design

Engineering 119	Dynamics of Machines
Engineering 120	Advanced Machine Design
Engineering 121	Manufacturing Processes
Engineering 122	Introduction to Mechanical Vibrations
Engineering 180	Instrumentation
Engineering 183	Advanced Strength of Materials
Engineering 184	Experimental Stress Analysis

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 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.

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.

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 prerequisites can be met.

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 scientific or professional engineering degrees can be arranged in the following areas of study.

Master of Engineering

Doctor of Engineering

- Agricultural power and machinery, processing, and structures
- Food processing
- Irrigation, drainage, and water resources
- Microclimatology and environment

Master of Science

Doctor of Philosophy

- Applied mechanics
- Applied thermodynamics
- Fluid mechanics
- Heat and mass transfer
- Hydrology

For admission and program requirements write to the Associate Dean of the College of Engineering or to the Dean of the Graduate Division, University of California, Davis.

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 91.)

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. A special adviser is provided for each student planning a major not offered on the Davis campus. 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. Any request to take fewer than 12 units must be approved by the Dean of the College.

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 *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, 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.

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, XB, or XL.

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. 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. 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.

MATHEMATICS REQUIREMENT

Students must meet the mathematics requirement by *either* of the following:

1. Passing the mathematical section of the College Entrance Examination Board Scholastic Aptitude Test with a score of 400 or higher.
2. Passing any course given on this campus by the Department of Mathematics or an equivalent course taken in college.

This requirement must be completed by the end of the student's sophomore year, except in the case of transfer students. The latter must complete the requirement prior to graduation.

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. 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; course 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, 17. Performance courses: 2A*, 2B*, 3A-3B*, 12*, 14A*, 14B*, 101A-101B*, 102A-102B*, 107*, 129*, 141*, 142*.

Classics. All undergraduate courses.

Dramatic Art. All undergraduate courses except 124. Performance course: 190*.

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

French. All undergraduate courses except 1, 2, 3.

German. All undergraduate courses except 1, 2, 3.

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

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

- Latin. All undergraduate courses except 1, 2, 3.
 Music. All undergraduate courses except 10. Performance courses: 41*, 42*, 43*, 44*, 46A-46B*, 141*, 142*, 143*, 144*.
 Philosophy. All undergraduate courses.
 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, 175, 178A, 178B.
 Political Science. 118A, 118B, 119.

Social Sciences

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

Natural Sciences

The following courses or sequences of courses satisfy the laboratory science requirement: Botany 1, Entomology 1, Physiology 1L, Zoology 1A. Chemistry 1A; sequence Geology 1A (formerly 1), 1B; Geology 103 (formerly Geochemistry 100); sequence Physics 3A, 3B; sequence Physics 4A, 4B; sequence Physics 4A, 4C.

Biological Sciences (at least 3 units)

- Anthropology. 1, 152, 153.
 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, 150.
 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 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 than 30 or more than 60 units and must include at least 24 units in upper division courses. The types 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.

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

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 91), including not fewer than 36 units in upper division courses. 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. 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.

ENGLISH REQUIREMENT

The candidate must complete English 1A-1B.

FOREIGN LANGUAGE REQUIREMENTS

The candidate must complete course 3 of a foreign language or 8 units of one foreign language taken in college.

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.

MATHEMATICS REQUIREMENT

Students must meet the mathematics requirement by *either* of the following:

1. Passing the mathematical section of the College Entrance Examination Board Scholastic Aptitude Test with a score of 400 or higher.
2. Passing any course given on this campus by the Department of Mathematics or an equivalent course taken in college.

This requirement must be completed by the end of the student's sophomore year, except in the case of transfer students. The latter must complete the requirement prior to graduation.

MAJOR REQUIREMENT

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

Organized Majors and Professional Curricula

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.

To facilitate intercampus relations, the Dean of the College is authorized to designate a major, entitled "General Major," for those students enrolled on this campus for one semester only and who are to graduate from another campus of the University. This will enable intercampus transfers to be resident here for one semester and continue with majors not as yet organized on this campus.

Departmental programs are described in detail under "Courses of Instruction" beginning on page 105.

*American Civilization	Economics	Music
†American History and Literature	English	Philosophy
Anthropology	French	Physical Education
Art	Geography	Physical Sciences
Biological Sciences	Geological Sciences	Physics
Botany	German	Political Science
Chemistry	History	Psychology
Dramatic Art and Speech	International Relations	Sociology
	Mathematics	Spanish
	Microbiology	Zoology

Preprofessional training is offered in Pre dental (2 years), in Pre legal, in Pre medical (3 years), in Pre medical Technology, in Pre nursing (2 years), in Pre optometry (2 years), in Pre pharmacy (2 years), in Pre physical Therapy (3 years), and in Pre social Welfare.

Students who are interested in obtaining teaching credentials are referred to pages 99-104 of this bulletin.

AMERICAN CIVILIZATION

Only those students registered for the American Civilization program prior to the fall semester of 1961 will be accepted as majors during the academic year 1962-1963.

Chairman and Advisers: Mr. R. A. Wiggins, Mr. J. R. Owens.

The American civilization program is designed to give the students an understanding of their own civilization as a living culture. To this end they are directed to investigate its origin; its development; its economic, political, and social institutions; its philosophy; and its intellectual, scientific, and artistic achievements.

The program incorporates the course requirements of a social science major for the general secondary teaching credential and, with proper selection of electives, the course requirements of a teaching minor in English.

The Major Program

Lower Division Courses

No lower division courses are required in addition to those necessary to fulfill the breadth requirements of the College of Letters and Science. Students are advised to select courses, especially History 4A-4B, from the lower

* No new students registering during the academic year 1962-63 may declare American Civilization as a major.

† For information concerning major requirements see adviser, Mr. R. A. Wiggins, in Room 173, Academic Office Building.

division sequences in the humanities and social sciences. Selection should be made in consultation with the adviser to make certain that the prerequisites for upper division courses have been fulfilled.

Upper Division Courses

The candidate must complete 36 upper division units, 24 of which must be selected from the courses listed below with a minimum of 6 units in each of the three groups:

- Group 1:** Art 119B. The Art of the United States.
 Dramatic Art 150. American Drama.
 English 125E. The American Novel.
 English 137A-137B. Survey of American Literature.
 Music 128. Musical Literature: Music in the United States.
 Philosophy 135A. Contemporary Tendencies: British American.
- Group 2:** Economics 110. Economic History.
 History 174A-174B. Recent History of the United States.
 History 176A-176B. Social and Cultural History of the United States.
 History 178A-178B. Great Issues in United States History.
 History 179. Economic Growth of the United States.
 History 180. The Westward Movement to 1850.
 History 183. The Trans-Mississippi Frontier.
- Group 3:** Economics 121. Industrial Organization.
 Economics 150. Labor Economics.
 Geography 121. Geography of Anglo-America.
 Political Science 113. American Political Theory.
 Political Science 128A. Recent American Foreign Policy.
 Political Science 157A-157B. American Constitutional Law.
 Political Science 163. Political Parties.
 Political Science 166. Public Policy and the Governmental Process.
 Sociology 123. American Society.

The balance of 12 units may be selected in consultation with the adviser either from this list or from courses outside the list as they may seem appropriate. American Civilization 196, the Role of Natural Science in American Civilization, may count toward the 24 units but may not substitute for any part of the 6-unit minimum in each group.

The Honors Program

In addition to the basic 24 units described above, the student will complete the major requirements by taking American Civilization 194H once in the junior year and once in the senior year, American Civilization 197 in the last semester of the senior year, and an elective of his choice.

American Civilization 194H

Special Study for Honor Students is designed to permit supplementary or advanced study with a member of the faculty. During the last semester of the senior year students will read in preparation for a comprehensive examination in American studies under the supervision of a faculty committee. The graduating student will register in American Civilization 197 for this purpose.

For additional information see page 123.

BIOLOGICAL SCIENCES

Major Advisers: Mr. T. E. Weier, Mr. E. A. Pessagno, Mr. E. T. DuPraw.

This program is designed for students desiring a basic understanding of the living world together with some specialized knowledge of both the animal and plant kingdoms. It features a balanced distribution of preparatory and

advanced courses in botany, zoology, and related fields and provides a wider coverage of the biological sciences than is possible with a departmental major in any one of them.

A biological sciences major may serve as a basis for graduate study leading to advanced degrees preparatory for academic and professional careers in teaching; research; or practice of medicine, dentistry, and associated fields. It incorporates most of the course requirements of the life science major for the general secondary teaching credential. A choice of two major programs is offered leading either to the A.B. or to the B.S. degree in biological sciences (see below). The latter is suggested for students with professional orientation, whereas the traditional A.B. degree is recommended for the general student.

Bachelor of Arts Major Program

Lower Division Courses

Required: Botany 1; Zoology 1A-1B; Chemistry 1A, 1B or 8; and an introductory course in entomology or bacteriology. Recommended: introductory courses in other 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 taken in accordance with a plan approved by the major advisers. The program must include a course dealing with invertebrate animals; one with the vertebrates; a course in systematic botany; a course in plant morphology; and one course, either botanical or zoological, in each of the following fields: genetics and/or evolution, and physiology.

Bachelor of Science Major Program

Lower Division Courses

Required: Botany 1; Zoology 1A-1B; Chemistry 1A, 1B or 8; Bacteriology 1; Physics 2A-2B, 3A-3B. Recommended: introductory courses in other natural science and mathematics courses, such as Anthropology 1; Entomology 1; Geography 1, 3; Geology 1A, 1B; Mathematics 13; Psychology 1A-1B.

Upper Division Courses

A total of 30 units in biological sciences, including at least one course in each of the following four categories:

1. Plant morphology and taxonomy.
2. Animal morphology and taxonomy.
3. Physiology (plant or animal).
4. 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 student may elect additional upper division courses in the above-mentioned groups and/or in other biological fields, such as microanatomy and cytology, embryology, comparative anatomy, biochemistry, ecology, paleontology, and microtechnique.

The Honors Program

Students on the honor list may enroll in an Honors Program of courses leading to honors with either bachelor's degree (see page 93). The program features two options:

1. 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.
2. A comprehensive examination on completion of a special study course (197H).

For further information see page 93.

INTERNATIONAL RELATIONS

Major Adviser: Mr. V. J. Puryear.

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, 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 190A-190B; Political Science 124 or 144, 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 136 (The Soviet Union in World Affairs); History 146 (Europe since 1870).

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

PHYSICAL SCIENCES

Chairman and Major Adviser: Mr. M. E. Gardner.

The major in physical sciences is designed primarily for students who wish to obtain a general secondary credential. The lower division course requirements are similar to those of the major in chemistry or physics. 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; Mathematics 16A-16B.

Upper Division Courses

A total of 24 units of upper division work in chemistry, physics, and allied subjects taken in accordance with a plan approved by the major adviser. These must include Chemistry 8, 9, 109, or their equivalents, and a minimum of 6 upper division units in physics.

All units in chemistry in excess of 13 are counted as upper division units.

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.

Preprofessional Curricula

SCHOOL OF DENTISTRY

The School of Dentistry in San Francisco offers two curricula leading to the degree of Bachelor of Science and to the degree of Doctor of Dental Surgery. The student has the option, at the close of the second semester in the School of Dentistry, of registering in either one of two major curricula: restorative dentistry or orthodontics. At the end of the sophomore year (fourth semester) a selected small group of students may enter the Honors Curriculum, which is designed to train outstanding students in the fields of dental research and teaching. In addition to these, there is a curriculum for the training of dental hygienists, leading to the degree of Bachelor of Science.

Classes are admitted to the School of Dentistry once a year, in September. Applications for admission in September 1963, may be filed between January 1, 1962, and December 30, 1962. For application for admission write to the Office of Admissions, Room 62A, U. C. Hospital, University of California, San Francisco Medical Center, San Francisco 22.

Upon the satisfactory completion of six semesters of work the dental student will be eligible for the Bachelor of Science degree, and for the Doctor of Dental Surgery degree upon the completion of two additional semesters. The Bachelor of Science degree will be granted the student in the dental hygiene curriculum at the end of the fourth semester.

The dental student who wishes to qualify for the degree of Bachelor of Science in addition to the degree of Doctor of Dental Surgery must complete satisfactorily a special project and thesis in the field of his major interest under the supervision of a faculty committee, and receive at least C grades in 4 units of special instruction selected by the committee.

ADMISSION TO DENTAL CURRICULA

All applicants for admission to the dental curricula must have completed at least 60 units of college work with a scholarship average satisfactory to the Admissions Committee, including the requirements 2-5 listed below. Students who have attended the University of California must have a grade C average or better in work undertaken in the University. In addition, all applicants must take a performance test, designed to test manual dexterity. This test is given on the San Francisco campus immediately following the end of the spring semester and during the Christmas recess and during the period between the fall and spring semesters. One test will be given in the Los Angeles area at a time and place to be announced. Provided there is sufficient demand, one test will be given in Boulder, Colorado. The dental aptitude test of the American Dental Association is also a requirement for admission. This test is usually given in October, January, and April. Applicants for admission to the School of Dentistry must take one of the first two tests. For further information regarding this test, write to the Dean's office, Room 630 Medical Sciences Building, University of California, San Francisco Medical Center, San Francisco 22.

The School of Dentistry reserves the right to limit enrollment on the basis

of scholarship, results of the performance and aptitude tests, recommendations, and interviews. At the present time, because of limited facilities and the large number of applications, it is not possible for the School of Dentistry to act favorably upon applications from persons who have not had the major portion of their high school and preprofessional education and residence in California or in one of the far western states. Exception to this is made only in cases of persons who are over 21 years of age and who have been residents of the state of California for over one year. Students from the far western states without dental schools who are interested in certification for education benefits under the Western Interstate Commission for Higher Education program may write to the Dean of the School of Dentistry for a pamphlet describing the program.

The student will find himself more adequately prepared for the dental curricula if he has taken in high school the following subjects: English, 3 units; history, 1 unit; mathematics, 3 units (algebra, plane geometry, and trigonometry); chemistry, 1 unit; physics, 1 unit; foreign language, 4 units in one language. Students who do not complete trigonometry and 4 units of foreign language in high school may find that they will need more than two years to complete their pre dental requirements at the college level.

PREDENTAL CURRICULUM

Advisers: Mr. T. L. Allen, Mr. C. M. Garverick, Mr. C. P. Nash.

Requirements for First and Second Years

1. General University requirements.

Subject A (see page 37).

The requirement of American History and Institutions is pre-requisite to the bachelor's degree. Although this requirement may be satisfied while enrolled in the School of Dentistry, it is preferable that it be completed in the pre dental program. (See page 38.)

- | | |
|---|-------------|
| 2. English 1A-1B | 6 units |
| 3. Science | 28-32 units |
| a. Chemistry | |
| Inorganic (1A-1B) | 10 units |
| Organic lecture (8) | 3 units |
| Organic laboratory (9) or quantitative analysis (5) | 3 units |
| b. Physics with laboratory (2A-2B and 3A-3B or 4A-4B) | 6-8 units |
| c. Biology, including one full semester of vertebrate zoology,
with laboratory (Zoology 1A-1B) | 6-8 units |
| 4. Trigonometry (Mathematics C) | 3 units |
| It is strongly recommended that this requirement be completed in high school. | |
| 5. Foreign language (in not more than one language) | 12 units |
| This may be counted from high school at the rate of 4 units for the first two years and 4 units for each year thereafter. | |
| 6. Social science and humanities | 12 units |

Any accredited college courses in these fields may be counted in satisfaction of this requirement. The following subjects are recommended for the student's consideration: anthropology, economics, history, political science, psychology, sociology, history and appreciation of art or music, English or speech (in addition to the basic requirement), and philosophy.

Whenever scheduling permits, a student should include at least one year sequence in one of the subjects listed above.

If a student wishes to substitute mathematics in partial satisfaction of this requirement, he may include in his program a

maximum of 3 units of mathematics (in addition to the required trigonometry).

Applicants for admission to the School of Dentistry in 1963 who started their college work prior to 1958 may qualify for admission on *either* the above requirements or the requirements in effect in 1959 (see the *Announcement of the School of Dentistry, 1962-1963*).

ADMISSION TO THE DENTAL HYGIENE CURRICULUM*

Applicants for admission to the dental hygiene curriculum must have completed at least 60 units of college work with a scholarship average satisfactory to the Admissions Committee, including the requirements 2-9 listed below. Students who have attended the University of California must have a grade C average or better in work undertaken in the University. The University of California Dental Hygiene Performance Test is required of all applicants who meet the minimum grade point average, which is set each year in relationship to the total number of applicants. The dental hygiene aptitude test of the American Dental Hygienists' Association also is required of all applicants. All applicants are urged to take the test given in October of the year preceding admission. The School of Dentistry reserves the right to limit enrollment if applications exceed the available facilities and to require interviews and additional aptitude tests if they are necessary in the selection of a class. The student will find herself more adequately prepared if she has taken in high school the following subjects: English, 3 units; history, 1 unit; mathematics, 2 units (algebra, plane geometry); chemistry, 1 unit; physics, 1 unit; foreign language, 4 units in one language.

1. General University requirements.

Subject A (examination in English composition).

American History and Institutions (required for the bachelor's degree). The examination in American History and Institutions may be taken while enrolled in the School of Dentistry, but it is preferable to satisfy the requirement in the pre-dental hygiene program. (See page 38.)

- | | |
|--|------------|
| 2. English 1A-1B | 6 units |
| 3. Chemistry (1A, 8) | 8 units |
| 4. Biology (Zoology 1A-1B) | 8 units |
| 5. Psychology | 6 units |
| 6. Social science | 12 units |
| Courses in the fields of anthropology, economics, history, political science, psychology (in addition to the required 6 units), and sociology may be used to satisfy this requirement. | |
| 7. Humanities | 12 units |
| Courses in the field of history and appreciation of art or music, English or speech (in addition to the basic requirement), foreign language (in addition to requirement 8 below), and philosophy may be used to satisfy this requirement. | |
| 8. Foreign language (in not more than one language) | 12 units |
| This may be counted from high school at the rate of 4 units for the first two years and 4 units for each year thereafter. | |
| 9. Electives to complete a total of 60 units | 10-0 units |

Applicants for admission to the School of Dentistry in 1963 who started their college work prior to 1958 may qualify for admission on *either* the

* At the time this catalog went to press, academic legislation was pending which would make it possible for men to apply for admission to the Dental Hygiene Curriculum beginning in 1963. For further information write the Dean's Office, School of Dentistry, University of California, San Francisco Medical Center, San Francisco 22, California.

above requirements or the requirements in effect in 1959 (see *Announcement of the School of Dentistry, 1962-1963*).

PRELEGAL

Advisers: Mr. C. E. Jacobs, Mr. M. Zetterbaum.

Students interested in entering the profession of law should consult with Mr. Jacobs or Mr. Zetterbaum of the Department of Political Science.

PREMEDICAL CURRICULUM

Advisers: Mr. D. O. Banks, Mr. H. F. Gregor, Mr. E. P. Painter.

Preliminary Preparation

Completion of ninety semester hours of college work is a minimum requirement for admission to the University of California School of Medicine, San Francisco. This must include the subjects listed below; the corresponding courses offered at the University of California, Davis, are given in parentheses.

One year of English (English 1A-1B).

One year of general chemistry, with laboratory (Chemistry 1A-1B).

Three semester hours of quantitative chemical analysis (Chemistry 5).

Three semester hours of organic chemistry (Chemistry 8).

One year of college physics, with laboratory (Physics 2A-2B, 3A-3B).

One year of general zoology or biology, with laboratory (Zoology 1A-1B).

Three semester hours of vertebrate embryology (Zoology 100, 100L).

Eight semester hours of one modern foreign language.

All students who are candidates for the bachelor's degree must demonstrate a knowledge of American History and principles of American Institutions under the federal and state constitutions.

Courses beyond the minimum listed above can be selected to fit the interests and needs of the undergraduate student as well as fulfill the requirements of his particular college or university. College mathematics through calculus is practically mandatory for those seeking a career in medical research and, in the opinion of the faculty, is desirable for all medical students. Any course or group of courses in the physical, biological, behavioral, or social sciences or in the humanities is acceptable in the opinion of our admissions committee. Duplication of courses provided by the medical curriculum is not advised. For example, elementary human anatomy, physiology, or bacteriology would be considered undesirable as premedical courses.

The admissions committee encourages premedical students to take a four-year undergraduate curriculum, leading to a baccalaureate degree. Such a course has many advantages. First, it gives the student an opportunity to pursue an integrated program leading to a senior year in which he is able to do independent work. In addition, it offers a wider choice of electives, thus broadening the student's general educational experience. At least half the students entering the University of California School of Medicine, San Francisco, have received a baccalaureate degree. For practical reasons, however, many students must enter medical school at the end of three years of undergraduate work. The faculty of our School of Medicine recognizes this need and does not in any way discriminate against those who may apply for admission after the completion of the third year of undergraduate study. If the student has not received a baccalaureate degree prior to entering the School of Medicine, it is possible for him to receive the Bachelor of Science degree in medical sciences on successful completion of the first year of the School of Medicine curriculum.

For further information concerning the School of Medicine, see the *Announcement of the School of Medicine*, obtainable upon request from the Dean, University of California School of Medicine, San Francisco 22.

PREMEDICAL TECHNOLOGY CURRICULUM

Adviser: Mr. D. M. Reynolds.

Students interested in this field should consult with Mr. Reynolds of the Department of Bacteriology.

PRENURSING CURRICULUM

Advisers: A-L, Mr. G. W. Salt; M-Z, Mr. R. L. Rudd.

The prenursing or preprofessional program consists of two years preprofessional training to be taken at any accredited college or junior college where the appropriate courses are offered. The preprofessional program is followed by six semesters in the basic curriculum of the School of Nursing at the University Medical Center in San Francisco. Students graduate from the basic curriculum with a B.S. degree and are prepared to take the California State Board examination for a license as a registered nurse.

The two years (four semesters) of prenursing training at Davis must consist of a program that contains a minimum of 60 units, satisfies the breadth requirements (see page 79) of the College of Letters and Science, and includes the preparatory courses required by the School of Nursing. These latter are: Chemistry 1A, Bacteriology 1, Physiology 1 and 1L, Zoology 25, Psychology 1A, Sociology 1, English 1A, 1B, and satisfaction of the American History and Institutions requirement.

PREOPTOMETRY CURRICULUM

The curriculum of the School of Optometry leading to the Bachelor of Science degree and the Certificate of Completion and Master of Optometry degree consists of three years of professional study. To be eligible for admission to the School, two years of preprofessional study, comprising a minimum of 60 units of collegiate work including the subjects listed below, must have been completed with an average grade of C or better.

Required courses:

Bacteriology. 2 and 4, or 1 and 4.

Chemistry. 1A, 8

English. 1A-1B.

*Foreign Languages.

Mathematics. 3A or 16A.

Physics. 2A-2B, 3A-3B.

†Physiology. 1, 1L.

Psychology. 1A, 33 or 1A-1B.

PREPHARMACY CURRICULUM

Adviser: Mr. J. E. Warren

In order to fulfill the requirements for admission to the School of Pharmacy, it is necessary to complete a minimum of sixty semester hours of academic work, including the specific courses listed below. The courses indicated in parentheses are the required courses as offered on the *Berkeley* campus of the University of California. Equivalent courses at any accredited collegiate institution will satisfy the requirements. Courses which are similar in content, but not equivalent to the required courses as offered by the University of California, must be approved by the School of Pharmacy. Questions about the acceptability of specific courses should be directed to the Office of Student Admissions.

* Students must meet the breadth requirements of the College of Letters and Science.

† While Physiology 1, 1L constitute the preferable biological science sequence, this requirement may be satisfied for admission purposes by any one of the following, listed in order of preference: Zoology 1A-1B; Zoology 1A-Anatomy 25; Zoology 1A-Comparative Anatomy.

Subjects which must be included in the required sixty units:

- | | |
|---|----------|
| (1) One year of English (English 1A-1B) | 6 units |
| (2) One year of general chemistry with laboratory (Chemistry 1A-1B) | 10 units |
| (3) One year of physics with laboratory (Physics 2A-2B, 3A-3B)... | 8 units |
| (4) One year of analytic geometry and calculus (Mathematics 3A-3B or 16A-16B) | 6 units |
| (5) One year of general biology with laboratory (Zoology 1A and Botany 1) | 9 units |
| (6) One semester of vertebrate zoology (Zoology 1B) | 4 units |
| (7) One year of elective course work chosen from one field of study†... | 6 units |

PREPHYSICAL THERAPY CURRICULUM

Advisers: A-L, Mr. G. W. Salt; M-Z, Mr. R. L. Rudd.

The physical therapy curriculum consists of three years on the Davis campus and one year at the Medical Center in San Francisco. A B.S. degree is awarded on completion by the Medical School. The program at Davis must satisfy the breadth requirements of the College of Letters and Science, the University requirement in American History and Institutions, and total a minimum of 90 units including the following subjects: Chemistry 1A, Physics 2A or 2B, Zoology 25, Physiology 1 and 1L, and Psychology 168.

PRESOCIAL WELFARE CURRICULUM

Advisers: Mr. C. D. Bolton, Mr. E. M. Lemert.

Students planning to enter the field of social work are referred to Mr. Bolton or Mr. Lemert of the Department of Sociology (see page 295).

Letters and Science List of Courses

Of the 120 units required for the degree of Bachelor of Arts, 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, or accepted in partial satisfaction of the breadth requirement, shall for students offering that major at graduation, or for students offering that course in partial satisfaction of the breadth requirement, but for no others, be treated as if it were in the Letters and Science List of Courses.

The following list refers to the courses as given in the departmental offerings for the fall and spring semesters, 1962-1963.

American Civilization. All undergraduate courses.

Anthropology. All undergraduate courses.

Art. All undergraduate courses. Performance courses: 2A*, 2B*, 3A*, 3B*, 12*, 14A*, 14B*, 101A*, 101B*, 102A*, 102B*, 128*, 129*, 141*, 142*, 143*, 160*.

Bacteriology. All undergraduate courses except 105A, 105B.

Biological Sciences. All undergraduate courses.

Botany. All undergraduate courses except 8, 107, 155.

Chemistry. All undergraduate courses.

Classics. All undergraduate courses.

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

† A year course chosen from foreign language, mathematics, social science, philosophy, or the fine arts and selected from the courses offered in satisfaction of the breadth requirements in the College of Letters and Science.

- Dramatic Art. All undergraduate courses. Performance courses: 124*, 190*.
 Economics. All undergraduate courses.
 Education. 110.
 English. All undergraduate courses.
 French. All undergraduate 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 except 129.
 Military Science. All 6 units of lower division courses.
 Music. All undergraduate courses. Performance courses: 41*, 42*, 43*, 44*, 46A*, 46B*, 141*, 142*, 143*, 144*.
 Philosophy. All undergraduate courses.
 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 other students specially approved for inclusion in the honor list by the Committee on Honors.

Students on the honor list may take the 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.

At the discretion of the Dean, a student on the honor list 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 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." 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. In calculating grade-point standing, units gained in this way are not counted.

Students on the honor list who have senior standing and have attained at least a grade B average in the junior year at the University of California 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.

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

Honors with the Bachelor's Degree

Honors at graduation are conferred upon those students who have completed an Honors Program to the satisfaction of the department or major committee concerned and those students who have completed with distinction a regular program but who have not been enrolled in or completed an Honors Program.

Any student on the honor list may, upon the recommendation of his adviser, enroll in an Honors Program established for his major at any time not later than the first semester of his senior year. In special cases, a student who is not an honor student may enroll in such a program by permission of the Dean.

Students enrolled in Honors Programs have all the privileges of students on the honor list.

Students enrolled in an Honors Program are eligible for three kinds of honors with the bachelor's degree:

1. Honors—for completing an Honors Program to the satisfaction of the department or major committee concerned.

2. High Honors—for completing an Honors Program with distinction.

3. Highest Honors—for completing an Honors Program with great distinction.

Students who are not enrolled in an Honors Program but who qualify for honors at graduation upon recommendation of the department, the Committee on Honors, and the Executive Committee of the College of Letters and Science are not eligible for High or Highest Honors.

A list of students receiving Honors, High Honors, and Highest Honors is published in the annual *Commencement Program*.

SCHOOL OF VETERINARY MEDICINE*

The School of Veterinary Medicine offers a two-year curriculum leading to the degree of Bachelor of Science and a two-year graduate curriculum leading to the degree of Doctor of Veterinary Medicine.

Admission to the School of Veterinary Medicine

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

1. American History and Institutions; mathematics, 6 units**, and Subject A, as required.		
2. Curriculum requirements (General):		<i>Units</i>
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
		60

At least 60 units of credit in one of the colleges of the University of California, or other accredited institution, including the prescribed subjects listed in the pre-veterinary curriculum above (except that minor shortages may be waived by the admissions committee of the School of Veterinary Medicine).

Students are frequently required to take more than a minimum 60 units to demonstrate scholastic achievement.

The pre-veterinary curriculum offers a well-balanced basic training in natural science and the humanities that will prepare the candidate not only for the courses in the School of Veterinary Medicine but also to meet the varied problems of his chosen profession. This course of study can be completed on any of the campuses of the University or at any junior college or four-year college offering the prescribed courses.

Enrollment in the School is limited, with the candidates being selected in major part on the basis of scholarship. In addition, applicants must have had sufficient animal experience to serve as a basis for the study of veterinary medicine and to justify their desire to work with animals. Deficiencies in scholastic work and animal experience should not deter the candidate from filing an application, since all factors are reviewed by the Admissions Committee. The student should plan his program in such a way that in the event that he fails to enter the School of Veterinary Medicine, he can complete the requirements for the bachelor's degree in some other curriculum without loss of time.

Students are admitted to the School of Veterinary Medicine in the fall of each year. The necessary application blanks may be obtained from the Registrar and filed with him before March 1. All the requirements need not be completed at that time, but the student must supply a transcript showing work in progress.

* Prospective students should consult the *Announcement of the School of Veterinary Medicine*, obtainable without charge from the Registrar, University of California, Davis.

** May be completed in high school—trigonometry is prerequisite to physics at the University.

† Requirement may be fulfilled after admission to the School of Veterinary Medicine.

§ Mathematics beyond trigonometry.

Students who hold a recognized baccalaureate degree and are admitted to the School of Veterinary Medicine will register as graduate students studying directly for the degree of Doctor of Veterinary Medicine.

Admission in Advanced Standing

An applicant for admission in advanced standing 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.

Selection of Applicants

Enrollment in the School of Veterinary Medicine is limited. Candidates for admission are selected primarily on scholarship with particular emphasis being placed on the preveterinary requirements. Animal experience and personal qualifications must also be considered satisfactory. A personal interview may be required; if so, the Chairman of the Committee on Admissions will notify those concerned. Eligible applicants will not be considered until after the last date for filing applications.

For the information of those applicants who may be concerned with residence requirements, the following statements relative to residency are offered:

1. Not more than five applicants in each class whose legal residence is other than that of California will be accepted. The Committee on Admissions, however, is not obligated to select any out-of-State applicants.

- a. These five out-of-state applicants will ordinarily be selected from the bordering western states of Arizona, Hawaii, Nevada, and Oregon. To be considered an applicant from one of these places mentioned, the student must be a legal resident of that state.

- b. An exceptional candidate from anywhere in the world will be considered.

2. To be considered a bona fide California applicant, a student must have been a legal resident of California prior to the beginning of his preveterinary work. An exception to this rule may be made in the case of applicants whose legal residence in California has been clearly established on another basis than for the purpose of completing the preveterinary curriculum.

3. 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.

It is necessary to limit enrollment in the School. The basic reason is the supply of clinical material. Registration of students in excess of material and facilities available has been tried at other veterinary schools with the result that so many students were necessarily being assigned to limited numbers of cases that accreditation of the schools became jeopardized.

Minimum requirements for accreditation are outlined by the American Veterinary Medical Association and the Agricultural Research Service, United States Department of Agriculture, the largest employer of veterinarians in this country.

The two final years of the curriculum in Veterinary Medicine are administered by the Graduate Division. Upon completion of the requirements for the degree of Bachelor of Science, application must be filed for admission to the Graduate Division through the Dean of the School of Veterinary Medicine.

Further information is given in the *Announcement of the Graduate Division*, which may be obtained from the Dean of the Graduate Division, Room 6, Memorial Union.

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 and School of Veterinary Medicine requirements, including:

a. *American History and Institutions.* The student may meet this requirement by the passing of an examination in American History and Institutions or by the completion of courses prescribed by the University.

b. *Subject A.* The Subject A examination in English composition is required of every undergraduate student at the time of his first registration in the University. Students admitted with advanced standing may satisfy this requirement with a grade of C or better in one or more courses in English composition.

c. *Residence in the University during the final undergraduate year* in the School of Veterinary Medicine and completion of at least the final 24 units of credit.

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.

f. *Complete at least 124 units of University work at least 36 of which must be in upper division courses* (courses numbered 100-199). Not more than 4 of the 124 units may be in lower division physical education courses.

2. Complete, in the School of Veterinary Medicine, the following 74 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
e. Veterinary courses offered by the departments in the School of Veterinary Medicine	63
	74

Requirements for the Degree of Doctor of Veterinary Medicine

1. The candidate for the degree of Doctor of Veterinary Medicine must have completed the requirements for the bachelor's degree in one of the colleges or schools of the University of California or at another college or university of approved standing.

2. He must give satisfactory evidence of possessing a 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. 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 of the Northern Section.

Graduate Study

For information on work leading to higher degrees other than the D.V.M., see the *Announcement of the Graduate Division*, which may be obtained from the Dean of the Graduate Division, Room 6, Memorial Union.

Plan of Study

PREVETERINARY CURRICULUM

The following schedule of study need not be rigidly adhered to but it satisfies the requirements without conflicts. 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		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Animal Husbandry 7	3	..	Chemistry 8, 5	3	3
Chemistry 1A, 1B	5	5	Physics 2A, 2B	3	3
English 1A, 1B	3	3	Zoology 1A, 1B	4	4
Elective	3	6	Elective	5	5
	14	14		15	15

VETERINARY CURRICULUM

The completion of the first two years of the curriculum of the School of Veterinary Medicine satisfies the requirements for the degree of Bachelor of Science. The courses are primarily preclinical sciences but are closely correlated with and are basic to the work in the clinical sciences of the last two years.

The following are the schedules for the first two years of the School of Veterinary Medicine, corresponding to the junior and senior years of undergraduate study. The graduate curriculum in the School of Veterinary Medicine is given the third and fourth years.

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

THIRD YEAR			FOURTH YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Anatomy 220	..	4	Avian Medicine 251A-251B	1	1
Avian Medicine 208	3	..	Clinical Pathology 251A-251B	1	1
Clinical Pathology 201, 202	3	3	Clinical Pathology 270A-270B	0	0
Veterinary Medicine 203, 205	4	5	Pathology 251A-251B	1	1
Veterinary Medicine 206	..	3	Public Health 240	..	5
Veterinary Medicine 210, 220	2	4	Veterinary Medicine 204	..	5
Veterinary Medicine 230, 250	4	1	Veterinary Medicine 207	4	..
Veterinary Medicine 254	..	..	Veterinary Medicine 223	4	..
Veterinary Medicine 260	2	..	Veterinary Medicine 224	2	..
	18	20	Veterinary Medicine 225	1	..
			Veterinary Medicine 245	2	..
			Veterinary Medicine 251A-251B	5	5
			Veterinary Medicine 256A-256B	1	1
				20½	17½

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

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, Memorial Union.

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.

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, Memorial Union.

Organization of Graduate Study and Research

Graduate study and research is offered at Davis in:

Agricultural Chemistry (Ph.D.)	Food Science (M.S.)
Agricultural Economics (M.S.)	French (M.A.)
Agricultural Education (M.Ed.)	Genetics (M.S., Ph.D.)
Agronomy (M.S.)	Geological Sciences (M.S.)
Animal Husbandry (M.S.)	German (M.A.)
Animal Physiology (M.S., Ph.D.)	History (M.A.)
Anthropology (M.A.)	Home Economics (M.S.)
Art (M.A.)	Horticulture (M.S.)
Biophysics (Ph.D.)	Irrigation (M.S., Ph.D.)
Botany (M.A., Ph.D.)	Mathematics (M.A., Ph.D.)
Chemistry (M.S., Ph.D.)	Microbiology (M.A., Ph.D.)
Comparative Biochemistry (M.A., Ph.D.)	Nutrition (M.S., Ph.D.)
Comparative Pathology (M.S., Ph.D.)	Physics (M.A., Ph.D.)
Comparative Pharmacology and Toxicology (M.S., Ph.D.)	Plant Pathology (M.S., Ph.D.)
Dramatic Art (M.A.)	Plant Physiology (M.S., Ph.D.)
Economics (M.A.)	Political Science (M.A.)
Education (Teaching Credential)	Poultry Science (M.S.)
Engineering (M.Eng., D.Eng., M.S., Ph.D.)	Range Management (M.S.)
English (M.A., Ph.D.)	Soil Science (M.S., Ph.D.)
Entomology (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 of Doctor of Veterinary Medicine (see page 96).

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

Curricula for Teacher Education

Curricula leading to credentials in the general elementary, the general secondary, and certain special secondary fields are offered. In the secondary credential field the teaching majors and minors offered are those listed in the section below.

Agriculture	Mathematics
Art	Music
English	Physical Education
Foreign Languages	Physical Science
Homemaking	Social Studies
Life Sciences	Speech Arts

GENERAL REQUIREMENTS

The student must satisfy the following general requirements to complete a curriculum leading to a recommendation for a teaching credential. He must also fulfill the specific requirements of the credential for which he applies.

Oral English

The student must prove that he has a command of spoken English adequate to the purposes of instruction.

Health Certificate

The student is required to have a medical examination and to obtain a satisfactory certificate of health from a physician. Every new student must have with him at the time of registration, a certificate testifying to successful vaccination against smallpox within the last three years. A form for this purpose is provided by the University.

Citizenship

Each applicant for a credential must be a citizen of the United States. This is a requirement of the California State Department of Education. Non-citizens who have filed their first papers are eligible to apply for short-term credentials. Failure to complete the naturalization process within six months of the date of eligibility will result in the revocation of the credential. After a foreign student has become naturalized he may apply for a long-term credential.

Oath of Allegiance

The State Department of Education also requires each applicant for a credential to take an oath of allegiance.

The Constitution of the United States

The State Department of Education requires the completion of a course on the provisions and principles of the Constitution of the United States. This requirement may be satisfied by completing one of the following courses: Political Science 1A, 1B, 102, 105, 113, 128A, 157A-157B, 162, 163, 166; or one of the following sequences: History 17A-17B, 171A-171B, 172A-172B, 174A-174B, 176A-176B, 178A-178B, 179, 180, 183; or by passing an examination in American History and Institutions.

Admission to Graduate Standing

Upon graduation, each prospective candidate for a teaching credential must file a formal application for admission to graduate standing with the Dean of the Graduate Division. This application should be filed preferably twelve weeks before the beginning of graduate residence, and in no case later than August 1 for the fall semester and January 1 for the spring semester. The ap-

plication must be accompanied by a bank draft or money order for the \$5† application fee made payable to The Regents of the University of California. The transferring graduate student must furnish a transcript of his college or university work to both the Dean of the Graduate Division and the Chairman of the Department of Education or the Department of Agricultural Education when he files his preliminary application.

SPECIFIC REQUIREMENTS

Special Secondary Credentials

The student who plans to teach agriculture or home economics in the secondary schools may obtain the special secondary credential in vocational agriculture or homemaking, or the general secondary teaching credential, or both. At least two semesters of graduate work are required to fulfill the requirements in vocational agriculture, and one semester in homemaking.

In some schools it is an advantage to hold both a special vocational credential and a general secondary credential. An applicant qualifying for the special credential may use agriculture or home economics as the major and may obtain the general secondary credential by completing a minor and meeting the other requirements as outlined below.

**The Special Secondary Credential in Vocational Agriculture*

The University of California cooperates with the Bureau of Agricultural Education of the State Department of Education in offering the graduate training for the special vocational agriculture credential. Students desiring admission to the graduate training for the special credential must apply for and receive "cadet" appointments from the Chief of the Bureau of Agricultural Education in addition to applying for admission to the Graduate Division. Appointments are made only after personal interviews. Since supervised teaching comprises a major part of this training, students must spend one semester of this fifth year in directed teaching centers.

The Special Secondary Limited Credential in Agriculture

This credential authorizes the holder to teach the agricultural subjects named in the credential in secondary schools and requires 8 semester units of work in each of the subjects named. It does not authorize the holder to teach vocational agriculture in departments organized under the Federal and State Vocational Acts. Fifteen semester hours of professional work in education, including 4 semester units of directed teaching in agriculture, are required.

The Special Secondary Credential in Homemaking

The University of California cooperates with the Bureau of Homemaking Education of the State Department of Education in offering the training required for this credential. The undergraduate courses comprising the general major in home economics satisfy the subject-matter requirements for this credential.

Normally one semester of graduate work devoted primarily to supervised teaching and instruction in professional methods is required to complete credential requirements.

* A special summer session for high school teachers of vocational agriculture will be offered on the Davis campus beginning July 1, 1963, and ending August 9, 1963. This session will offer courses in education and agriculture for students who are candidates for teaching credentials and for teachers of agriculture and farm advisors who desire graduate training. Courses will also be offered for teachers who desire to complete requirements for administrative, supervisory, and general credentials.

† Veterans who expect to enroll under the provisions of Public Law 894 or Public Law 16 are not required to remit this fee with their applications. If the applicant is accepted and registers in the University, the fees will be paid by the government.

General Elementary Credentials

This credential authorizes the holder to teach any or all subjects in all grades, kindergarten through eighth grade, with the exception of classes in special education.

Candidates for this credential must satisfy specific requirements, in addition to the general requirements stated above. These requirements are fulfilled by the general education requirement for the bachelor's degree and are as follows:

1. Forty semester hours of general education with a minimum of 6 semester hours in each of the following areas:

a. Science and mathematics.

b. The practical arts and the fine arts—art, music, homemaking, health education, physical education, industrial arts, and similar fields.

c. Social sciences.

d. The communicative arts—languages, literature, speech arts, and similar fields.

2. A bachelor's degree from one of the academic colleges of the University or its equivalent.

3. Two semesters of graduate work including 6 semester hours in subject fields commonly taught in elementary schools.

4. A scholarship record of 2.5 or better in upper division courses and 2.75 or better in postgraduate courses.

5. Completion of the following:

a. A minimum of 24 semester hours of professional work in education, affording adequate preparation for teaching the statutory elementary school subjects and the subjects in which the applicant is required by law to be proficient. This work shall include:

(1) Fourteen semester hours of elementary education courses including:

(a) Two semester hours of introduction to elementary teaching.

(b) Four semester hours of methods of teaching basic elementary school subjects.

(c) Two semester hours in principles of elementary school curriculum.

(d) Three semester hours of psychological foundations of education.

(e) Three semester hours of social foundations of education.

(2) Eight semester hours of directed teaching. (This requirement can be met, subject to the approval by the Department of Education, by internship in an elementary school. Students intending to apply for the internship program are advised to contact the Department of Education at the beginning of their senior year).

(3) Two semester hours of a professional course (300 series or equivalent) in a subject matter department. The applicant may take this course as an undergraduate.

b. The completion of a two-semester-hour course, or the passing of an examination on the provisions and principles of the Constitution of the United States.

6. One semester course from each of the following areas is to be completed by the end of the fifth year. It is presumed that most of these, if not all, will be taken in the undergraduate program. Recommended courses to satisfy these requirements are indicated in parentheses for each area:

Art (Art 300)

California History (History 189A or 189B; Geography 131; or Political Science 104)

Child Development (Home Economics 131 or Psychology 112)

- English (English 1A or 1B).
- Geography (Geography 2 or 131).
- Mathematics (Math 36).
- Music (Music 10).
- Physical Education (Course 1 or 26).
- Psychology (Course 1A).
- Sociology or Anthropology (Soc. 1 or Anthropology 2).

General Secondary Credentials

This credential authorizes the holder to teach any or all subjects in all grades of any junior college¹, senior high school, four-year high school, junior high school, and the seventh and eighth grades of elementary schools with the exception of classes organized under the provisions of the Federal and State Vocational Educational Acts where special credentials in specific vocational subjects are required.

Candidates for recommendation for this credential must satisfy specific requirements, in addition to the general requirements stated above. Courses offered in fulfillment of the general education requirement for the bachelor's degree may also be applied toward the fulfillment of major and minor requirements, provided the courses are within the same subject field as the major and minor. The specific requirements are as follows.

1. Forty semester hours of general education with a minimum of 6 semester hours in each of the following four areas:

a. Science and mathematics.

b. The practical arts and the fine arts—art, music, homemaking, health education, physical education, industrial arts, and similar fields.

c. Social sciences.

d. The communicative arts—languages, literature, speech arts, and similar fields.

2. One major* and one minor* in teaching fields commonly taught in California senior or four-year high schools, or a major in a field not commonly taught, and two minors in acceptable teaching fields.

3. Two semesters of graduate work including 6 semester hours in subject fields commonly taught in junior and senior high schools.

4. A scholarship record of 2.5 or better in upper division courses and 2.75 or better in postgraduate courses.

5. Completion of the following:

a. A minimum of 22 semester hours of professional work in education.

This work is to include:

(1) Eight semester hours of education courses including:

(a) Three semester hours of psychological foundations of education.

(b) Three semester hours of social foundations of education.

(c) Two semester hours of methods and curriculum.

(2) Six semester hours of directed teaching.

(3) Eight semester hours, including a professional course (300 series or equivalent) in both the major and minor subject matter department, if offered. Additional electives sufficient to bring the total to eight semester hours must be chosen from the following: Education 115, 150, 163, and 320A.

b. Psychology 1A or its equivalent is prerequisite to all education courses.

The above course requirement in directed teaching can be met, subject to the approval by the Department of Education, by internship in a secondary school. Students intending to apply for the internship program are advised to contact the Department of Education at the beginning of their senior year.

* See page 103.

¹ Preference is given to holders of the master's or doctor's degree in appointment to junior college faculties.

Teaching Majors and Minors for the General Secondary Credential

In many instances the departmental major fulfills subject matter requirements for the teaching major. Prospective teachers are advised to consult counselors in the Departments 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. Helpful guidance in this choice may be obtained from the subject representatives.

*College of Agriculture***Agriculture**

Subject Representatives: Sidney S. Sutherland, Elwood M. Juergenson.

Major: See page 52.

Minor: A minimum of 20 units in agricultural subjects. Students should consult with subject representatives.

Homemaking

Subject Representative: Arline Johnson.

Major: See pages 58 and 59.

Minor: A minimum of 20 units in home economics.

*College of Letters and Science***Art**

Subject Representative: Richard L. Nelson.

Major: See "Art," page 138.

Minor: 20 units in the field of art. Not less than 9 units in this total in upper division courses (except as recommended by the Department of Art).

English

Subject Representative: Gwendolyn B. Needham.

Major: See "English," page 187.

Minor: 20 units including English 1A-1B, 46A-46B, and at least 9 units of upper division courses including English 106L and two courses chosen from English 125C-125D, 117J, 137A-137B. English 300 should be taken in the senior or postgraduate year.

French

Subject Representative: Merle L. Perkins.

Major: See "French," page 202.

Minor: Four semester French courses in the lower division, or their equivalents. Usually these will consist of French 1, 2, 3, 4. At least 12 units of upper division work in French including a full year course in conversation and composition.

German

Subject Representative: Siegfried B. Puknat.

Major: See "German," page 205.

Minor: Four semester German courses in the lower division, or their equivalents. Usually these will consist of German 1, 2, 3, 4. At least 12 units of upper division work in German including a full year course in conversation and composition.

Spanish

Subject Representative: Daniel S. Keller.

Major: See "Spanish," page 209.

Minor: 18 to 22 units in the lower division, or their equivalents. Usually these will consist of Spanish 1, 2, 3, 4, 25A-25B. Spanish 4 may be omitted with a grade of B or better. At least 12 units of upper division work.

Life Sciences

Subject Representatives: Milton A. Miller, T. Elliot Weier.

Major: See "Biological Sciences," page 83.

Minor: Botany 1; Zoology 1A-1B. At least 8 units of advanced work in zoology and botany; a laboratory course in a physical science.

Mathematics

Subject Representative: Albert C. Burdette.

Major: See "Mathematics," page 237.

Minor: 20 units of numbered mathematics including courses 1, 7, 16A-16B or 3A-3B, three units of upper division mathematics and not less than five additional units of mathematics. These last eight units shall be taken in three different areas of mathematics.

Music

Subject Representative: Jerome W. Rosen.

Major: See "Music," page 255.

Minor: Music 1A-1B or 27A-27B, 4A-4B, 5A, 108, 112A or 112B. Students are advised, in addition, to enroll in at least one performance course.

Physical Education

Subject Representatives: Charles R. Kovacic, Willard S. Lotter, James L. Sells, Marya Welch.

Major: See "Physical Education," page 267.

Minor: 20 units of physical education. Students should consult with representatives of the department as early as possible in their University programs.

Physical Sciences

Subject Representative: Harold G. Reiber.

Major: See page 85.

Minor: Chemistry 1A-1B and 8; Physics 2A-2B and 3A-3B; Chemistry or Physics—3 upper division units; a laboratory course in botany, zoology, or physiology.

Social Studies

Subject Representatives: Kenneth Thompson, Richard N. Schwab.

Major: A degree in one of the social sciences or an interdepartmental major may be offered (see page 81 and the course section of this Catalogue under the headings of Anthropology and Geography, Economics, History and Political Science, Psychology and Sociology). Students should consult with subject representatives in arranging their programs.

Minor: 20 units in the social sciences, of which 9 are in upper division courses.

Speech Arts

Subject Representatives: Theodore J. Shank, Ralph S. Pomeroy.

Major: See "Dramatic Art and Speech," page 163.

Minor: 20 units in dramatic art and speech including Speech 1A or 2A or 40 or 140 or 141; and Dramatic Art 10A or 10B or 127.

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.

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 4, California.

SYMBOLS

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

† Absent on leave, 1962-1963.

‡ Absent on leave, fall semester 1962-1963.

§ Absent on leave, spring semester 1963.

¹ Sabbatical leave in residence, 1962-1963.

² Sabbatical leave in residence, fall semester 1962-1963.

³ Sabbatical leave in residence, spring semester 1963.

* Not to be given, 1962-1963.

⁴ Not to be given, fall semester 1962-1963.

⁵ Not to be given, spring semester 1963.

To be given if a sufficient number of students enroll.

AGRICULTURAL CHEMISTRY

Clinton O. Chichester, Ph.D., *Chairman of the Executive Committee.*

Committee Office, 237 Food Technology Building

Committee in Charge:

‡Maynard A. Amerine, Ph.D., *Professor of Enology.*

Lawrence J. Andrews, Ph.D., *Professor of Chemistry.*

Richard A. Bernhard, Ph.D., *Assistant Professor of Food Science and Technology.*

Clinton O. Chichester, Ph.D., *Associate Professor of Food Science and Technology.*

Eric E. Conn, Ph.D., *Associate Professor of Plant Biochemistry.*

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.*

John L. Ingraham, Ph.D., *Associate Professor of Bacteriology.*

Lloyd L. Ingraham, Ph.D., *Associate Professor of Enzyme Chemistry.*

Eugene L. Jack, Ph.D., *Professor of Food Science and Technology.*

Walter G. Jennings, Ph.D., *Associate Professor of Food Science and Technology.*

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.*

George L. Marsh, M.S., *Professor of Food Science and Technology.*

Tommy Nakayama, Ph.D., *Lecturer in 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., *Associate Professor of Vegetable Crops.*

Harold G. Reiber, Ph.D., *Professor of Chemistry.*

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.*

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.*

David H. Volman, Ph.D., *Professor of Chemistry.*

‡A. Dinsmoor Webb, Ph.D., *Professor of Enology.*

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

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

Herbert A. Young, Ph.D., *Professor of Chemistry.*

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

Gunter Zweig, Ph.D., *Lecturer in Entomology.*

† Absent on leave, 1962-1963.

‡ Absent on leave, fall semester, 1962-1963.

GRADUATE COURSES

290. Seminar in Agricultural Chemistry. (1) II.

Mr. Jennings

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

299. Research in Agricultural Chemistry. (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., *Acting Chairman of the Department, Berkeley-Davis.*
Benjamin C. French, Ph.D., *Vice-Chairman of the Department.*

Department Office, 118 Academic Office Building

†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.*
Chester O. McCorkle, Jr., Ph.D., *Professor of Agricultural Economics.*
Loy L. Sammet, Ph.D., *Professor of Agricultural Economics.*
James M. Tinley, Ph.D., *Professor of Agricultural Economics.*
Edwin C. Voorhies, B.S., *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., *Associate Professor of Agricultural Economics.*
†Jerry Foytik, Ph.D., *Associate Professor of Agricultural Economics.*
Gordon A. King, Ph.D., *Associate Professor of Agricultural Economics.*
J. Herbert Snyder, Ph.D., *Associate Professor of Agricultural Economics.*
Curtis C. Harris, Jr., Ph.D., *Assistant Professor of Agricultural Economics.*
Stephen H. Sosnick, Ph.D., *Assistant Professor of Agricultural Economics.*



Oscar R. Burt, B.S., *Acting Assistant Professor of Agricultural Economics.*
Stanley S. Johnson, M.A., *Lecturer in Agricultural Economics.*
Samuel H. Logan, M.S., *Acting Assistant Professor of Agricultural Economics.*

Alyce Williams Lowrie, M.S., *Lecturer in Agricultural Economics.*

Warren K. Taylor, LL.B., *Lecturer in Business Law.*

Departmental Major Advisers.—Mr. Logan, Mr. Harris, Mr. Carter, Mr. Sosnick.

Bachelor of Science Major Program and Graduate Study. See page 51.

LOWER DIVISION COURSES

1. The Agricultural Industry. (3) I. Mr. Voorhies
Lecture—2 hours; discussion—2 hours.

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.

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

Sophomore standing required. Not open to students with credit for Business Administration 18.

Introduction to law, contracts, sales, and agency.

49. Field Practice. (1-6) I and II. Mr. Logan

Field trips to observe economic aspects of production, processing, handling, or marketing of California agricultural products. Various areas and problems—such as management, tenure, financing, taxation, labor practices, market functions, transportation—will be emphasized on the different trips.

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.

† Absent on leave, 1962-1963.

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

Lecture—3 hours.

Prerequisite: Economics 1A–1B, and one course in statistics.

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. Harris

Lecture—3 hours.

Prerequisite: course 100A or equivalent.

The application of economic principles to the 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. Burt

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—2 hours.

Prerequisite: Economics 1A or 1B.

Farmers' credit needs, methods of financing the agricultural industry, and the agencies supplying agricultural credit.

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

Lecture—3 hours.

Prerequisite: Economics 11A 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.

***115A–115B. Agricultural Business Management. (3–3) I and II.**

I. Mr. DeLoach; II. Mr. Foytik.

Lecture—2 hours; discussion—2 hours.

Prerequisite: Economics 1A or 1B or 11A or equivalent course (economic principles or elementary accounting), or consent of the instructor. Course 115A is not a prerequisite to 115B.

Application of management principles and practices to agricultural business; the economic and institutional aspects of organization and management of business firms; planning and control; industrial regulations; facilities planning; public activity in control and regulation of agricultural processing and marketing.

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

Lecture—3 hours.

Prerequisite: Economics 1A–1B.

The evolution of agricultural policy in the United States. Historical and analytical treatment of principal farmer movements, legislative provisions for the betterment of agriculture, and current policy problems.

* Not to be given, 1962–1963.

* Not to be given, fall semester, 1962–1963.

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

Prerequisite: Economics 1A or 1B.

Survey of determinants of agricultural markets and trade. Organization and operation of agricultural markets. Cooperative marketing. Costs of marketing. Government in marketing. Changes in agricultural marketing and markets.

135. Cooperation in Agriculture. (3) II. Mrs. Lowrie
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, social aspects.

140. Fundamentals of Farm Management. (4) I and II.

I. Mr. Hedges; II. Mr. McCorkle.

Lecture—3 hours; laboratory—3 hours.

Prerequisite: junior standing.

Farm firm 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. Snyder
Lecture—2 hours; laboratory—3 hours. One field trip is required.

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.



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-to-180 series may be admitted with the consent of the course instructor.

160. Economic Analysis in Agricultural Marketing. (3) I. 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) II.

Lecture—3 hours.

Mr. French

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

* Not to be given, 1962-1963.

- 170. Economic Analysis in Farm Management.** (3) I. Mr. Burt
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.

- 180. Economic Analysis in Agricultural Policy.** (3) II. Mr. Harris
Lecture—3 hours.

An analytical treatment of agricultural policy: economic appraisal of types of policies and policy problems; production, marketing and price; land; credit; markets, relations to national economic policy.

- 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

- 250. Institutional Setting for Agricultural Business.** (3) I. 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.

- 252. Administrative Organization and Behavior.** (3) I. Mr. Hedges
Lecture—3 hours.

Evaluation of the role of administration in the individual agricultural business firm: nature and theory of administration; contribution of the behavioral sciences; use of administrative tools in the organization and operation of the firm.

- 253. Quantitative Analysis of Operational Problems.** (3) II. Mr. Carter
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.

- 256. Pricing and Business Forecasting.** (3) I. Mr. King
Lecture—3 hours.

Appraisal of price-forming mechanisms for market structures encountered by agriculture-related industries: price theory for product and factor markets; price policies for the firm; business fluctuations; forecasting prices and sales for the individual firm.

AGRICULTURAL EDUCATION

Sidney S. Sutherland, M.S., *Chairman of the Department.*

Department Office, 272 Academic Office Building

Sidney S. Sutherland, M.S., *Professor of Agricultural Education, Supervisor of Teacher Training—Vocational.*

Frederick L. Griffin, M.S., *Professor of Agricultural Education, Emeritus.*

Elwood M. Juergenson, Ph.D., *Associate Professor of Agricultural Education.*

Orville E. Thompson, Ph.D., *Associate 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:

Special Secondary—Agriculture.—Mr. Juergenson.

Special Secondary—Home Economics.—Miss Johnson.

Bachelor of Science Major Program and Graduate Study. See page 52.

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.

†161. Problems in Vocational Education. (2) I and II. Mr. Juergenson
Lecture—2 hours.

Vocational surveys, junior employments, occupational analysis, trade tests, apprentice training, vocational education for adults, foremanship courses, corporation schools, current legislation, etc.

187. Extension Education in Agriculture and Home Economics. (2) II.

Lecture—1 hour; laboratory or field trip—3 hours.

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.

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.

Mr. Sutherland

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.

† Open only to apprentice teachers and graduate students.

198. **Directed Group Study.** (1-5) I and II.
The Staff (Mr. Sutherland in charge)
199. **Special Study for Advanced Undergraduates.** (1-5) I and II.
The Staff (Mr. Sutherland in charge)

GRADUATE COURSES

290. **Seminar in Agricultural Education.** (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 in Agricultural Education.** (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) I and II.
I. ———; 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. Homemaking. Miss Johnson
Directed teaching for candidates for the special credentials in agriculture and homemaking.
- ‡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. Homemaking. 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.

‡ 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, 1962, will begin on or about August 31 and end January 29. For the spring semester, 1963, they will begin on or about February 1 and end June 17. Students should make arrangements accordingly.

‡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. Homemaking.

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, 1962, will begin on or about August 31 and end January 29. For the spring semester, 1963, they will begin on or about February 1 and end June 17. Students should make arrangements accordingly.

AGRICULTURAL ENGINEERING

Clarence F. Kelly, M.S., *Chairman of the Department.*
Department Office, 206 Walker Engineering Building

Norman B. Akesson, M.S., *Professor of Agricultural Engineering.*
Roy Bainer, M.S., *Professor of Agricultural Engineering.*
Frederick A. Brooks, Sc.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.*
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.*
Lloyd H. Lamouria, M.S., *Associate Professor of Agricultural Engineering.*
Wesley E. Yates, M.S., *Associate Professor of Agricultural Engineering.*
†William J. Chancellor, Ph.D., *Assistant Professor of Agricultural Engineering.*
Robert B. Fridley, B.S., *Assistant Professor of Agricultural Engineering.*



Todd V. Crawford, M.S., *Lecturer in Agricultural Engineering.*
Marvin J. Dvoracek, *Lecturer in Agricultural Engineering.*
Frederic C. Jacob, M.S., *Lecturer in Agricultural Engineering.*
Charles R. Kaupke, M.S., *Assistant in Agricultural Engineering.*
Allan A. McKillop, Ph.D., *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. Kelly

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

Physics 2A-2B or 4A-4B are prerequisite to all upper division courses in agricultural engineering.

103. Agricultural Power. (3) II.

Mr. Kaupke

Lecture—2 hours; laboratory—3 hours.

Theory of operation, construction, and utilization of internal combustion engines; tractors; electric motors and appliances. Open to qualified lower division students by permission.

104. Agricultural Machinery. (3) I.

Mr. Yates

Lecture—2 hours; laboratory—3 hours.

Construction, operation, requirements, and utilization of tillage, seeding, harvesting, belt-operated farm machinery and pest-control equipment; theory and testing of displacement and centrifugal pumps.

† Absent on leave, 1962-1963.

105. Farm Structures. (3) II.

Mr. Kelly

Lecture—2 hours; laboratory—3 hours.

Prerequisite: Physics 2A and 3A, 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 and design of beams, columns, trusses, and tanks.

106. Heat Transfer in Agricultural Climatic Environment. (2) II.

Lecture—2 hours.

Mr. Crawford

Atmospheric and thermal environment of life and structures near the earth's surface. Introduces agricultural climatology and treats solar and nocturnal radiations, thermal convection, diurnal heat flow, cold-air drainage, and frost protection; outdoor condensation and evaporation; dispersion of aerosols.

PROFESSIONAL COURSES

314A. Agricultural Engineering Problems and Techniques for Teachers.

(2) I.

Mr. O'Brien

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. O'Brien

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 2A-2B or 4A-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.

* Not to be given, 1962-1963.

AGRICULTURAL PRACTICES

Harry O. Walker, Ed.D., *Chairman of the Department.*
Department Office, 2 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.

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.*
Fred N Briggs, Ph.D., *Professor of Agronomy.*
Paulden F. Knowles, Ph.D., *Professor of Agronomy.*
Horton M. Laude, Ph.D., *Professor of Agronomy.*
R. Merton Love, Ph.D., *Professor of Agronomy.*
Maurice L. Peterson, Ph.D., *Professor of Agronomy.*
Charles W. Schaller, Ph.D., *Professor of Agronomy.*
Francis L. Smith, Ph.D., *Professor of Agronomy.*
†Ernest H. Stanford, Ph.D., *Professor of Agronomy.*
Frederick P. Zscheile, Jr., Ph.D., *Professor of Agronomy.*
John P. Conrad, Ph.D., *Professor of Agronomy, Emeritus.*
Ben A. Madson, B.S.A., *Professor of Agronomy, Emeritus.*
Duane S. Mikkelsen, Ph.D., *Associate Professor of Agronomy.*
William A. Williams, Ph.D., *Associate Professor of Agronomy.*
Robert S. Loomis, Ph.D., *Assistant Professor of Agronomy.*
Wyman E. Nyquist, Ph.D., *Assistant Professor of Agronomy.*
Dale G. Smeltzer, Ph.D., *Assistant Professor of Agronomy.*

Beecher Crampton, M.S., *Lecturer in Agronomy.*
Ray C. Huffaker, Ph.D., *Lecturer in Agronomy.*
J. Caswell Williams, Jr., Ph.D., *Lecturer in Agronomy.*

Departmental Major Advisers.—Mr. Laude, Mr. Loomis, Mr. Schaller, Mr. Smeltzer.

Bachelor of Science Major Program and Graduate Study. See page 61.

LOWER DIVISION COURSE

1. **Introduction to Agronomy.** (3) I. Mr. Smith, Mr. Smeltzer
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.
112. **Forage Crops.** (3) II. Mr. W. A. Williams
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 1 or consent of the instructor.
Crop-ecological principles in the establishment and management of such

† Absent on leave, fall semester, 1962–1963.

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. Nyquist
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.

* Not to be given, 1962-1963.

290. Seminar in Agronomy. (1) I and II.

Mr. Addicott

Seminar—1 hour.

Technical topics of current interest in agronomy will be discussed. Students will prepare and present reports to the seminar.

299. Research in Agronomy. (1-6) 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)**Water-Soil-Plant Relationships** (Irrigation 100)**Irrigation Principles and Practices** (Irrigation 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)

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 CIVILIZATION

Robert A. Wiggins, Ph.D., *Chairman of the Committee.*
Committee Office, 178 Academic Office Building

Only those students registered for the American Civilization program prior to the fall semester of 1961 will be accepted as majors during the academic year 1962-1963.

Committee in Charge:

Arthur Child, Ph.D., *Professor of Philosophy.*
David L. Jacobson, Ph.D., *Assistant Professor of History.*
John R. Owens, Ph.D., *Assistant Professor of Political Science.*
Roland C. Petersen, M.A., *Associate Professor of Art.*
Theodore J. Shank, Ph.D., *Assistant Professor of Dramatic Art.*
Robert A. Wiggins, Ph.D., *Associate Professor of English.*
Marvin Zetterbaum, Ph.D., *Assistant Professor of Political Science.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 91).

Group Major Adviser.—Mr. Wiggins.

The Major Program.—See description, page 82.

The Major with Honors.—See description, page 83.

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 civilization.

***196. The Role of Natural Science in American Civilization. (3) II.**

Lecture and discussion—3 hours.

Mr. Weier

Prerequisite: junior standing. History 4A-4B and a laboratory course in science are desirable.

A study of selected problems of natural science in relation to American civilization, past and present.

197H. Special Study for the Comprehensive Examination for Honors Students. (3) I and II.

The Staff

Conference—1 hour.

Prerequisite: completion of all other major requirements for the A.B. degree in American civilization.

Study for a written and oral examination by an interdepartmental committee, the members to be chosen from the student's instructors in American Civilization courses.

199. Special Study for Advanced Undergraduates. (1-3) I and II. The Staff
Conference—1 hour.

RECOMMENDED COURSES

Group A: Art 119B. The Art of the United States.

Dramatic Art 150. American Drama.

English 125E. The American Novel.

English 137A-137B. Survey of American Literature.

* Not to be given, 1962-1963.

- Music 128. Musical Literature: Music in the United States.
Philosophy 135A. Contemporary Tendencies: British-American.
- Group B: Economics 110. Economic History.
History 174A-174B. Recent History of the United States.
History 176A-176B. Social and Cultural History of the United States.
History 178A-178B. Great Issues in United States History: Ideas and Interpretations.
History 179. Economic Growth of the United States.
History 180. The Westward Movement to 1850.
History 183. The Trans-Mississippi Frontier.
- Group C: Economics 121. Industrial Organization.
Economics 150. Labor Economics.
Geography 121. The Geography of Anglo-America.
Political Science 113. American Political Theory.
Political Science 128A. Recent American Foreign Policy.
Political Science 157A-157B. American Constitutional Law.
Political Science 163. Political Parties.
Political Science 166. Public Policy and the Governmental Process.
Sociology 123. American Society.

ANATOMY

Logan M. Julian, D.V.M., Ph.D., *Chairman of the Department.*
Department Office, 1047 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.*
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 1B 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. McFarland, 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

220. Surgical Anatomy. (4) II. Mr. Julian, 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 in Anatomy. (1) I and II. The Staff
Seminar—1 hour.

299. Research in Anatomy. (1-6) I and II. The Staff
Laboratory.

* Not to be given, 1962-1963.

ANIMAL HUSBANDRY

James H. Meyer, Ph.D., *Chairman of the Department.*

Department Office, 128 Animal Science Building

Harold H. Cole, Ph.D., *Professor of Animal Husbandry.*
Perry T. Cupps, Ph.D., *Professor of Animal Husbandry.*
Paul W. Gregory, Sc.D., *Professor of Animal Husbandry.*
Hubert Heitman, Jr., Ph.D., *Professor of Animal Husbandry.*
Glen P. Lofgreen, Ph.D., *Professor of Animal Husbandry.*
James H. Meyer, Ph.D., *Professor of Animal Husbandry.*
William C. Weir, Ph.D., *Professor of Animal Husbandry.*
Harold Goss, Ph.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.*
James M. Boda, Ph.D., *Associate Professor of Animal Husbandry.*
Floyd D. Carroll, Ph.D., *Associate Professor of Animal Husbandry.*
Moses T. Clegg, Ph.D., *Associate Professor of Animal Husbandry.*
Irving I. Geschwind, Ph.D., *Associate Professor of Animal Husbandry.*
Robert C. Laben, Ph.D., *Associate Professor of Animal Husbandry.*
Wade C. Rollins, Ph.D., *Associate Professor of Animal Husbandry.*
Magnar Ronning, Ph.D., *Associate Professor of Animal Husbandry.*
G. Eric Bradford, Ph.D., *Assistant Professor of Animal Husbandry.*
Robert G. Loy, Ph.D., *Assistant Professor of Animal Husbandry.*
Glenwood M. Spurlock, Ph.D., *Assistant Professor of Animal Husbandry.*



Jack R. Luick, Ph.D., *Lecturer in Animal Husbandry.*

Departmental Major Advisers.—Mr. Bradford, Mr. Heitman, Mr. Laben, Mr. Cupps, Mr. Ronning, Mr. Spurlock.

Bachelor of Science Major Program and Graduate Study. See page 55.

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. Mr. Carroll, Mr. Spurlock
Laboratory—3 hours.

Prerequisite: course 7 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.

11. **Livestock and Dairy Cattle Judging.** (2) II. Mr. Heitman, 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. Luick
Lecture—1 hour; laboratory—6 hours.
Prerequisite: Biochemistry 101 (may be taken concurrently).
- 103. Feeds and Feeding.** (3) II. Mr. Weir
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. Lofgreen
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. Lofgreen
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. Bradford
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.
- 109. The Composition and Use of Feedstuffs.** (2) I. Mr. Ronning
Lecture—1 hour; laboratory—3 hours.
Prerequisite: course 105.
The composition of feedstuffs and its relation to the feeding of livestock; preparation of balanced rations; study of feedlot, range and pasture feeding of livestock; discussion of new developments in livestock feeding.
- 110. Physiology of Domestic Animals.** (5) I. Mr. Boda
Lecture—4 hours; laboratory—3 hours.
Prerequisite: Chemistry 8; Zoology 1A-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.
Laboratory—6 hours. Mr. Cupps, Mr. Heitman
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) I. Mr. Luick
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. Meyer
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. Spurlock
Lecture—2 hours; laboratory—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. Kleiber
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. Carroll
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.
- 198. Directed Group Study.** (1-3) I and II. The Staff (Mr. Meyer in charge)
Prerequisite: consent of the instructor.
Group study of selected topics relating to livestock production.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II.
The Staff (Mr. Meyer in charge)

GRADUATE COURSES

- 201. Protein Biochemistry.** (3) I. Mr. Geschwind
Lecture—3 hours.
Prerequisite: Biochemistry 101 and 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.
- 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.
Offered in alternate years.
- 290. Seminar in Animal Husbandry.** (1) I and II.
Seminar—1 hour. The Staff (Mr. Meyer in charge)
Reports and discussions of topics of interest in the fields of animal husbandry, animal nutrition, animal physiology or animal genetics.
- 299. Research in Animal Husbandry.** (1-6) I and II. The Staff
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 Group.*
Chairman's Office, 130 Poultry Husbandry Building

Members of the Animal Physiology Group:

Ursula H. Abbott, Ph.D., *Associate Professor of Poultry Husbandry.*
Norman F. Baker, D.V.M., Ph.D., *Associate Professor of Parasitology.*
Arthur L. Black, Ph.D., *Professor of Biochemistry.*
James M. Boda, Ph.D., *Associate Professor of Animal Husbandry.*
Floyd D. Carroll, Ph.D., *Associate Professor of Animal Husbandry.*
Moses T. Clegg, Ph.D., *Associate Professor of Animal Husbandry.*
Harold H. Cole, Ph.D., *Professor of Animal Husbandry.*
Charles E. Cornelius, D.V.M., Ph.D., *Associate Professor of Clinical Pathology.*
Perry T. Cupps, Ph.D., *Professor of Animal Husbandry.*
Irving I. Geschwind, Ph.D., *Associate Professor of Animal Husbandry.*
Frederic W. Hill, Ph.D., *Professor of Poultry Husbandry.*
Louis W. Holm, Ph.D., *Professor of Physiology.*
Jurgen H. H. Jacobs, Ph.D., *Assistant Professor of Zoology.*
Logan M. Julian, D.V.M., Ph.D., *Professor of Anatomy.*
Jiro J. Kaneko, D.V.M., Ph.D., *Assistant Professor of Clinical Pathology.*
Clarence F. Kelly, M.S., *Professor of Agricultural Engineering.*
Max Kleiber, Sc.D., *Professor of Animal Husbandry, Emeritus.*
Charles R. Kovacic, Ed.D., *Professor of Physical Education.*
Frederick W. Lorenz, Ph.D., *Professor of Poultry Husbandry.*
Robert G. Loy, Ph.D., *Assistant Professor of Animal Husbandry.*
Frank X. Ogasawara, Ph.D., *Assistant Professor of Poultry Husbandry.*
Stuart A. Peoples, M.D., *Professor of Comparative Pharmacology.*
Edward A. Rhode, Jr., D.V.M., *Associate Professor of Veterinary Medicine.*
George W. Salt, Ph.D., *Associate Professor of Zoology.*
Arthur H. Smith, Ph.D., *Professor of Poultry Husbandry.*
Wilbor O. Wilson, Ph.D., *Professor of Poultry Husbandry.*



Emanuel Epstein, Ph.D., *Lecturer in Plant Nutrition.*
Chester L. Foy, Ph.D., *Lecturer in Agricultural Botany.*
Jack R. Luick, Ph.D., *Lecturer in Animal Husbandry.*
Edward C. Maxie, Ph.D., *Lecturer in Pomology.*

Instruction in Animal Physiology 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 Group in Animal Physiology. An undergraduate major is offered within the animal science curriculum.

Group Major Adviser.—Mr. Lorenz.

Bachelor of Science Major Program and Graduate Study. See page 55.

UPPER DIVISION COURSES

***100. General Physiology.** (4) I.

Mr. Smith

Lecture—3 hours; laboratory—3 hours.

Prerequisite: Chemistry 1A–1B, 8; Physics 2A–2B; Physiology 1, 1L, or Zoology 1A–1B, or Botany 1. Recommended: biochemistry; mammalian physiology; Animal Husbandry 110; Mathematics 16A–16B.

* Not to be given, 1962–1963.

Lectures and laboratory on the physical and chemical processes of cells and tissues.

Offered in fall semester of odd-numbered years.

120A. Comparative Physiology. (3) I. The Staff (Mr. Clegg in charge)
Lecture—3 hours.

Prerequisite: systemic physiology (Animal Husbandry 110 or Physiological Sciences 140) which may be taken concurrently. Recommended: Zoology 106.

A description and comparison of the diverse ways in which a wide variety of animals perform physiological functions with special reference to integrative mechanisms and reproduction.

Offered in alternate years.

120B. Comparative Physiology. (3) II. The Staff (Mr. Boda in charge)
Lecture—3 hours.

Prerequisite: systemic physiology (Animal Husbandry 110 or Physiological Sciences 140) which may be taken concurrently. Recommended: Zoology 106. Course 120A is not prerequisite to 120B.

A description and comparison of the diverse ways in which a wide variety of animals perform physiological functions with special reference to respiration, circulation, digestion, and excretion.

Offered in alternate years.

199. Special Study for Advanced Undergraduates. (1-5) I and II.

Mr. Lorenz

GRADUATE COURSES

***243. Use of Isotopes as Tracers in Biological Research.** (2) I.

Lecture—2 hours. Mr. Black, Mr. Epstein, Mr. Foy, Mr. Kleiber, Mr. Luick
Discussion of the use of isotopes as tracers in biological systems.

***243L. Laboratory in Use of Isotopes as Tracers in Biological Research.**

(2) I. Mr. Black, Mr. Epstein, Mr. Foy, Mr. Kleiber

Laboratory—6 hours.

Laboratory practice in handling radioisotopes and their application in biological research.

290. Seminar in Animal Physiology. (1) I and II.

Seminar—1 hour. The Staff (Mr. Lorenz in charge)

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.

RELATED COURSES

Mammalian Physiology (Animal Husbandry 110, Physiological Sciences 140, 140L)

Metabolism and Food Utilization (Animal Husbandry 120, Poultry Husbandry 150)

Physiology of Reproduction (Animal Husbandry 121)

Physiology of the Endocrine Glands (Animal Husbandry 130)

Biochemical Aspects of Endocrinology (Animal Husbandry 230)

General Cytology (Botany 130)

Kinesiology (Physical Education 103A-103B)

* Not to be given, 1962-1963.

Physiological Chemistry (Physiological Sciences 101, 101L)

Intermediary Metabolism of Animals (Physiological Sciences 205, Bacteriology 103, Biochemistry 150A, 150B, Clinical Pathology 203)

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)

Invertebrate Physiology (Zoology 142)

ANTHROPOLOGY AND GEOGRAPHY

David L. Olmsted, Ph.D., *Chairman of the Department.*
Department Office, 324 Academic Office Building

David L. Olmsted, Ph.D., *Professor of Anthropology.*
†Martin A. Baumhoff, Ph.D., *Associate Professor of Anthropology.*
Daniel J. Crowley, Ph.D., *Associate Professor of Anthropology and Art.*
Alan D. Coult, Ph.D., *Assistant Professor of Anthropology.*
Howard F. Gregor, Ph.D., *Assistant Professor of Geography.*
†Kenneth Thompson, Ph.D., *Assistant Professor of Geography.*
Philip L. Wagner, Ph.D., *Assistant Professor of Geography.*



Thomas H. Pagenhart, A.B., *Acting Assistant Professor of Geography.*
Herbert B. Schultz, Ph.D., *Lecturer in Geography.*
Mary E. Shutler, M.A., *Acting Assistant Professor of Anthropology.*

ANTHROPOLOGY

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 91).

Departmental Major Adviser.—Mr. Olmsted.

The Major Program

(A) Lower Division Courses.—Required: Anthropology 1, 2, Geography 1, Anthropology 1A, and Mathematics 13. Recommended: Geology 1A, 1B, Zoology 1A.

(B) Upper Division Courses.—Required: courses 102, 103, 110A–110B, 128, 195 and 7 units drawn from other upper division courses in anthropology or from Art 150, 154A, 154B; Sociology 126; Genetics 100; Geology 111.

LOWER DIVISION COURSES

1. Physical Anthropology. (3) I and II. Mrs. Shutler, ———

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. Crowley, Mr. Coult

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. Coult

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–103B. Culture Growth. (3–3) Yr. Mrs. Shutler

Lecture—3 hours.

Prerequisite: consent of the instructor. Course 103A is not prerequisite to 103B.

† Absent on leave, 1962–1963.

- Comparative prehistory and archaeology.
103A. Old World.
103B. New World.
- *105. The American Indian. (3) II.** Mr. Coult
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, morphemes, tactics.
- 110B. Language and Culture. (3) II.** Mr. Olmsted
Lecture—3 hours.
Prerequisite: course 110A.
Linguistic prehistory, historical linguistics and reconstruction. Dialect geography. The relations of language and other cultural systems.
- *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.
- 124. Comparative Religion. (3) II.** Mr. Olmsted
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. Coult
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) II.** 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.
- 147. Peoples of the Pacific. (3) I.** Mr. Coult
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.

* Not to be given, 1962-1963.

- 152. Human Evolution and Fossil Man. (3) I.** _____
 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.
- 195. Field Course in Archaeological Method. (2) I.** Mrs. Shutler
 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.** Mrs. Shutler
 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.
- 199. Special Study for Advanced Undergraduates. (1-3) I and II.**
 Investigation of special problems. The Staff (Mr. Olmsted in charge)

GRADUATE COURSES

- 250. Theory and Method of Anthropology. (2) II.** Mr. Olmsted
 Seminar—2 hours.
- 292. Seminar in Anthropological Linguistics. (2) I.** Mr. Olmsted
 Seminar—2 hours.

GEOGRAPHY

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 91).

Departmental Major Adviser.—Mr. Gregor.

The Major Program

(A) Lower Division Courses.—Required: Geography 1, 2, 3; Anthropology 2; Economics 1B; 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).

It is recommended that selected courses be taken in agricultural economics, anthropology, botany, economics, geology, history, political science, sociology, statistics, and other fields. Course selection, as appropriate to the individual student's program, should be made in consultation with the adviser.

* Not to be given, 1962-1963.

LOWER DIVISION COURSES

- 1. Introduction to Physical Geography.** (3) I and II. Mr. Pagenhar'
Lecture—3 hours.
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. Mr. Wagner
Lecture—3 hours.
A study of the basic cultural elements of geography (especially population distribution, general settlement and land-use patterns, and economies) 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—3 hours.
Composition and structure of atmosphere, weather elements, pressure, wind, temperature, moisture, fog, and clouds; weather maps; regional climates and world climate classification; instruments for obtaining climatological data; installation and maintenance of weather stations; evaluation of recordings.

UPPER DIVISION COURSES

- 101. Methods of Geographic Research.** (3) II. Mr. Pagenhart
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.
Offered in alternate years.
- 105. Cartography.** (3) I. Mr. Gregor
Lecture—1 hour; laboratory—4 hours.
Prerequisite: 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.
- 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, Canada, and Alaska.
- 122. The Geography of Latin America.** (3) I. Mr. Pagenhart
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. Pagenhart
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.

* Not to be given, 1962-1963.

- 129. The Geography of the Soviet Union. (3) II.** 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 the USSR.
- 131. Geography of California. (3) I.** Mr. Gregor
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.
A geographical analysis of the distribution and production of the world's major agricultural and mineral raw materials.
- 143. Political Geography. (3) II.** Mr. Wagner
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. Wagner
Lecture—3 hours.
Prerequisite: three upper division courses in geography.
Objectives, subdivisions, and development of geography.
Offered in alternate years.
- 155. Urban Geography. (3) I.** Mr. Wagner
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.
- 161. The Conservation of Natural Resources. (3) II.** Mr. Pagenhart
Lecture—3 hours.
The general principles of conservation and their application, especially in the United States.
- 199. Special Study for Advanced Undergraduates. (1-3) I and II.**
Investigation of special problems. The Staff (Mr. Gregor in charge)

PROFESSIONAL COURSE

- 300. Problems in Teaching Geography. (1) II.** The Staff
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.

ART

Richard L. Nelson, M.A., *Chairman of the Department.*

Department Office, 101 East Hall

Richard L. Nelson, M.A., *Professor of Art.*
Daniel J. Crowley, Ph.D., *Associate Professor of Art.*
Roland C. Petersen, M.A., *Associate Professor of Art.*
———, *Associate Professor of Art.*
Tio L. Giambruni, M.A., *Assistant Professor of Art.*
Seymour Howard, Ph.D., *Assistant Professor of Art.*
Ralph M. Johnson, M.A., *Assistant Professor of Art.*
Wayne Thiebaud, M.A., *Assistant Professor of Art.*
William T. Wiley, M.F.A., *Instructor in Art.*



Joseph A. Baird, Jr., Ph.D., *Lecturer in Art.*
†Richard D. Cramer, M.F.A. (Architecture), *Associate Professor of Design.*
Ruth J. Horsting, M.A., *Assistant Professor of Design.*
Charles Muskavitch, H.D., F.I.I.C., *Lecturer in Art.*
Daniel Shapiro, *Associate Professor of Design.*

Letters and Science List.—All undergraduate courses except 16 and 17 are included in the Letters and Science List of Courses (see page 91).

Departmental Major Advisers.—Mr. Giambruni, Mr. Howard, Mr. Johnson, Mr. Nelson, Mr. Thiebaud.

Preparation for the Art Major.—Courses 2A–2B, 3A–3B, and 6 units chosen from courses 1A, 1B, 1C, and 1D.

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, 2 units of Group B, 4 units of Group C, and 6 units chosen from Group A, B, or C.

II. History of Art. Required: 12 units of Group C of which 6 units must be in an historical sequence such as 154A–154B; Art 190; and 9 additional 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.

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.

† Absent on leave, 1962–1963.

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. (3) I and II.**
Lecture—3 hours.
Emphasis on Painting.
Field trips are included.
- 1C. History of Medieval, Renaissance, and Modern Art. (3) II.** Mr. Howard
Lecture—3 hours.
Emphasis on Architecture and Sculpture.
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-2B. Elementary Form and Color. (2-2) I and II.**
Laboratory—6 hours. Mr. Johnson, Mr. Thiebaud, Mr. Wiley
Beginning each semester.
2A: Form in composition using black and white media.
2B: Introduction to color in composition.
Field trips are included.
- 3A-3B. Intermediate Form and Color. (2-2) I and II.** Mr. Johnson
Laboratory—6 hours.
Beginning each semester.
Prerequisite: course 2A-2B.
3A: Color and form in composition.
3B: 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.** Mr. Howard
Laboratory—6 hours.
An introduction to ceramic forms and ceramic sculpture.
- 14A. Sculpture. (2) I.** Mr. Johnson
Laboratory—6 hours.
Introduction to basic elements of three-dimensional construction and relief
in clay and plaster.
- 14B. Sculpture. (2) II.** Mr. Johnson
Laboratory—6 hours.
Prerequisite: course 14A.
Introduction to space design, using the human figure as a motif, with con-
struction in clay, plaster, wood and stone.

UPPER DIVISION COURSES

Group A: Appreciation and Practice

Prerequisite: courses 2A-2B, 3A-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-101B. Advanced Drawing and Painting. (2-2) Yr.

Mr. Petersen, Mr. Johnson, Mr. Thiebaud, Mr. Wiley

Laboratory—6 hours.

Prerequisite: courses 2A-2B, 3A-3B. Course 101A is not prerequisite to 101B.

Representational composition based upon out-of-door subjects in any medium. Composition with the human figure as a basic motif. Paintings in various media including oil, tempera, gouache, and wax. May be repeated for credit.

Field trips are included.

***121. Architectural Design.** (2) II.

Mr. Cramer

Laboratory—6 hours.

Prerequisite: 2 semesters in art practice or design.

Studio projects in architectural design.

128. Graphic Design. (2) I.

Mr. Shapiro

Laboratory—6 hours.

Prerequisite: two semesters of art practice or design.

Experimental methods in relief and intaglio printing; graphic symbolism.

129. Graphic Arts. (2) II.

Mr. Thiebaud

Laboratory—6 hours.

Prerequisite: course 2A-2B.

Methods of engraving, etching, aquatint, dry point, and lithography.

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.

Mrs. Horsting

Laboratory—6 hours.

Prerequisite: courses 3B, 14B; or consent of the instructor. Recommended: courses 131, 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.

Mr. Giambruni

Laboratory—6 hours.

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.

* Not to be given, 1962-1963.

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. **History of Greek Art.** (3) I. Mr. Howard
Lecture—3 hours.
Prerequisite: course 1A or consent of the instructor.
From the Archaic period to the late Hellenistic period.
Offered in alternate years.

- 154B. **History of Roman Art.** (3) II. Mr. Howard
Lecture—3 hours.
Prerequisite: course 1A or consent of the instructor.
Course 154A is not prerequisite to 154B.
From the Republic through the beginning of the Christian Era.
Offered in alternate years.

177. **Medieval Art.** (3) I. _____
Lecture—3 hours.

- 178A. **Renaissance Art** (3) I. _____
Lecture—3 hours.

- 178B. **Baroque Art.** (3) II. _____
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.

- 183A. **European Painting in the Nineteenth Century.** (3) I. Mr. Howard
Lecture—3 hours.
Field trips are included.

- 183B. **European Painting in the Twentieth Century.** (3) II. _____
Lecture—3 hours.
Field trips are included.

- *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.

* Not to be given, 1962-1963.

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.

190. 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.

Special Study Courses

195. Special Study in Appreciation and Practice of Art. (2) I and II.

Lecture—2 hours; laboratory—4 hours. The Staff

Prerequisite: 8 units of appreciation and of practice work or equivalent, taken at another university. Admission only by consent of instructor. May not be repeated for credit.

198. Directed Group Study. (1-4) I and II. Mr. Johnson, Mr. Nelson

199. Special Study for Advanced Undergraduates. (1-4) I and II.

Mr. Howard, Mr. Nelson

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.

220. Seminar in Art. (3) I and II. The Staff

Seminar—3 hours.

Seminar in 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.

298. Special Study for Graduate Students. (1-6) I and II. The Staff

PROFESSIONAL COURSE

300. Practice and Principles of Art Education. (2) I. Mr. Giambruni

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

Livio G. Raggi, 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.*

UPPER DIVISION COURSES

- 112. Principles of Poultry Diseases.** (3) II. Mr. Adler
Lecture—3 hours.
Prerequisite: Zoology 1A; 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 (Mr. Raggi in charge)

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.
- 251A-251B. Avian Medicine Laboratory.** ($\frac{1}{2}$ - $\frac{1}{2}$) Yr. The Staff
Lecture—5 hours; laboratory—15 hours. (Hours per semester)
Prerequisite: fourth-year standing in the School of Veterinary Medicine.
Application of avian medicine knowledge to diagnosis of poultry diseases.
- 290. Seminar in Avian Medicine.** (1) I and II. Mr. Raggi
Seminar—1 hour.
- 299. Research in Avian Medicine.** (1-6) I and II.
The Staff (Mr. Raggi in charge)

BACTERIOLOGY

John L. Ingraham, Ph.D., *Chairman of the Department.*
Department Office, 1076C Haring Hall

†Robert E. Hungate, Ph.D., *Professor of Bacteriology.*
Mortimer P. Starr, Ph.D., *Professor of Bacteriology.*
Courtland S. Mudge, Ph.D., *Professor of Bacteriology, Emeritus.*
John L. Ingraham, Ph.D., *Associate Professor of Bacteriology.*
Allen G. Marr, Ph.D., *Associate Professor of Bacteriology.*
Donald M. Reynolds, Ph.D., *Associate Professor of Bacteriology.*
Monica Riley, Ph.D., *Assistant Professor of Bacteriology.*



Herman J. Phaff, Ph.D., *Professor of Food Science and Technology.*
Reese H. Vaughn, Ph.D., *Professor of Food Science and Technology.*
George K. York, II, Ph.D., *Assistant Professor of Food Science and Technology.*

Letters and Science List.—All undergraduate courses in bacteriology except course 105A–105B are included in the Letters and Science List of Courses (see page 91).

The Major in Microbiology.—The undergraduate major program is designed to provide a proper balance of studies in microbiology and the auxiliary chemical and biological sciences, with considerable latitude in the selection of individual courses.

A major in microbiology is appropriate for students contemplating a career in medical technology.

Major Adviser.—Mr. Starr.

The Major Program

(A) Lower Division Courses.—Required: Bacteriology 1; Botany 1; Chemistry 1A–1B, and 8; Physics 2A–2B; Zoology 1A. Recommended: Chemistry 9; Mathematics 16A–16B; elementary courses in German and French.

(B) Upper Division Courses.—Required: Bacteriology 100 and at least 5 units of other upper division courses in bacteriology; Chemistry 5, Biochemistry 101, 101L. In addition, at least 5 units from the following list with the approval of the major adviser (in special cases, substitutions may be permitted): Bacteriology 103, 104, 105B, 199; Botany 114, 119; Chemistry 109; Genetics 100; Veterinary Parasitology 124; Zoology 110.

All units in chemistry in excess of 13 are counted as upper division units.

All students majoring in microbiology are required to take a comprehensive final examination during the final semester of the senior year. The examination carries no credit value.

All courses required for the major must be completed with at least a grade of C.

Honors and Honors Program (see page 92).—The honors program comprises course 194H, an acceptable thesis, and superior performance on the regular departmental comprehensive examination.

Graduate Study.—The Group in Microbiology offers programs of study and research leading to the M.A. and Ph.D. degrees in general microbiology, including bacteriology. The offerings of the Department of Bacteriology are

† Absent on leave, 1962–1963.

augmented by courses and personnel of the departments of Biochemistry, Botany, Food Science and Technology, and Chemistry, the Enology Laboratory, and the School of Veterinary Medicine. For detailed information regarding graduate study in microbiology, address the Graduate Adviser in Microbiology, Department of Bacteriology.

LOWER DIVISION COURSE

- 1. Introduction to Microbiology. (4) II.** Mr. Reynolds
 Lecture—2 hours; laboratory—6 hours.
 Prerequisite: Chemistry 1A; one course in botany, zoology, or physiology (Botany 1, Zoology 1A or 10, Physiology 1, or equivalent).
 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. Advanced Bacteriology. (5) I.** Mr. Marr
 Lecture—3 hours; laboratory—6 hours.
 Prerequisite: course 1; Chemistry 8; Physics 2B.
 Microscopy, cytology and growth of microorganisms, effects of the physico-chemical environment, and 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 Classification. (4) I.** Mr. Starr
 Lecture—2 hours; laboratory—6 hours.
 Prerequisite: course 1; Chemistry 8.
 Principles of bacterial ecology and classification with intensive study of selected groups.

- 105A. Food and Industrial Microbiology. (2) I.** Mr. Vaughn, Mr. York, Mr. Ingraham
 Lecture—2 hours.
 Prerequisite: course 1; Chemistry 1A-1B, 8.
 Microbiology of food fermentations (including the vinous fermentation but not brewing), food processing, food spoilage and the disposal of wastes. For laboratory to accompany this course, students should register in Food Technology 105A.

- 105B. Food and Industrial Microbiology. (2) II.** Mr. Ingraham, Mr. Phaff, Mr. Reynolds
 Lecture—2 hours.
 Prerequisite: course 1; Chemistry 1A-1B, 8. Course 105A is not prerequisite to 105B.
 Microorganisms and their activity in relation to industrial processes such

* Not to be given, 1962-1963.

as baking, brewing, production of industrial alcohol, yeast, solvents, vitamins, enzymes, antibiotics, and other drugs. For laboratory to accompany this course, students should register in Food Technology 105B.

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

202. Seminar in Bacteriology and Microbiology. (1) I and II. The Staff
Seminar—1 hour.

203. Selected Topics in Microbial Biochemistry. (3) II.

Lecture—3 hours.

Mr. Ingraham, Mr. Marr, Mrs. Riley

Prerequisite: Biochemistry 150A-150B, Chemistry 110A-110B or 109.

Analysis of selected topics including protein synthesis, control mechanisms, biochemical genetics and metabolic pathways.

205. Bacterial Taxonomy. (2) I.

Mr. Starr

Lecture—2 hours.

Principles of classification. Nomenclatural systems and codes. Evolution and phylogeny of bacteria and other microorganisms. Determinative 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 in microorganisms, 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 bacteriophage.

299. Special Study and Research in Microbiology. (1-6) I and II. The Staff

RELATED COURSES

Intermediary Metabolism (Biochemistry 150A-150B)

Enzymology (Biochemistry 210)

Biochemical Mechanisms (Biochemistry 205)

Comparative Morphology of Nonvascular Plants (Botany 114)

Mycology (Botany 119)

Food and Industrial Microbiology Laboratory (Food Science and Technology 105A-105B)

* Not to be given, 1962-1963.

Microbiology of Milk and Dairy Products (Food Science and Technology 132)

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)

BIOCHEMISTRY AND BIOPHYSICS

Eric E. Conn, Ph.D., *Chairman of the Department.*

Department Office, 265 Hoagland Hall

Paul K. Stumpf, Ph.D., *Professor of Plant Biochemistry.*
Eric E. Conn, Ph.D., *Associate Professor of Plant Biochemistry.*
Lloyd L. Ingraham, Ph.D., *Associate Professor of Enzyme Chemistry.*
Sterling Chaykin, Ph.D., *Assistant Professor of Animal Biochemistry.*
Richard S. Criddle, Ph.D., *Assistant Professor of Physical Biochemistry.*

Departmental Major Adviser.—Mr. Conn.

The department does not offer an undergraduate major in this subject. 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.

UPPER DIVISION COURSES

101. General Biochemistry. (3) I.

Mr. Conn

Lecture—3 hours.

Prerequisite: 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.

Lecture—1 hour; laboratory—6 hours.

Mr. Criddle, Mr. Chaykin

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. Chaykin, Mr. Conn, 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. Mr. Chaykin, Mr. Conn, Mr. Stumpf

Lecture—3 hours.

Prerequisite: course 101 or equivalent. Recommended: Chemistry 150B.

Comparative metabolism of amino acids, proteins, porphyrins, and nucleic acids.

GRADUATE COURSES

201L. General Biochemistry Laboratory. (5) I.

Mr. Chaykin

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.

- 205. Biochemical Mechanisms.** (2) I. Mr. Ingraham
Lecture—2 hours.
Prerequisite: course 101; Chemistry 109 or 110A–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 110A–110B.
Application of modern physical concepts and experimental methods to the problems of large molecules of biological interest.
- 210. Enzyme Chemistry.** (3) II. Mr. Ingraham, Mr. Stumpf
Lecture—3 hours.
Prerequisite: course 101 or equivalent; Chemistry 109 or 110A–110B.
Recommended: Chemistry 112A–112B.
Chemical and physical-chemical properties of coenzymes and enzymes; their role in biochemical processes.
- 210L. Enzyme Chemistry Laboratory.** (3) II. Mr. Ingraham
Lecture—1 hour; laboratory—6 hours.
Prerequisite: courses 101L and 210 (210 may be taken concurrently); or consent of instructor.
Experimental methods of enzyme chemistry.
- 222. Plant Biochemistry.** (2) II. Mr. Conn, 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.
- 290. Seminar in Biochemistry.** (1) I and II. The Staff
Seminar—1 hour.
- 299. Research in Biochemistry.** (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 (Animal Physiology 243)
Microbial Metabolism (Bacteriology 103)
Selected Topics in Microbial Metabolism (Bacteriology 203)
Microbial Biochemistry (Bacteriology 204)
Plant Cell Metabolism (Botany 211)
Physical Biochemistry (Chemistry 213)
Proteins—Their Functional Activities and Interactions (Food Science and Technology 210)
Intermediary Metabolism of Animals (Physiological Sciences 205)

BIOLOGICAL SCIENCES

T. Elliot Weier, Ph.D., *Chairman of the Committee.*

Committee Office, 277 Robbins Hall

Committee in Charge:

Charles R. Goldman, Ph.D., *Assistant Professor of Zoology.*

Emile A. Pessagno, Jr., Ph.D., *Assistant Professor of Geology.*

Monica Riley, Ph.D., *Assistant Professor of Bacteriology.*

C. Ralph Stocking, Ph.D., *Professor of Botany.*

T. Elliot Weier, Ph.D., *Professor of Botany.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 91).

Major Advisers.—Mr. DuPraw, Mr. Pessagno, Mr. Weier.

The Major Program.—See description, page 83.

Honors and Honors Program (see page 92).—The Honors Program comprises courses 194H, 195H, or 197H. These courses are in addition to the 24-unit requirement in upper division courses.

UPPER DIVISION COURSES

194H. Special Study for Honors Students. (2-4) I and II.

The Staff (Mr. Weier 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 (Mr. Weier in charge)

Prerequisite: course 194H.

Preparation of comprehensive thesis incorporating studies undertaken in course 194H.

197H. Special Survey of the Biological Sciences. (3) I and II.

The Staff (Mr. Weier in charge)

Prerequisite: enrollment limited to honors students in their final undergraduate semester.

Studies designed to integrate the fields of biological sciences followed by a written and oral comprehensive examination. Study and examination under the supervision of an appropriate interdepartmental committee.

BOTANY

Alden S. Crafts, Ph.D., *Chairman of the Department.*
Department Office, 143 Robbins Hall

Alden S. Crafts, Ph.D., *Professor of Botany.*
Herbert B. Currier, Ph.D., *Professor of Botany.*
Katherine Esau, Ph.D., *Professor of Botany.*
Ernest M. Gifford, Jr., Ph.D., *Professor of Botany.*
C. Ralph Stocking, Ph.D., *Professor of Botany.*
T. Elliot Weier, Ph.D., *Professor of Botany.*
John M. Tucker, Ph.D., *Associate Professor of Botany.*
Rolf Y. Berg, Ph.D., *Assistant Professor of Botany.*
Jack Major, Ph.D., *Assistant Professor of Botany.*
Kenneth Wells, Ph.D., *Assistant Professor of Botany.*



†Floyd M. Ashton, Ph.D., *Lecturer in Botany and Assistant Professor of Agricultural Botany.*
Chester L. Foy, Ph.D., *Lecturer in Botany.*

Letters and Science List.—All undergraduate courses except Botany 8, 107, and 155 are included in the Letters and Science List of Courses (see page 91).

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.—Botany 1; Chemistry 1A, 8; Physics 2A-2B; plus 13 units in related natural science subjects; German or French is the required language; Bacteriology 1, Chemistry 1B, Zoology 10 or 1A-1B are recommended.

(B) Upper Division Courses.—Botany 108, 111, 114, 116; Genetics 100; 6 additional units in botany, plus 7 units in related natural science courses.

Bachelor of Arts Major Program

(A) Lower Division Courses.—Botany 1; Zoology 10; Chemistry 1A. Chemistry 8 is 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.

Honors and Honors Program (see page 92).—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.

Graduate Study.—Graduate programs leading to M.A., M.S., and Ph.D.

† Absent on leave, 1962-1963.

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.

LOWER DIVISION COURSES

1. General Botany. (5) I and II.

Mr. Weier, Mr. Stocking, Mr. Tucker, Mr. Wells

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.

8. Poisonous Plants. (2) II.

Mr. Tucker, Mr. Berg

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.

Morphology and Taxonomy

105. Plant Anatomy. (4) II.

Miss Esau

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, Mr. Berg

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.

114. Comparative Morphology of Nonvascular Plants. (4) II.

Lecture—2 hours; laboratory—6 hours.

Mr. Gifford, Mr. Wells

Prerequisite: course 1, Bacteriology 1, or equivalent.

Introduction to structure and reproduction of the algae and fungi with special emphasis on distribution and ecology; field trips.

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.

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.

RELATED COURSES

Pathogenic Fungi (Plant Pathology 224)

Fruit Morphology (Pomology 110)

Plant Physiology and Plant Biochemistry

120A–120B. Plant Physiology. (3–3) Yr. Mr. Currier
Lecture—3 hours.
Prerequisite: course 111 or consent of the instructor, Chemistry 8. Recommended: Biochemistry 101 or Chemistry 101.

The cell as a physicochemical system; water relations, mineral nutrition, translocation, plant metabolism, enzyme action, photosynthesis, respiration, and various aspects of growth.

121A–121B. Plant Physiology Laboratory. (2–2) Yr. Mr. Currier
Laboratory—6 hours.
Prerequisite: course 120A–120B (may be taken concurrently).
Laboratory methods and procedures in plant physiology. Experiments selected to follow subject matter sequence of course 120A–120B.

Cytology and Genetics

130. General Cytology. (4) I. Mr. Weier
Lecture—2 hours; laboratory—6 hours.
Prerequisite: Genetics 100.

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.

RELATED COURSES

Cytogenetics (Genetics 101)

Cytogenetics Laboratory (Genetics 101L).

General Courses

155. Plant Microtechnique. (3) I. Mr. Gifford, Mr. Weier
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.

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

203. **Seminar in Plant Physiology.** (1) I and II. Mr. Currier, Mr. Foy
Seminar—1 hour.

Survey and discussion of recent developments in the field of plant physiology at the graduate level.

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, effect 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.

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. Crafts
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.

Offered in alternate years.

*214. **Mechanisms of Toxic Action.** (2) I. _____
Lecture—2 hours.

Prerequisite: courses 107, 120B; Biochemistry 101, or consent of the instructor.

Physiological and biochemical mechanisms underlying toxicity and detoxification reactions.

Offered in alternate years.

*216A. **Advanced Morphology of Vascular Plants.** (3) II. _____
Lecture—2 hours; laboratory—3 hours.

Prerequisite: course 116 or equivalent.

Evolution of form, structure, and reproduction of fossil and extant types through Cycadophytes.

* Not to be given, 1962-1963.

231. Advanced Microtechnique. (3) II. Mr. Weier, Mr. Gifford

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.

291. Seminar in Plant Morphology. (1) I and II.

Seminar—1 hour.

Miss Esau, Mr. Gifford, Mr. Tucker, Mr. Weier

Survey and discussion of recent developments in the field of plant morphology.

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

The Staff

CHEMISTRY

Raymond M. Keefer, Ph.D., *Chairman of the Department.*
Department Office, 139 Physical Science Building

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.*
David H. Volman, Ph.D., *Professor of Chemistry.*
†Herbert A. Young, Ph.D., *Professor of Chemistry.*
Thomas L. Allen, Ph.D., *Associate Professor of Chemistry.*
Albert T. Bottini, Ph.D., *Assistant Professor of Chemistry.*
Gary E. Maciel, Ph.D., *Assistant Professor of Chemistry.*
W. Kenneth Musker, Ph.D., *Assistant Professor of Chemistry.*
Charles P. Nash, Ph.D., *Assistant Professor of Chemistry.*
George B. Savitsky, Ph.D., *Assistant Professor of Chemistry.*
William E. Thiessen, Ph.D., *Assistant Professor of Chemistry.*
John E. Warren, Ph.D., *Assistant Professor of Chemistry.*
———, *Assistant Professor of Chemistry.*
———, *Assistant Professor of Chemistry.*



David B. R. Johnston, Ph.D., *Acting Assistant Professor of Chemistry.*
David C. Whitney, B.S., *Acting 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 91).

Major Subject Advisers.—Mr. Bottini, Mr. Maciel, Mr. Savitsky.

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 3A, 3B, 4A, 4B; 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 101 and 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.

† Absent on leave, 1962–1963.

(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 92).—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. Prospective candidates for advanced degrees in chemistry may specialize in agricultural, biological, inorganic, organic, or physical 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 and Mr. Maciel in charge; II. Mr. Allen 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.

Mr. Whitney

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–7B. General Chemistry. (5–5) Yr.

Mr. Nash, Mr. Savitsky

Lecture—3 hours; laboratory—6 hours.

Prerequisite: high school chemistry, Mathematics 3A 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. Equivalent to the sequence Chemistry 1A–1B–5 as a prerequisite for further courses in chemistry.

8. Short Survey of Organic Chemistry. (3) I and II.

Lecture—3 hours.

I. Mr. Reiber; II. Mr. Johnston

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.

Mr. Painter

Lecture—1 hour; laboratory—6 hours.

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

101. General Biochemistry. (3) II.

Mr. Painter

Lecture—3 hours.

Prerequisite: course 8 or 112A with a grade of C or higher, or consent of the instructor.

The chemistry of carbohydrates, fats, proteins, amino acids, nucleic acids, and related compounds in plant and animal tissues. The role of these compounds in life processes.

- 105. Advanced Quantitative Analysis.** (3) II. Mr. Whitney
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 5 or 7B.
- 109. Physical Chemistry, Brief Course.** (3) II. Mr. Brinton
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. Mr. Savitsky
Lecture—3 hours.
Prerequisite: course 5 or 7B; Mathematics 4A or 16B; one year of college physics.
The general principles of physical chemistry and elementary thermodynamics.
- 110B. Physical Chemistry.** (3) II. Mr. Keefer
Lecture—3 hours.
Prerequisite: course 110A.
A continuation of course 110A.
- 111. Physical Chemistry.** (3) I and II. I. Mr. Warren; II. Mr. Maciel
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 110B (may be taken concurrently) or course 109 and 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. Thiessen; II. Mr. Bottini
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. Johnston; II. Mr. Reiber
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. Johnston; II. Mr. Reiber
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.
- 124. Advanced Inorganic Chemistry.** (3) I. Mr. Musker
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 109 or 110B.
Modern physicochemical concepts applied to selected groups 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. Bottini
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. Bottini
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) II.** Mr. Keefer
Lecture—3 hours.
A consideration of important classes of chemical reactions in gaseous and condensed phases. Experimental methods, and application of theory.
Offered in alternate years.

* Not to be given, 1962-1963.

- 205. Quantum Chemistry.** (3) I. Mr. Allen
Lecture—3 hours.
The quantum theory and its chemical applications.
Offered in alternate 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 alternate 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 alternate 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 alternate years.
- 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. Maciel
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.
- 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, 1962-1963.

CLINICAL PATHOLOGY

Oscar W. Schalm, D.V.M., Ph.D., *Chairman of the Department.*

Department Office, 1165 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., *Assistant Professor of Clinical Pathology.*



William R. Pritchard, D.V.M., Ph.D., *Professor of Veterinary Medicine.*

Robert Schneider, D.V.M., *Lecturer in Clinical Pathology.*

UPPER DIVISION COURSES

198. **Directed Group Study.** (1-3) I and II. The Staff

Prerequisite: consent of the instructor.

Directed group study of selected topics in clinical pathology.

199. **Special Study for Advanced Undergraduates.** (1-4) I and II. The Staff

GRADUATE COURSES

201. **Clinical Hematology and Bacteriology.** (3) I. Mr. Kaneko, Mr. Schalm
Laboratory—9 hours.

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. Cornelius, Mr. Jasper

Lecture—1 hour; laboratory—6 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. **Advanced Clinical Pathology.** (3) II. Mr. Kaneko, Mr. Schalm

Lecture—2 hours; laboratory—3 hours.

Prerequisite: consent of the instructor.

Selected topics in advanced clinical pathology with special emphasis on comparative hematology and clinical biochemistry.

251A-251B. **Clinical Pathology Laboratory.** ($\frac{1}{2}$ - $\frac{1}{2}$) Yr. 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.

270A-270B. Jurisprudence. (No credit) Yr.

Mr. Pritchard

Lecture—1 hour.

Professional ethics and business law.

290. Seminar in Clinical Pathology. (1) I and II.

Seminar—1 hour.

The Staff (Mr. Cornelius in charge)

299. Research in Clinical Pathology. (1-6) I and II.

The Staff

DESIGN

For courses in design, see "Home Economics" on page 225.

DRAMATIC ART AND SPEECH

Theodore J. Shank, Ph.D., *Chairman of the Department.*
Department Office, 127A South Hall

Everard D'Harnoncourt, Ph.D., *Assistant Professor of Dramatic Art.*
Clifford C. Fellage, Jr., M.A., *Assistant Professor of Dramatic Art.*
†John T. Goldthwait, Ph.D., *Assistant Professor of Speech.*
Ralph S. Pomeroy, Ph.D., *Assistant Professor of Speech.*
Theodore J. Shank, Ph.D., *Assistant Professor of Dramatic Art.*
Alan A. Stambusky, Ph.D., *Assistant Professor of Dramatic Art.*



Benne B. Daniel, M.A., *Acting Instructor in Speech.*
Leonard G. Homann, A.B., *Lecturer in Speech.*
Gerald P. Mohrmann, M.A., *Acting Assistant Professor of Speech.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 91).

Departmental Major Advisers.—Mr. Pomeroy, Mr. Shank.

Graduate Adviser.—Mr. Shank.

The Major Program

(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 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 in speech arts.

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 92).—The honors program consists of course 194H (Special Study for Honors Students) in addition to the regular major.

Graduate Study.—The Department of Dramatic Art and Speech offers programs of study leading toward the M.A. degree. For detailed information and complete list of graduate courses, address the Graduate Adviser, Department of Dramatic Art and Speech.

† Absent on leave, 1962–1963.

DRAMATIC ART

LOWER DIVISION COURSES

- 10A. Fundamentals of Acting.** (3) I. Mr. Stambusky
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. Stambusky
Lecture—2 hours; laboratory—2 hours.
Course 10A is not prerequisite to 10B.
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.
- 20. Introduction to Dramatic Art.** (3) I and II.
Lecture—3 hours. Mr. D'Harnoncourt, Mr. Shank
Understanding and appreciation of the arts and literature of the theatre.
Field trips included.

UPPER DIVISION COURSES

English 1A is prerequisite to all upper division courses.

- 124. Visual Aspects of Dramatic Presentation.** (3) I. Mr. Fellage
Lecture—2 hours; laboratory—3 hours.
Dramatic emphasis as affected by theatre design, stage decor and lighting, make-up, and costuming.
- 125. Principles of Scene Design.** (3) II. Mr. Fellage
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.
- *127. Principles of Directing.** (3) I. Mr. Stambusky
Lecture—3 hours.
Theory of directing and directorial analysis of dramas from various periods.
Offered in alternate years.
- *150. American Drama.** (3) II. Mr. Stambusky
Lecture—3 hours.
Selected plays and the history of the theatre from Colonial times to the present.
Offered in alternate years.
- 158A. World Drama.** (3) I. Mr. D'Harnoncourt
Lecture—3 hours.
Selected plays and the history of the theatre from ancient Greece to the Renaissance.
Offered in alternate years.
- 158B. World Drama.** (3) II. Mr. D'Harnoncourt
Lecture—3 hours.
Course 158A is not prerequisite to 158B.
Selected plays and the history of the theatre from the Renaissance to the present time.
Offered in alternate years.

* Not to be given, 1962-1963.

- *159. **Contemporary Drama.** (3) I. Mr. Shank
Lecture—3 hours.
Twentieth-century European, British, and American plays.
Offered in alternate years.
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.
Analysis of dramatic structure and the composition of original plays.
Offered in alternate years.
- *165. **Dramatic Theory and Criticism.** (3) II. Mr. Shank
Lecture-seminar—3 hours.
Changing concepts of drama from Aristotle to the present.
190. **Theatre 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.
- 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
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. The Staff
Prerequisite: consent of the instructor.
Advanced study of dramatic literature, acting, or play production.

GRADUATE COURSES

- *230. **Greek and Roman Theatre.** (3) II. _____
Seminar—2 hours.
Seminar in classical theatre and drama.
- *235. **Elizabethan Theatre.** (3) II. _____
Seminar—2 hours.
280. **Theatre Laboratory.** (1-6) I and II. The Staff (Mr. Shank in charge)
Advanced practice in acting, design, directing, playwriting, and technical
theatre.
299. **Special 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 91).

* Not to be given, 1962-1963.

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. Miss Daniel
 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. Homann
 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. Homann
 Lecture-recitation—4 hours.
 Continuation of course 25; required of those who have taken course 25.
- 40. Fundamentals of Debate.** (3) I and II. Miss Daniel
 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. Miss Daniel
 Lecture-recitation—3 hours.
 Prerequisite: course 2A.
 Thorough application of the principles of oral interpretation to poetic literature.
 Offered in alternate years.
- *102. Oral Interpretation of Selected Fields of Literature.** (3) II. Mr. Goldthwait
 Lecture-recitation—3 hours.
 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.
 Offered in alternate years.

* Not to be given, 1962-1963.

- *117. Theories of Rhetoric and Criticism.** (3) II. Mr. Goldthwait
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 alternate years.
- 130. History of Public Address.** (3) I. Mr. Pomeroy
Lecture—3 hours.
A survey of public address in its major periods of influence in Western civilization.
Offered in alternate 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. The Staff
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
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. Special Study.** (1-6) I and II. The Staff (Mr. Pomeroy in charge)

* Not to be given, 1962-1963.

ECONOMICS

Bruce Glassburner, Ph.D., *Chairman of the Department.*
Department Office, 308 Academic Office Building

Thomas Mayer, Ph.D., *Visiting Professor of Economics.*
Frank C. Child, Ph.D., *Associate Professor of Economics.*
Bruce Glassburner, Ph.D., *Associate Professor of Economics.*
† Adam A. Pepelasis, Ph.D., *Associate Professor of Economics.*
Warren S. Gramm, Ph.D., *Assistant Professor of Economics.*
Martin P. Oettinger, Ph.D., *Assistant Professor of Economics.*



Gary W. Bickel, M.A., *Lecturer in Economics.*

Letters and Science List.—All undergraduate courses in economics are included in the Letters and Science List of Courses (see page 91).

Departmental Major Advisers.—Mr. Glassburner, Mr. Gramm, Mr. Oettinger.

Graduate Adviser.—Mr. Child.

The Major Program

(A) Lower Division Courses.—Required: Economics 1A–1B and 6 additional units in social science; Mathematics 13 or a course in statistics approved by the department; and at least an average grade of C in these courses. Students planning to major in economics should complete these courses by the end of the sophomore year.

(B) Upper Division Courses.—A total of 24 units of upper division courses in economics is required, including Economics 100A–100B, and either 110A or 110B. It is recommended that these required courses be taken in 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.

Honors and Honors Program (see page 92).—The honors program comprises at least 3 units of course 194H and an honors thesis in a field of study approved by two members of the faculty. This work normally will be completed as a fall-spring sequence during the student's senior year.

LOWER DIVISION COURSES

1A. Principles of Economics (3) I and II. Mr. Child, Mr. Bickel
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. Bickel; Mr. Child
Lecture—2 hours; discussion—1 hour.

Prerequisite: course 1A is not a prerequisite to 1B, but it is recommended that the courses be taken in sequence.

† Absent on leave, 1962–1963.

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.

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.

UPPER DIVISION COURSES

Upper Division Prerequisites.—For students with a major in economics, course 1A—1B is prerequisite to all upper division work in the department. For students not majoring in economics, junior standing and consent of the instructor are required for admission to all upper division courses in the department.

100A. Economic Theory. (3) I. Mr. Child

Lecture—3 hours.

Scope and method of economic science and theory of income and employment.

100B. Economic Theory. (3) II. Mr. Child

Lecture—3 hours.

Price and distribution theory.

***101A. History of Economic Thought.** (3) I. _____

Lecture—3 hours.

Historical survey of economic doctrines, with emphasis on the classical school and its antecedents.

101B. History of Economic Thought. (3) II. Mr. Glassburner

Lecture—3 hours.

Historical survey of economic doctrines, with emphasis on the classical school and neoclassical theory; their critics; current developments in economic thought.

102. Advanced Economic Theory. (3) I. Mr. Bickel

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. Mr. Oettinger

Lecture—3 hours.

Prerequisite: courses 1A and 1B.

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. Gramm

Lecture—3 hours.

Analysis of economic problems in their historical setting. Emphasis on development of economic institutions in Europe; implications for contemporary world economic relationships.

* Not to be given, 1962–1963.

110B. Economic History. (3) II.

Mr. Gramm

Lecture—3 hours.

Course 110A is not prerequisite to 110B.

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. Glassburner

Lecture—3 hours.

Prerequisite: course 1A-1B or consent of the instructor. Theories of economic development and underdevelopment; economic policy for growth and development.

116. Comparative Economic Systems. (3) II.

Mr. Gramm

Lecture—3 hours.

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.

121. Industrial Organization. (3) II.

Mr. Bickel

Lecture—3 hours.

The organization and structure of industries and their markets in the American economy, competitive behavior, price policy, and market performance in such industries; public policy in the regulation of industry.

130. Public Finance and Taxation. (3) I.

Mr. Mayer

Lecture—3 hours.

Examination of the growth and economic effects of public expenditures; taxation and borrowing; analysis of income, property, excise and other major taxes; fiscal policy and economic stability.

131. The Economics of Corporation Finance. (3) I.

Mr. Oettinger

Lecture—3 hours.

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.

Mr. Mayer

Lecture—3 hours.

Prerequisite: Mathematics 13 and 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. Money, Banking, and Monetary Policy. (3) I.

Mr. Mayer

Lecture—3 hours.

The monetary economy; survey of monetary interest, and income theory; commercial and central banks, the Treasury, and the supply of money.

135B. Money, Banking, and Monetary Policy. (3) II.

Mr. Mayer

Lecture—3 hours.

Monetary standards and international finance; competing objectives of monetary policy; recent monetary experience; current issues.

- 150A. Labor Economics. (3) I.** Mr. Gramm
Lecture—3 hours.
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.
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.
- 190A. International Economic Relations. (3) I.** Mr. Bickel
Lecture—3 hours.
Course 190A is not prerequisite to 190B.
International trade theory and analysis of selected international and economic problems.
- 190B. International Economic Relations. (3) II.** Mr. Bickel
Lecture—3 hours.
Course 190A is not prerequisite to 190B.
International finance; U. S. Foreign trade policies and their impact on the world economy.
- 194H. Special Study for Honors Students. (3) I and II.** The Staff
Consultation—1 hour.
- 199. Special Study for Advanced Undergraduates. (1-5) I and II.**
The Staff (Mr. Gramm in charge)

GRADUATE COURSES

- 200A. Economic Theory. (3) I.** Mr. Child
Lecture and discussion—3 hours.
Macrostatic and macrodynamic theoretical issues; theory of income and employment and theory of economic growth.
- 200B. Economic Theory. (3) II.** Mr. Child
Lecture and discussion—3 hours.
Prerequisite: course 200A is not prerequisite to 200B.
Microstatic and microdynamic theoretical issues; theory of production, theory of the firm, and general theory of choice.
- 201. History of Economic Thought. (3) II.** Mr. Glassburner
Lecture—3 hours.
Analysis of the relationships between historical conditions, economic theory, and economic policy from the Greeks to modern times.
- 210. Seminar in Economic History. (3) I.** Mr. Gramm
Lecture—3 hours.
American and European economic history. Emphasis upon development of economic institutions.
- 215. Economics of Underdeveloped Countries. (3) I.** Mr. Glassburner
Lecture—3 hours.
The theories of economic stagnation, of development and of growth; specific problems of development policy in Latin America, Africa, the Near East, and Asia.

- 216. Comparative Economic Systems.** (3) II. Mr. Gramm
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.
- 233. Dynamic Economics and Business Fluctuations.** (3) II. Mr. Mayer
Lecture—3 hours.
Macro- and micro-dynamic economic models; review of business cycle theory; economic policy for growth and stability.
- 235. Money and Banking.** (3) I. Mr. Mayer
Lecture—3 hours.
Monetary theory; monetary and banking policy.
- 250. Seminar in Labor Economics.** (3) II. Mr. Oettinger
Seminar—3 hours.
Theory of the labor market; trade union movements.
- 290. Seminar in International Economic Relations.** (3) II. ———
Seminar—3 hours.
Theory of international trade, policy problems in international relations.
- 297. Supervised Individual Study.** (1-5) I and II.
The Staff (Mr. Glassburner in charge)

EDUCATION

Hugh C. Black, Ph.D., *Chairman of the Department.*
Department Office, 244 Academic Office Building

Hugh C. Black, Ph.D., *Associate Professor of Education.*
Charles M. Garverick, Ph.D., *Assistant Professor of Education.*



J. Richard Blanchard, M.S., *Lecturer in Education.*
Dorcey F. Davy, M.A., *Lecturer in Education, Supervisor of Teaching—Secondary.*
Douglas L. Minnis, M.A., *Lecturer in Education, Supervisor of Teaching—Elementary.*
Lawrence P. Newberry, Ed.D., *Acting Administrator of Teacher Training, Lecturer in Education, Supervisor of Teaching—Secondary.*
Margaret R. Sutherland, Ph.D., *Lecturer in Education, Supervisor of Teacher Training.*
———, *Lecturer in Education, Supervisor of Teaching—Elementary.*

Letters and Science List.—Education 110.

Credentials Counselors:

General Secondary.—Mr. Davy, Mr. Newberry, Miss Sutherland.

General Elementary.———, Mr. Minnis.

UPPER DIVISION COURSES

110. Introduction to Educational Psychology. (3) I and II. Miss Sutherland
Lecture—3 hours.

Prerequisite: Psychology 1A.

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 and II. Mr. Garverick
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
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.

130. Elementary School Curriculum. (2) I. Mr. Minnis
Lecture—2 hours.

Selection and placement of content; organization of elementary school programs; analysis of instructional materials; evaluation of student achievement.

***150. Bibliographic Methods.** (1) I. Mr. Blanchard
Lecture—1 hour.

Prerequisite: junior standing.

Techniques of literature searching and the location of information. Use of

* Not to be given, 1962–1963.

bibliographies, abstract journals, card catalogs, reference works and other source materials. Preparation of scientific bibliographies. Designed to assist upper division and graduate students in preparation of research papers and dissertations.

163. Guidance and Counseling. (3) I and II. Mr. Garverick

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. Education Seminar. (2) I and II. _____

PROFESSIONAL COURSES

300. Language Arts in the Elementary Schools. (2) I and II. _____

Lecture—2 hours.

Prerequisite: consent of the instructor.

Principles, procedures, and curricular materials for developing oral and written language skills.

320A. Introduction to Teaching in Secondary Schools. (1) I and II.

Lecture—1 hour; laboratory—2 hours. Mr. Davy, Mr. Newberry

Lectures, conferences, and field work in secondary teaching. Observations and participation in some form of public school work.

‡320C. Supervised Teaching in Secondary Schools. (3-7) I and II.

Prerequisite: course 320E (must be taken concurrently).

Sec. 1. For student teachers. Mr. Davy

Sec. 2. For intern teachers. Mr. Newberry

Directed teaching for candidates for the general secondary credential.

May be repeated for credit up to a total of 7 units.

‡320E. Methods of Teaching in Secondary Schools. (2) I and II.

Lecture—2 hours.

Prerequisite: course 320C (must be taken concurrently).

Sec. 1. For student teachers. Mr. Davy

Sec. 2. For intern teachers. Mr. Newberry

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.

Lecture—1 hour; laboratory—3 hours. _____, Mr. Minnis

Sec. 1. For student teachers.

Sec. 2. For intern teachers.

Lectures, conferences, and field work; observation of and participation in classroom activities in the public elementary schools.

‡ 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, 1962, will begin on or about August 31 and end January 29. For the spring semester, 1963, they will begin on or about February 1 and end June 17. Students should make arrangements accordingly.

‡330C. Supervised Teaching in Elementary Schools. (4-8) I and II.

_____, Mr. Minnis
Prerequisite: course 330E (must be taken concurrently).

Sec. 1. For student teachers.

Sec. 2. For intern teachers.

Directed teaching for candidates for the general elementary credential.

‡330E. Methods of Teaching in Elementary Schools. (2) I and II.

Lecture—2 hours.

_____, Mr. Minnis
Prerequisite: course 330C (must be taken concurrently).

Sec. 1. For student teachers.

Sec. 2. For intern teachers.

Selection, organization, and evaluation of teaching materials, including the use of audio-visual aids.

‡ 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, 1962, will begin on or about August 31 and end January 29. For the spring semester, 1963, they will begin on or about February 1 and end June 17. Students should make arrangements accordingly.

ENGINEERING

Roy Bainer, M.S., *Chairman of the Department*
Department Office, 204 Walker Engineering Building

- Roy Bainer, M.S., *Professor of Engineering, Professor of Agricultural Engineering.*
S. Milton Henderson, M.S., *Professor of Engineering and Professor of Agricultural Engineering.*
Robert A. Kepner, B.S., *Professor of Engineering and Professor of Agricultural Engineering.*
Coby Lorenzen, Jr., M.S., *Professor of Engineering and Professor of Agricultural Engineering.*
James N. Luthin, Ph.D., *Professor of Engineering and Professor of Irrigation.*
Loren W. Neubauer, Ph.D., *Professor of Engineering and Professor of Agricultural Engineering.*
John B. Powers, Ph.D., *Professor of Engineering and Professor of Agricultural Engineering.*
Joseph M. Smith, Ph.D., *Professor of Engineering and Professor of Food Science and Technology.*
Jaime Amorochio, Ph.D., *Associate Professor of Engineering and Associate Professor of Irrigation.*
Robert H. Burgy, M.S., *Associate Professor of Engineering and Associate Professor of Irrigation.*
John C. Harper, Ph.D., *Associate Professor of Engineering and Associate Professor of Agricultural Engineering.*
Verne H. Scott, Ph.D., *Associate Professor of Engineering and Associate Professor of Irrigation.*
Charles W. Beadle, Ph.D., *Assistant Professor of Engineering.*
Theodor S. Strelkoff, Ph.D., *Assistant Professor of Engineering and Assistant Professor of Irrigation.*
_____, *Assistant Professor of Engineering.*
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_____, *Assistant Professor of Engineering.*
_____, *Assistant Professor of Engineering.*
_____, *Assistant Professor of Engineering.*



- Lawrence J. Andrews, Ph.D., *Professor of Chemistry.*
Bruce Caswell, B.A.Sc., *Acting Assistant Professor of Engineering.*
Clinton O. Chichester, Ph.D., *Associate Professor of Food Science and Technology.*
John R. Davis, Ph.D., *Lecturer in Irrigation.*
Marvin J. Dvoracek, M.S., *Lecturer in Engineering.*
J. Robert Freeman, E.E., *Lecturer in Engineering.*
Robert B. Fridley, M.S., *Assistant Professor of Agricultural Engineering.*
James F. Guymon, Ph.D., *Professor of Enology.*
John R. Goss, M.S., *Associate Professor of Agricultural Engineering.*
Samuel A. Hart, Ph.D., *Associate Professor of Agricultural Engineering.*
Charles A. Hayes, Ph.D., *Professor of Mathematics.*
Jerald M. Henderson, M.S., *Associate in Engineering.*
Frederic C. Jacob, M.S., *Lecturer in Agricultural Engineering.*

Lloyd H. Lamouria, M.S., *Associate Professor of Agricultural Engineering.*
 Arthur S. Leonard, M.S., *Lecturer in Engineering.*
 Allan A. McKillop, Ph.D., *Lecturer in Engineering.*
 Michael O'Brien, Ph.D., *Lecturer in Agricultural Engineering.*
 C. Gordon Patton, Ph.D., *Professor of Physics.*
 George F. Stewart, Ph.D., *Professor of Food Science and Technology.*
 Aloys L. Tappel, Ph.D., *Professor of Food Science and Technology.*
 Herbert A. Young, Ph.D., *Professor of Chemistry.*

Departmental Major Advisers.—Mr. Beadle, Mr. Davis, Mr. Caswell, Mr. Freeman, Mr. Fridley, Mr. Goss, Mr. Hart, Mr. Henderson, Mr. Jacob, Mr. Kepner, Mr. Lamouria, Mr. McKillop.

The Major.—See page 69.

LOWER DIVISION COURSES

1A. Plane Surveying. (3) I.

Lecture—2 hours; laboratory—3 hours.

Prerequisite: plane trigonometry.

Principles; field practice; calculations and mapping with special reference to irrigation, drainage, and agricultural engineering problems.

10. Introduction to Engineering Measurements. (3) I and II. Mr. Goss

Lecture—1 hour; laboratory—6 hours.

Prerequisite: Mathematics 3A (may be taken concurrently).

Theory and application of engineering measurements for the evaluation of geometrical dimensions, temperature, work, fluid flow, pressure, and other physical quantities. Laboratory exercises and demonstrations, using engineering systems and including applications to surveying. Statistical representation, analysis of errors, and evaluation of data.

25. Engineering Graphics. (4) I and II. Mr. Dvoracek, Mr. Hart

Lecture—2 hours; laboratory—6 hours.

Prerequisite: trigonometry; mechanical drawing; and mathematics 3A (may be taken concurrently).

The fundamental principles of orthogonal projection and their application to the solution of three-dimensional problems arising in the various branches of engineering; freehand pictorials; dimensioning; freehand and instrumental working drawings; graphic computations; plotting experimental data and determination of elementary empirical equations.

35. Statics. (3) I and II. Mr. Fridley

Lecture—3 hours.

Prerequisite: Physics 4A; Mathematics 14 or 106, 107 (106, 107 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. Leonard

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. Electrical Engineering.** (3) I and II. Mr. Freeman, Mr. Jacob
Lecture—3 hours.
Prerequisite: Mathematics 106, 107 or the equivalent; Physics 4C.
The physical basis for current conduction in vacuo, gases, metallic conductors, and semiconductors; vacuum tube and transistor parameters, characteristics, and equivalent circuits; rectifiers and power supplies; untuned voltage and power amplifiers; amplitude modulation and demodulation.
- 100B. Electrical Engineering** (3) I and II. Mr. Freeman, Mr. Jacob
Lecture—3 hours.
Prerequisites: courses 100A and 101.
Feedback amplifiers; resonance and coupled circuits; tuned amplifiers and sinusoidal oscillators; amplitude and frequency modulation and demodulation; magnetic materials and circuits; permanent magnets; magnetic devices.
- 101. Electrical Laboratory.** (2) I and II. Mr. Freeman, Mr. Jacob
Laboratory—6 hours.
Prerequisite: course 100A (should be taken concurrently).
Instruction and practice in the use of basic laboratory instruments; experimental determination of the characteristics of transducers for mechanical, thermal, and optical measurements; combination of transducers and laboratory instruments for the measurement of non-electrical quantities.
- 102. Dynamics.** (3) I and II. Mr. Beadle
Lecture—3 hours.
Prerequisite: course 35; Mathematics 14B or 106, 107.
Kinematics and kinetics of a particle and of rigid bodies as applied to engineering problems. Force, energy, and momentum methods of solution. Introduction to vibrations.
- 103. Elementary Fluid Mechanics.** (3) I and II. ———
Lecture—3 hours.
Prerequisite: course 102 (may be taken concurrently).
The principles of mechanics applied to the statics and to the flow of incompressible and compressible fluids.
- 104. Mechanics of Materials.** (3) I and II. Mr. Beadle
Lecture—3 hours.
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.
- 105A. Thermodynamics.** (3) I and II. Mr. Leonard
Lecture—3 hours.
Prerequisite: course 102 (may be taken concurrently); Chemistry 1B or 8; Physics 4C.
Energy transformations, reversibility, availability; thermal properties of gases and vapors; theoretical cycles and practical engine forms, mechanisms and performance.
- 105B. Thermodynamics.** (3) II. Mr. Leonard
Lecture—3 hours.
Prerequisite: course 105A.
Heat transmission and equipment, fuels, combustion, and analysis of products of combustion. Heat power engines using nozzles. Reheating and regenerative cycles and equipment. Plant performance.

106. **Engineering Economics.** (3) II. _____
Lecture—3 hours.
Prerequisite: senior 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.
112. **Unit Operations in Agricultural Processing.** (3) II. Mr. Henderson
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 105B.
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: course 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: course 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. Lorenzen
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 105B.
Principles of internal combustion engines and accessories for stationary and mobile power. Design criteria for agriculture.
118. **Machine Design.** (3) II. _____
Lecture—2 hours; laboratory—3 hours.
Prerequisites: courses 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. _____
Lecture—3 hours.
Prerequisite: course 102.
Advanced kinematic analysis and synthesis of typical machine elements; velocity and acceleration analysis of linkages, gearing and cams.
120. **Advanced Machine Design.** (3) II. _____
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.

121. Manufacturing Processes. (3) I. _____

Lecture—3 hours.

Prerequisite: courses 25 and 45, or the equivalent.

Casting processes; hot and cold working; machining; measuring and gaging; welding and joining; grinding and surface finishing; general-purpose and production-type machine tools; tooling, jigs and fixtures; relation of design to production.

122. Introduction to Mechanical Vibrations. (3) I. _____

Lecture—3 hours.

Prerequisite: course 102; Mathematics 106 and 107.

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. McKillop in charge)

Laboratory—9 hours.

Prerequisite: courses 100B, 103, 105B.

Special projects designed to acquaint students with techniques of experimental analysis of engineering systems.

124. Engineering Systems Design. (3) II. _____

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. Fluid Mechanics and Machinery. (3) II. _____

Lecture—3 hours.

Prerequisite: course 103.

The theory of one-dimensional, compressible flow with related phenomena; unsteady flow in liquid pipe lines; theory and model laws of rotodynamic and other types of hydraulic machinery.

***130. Material Mechanics Laboratory. (2) I.** _____

Laboratory—6 hours.

Prerequisite: courses 45, 104, 132, 133 (133 may be taken concurrently).

A generalized approach to the characterization of the properties of materials with regard to their selection and use. Tests of metals, wood, soil, concrete, aggregate, and asphalts are included.

131. Structural Analysis. (3) II. _____

Lecture—3 hours.

Prerequisite: course 130.

Analysis of determinate structures, including beams, frames, and roof and bridge trusses by algebraic and graphical methods. Introduction to indeterminate structural analysis.

132. Engineering Design with Metals, Wood, and Concrete. (5) II. _____

Lecture—5 hours.

Prerequisite: courses 104 and 131 (131 may be taken concurrently).

The analysis and design of structural components (beams, columns, plates, and connections) made of metals, wood, and reinforced concrete.

133. Engineering Design with Soils and Asphalts. (3) I. _____

Lecture—3 hours.

Prerequisite: course 104.

Physical and mechanical properties of soils; the supporting capacity of soils; design considerations in foundations and earth structures; properties and design considerations of asphalts and asphaltic mixtures.

***134. Analysis and Design of Buildings. (3) I.**

Lecture—1 hour; laboratory—6 hours.

Prerequisite: course 132. 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.**

Lecture—3 hours.

Prerequisite: courses 104, 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.

136. Functional Aspects of Buildings Design. (3) II.

Mr. Hart

Lecture—2 hours; laboratory—3 hours.

Prerequisite: course 104.

The design of structures for industry, public works, and agriculture, with emphasis on costs and functional requirements in regard to labor efficiency, environmental control, and aesthetics.

***137. Construction Principles. (3) I.**

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.

141. Intermediate Fluid Mechanics. (3) I.

Mr. Strelkoff

Lecture—2 hours; laboratory—3 hours.

Prerequisite: course 103.

Principles of solid dynamics treating the effects of each major fluid property: flows in closed conduits and open channels; non-uniform and unsteady flows; dynamic similitude; applications to hydraulic and irrigation problems. Laboratory experiments illustrating flow principles and design problems.

142. Water Supply. (3) I.

Mr. Burgy

Lecture—3 hours.

Prerequisite: course 103 or Irrigation 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.

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: course 103; Irrigation 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: course 141.

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: courses 141, 145. (145 may be taken concurrently).

Experimental analysis and design of water supply systems including related storage and conveyance structures, and of irrigation and drainage systems; measurements and instrumentation.

147. Air and Water Pollution Control. (3) II.

Lecture—3 hours.

Prerequisite: course 142.

Sewerage systems, engineering and biological principles of waste handling and treating systems; nature of air pollutants; method of appraising and ameliorating atmospheric pollution; discussion of radiological wastes as air and water pollutants.

152. Chemical Engineering Thermodynamics. (3) II.

Mr. Harper

Lecture—3 hours.

Prerequisite: course 105A, Chemistry 110A.

Application of the laws of thermodynamics with particular emphasis on the behavior of fluids, phase equilibria, and chemical reaction equilibrium.

153. Momentum and Energy Transfer. (3) I.

Mr. Smith

Lecture—3 hours.

Prerequisite: course 103.

Fundamental concepts of momentum and energy transfer in fluids; their application to heat transfer and flow processes.

***154. Chemical Engineering Transport Processes. (3) II.**

Mr. Smith

Lecture—3 hours.

Prerequisite: course 153, 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 153 (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 (154 should be taken concurrently).

Laboratory experiments and analysis emphasizing fundamentals of mass transfer. Applications to absorption, extraction, distillation and other separation processes.

* Not to be given, 1962–1963.

- *156. Chemical Engineering Kinetics. (2) I.** 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. (2) II.** Mr. Harper
Lecture—2 hours.
Prerequisite: courses 153, 156.
Integration and application of momentum, energy and mass transfer, thermodynamics, and kinetics to design of processes.
- *160A. Electronics Design. (3) I.** Mr. Freeman
Lecture—3 hours.
Prerequisite: courses 100B, 161 and 182. Recommended: course 162, taken concurrently.
The study of electronic circuits that operate with discontinuous waveforms; pulse amplifiers, multivibrators, coders, decoders, gates, trigger circuits, pulse transformers, blocking oscillators, delay circuits.
- *160B. Electronic Systems. (3) II.** _____
Lecture—3 hours.
Prerequisite: courses 160A and 162.
Design factors governing the selection and combination of electronic circuits and devices to produce useful systems for measurement, communication, computation, and control; impedance matching; energy conversion; frequency transformation; analog-digital transformation.
- *161. Electronics Laboratory I. (2) II.** Mr. Powers
Laboratory—6 hours.
Prerequisite: course 101, 100B (may be taken concurrently).
Experiments illustrating the effects of feedback; a study of resonant circuits and their applications; experiments with magnetic circuits and devices.
- *162. Electronics Laboratory II. (2) I.** Mr. Powers
Laboratory—6 hours.
Prerequisite: courses 160A (should be taken concurrently) and 161.
Laboratory experiments with electronic components and circuits used in pulse, digital and switching systems.
- *163. Information and Data Systems. (3) I.** _____
Lecture—3 hours.
Prerequisite: courses 100B and 182.
Discrete and continuous signal systems used in the transmission and processing of information; frequency spectra; the use of logical algebra in discrete-state systems; modulation and demodulation; probability; random noise, correlation functions, and codes; information theory.
- *165A-165B. Solid State Materials and Components. (3-3) Yr.** _____
Lecture—3 hours.
Prerequisite: courses 100B and 181; Physics 121.
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.
- *166. Principles of Feedback. (3) II.** _____
Lecture—3 hours.
Prerequisite: courses 100B and 182.

* Not to be given, 1962-1963.

The design and analysis of closed-loop automatic control systems and electronic circuits; signal flow graphs; stability criteria; the use of log-modulus and root-locus methods; phase-plane analysis of non-linear systems.

***167. Network Theory. (3) II.** _____

Lecture—3 hours.

Prerequisite: courses 160A and 182.

Lumped-parameter circuits and their network functions; network theorems; synthesis of one- and two-part networks, including ladder-type filters; use of signal flow graphs and the scattering matrix.

***171A–171B. Electromagnetic Fields and Waves. (3–3) Yr.** _____

Lecture—3 hours.

Prerequisite: course 181. (Not open to students taking Physics 110A–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. (3) I. _____

Mr. Freeman

Lecture—2 hours; laboratory—3 hours.

Prerequisite: senior standing in engineering.

Description and analytical study of instruments used in engineering data observations, in research, and as basic components for controls.

181. Introduction to Field Theory. (3) II. _____

Mr. Powers

Lecture—3 hours.

Prerequisite: Mathematics 106 and 107.

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) II. _____

Lecture—3 hours.

Prerequisite: course 100A.

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.

183. Advanced Mechanics of Materials. (3) II. _____

Mr. Beadle

Lecture—3 hours.

Prerequisite: course 104.

Strain energy methods; inelastic behavior; limit design; bending theory, including curved beams, unsymmetrical loading, beam columns; beams on elastic foundation; torsion of non-circular elements; thin plates and shells; symmetrical deformation problems including thick-walled cylinders, shrink fits, and rotating discs.

184. Experimental Stress Analysis. (3) II. _____

Mr. Beadle

Lecture—1 hour; laboratory—6 hours.

Prerequisite: course 104.

Experimental methods used for the analysis of stress and strain, including photoelasticity, brittle lacquers, mechanical and electrical strain gages and instrumentation; analogy methods and principles of similitude for loaded structural models.

* Not to be given, 1962–1963.

190. Proseminar. (1) II.

Mr. Bainer, Mr. O'Brien

Lecture—1 hour.

Prerequisite: senior standing in engineering.

Professional ethics and social responsibilities of engineers; cooperative research procedures; validity of findings; written and oral presentation of short technical reports.

198. Directed Group Studies for Advanced Undergraduates. (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

***202. Engineering Analysis and Synthesis. (2) I and II.**

Lecture—2 hours.

The Staff (Mr. Henderson in charge)

Procedures for analyzing engineering data and synthesizing engineering systems with special reference to agricultural problems.

203. Heat and Mass Transfer. (3) II.

Mr. Harper

Lecture—3 hours.

Prerequisite: course 153; Mathematics 106 and 107, or the equivalent.

Development of equations describing heat, mass, and momentum transfer by convection; analogies among transport systems; applications to systems important in agricultural and food processing and in agricultural climatology.

204. Advanced Heat Transfer. (3) I.

Mr. McKillop

Lecture—3 hours.

Prerequisite: course 153; Mathematics 106 and 107, or the equivalent.

Analytical treatment of steady state, transient, and periodic heat conduction; transfer of radiant energy; geometrical and spectral characteristics of radiating systems.

210. Field Theory. (3) I.

Mr. Powers

Lecture—3 hours.

Prerequisite: course 181.

Energy relationships in fields; interaction of fields and matter; time-variant fields in acoustic, electromagnetic, and fluid domains; diffusion and radiation equations; the Navier-Stokes equation and some of its special integrals; introduction to tensor methods.

220. Mechanical Vibrations. (3) II.

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.

225. Theory of Elasticity. (3) I.

Mr. Beadle

Lecture—3 hours.

Prerequisite: Mathematics 106 and 107.

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 prismatical bars and plates. Display and measurement of strain.

* Not to be given, 1962-1963.

- 230. Engineering Analysis. (3) II.** Mr. McKillop
Lecture—3 hours.
Prerequisite: Mathematics 106 and 107, or the equivalent.
Methods of theoretical analysis of typical engineering problems in heat transfer, fluid mechanics, electrical network, mechanical vibrations, and elasticity.
- 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 106 and 107, or the equivalent, and consent of 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.
- 278. Advanced Fluid Mechanics. (3) I.** Mr. Strelkoff
Lecture—3 hours.
Prerequisite: 220A–220B (may be taken concurrently).
Mechanics of potential and rotational flows; dimensional analysis; stream and potential functions; conformal mapping; general energy and momentum principles applied to laminar and turbulent flows; boundary layers.
- 287A. Advanced Engineering Dynamics. (3) II.** Mr. Powers
Lecture—3 hours.
Prerequisite: course 102; Mathematics 106 and 107, or the equivalent.
Applications of advanced dynamics to engineering problems. Dynamics of constrained systems using generalized coordinates. Lagrange's equations with applications to engineering systems. Resistance to motion. Stability of mechanical systems. Wave propagation in elastic and plastic systems.
- 290. Seminar in Engineering. (1) II.** The Staff
Lecture—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. Henderson in charge)
Engineering topics important to agriculture such as: vibration, indeterminate structures, mass transfer, control systems, electronics, micrometeorology, fluid mechanics of porous systems, instrumentation, food processing unit operations. The topics treated are dependent upon the availability of staff and student interest.
- 299. Research in Engineering. (1–6) I and II.** The Staff

ENGLISH

William V. O'Connor, Ph.D., *Chairman of the Department.*
Department Office, 176 Academic Office Building

Everett Carter, Ph.D., *Professor of English.*
Solomon Fishman, Ph.D., *Professor of English.*
Gwendolyn B. Needham, Ph.D., *Professor of English.*
William V. O'Connor, Ph.D., *Professor of English.*
Linda Van Norden, Ph.D., *Professor of English.*
Celeste T. Wright, Ph.D., *Professor of English.*
Thomas A. Hanzo, Ph.D., *Associate Professor of English.*
‡Elizabeth R. Homann, Ph.D., *Associate Professor of English.*
§Robert A. Wiggins, Ph.D., *Associate Professor of English.*
Alexander B. Chambers, Ph.D., *Assistant Professor of English.*
*Jay L. Halio, Ph.D., *Assistant Professor of English.*
Hilton J. Landry, Ph.D., *Assistant Professor of English.*
Hugh B. Staples, Ph.D., *Assistant Professor of English.*



Daniel S. Silvia, Jr., M.A., *Acting Assistant Professor of English.*
Caroline Gordon Tate, B.A., *Lecturer in English.*

ENGLISH MAJOR

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 91).

Departmental Major Advisers.—Mr. Chambers, Mr. Halio, Mr. Hanzo, Mrs. Homann, Mr. Landry, Mrs. Needham, Mr. Staples, Miss Van Norden, Mrs. Wright.

The Major Program

(A) Lower Division Courses.—First year, course 1A-1B required. Second year, course 45A-45B. Recommended: philosophy.

(B) Upper Division Courses.—Twenty-four units of upper division courses in literature with specific requirements: third year, course 117J; fourth year, course 145A-145B. Recommended: a course in English history.

Courses 106L and 110 and Speech 1A or 2A are required of candidates for the Certificate of Completion of the teacher-training curriculum whose teaching major is English.

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 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 92).—The honors program consists of course 194H 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.

‡ Absent on leave, fall semester 1962-1963.

§ Sabbatical leave in residence, fall semester 1962-1963.

§ Absent on leave, spring semester 1963.

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.

Mr. Fishman, Mr. Wiggins, Mr. O'Connor

Lecture—1 hour; discussion—2 hours.

1B. First-Year Reading and Composition. (3) I and II.

Mrs. Wright, Mr. Hanzo, Mrs. Homann

Lecture—1 hour; discussion—2 hours.

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. Mr. Carter

Lecture—3 hours.

Prerequisite: course 1A. Course 30A is not prerequisite to 30B.

31. Intermediate Composition. (3) I.

Mr. Staples

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. Mr. Landry, Mr. Staples

Lecture—3 hours.

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. Chambers

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.

Mr. Chambers

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 nonmajors.

46B. Masterpieces of English Literature. (3) II.

Mrs. Wright

Lecture—3 hours.

Prerequisite: course 1A. Recommended: course 1B.

Course 46A is not prerequisite to 46B.

Selected works of principal writers after 1700; lectures and discussion. Designed for majors and nonmajors.

47. Introduction to Modern Literature. (3) II.

Mr. Halio, 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.** Mrs. Tate
Lecture—3 hours.
Prerequisite: course 1B. Sophomore students may enroll in this course with the consent of the instructor.
- 106L. Advanced Composition. (3) II.** Miss Van Norden, Mrs. Wright
Lecture—3 hours.
Prerequisite: course 1B.
Designed to develop a clear, accurate, interesting style. Required of prospective high school English teachers.
- 110. Language. (3) II.** Mr. Silvia
Lecture—3 hours.
Origins, materials, growth, and function of language, with emphasis on English.
- 114A. The English Drama to 1620. (3) I.** Mr. Halio
Lecture—3 hours.
From the miracle plays through Elizabethan drama.
- 114B. The English Drama from 1620 to 1800. (3) II.** Mrs. Wright
Lecture—3 hours.
- 114C. The English Drama from 1800 to the Present. (3) I.** Mr. Landry
Lecture—3 hours.
- 116. The English Bible as Literature. (3) I.** Miss Van Norden
Lecture—3 hours.
- 117J. Shakespeare. (3) I and II.**
Lecture—3 hours. Mr. Chambers, Mrs. Wright; Mr. Halio, Mr. Landry
Study of twelve to fifteen of Shakespeare's principal plays.
- 119. The Age of Johnson. (3) II.** Mrs. Needham
Lecture—3 hours.
- 125C. The English Novel. (3) I.** Mrs. Needham
Lecture—3 hours.
From the beginnings to Dickens.
- 125D. The English Novel. (3) II.** Mrs. Needham
Lecture—3 hours.
Course 125C is not prerequisite to 125D.
From Dickens to Hardy.
- 125E. The American Novel. (3) II.** Mrs. Tate
Lecture—3 hours.
Reading and discussion of selected American novels.
- 125F. The English Novel. (3) II.** Mr. Fishman
Lecture—3 hours.
Prerequisite: courses 125C and 125D are not prerequisite to 125F.
From Hardy to the present.
- 131. Colonial and Neo-Classical American Literature. (3) II.** Mr. Landry
Lecture—3 hours.
Literature in America to 1800.

- *132. **Romanticism in American Literature.** (3) II. _____
Lecture—3 hours.
Irving, Cooper, Emerson, Thoreau, and other early nineteenth-century writers.
133. **Hawthorne and Melville.** (3) I. Mr. Carter
Lecture—3 hours.
134. **American Literature from 1865 to 1914.** (3) I. Mrs. Tate
Lecture—3 hours.
135. **Modern American Literature.** (3) II. Mr. Staples
Lecture—3 hours.
Twentieth-century prose, poetry, and drama.
- 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. _____
Lecture—3 hours.
Course 144A is not prerequisite to 144B.
Representative European novelists of the nineteenth and twentieth centuries.
- 145A–145B. **History of English Literature.** (3–3) Yr. Mr. Chambers, Mr. Halio
Lecture—3 hours.
Prerequisite: course 45A–45B or consent of instructor.
A study of English literature and its backgrounds.
147. **Introduction to Principles of Criticism.** (3) I. Mr. Hanzo
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. Landry
Lecture—3 hours.
Reading and discussion of representative lyric poems, English and American.
151. **Study of a Major Writer.** (3) II. Mr. Hanzo, Mr. Chambers
Lecture—3 hours.
With the consent of the instructor, this course may be repeated for credit.
154. **Chaucer.** (3) II. Mrs. Homann
Lecture—3 hours.
- *155. **Mediaeval Literature.** (3) I. _____
Lecture—3 hours.
Chief writers of the Middle Ages other than Chaucer.
- 158A. **The Age of Elizabeth.** (3) I. Mrs. Wright
Lecture—3 hours.
Beginnings of the English Renaissance, and literature of the sixteenth century.

* Not to be given, 1962–1963.

- 158B. **Literature of the Seventeenth Century.** (3) II. Mr. Chambers
Lecture—3 hours.
Course 158A is not prerequisite to 158B.
159. **Milton.** (3) I. Miss Van Norden
Lecture—3 hours.
165. **The Age of Dryden.** (3) II. Miss Van Norden
Lecture—3 hours.
English literature of the Restoration.
166. **The Age of Swift and Pope.** (3) I. Mrs. Needham
Lecture—3 hours.
177. **The Romantic Period.** (3) I. Mr. Fishman
Lecture—3 hours.
Wordsworth, Coleridge, Byron, Shelley, Keats, and their eighteenth-century precursors.
187. **The Victorian Period.** (3) II. Mr. Staples
Lecture—3 hours.
188. **British Prose of the Nineteenth Century.** (3) I. Mr. Staples
Lecture—3 hours.
Coleridge, Newman, Ruskin, Carlyle, Macaulay, Mill and other representative writers.
191. **British Literature from 1880 to 1918.** (3) I. Mr. O'Connor
Lecture—3 hours.
Wells, Shaw, Conrad, Hardy, Housman, and other representative writers.
- *192. **British Literature from 1918 to the Present.** (3) II. ———
Lecture—3 hours.
Lawrence, Joyce, Yeats, Eliot, and other representative writers.
- 194H. **Honors Tutorial.** (2) I and II. The Staff
Conference—1 hour.
Prerequisite: honors status.
Individual directed study leading to preparation of a long paper. May be repeated once for credit.
- *198. **Directed Group Study of a Major Topic.** (3) I and II. The Staff
Lecture—3 hours.
199. **Special Study for Advanced Undergraduates.** (1-3) I and II.
The Staff (Mr. O'Connor 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. Mr. O'Connor
Lecture—2 hours.
211. **Introduction to Old English.** (3) I. Mr. Silvia
Lecture—3 hours.
Anglo-Saxon language and literature.
213. **Readings in Middle English.** (3) II. Mrs. Homann
Lecture—2 hours.
Rapid reading of selections in Middle English from the twelfth to the fifteenth century.

* Not to be given, 1962-1963.

- *214. **Arthurian Romance.** (3) I. Mrs. Homann
Lecture—3 hours.
The Arthurian tradition in the Middle Ages.
- *217. **Shakespeare.** (3) I. Mr. Halio
Lecture—3 hours.
Problems in Shakespearean criticism and interpretation.
- *231. **American-European Literary Relations.** (3) II. Mr. Carter
Lecture—3 hours.
The interchange of ideas between Europe and America in the nineteenth and twentieth centuries.
232. **Topics on American Writers.** (3) II. Mr. O'Connor
Lecture—3 hours.
Examination of selected major figures.
- *254. **Elizabethan and Jacobean Drama.** (3) II. Mrs. Wright
Lecture—3 hours.
Kyd, Marlowe, Beaumont and Fletcher, Jonson, Ford, Webster, Massinger, Shirley.
- *255. **Sense and Sensibility in the Eighteenth Century.** (3) I. Mrs. Needham
Lecture—3 hours.
Rationalism and sentimentalism in eighteenth-century thought and literature.
- *256. **The Irish Literary Renaissance.** (3) II. Mr. Hanzo
Lecture—3 hours.
Twentieth-century Anglo-Irish literature.
- *260. **Mediaeval Literature.** (3) I. Mrs. Homann
Lecture—3 hours.
Selected topics in the literature of the period.
- *262. **Sixteenth-Century Literature.** (3) II. Mr. Halio
Lecture—3 hours.
263. **Seventeenth-Century Literature.** (3) II. Miss Van Norden
Lecture—3 hours.
264. **Eighteenth-Century Literature.** (3) II. Mrs. Needham
Lecture—3 hours.
- *265. **Nineteenth-Century Literature.** (3) I. Mr. Staples
Lecture—3 hours.
- *266. **Twentieth-Century Literature.** (3) II. Mr. O'Connor
Lecture—3 hours.
- *270. **American Literature.** (3) II. Mr. Carter
Lecture—3 hours.
- *271. **Dramatic Literature.** (3) II. _____
Lecture—3 hours.
Problems in dramatic theory, criticism, and interpretation.
272. **Fiction.** (3) I. Mrs. Tate
Lecture—3 hours.
Problems in the theory and practice of the novel.

273. **Literary Criticism.** (3) II. Mr. Fishman
Lecture—3 hours.
A survey of literary criticism from Aristotle to the present.
280. **Ideas of the Self in Contemporary Literature.** (3) I. Mr. Hanzo
Lecture—3 hours.
Definitions of selfhood in the works of major twentieth-century writers in England.
299. **Special Study.** (1-6) I and II. The Staff

PROFESSIONAL COURSE

300. **Problems in Teaching English Literature and Composition in Secondary Schools.** (2) I. Mrs. Needham
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 306.

ENTOMOLOGY AND PARASITOLOGY

Ray F. Smith, Ph.D., *Chairman of the Department, Berkeley-Davis.*

Richard M. Bohart, Ph.D., *Vice-Chairman of the Department.*

Department Office, 122 Robbins Hall

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.*
Leslie M. Smith, Ph.D., *Professor of Entomology.*
Ray F. Smith, Ph.D., *Professor of Entomology (Berkeley campus).*
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.*
Oscar G. Bacon, Ph.D., *Associate Professor of Entomology.*
John W. MacSwain, Ph.D., *Associate Professor of Entomology (Berkeley campus).*
Norman E. Gary, Ph.D., *Assistant Professor of Entomology.*
Frank E. Strong, Ph.D., *Assistant Professor of Entomology.*



James R. Douglas, Ph.D., *Professor of Parasitology.*
Albert A. Grigarick, Jr., Ph.D., *Lecturer in Entomology.*
Paul D. Hurd, Jr., Ph.D., *Lecturer in Entomology (Berkeley campus).*
†Dewey J. Raski, Ph.D., *Professor of Nematology.*
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 57.

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.
5. **An Introduction to Apiculture.** (2) II. Mr. Gary
Lecture—2 hours.
Biology and behavior of bees and fundamentals of beekeeping.
- 5L. **Apiculture Laboratory.** (2) II. Mr. Gary
Laboratory—6 hours.
Prerequisite: course 5 (may be taken concurrently).
Study of structure and functions of honeybees and bee colonies; theories of colony management in apiculture.
10. **Natural History of the Insects.** (3) I. Mr. Smith
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.

† Absent on leave, 1962–1963.

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

106. **Introduction to Structure and Function in Insects.** (4) I.

Lecture—2 hours; laboratory—6 hours.

Mr. Laidlaw, Mr. Summers

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 5 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.

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.

124. **Economic Entomology.** (4) I and II.

I. Mr. Grigarick, Mr. Smith; II. Mr. Bacon, Mr. Lange.

Lecture—2 hours; laboratory—6 hours.

Life histories, habits, and principles underlying control of insects attacking fruit trees, field and vegetable crops.

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.

130B. **Agricultural Entomology.** (3) II.

Mr. Bailey, Mr. Stafford

Lecture—2 hours; laboratory—1 hour.

Prerequisite: course 124.

Complementary to 130A but emphasizing plot design, sampling techniques, control programs, and equipment. Examples primarily from deciduous fruit and nut pests.

198. **Directed Group Study for Advanced Undergraduates.** (1-5) I and II.
Prerequisite: consent of the instructor. The Staff (Mr. Bohart in charge)
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 in General Entomology.** (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 in Entomology and Parasitology.** (1-6) I and II. The Staff

* Not to be given, 1962-1963.

FOOD SCIENCE AND TECHNOLOGY

George F. Stewart, Ph.D., *Chairman of the Department.*
Department Office, 126 Cruess Hall

- Walter L. Dunkley, Ph.D., *Professor of Food Science and Technology.*
Robert E. Feeney, Ph.D., *Professor of Food Science and Technology.*
Eugene L. Jack, 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.*
Joseph M. Smith, Sc.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.*
Chester L. Roadhouse, D.V.M., *Professor of Dairy Industry, Emeritus.*
Clinton O. Chichester, Ph.D., *Associate Professor of Food Science and Technology.*
Edwin B. Collins, Ph.D., *Associate Professor of Food Science and Technology.*
Walter G. Jennings, 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.*
Richard A. Bernhard, Ph.D., *Assistant Professor of Food Science and Technology.*
Martin W. Miller, Ph.D., *Assistant 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.*
James F. Guymon, Ph.D., *Professor of Enology.*
John C. Harper, D.Sc., *Associate Professor of Agricultural Engineering.*
Bruce E. Hubbell, B.S., *Lecturer in Food Science and Technology.*
Wendell W. Kilgore, Ph.D., *Lecturer in Food Science and Technology.*
Samuel Lepkovsky, Ph.D., *Professor of Poultry Husbandry (Berkeley Campus)*
Mendel Mazelis, Ph.D., *Lecturer in Food Science and Technology.*
Tommy Nakayama, Ph.D., *Lecturer in Food Science and Technology.*
Daniel W. Peterson, Ph.D., *Associate Professor of Poultry Husbandry.*
Donald M. Reynolds, Ph.D., *Associate Professor of Bacteriology.*
Edward B. Roessler, Ph.D., *Professor of Mathematics.*

Departmental Major Advisers.—Mr. Berg, Mr. Marsh, Mr. Miller, Mr. Nickerson.

Bachelor of Science Major Program and Graduate Study. See page 57.

‡ Absent on leave, fall semester, 1962–1963.

LOWER DIVISION COURSES

1. Introduction to Food Science. (2) I.

Lecture—2 hours.

Mr. Roessler, 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, Mr. Whitaker

Prerequisite: Chemistry 5 and Biochemistry 101L or their equivalents.

Theory and application of physical and chemical methods for analyzing foods.

105A. Food and Industrial Microbiology Laboratory. (2) I.

Laboratory—6 hours.

Mr. Vaughn, Mr. York

Prerequisite: Bacteriology 1; Chemistry 8. Bacteriology 105A must be taken concurrently.

Microbiology of food fermentations (including vinous fermentation, but not brewing), food processing, food spoilage and the disposal of wastes.

105B. Food and Industrial Microbiology Summer Laboratory. (2)

Laboratory—6 hours.

Mr. Nakayama, Mr. Phaff

Prerequisite: Bacteriology 105B. Course 105A is not prerequisite to 105B.

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.

The course will be offered six hours a day, five days a week for three weeks (total: ninety hours).

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. (2) I.

Lecture—2 hours.

Mr. Bernhard, Mr. Smith

Prerequisite: courses 101, 103, and 105A; Mathematics 13 or equivalent.

Principles of quality control for food processing operations: sample selection; method of analysis; application of analyzed data to control of quality. Statistical quality control.

110. Engineering Principles of Food Processing. (5) I.

Mr. Dunkley, Mr. Guymon, Mr. Smith

Lecture—3 hours; laboratory—6 hours.

Prerequisites: Mathematics 3B; Physics 2B, 3B; Chemistry 109.

Application of the conservation of mass and energy to food processing. Introduction to process principles, including counter-current operation and equilibrium stage processing. Elements of fluid mechanics and heat transfer with illustrations in the food industry.

114. Principles of Processing Fruit and Vegetable Products. (3) II.

Lecture—2 hours; laboratory—3 hours.

Mr. Marsh

Prerequisite: Chemistry 8; Bacteriology 1.

Technical principles relating to processing operations used in the commercial preservation of fruit and vegetable products; theory and practical applications; field trips.

118A-118B. Principles of Dairy Processing. (3-3) Yr.

I. Mr. Dunkley; II. Mr. Nickerson

Lecture—3 hours.

Prerequisite: Biochemistry 101 or equivalent; Bacteriology 1.

Principles and technological processes involved in the processing of dairy foods.

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.

132. Microbiology of Milk and Dairy Products. (2) II.

Mr. Collins

Lecture—1 hour; laboratory—3 hours.

Prerequisite: Bacteriology 105A.

Significance, control, and detection of bacteria and other microorganisms used in manufacturing and/or ripening dairy products; bacteriophage action and control; defects produced by microorganisms; destruction of microorganisms; protection of public health.

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. Stewart 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. Stewart in charge)

GRADUATE COURSES

210. Proteins—Their Functional Activities and Interactions. (3) II.

Lecture—3 hours.

Mr. Feeney

Prerequisite: Biochemistry 101; Chemistry 109 or 110A–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. Jack, 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.

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. Stewart

299. Research. (1–9) I and II.

The Staff (Mr. Stewart in charge)

Prerequisite: graduate standing.

RELATED COURSES

Agricultural Business Management (Agricultural Economics 115A–115B)

Food and Industrial Microbiology (Bacteriology 105A–105B)

Handling, Storage, and Transit of Fruits (Pomology 112)

Technology of Handling Poultry Products (Poultry Husbandry 121)

Concepts of Animal Nutrition (Poultry Husbandry 150)

Handling, Storage, and Transit of Vegetables (Vegetable Crops 112)

Enology: Wine Processing and Analyses (Viticulture 124)

Enology: Wine Preparation (Viticulture 125)

FOREIGN LANGUAGES

Merle L. Perkins, Ph.D., *Chairman of the Department.*

Department Office, 378 Academic Office Building

- Siegfried B. Puknat, Ph.D., *Professor of German.*
Iver N. Nelson, Ph.D., *Professor of Spanish, Emeritus.*
Max Bach, Ph.D., *Associate Professor of French.*
Donald G. Castanien, Ph.D., *Associate Professor of Spanish.*
Daniel S. Keller, Ph.D., *Associate Professor of Spanish.*
Merle L. Perkins, Ph.D., *Associate Professor of French.*
Wayne S. Bowen, Ph.D., *Assistant Professor of Spanish.*
Donald M. Decker, Ph.D., *Assistant Professor of Spanish.*
Richard E. Grimm, Ph.D., *Assistant Professor of Classics.*
Roland W. Hoermann, Ph.D., *Assistant Professor of German.*
Martin Kanes, Docteur de l'Université de Paris, Ph.D., *Assistant Professor of French.*
Marshall Lindsay, Ph.D., *Assistant Professor of French.*
_____, *Assistant Professor of German.*
Oliver T. Myers, Ph.D., *Assistant Professor of Spanish.*



- William P. Galvin, M.A., *Associate in Foreign Languages.*
Anthony S. Kawczynski, Mag. Phil., *Lecturer in Foreign Languages.*
Enrique Lafoucade, *Lecturer in Spanish.*
Henry F. Loyzelle, A.B., *Associate in Italian.*
Russell L. Pfohl, M.A., *Acting Instructor in French.*
Raul Pimentel, M.A., *Acting Instructor in German.*
Leonilla F. Strelkoff, A.B., *Associate in Russian.*
Ruth J. Volman, M.A., *Associate in Foreign Languages.*

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 91.

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. Grimm
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 alternate years.

* Not to be given, 1962-1963.

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 alternate years.

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 91.

Departmental Major Advisers.—Mr. Bach, 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. With the permission of the staff, three of the 24 units may be related work in other fields. Students who major in French must maintain at least an average of C in upper division French courses.

Honors and Honors Program (see page 92).—The honors program comprises two semesters of study under course 194II, which will include a research paper and a comprehensive examination.

Course 134 and either course 130A or 130B are required for the General Secondary Teaching Credential in French.

Graduate Study.—The Department of Foreign Languages offers a program of study leading to the M.A. degree in French.

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.
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.
3. **Intermediate French.** (4) I and II. The Staff
Recitation—4 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.

UPPER DIVISION COURSES

Prerequisite for all courses except 150, 160: course 4 or its equivalent.

- 101A. Advanced Grammar, Composition, and Conversation.** (3) I.
 Lecture—3 hours. Mr. Lindsay
 Offered in alternate years.
- *101B. Advanced Grammar, Composition, and Conversation.** (3) I.
 Lecture—3 hours. Mr. Perkins
 Course 101A is not a prerequisite to 101B.
 Offered in alternate years.
- *109A. Survey of French Literature to 1715.** (3) I. Mr. Kanes
 Lecture—3 hours.
 Readings from major works; discussion of literary history; introduction to bibliography.
 Offered in alternate years.
- 109B. Survey of French Literature from 1715 to Present.** (3) II. Mr. Kanes
 Lecture—3 hours.
 Course 109A is not prerequisite to 109B.
 Readings from major works; discussion of literary history; elementary bibliography and research techniques.
 Offered in alternate years.
- *116. Literature of the Sixteenth Century.** (3) I. Mr. Lindsay
 Lecture—3 hours.
 Readings in Rabelais and Montaigne.
 Offered every third year.
- 117A. The Theater of the Seventeenth Century.** (3) I. Mr. Pfohl
 Lecture—3 hours.
 Offered in alternate years.
- *117B. Novelists and Moralists of the Seventeenth Century.** (3) I. Mr. Pfohl
 Lecture—3 hours.
 Offered in alternate 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 every third year.
- *118B. Drama and Novel in the Eighteenth Century.** (3) II. Mr. Perkins
 Lecture—3 hours.
 Plays of Marivaux and Beaumarchais; novels of Lesage, Prevost, Diderot, Voltaire, Rousseau.
 Course 118A is not a prerequisite to 118B.
 Offered in alternate years.

* Not to be given, 1962-1963.

- 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 alternate years.
- *119B. The Nineteenth Century. (3) II.** Mr. Kanes
Lecture—3 hours.
Realism and naturalism (Flaubert, Zola, Maupassant); criticism (Sainte-Beuve, Renan, Taine); symbolism (Baudelaire, Verlaine, Rimbaud, Mallarmé).
Course 119A is not a prerequisite to 119B.
Offered in alternate years.
- *124. French Lyric Poetry. (3) I.** Mr. Lindsay
Lecture—3 hours.
Prerequisite: one upper division course in French or consent of the instructor.
Study of French versification and poetic conventions; intensive analysis of the works of major poets.
Offered every third year.
- *130A. Advanced Grammar and Composition. (3) I.** Mr. Bach
Lecture—3 hours.
Prerequisite: courses 101A–101B or either course with grade B or better.
Offered in alternate years.
- *130B. Advanced Grammar and Composition. (3) II.** Mr. Bach
Lecture—3 hours.
Prerequisite: courses 101A–101B or either course with grade B or better.
Course 130A is not a prerequisite to 130B.
Offered in alternate years.
- 134. Survey of French Culture and Institutions. (3) II.** Mr. Bach
Lecture—3 hours.
Offered in alternate years.
- 140. 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.
Offered in alternate years.
- *150. Masterpieces of French Literature. (3) II.** Mr. Lindsay
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 alternate years.
- 160. French Literature of the Twentieth Century. (3) II.** Mr. Lindsay
Lecture—3 hours.
Representative readings from Proust, Gide, Valéry, Sartre and others.
Lectures in English; readings in English or French. Knowledge of French not required.
Offered in alternate years.

* Not to be given, 1962–1963.

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. _____
Lecture—3 hours.

*202. **Medieval French Literature.** (3) II. _____
Lecture—3 hours.

*217. **Seventeenth-Century French Literature.** (3) II. Mr. Pfohl
Lecture—3 hours.

218. **Eighteenth-Century French Literature.** (3) I. Mr. Perkins
Lecture—3 hours.

219. **Nineteenth-Century French Literature.** (3) II. Mr. Bach
Lecture—3 hours.

*220. **Twentieth-Century French Literature.** (3) II. Mr. Lindsay
Lecture—3 hours.

299. **Special Study.** (1-4) I and II. The Staff

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 91.

Departmental Major Advisers.—Mr. Hoermann, Mr. Puknat.

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 92).—The honors program comprises two semesters of study under course 194H, which will include a research paper and a comprehensive examination.

Graduate Study.—The Department of Foreign Languages offers a program of study leading to the M.A. degree in German.

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.

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.
3. **Intermediate German.** (4) I and II. The Staff
 Recitation—4 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. ———
 Lecture—3 hours.
 Offered in alternate years.
- 101B. **Advanced Grammar, Composition, and Conversation.** (3) I. ———
 Lecture—3 hours.
 Course 101A is not a prerequisite to 101B.
 Offered in alternate years.
102. **German Poetry.** (3) I. Mr. Hoermann
 Lecture—3 hours.
 Literary, folk, and church forms in German lyric and narrative verse from the Middle Ages to the present.
 Offered in alternate years.
- *103A. **The Classical Period: Lessing and Schiller.** (3) II. Mr. Puknat
 Lecture—3 hours.
 The major dramas and aesthetic principles of Lessing and Schiller.
 Offered in alternate years.
- 103B. **The Classical Period: Goethe.** (3) II. Mr. Puknat
 Lecture—3 hours.
 Course 103A is not a prerequisite to 103B.
 A study of *Iphigenie*; *Tasso*; and *Faust*, Parts I and II.
 Offered in alternate years.
109. **The "Sturm und Drang" Period and Romanticism.** (3) II.
 Lecture—3 hours. Mr. Hoermann
 The liberation of feeling in the imaginative literature of the Storm and Stress and Romantic periods.
 Offered every third year.
- *114. **Nineteenth-Century German Prose.** (3) I. Mr. Hoermann
 Lecture—3 hours.
 Readings from representative German prose writers of the nineteenth century from the end of Romanticism to Naturalism.
 Offered every third year.

* Not to be given, 1962–1963.

- *116. **Nineteenth-Century German Drama.** (3) II. _____
Lecture—3 hours.
The development of the German drama during the nineteenth century. Readings of representative plays by Kleist, Büchner, Grillparzer, and Heibel.
Offered every third year.
121. **History of German Literature.** (3) II. Mr. Pimentel
Lecture—3 hours.
A survey of German literature in the Middle Ages.
122. **History of German Literature.** (3) II. _____
Lecture—3 hours.
A survey of German literature from the Reformation to the end of the nineteenth century.
Offered in alternate years.
- *125. **Middle High German.** (3) I. Mr. Pimentel
Lecture—3 hours.
Outline of grammar; selections from Middle High German poetry. Offered in alternate years.
- *130A. **Advanced Grammar and Composition.** (3) I. The Staff
Lecture—3 hours.
Prerequisite: courses 101A–101B or either course with grade of B or better.
- *130B. **Advanced Grammar and Composition.** (3) II. The Staff
Lecture—3 hours.
Prerequisite: courses 101A–101B or either course with grade B or better.
- *150. **Masterpieces of German Literature.** (3) I. Mr. Puknat
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 alternate years.
160. **German Literature of the Twentieth Century.** (3) I. Mr. Puknat
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 alternate 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

- *201. **History of the German Language.** (3) II. _____
Lecture—3 hours.
- *205. **Sixteenth- and Seventeenth-Century German Literature.** (3) I. _____
Lecture—3 hours.
- *208. **Eighteenth-Century German Literature.** (3) II. Mr. Puknat
Lecture—3 hours.

* Not to be given, 1962–1963.

211. **Nineteenth-Century German Literature.** (3) II. Mr. Hoermann
Lecture—3 hours.
217. **Twentieth-Century German Literature.** (3) I. Mr. Puknat
Lecture—3 hours.
299. **Special Study.** (1-4) II. The Staff

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 91.

LOWER DIVISION COURSES

1. **Elementary Greek—Beginning.** (4) I. Mr. Grimm
Recitation—4 hours.
2. **Elementary Greek—Continued.** (4) II. Mr. Grimm
Recitation—4 hours.
Prerequisite: course 1 or the equivalent.

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 91.

LOWER DIVISION COURSES

1. **Elementary Italian—Beginning.** (4) I. Mr. Loyzelle
Recitation—3 hours; laboratory—2 hours.
Prerequisite: this course corresponds to the first two years of high school Italian.
2. **Elementary Italian—Continued.** (4) II. Mr. Loyzelle
Recitation—3 hours; laboratory—2 hours.
Prerequisite: course 1 or two years of high school Italian.

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 91.

LOWER DIVISION COURSES

1. **Elementary Latin—Beginning.** (4) I. Mr. Grimm
Recitation—4 hours.
2. **Elementary Latin—Continued.** (4) II. Mr. Grimm
Recitation—4 hours.
Prerequisite: two years of high school Latin or course 1 or consent of the instructor.
3. **Intermediate Latin.** (4) I. Mr. Grimm
Recitation—4 hours.
Prerequisite: course 2 or the equivalent.
4. **Readings in Latin Poetry.** (4) II. Mr. Grimm
Recitation—4 hours.
Prerequisite: course 3 or the equivalent.

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 91.

LOWER DIVISION COURSES

- | | |
|--|----------------|
| 1. Elementary Russian—Beginning. (4) I.
Recitation—3 hours; laboratory—2 hours. | Mrs. Strelkoff |
| 2. Elementary Russian—Continued. (4) II.
Recitation—3 hours; laboratory—2 hours.
Prerequisite: course 1. | Mrs. Strelkoff |
| 3. Intermediate Russian. (4) I.
Recitation—4 hours.
Prerequisite: course 2. | Mrs. Strelkoff |
| 4. Intermediate Russian. (4) II.
Recitation—4 hours.
Prerequisite: course 3. | Mrs. Strelkoff |
| 1G. Russian for Graduate Students. (No credit) I and II.
Lecture—3 hours.
A course designed to prepare students for the graduate reading examination. | Mrs. Strelkoff |

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 91.

Departmental Major Advisers.—Mr. Bowen, Mr. Castanien, Mr. Keller.

The Major Program

(A) Lower Division Courses.—Four years of high school Spanish, or courses 1, 2, and 3, and also 4 unless 3 has been passed with a grade of A or B; course 25A–25B. Recommended: one year of college Latin or the equivalent.

(B) Upper Division Courses.—Required: 24 units of upper division courses including 106A–106B (6 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 92).—The honors program comprises two semesters of study under course 194H, which will include a research paper and a comprehensive examination.

Graduate Study.—The Department of Foreign Languages offers a program of study leading to the M.A. degree in 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.
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.
3. **Intermediate Spanish.** (4) I and II. The Staff
 Recitation—4 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—4 hours.
 Prerequisite: course 3 or four years of high school Spanish.
 Spoken Spanish stressed through class discussion of a variety of selected readings.
- 25A–25B. **Advanced Spanish.** (3–3) Yr. The Staff
 Lecture—3 hours.
 Required as preparation for the major.
 Prerequisite: four years of high school Spanish, or course 3 (with a grade of at least B) or course 4, or the equivalent.

UPPER DIVISION COURSES

Prerequisite for all courses except 150: course 4 or its equivalent.

- 104A–104B. **Survey of Spanish-American Literature.** (3–3) Yr. Mr. Decker
 Lecture—3 hours.
 Course 104A is not prerequisite to 104B.
 Survey of major authors and important aspects of Spanish-American literary history from the Colonial Period to the present.
 Offered in alternate years.
- *105. **Peninsular Drama from the Romantic Movement to the Present.**
 (3) I. Mr. Decker
 Lecture—3 hours.
 Offered every third year.
- 106A. **History of Spanish Literature to 1680.** (3) I. Mr. Castanien
 Lecture—3 hours.
 Offered in alternate years.
- 106B. **History of Spanish Literature from 1680 to the Present.** (3) II.
 Lecture—3 hours. Mr. Keller
 Course 106A is not prerequisite to course 106B.
 Offered in alternate years.
- *108. **Modern Peninsular Prose Literature.** (3) II. Mr. Bowen
 Lecture—3 hours.
 Study of the Spanish novel and essay of the nineteenth and twentieth centuries.
 Offered in alternate years.
- *109. **Spanish Drama of the Golden Age.** (3) II. Mr. Castanien
 Lecture—3 hours.
 Offered in alternate years.

* Not to be given, 1962–1968.

- *111. **Cervantes.** (3) I. Mr. Castanien
Lecture—3 hours.
Offered in alternate years.
115. **Lyric Poetry.** (3) II. Mr. Bowen
Lecture—3 hours.
A survey of Spain's principal lyric poets from the Middle Ages to the present.
Offered every third year.
- *122. **Spanish-American Fiction of the Twentieth Century.** (3) I. Mr. Decker
Lecture—3 hours.
- 130A. **Advanced Grammar and Composition.** (3) I. Mr. Keller
Lecture—3 hours.
Prerequisite: courses 25A-25B.
Offered in alternate years.
- *130B. **Advanced Grammar and Composition.** (3) I. Mr. Myers
Lecture—3 hours.
Prerequisite: courses 25A-25B. Course 130A is not prerequisite to 130B.
Offered in alternate years.
140. **Introduction to Medieval Language and Literature.** (3) II. Mr. Myers
Lecture—3 hours.
Reading, analysis and discussion of representative works in Old Spanish.
Offered in alternate years.
150. **Masterpieces of Spanish Literature.** (3) I. Mr. Bowen
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 alternate 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

230. **History of the Spanish Language.** (3) I. Mr. Myers
Lecture—3 hours.
231. **Spanish Literature of the Golden Age.** (3) II. Mr. Castanien
Lecture—3 hours.
- *232. **Spanish-American Literature of the National Period.** (3) II. Mr. Keller
Lecture—3 hours.
- *233. **Spanish Literature of the Twentieth Century.** (3) I. _____
Lecture—3 hours.
299. **Special Study.** (1-4) I and II. The Staff

* Not to be given, 1962-1963.

FRENCH

For courses in French see "Foreign Languages" on page 201.

GENERAL LITERATURE COURSES

The following courses are open to students throughout the campus. The readings are in English.

CLASSICS

- 39A-*39B. Greek Literature in Translation.
- 40. Roman Literature in Translation.

DRAMATIC ART

- 158A. The World Drama.
- 159B. Contemporary Drama.

ENGLISH

- 47. Introduction to Modern Literature.
- 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.

SPANISH

- 150. Masterpieces of Spanish Literature.
- Refer to departmental listing for descriptions of courses.

GENETICS

G. Ledyard Stebbins, Ph.D., *Chairman of the Department.*
Department Office, 222 Animal Science Building

Melvin M. Green, Ph.D., *Professor of Genetics.*
G. Ledyard Stebbins, Ph.D., *Professor of Genetics.*
Sidney R. Snow, Ph.D., *Assistant 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 Agronomy.*
Vigfus S. Asmundson, Ph.D., *Professor of Poultry Husbandry.*
G. Eric Bradford, Ph.D., *Assistant Professor of Animal Husbandry.*
Fred N. Briggs, Ph.D., *Professor of Agronomy.*
Royce S. Bringhurst, Ph.D., *Associate Professor of Pomology.*
Glen N. Davis, Ph.D., *Professor of Vegetable Crops.*
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.*
Paulden F. Knowles, Ph.D., *Professor of Agronomy.*
Robert C. Laben, Ph.D., *Associate 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.*
Wyman E. Nyquist, Ph.D., *Assistant Professor of Agronomy.*
†Harold P. Olmo, Ph.D., *Professor of Viticulture.*
Charles M. Rick, Jr., Ph.D., *Professor of Vegetable Crops.*
Wade C. Rollins, Ph.D., *Associate 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.*
Sidney R. Snow, Ph.D., *Assistant Professor of Genetics.*
Ernest H. Stanford, Ph.D., *Professor of Agronomy.*
G. Ledyard Stebbins, Ph.D., *Professor of Genetics.*
Clyde N. Stormont, Ph.D., *Professor of Immunogenetics.*

Departmental Major Adviser.—Mr. Snow.

Bachelor of Science Major Program and Graduate Study (Animal Science).
See page 55.

Bachelor of Science Major Program and Graduate Study (Plant Science).
See page 60.

UPPER DIVISION COURSES

100. Principles of Genetics. (3) I and II.

I. Mr. Snow; II. Mr. Green.

Lecture—3 hours; conference—1 hour.

Prerequisite: general botany or general zoology.

Introduction to genetics with some consideration of its applications in agriculture and biology.

Students taking course 100C concurrently will include their conference hour within the laboratory period of that course.

100C. Principles of Genetics Laboratory. (1) I and II.

I. Mr. Snow; II. Mr. Green.

Laboratory—3 hours.

† Absent on leave, 1962–1963.

Must be taken concurrently with course 100.

Laboratory work in elementary genetics to supplement course 100.

101. **Cytogenetics.** (3) II. Mr. Snow
Lecture—3 hours; laboratory—6 hours.
Prerequisite: course 100; general cytology (Botany 130 or its equivalent).
Genetics as related to cytological conditions.
- 101L. **Cytogenetics Laboratory.** (2) II. Mr. Snow
Laboratory—6 hours.
Prerequisite: course 101 (may be taken concurrently).
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.
The principles of evolution, with particular reference to the evolutionary processes in plants.
- *106. **Advanced Genetics.** (3) I. Mr. Green
Lecture—3 hours.
Prerequisite: course 100; 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 fall semester of odd-numbered years.
196. **Lectures in Advanced Genetics.** (3) I and II. _____
Lecture—3 hours.
Prerequisite: course 100 or equivalent.
Selected topics in advanced genetics. May be repeated for credit.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II.
The Staff (Mr. Green in charge)

GRADUATE COURSES

297. **Graduate Seminar in Genetics.** (1-4) I and II.
The Genetics Group (Mr. Green in charge)
Prerequisite: graduate standing in genetics.
Intensive study of special topics, under supervision of some member of the staff.
299. **Research in Genetics.** (1-6) I and II. The Staff
- Staff Seminar in Genetics.** (No credit) I and II.
Prerequisite: course 100. The Genetics Group (Mr. Smith in charge)
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 120)

* Not to be given, 1962-1963.

GEOGRAPHY

For courses in geography see "Anthropology and Geography" on page 133.

GEOLOGICAL SCIENCES

Donald O. Emerson, Ph.D., *Chairman of the Department.*

Department Office, 305 Physical Sciences Building

† Charles G. Higgins, Ph.D., *Associate Professor of Geology.*

Donald O. Emerson, 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.*



Charles V. Guidotti, B.S., *Lecturer in Geology.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 91).

Departmental Major Adviser.—Mr. Pessagno.

GEOLOGICAL SCIENCES 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 numbered mathematics and/or natural science courses including:

(A) Lower Division Courses.—Chemistry 1A or 7A; Geology 1A-1B, 6; Mathematics 3A-3B, or 16A and 16B or 13; Physics 2A-2B, or 4A and 4B or 4C.

(B) Upper Division Courses.—24 units of upper division courses in geology. With the approval of the major adviser, 6 units of the 24 may be satisfied by upper division courses in other sciences related to the student's program.

Bachelor of Arts Major Program

(A) Lower Division Courses.—Chemistry 1A; Geology 1A-1B, 6; Physics 2A-2B and trigonometry.

(B) Upper Division Courses.—24 units of upper division courses in geology. With the approval of the major adviser, 6 units of the 24 may be satisfied by upper division courses in other fields related to the student's program.

Honors and Honors Program (see page 92).—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 Geological Sciences offers a program of study and research leading to the M.S. degree. For information regarding graduate study in geology, address the Graduate Adviser, Department of Geological Sciences.

† Absent on leave, 1962-1963.

LOWER DIVISION COURSES

- 1A. General Geology: Physical. (4) I.** Mr. Guidotti
Lecture—3 hours; laboratory—3 hours.
An introduction to the earth's physical features and the changes they undergo through dynamic processes.
- 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. Emerson
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

- 102. Field Geology. (3) II.** Mr. Todd
Lecture—1 hour; laboratory—6 hours.
Prerequisite: courses 6 and 116.
Principles and methods of making topographic and geologic field observations, measurements, and maps. Several all-day periods in the field.
- 104A. Crystallography and Optical Mineralogy. (4) II.** 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) I.** Mr. Todd
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. Todd
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. (4) II.** Mr. Pessagno
Lecture—2 hours; laboratory—6 hours.
Prerequisite: courses 1B and 111.
Principles of lithostratigraphy and biostratigraphy, with specific illustrations from the stratigraphic record.

116. **Structural Geology.** (3) I. Mr. Guidotti
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 1B and trigonometry.
Deformation of the earth, with special reference to causes, mechanics, and effects of crustal deformation; practice in laboratory methods dealing with geological problems in three dimensions.
- *117. **Geomorphology.** (2) II. Mr. Higgins
Lecture—2 hours.
Prerequisite: course 1A.
Sculpture of the earth's surface by natural processes.
- 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. **Advanced General Geology.** (2-3) I and II. The Staff
Prerequisite: senior standing in geology or consent of the instructor.
Directed group study in selected fields of the geological sciences.
199. **Special Study for Advanced Undergraduates.** (1-3) I and II. The Staff

GRADUATE COURSES

209. **Seminar and Laboratory in Physical Stratigraphy.** (2-4) II. Mr. Todd
Prerequisite: course 112 or equivalent.
The principles of sedimentation, lithologic correlation, and sedimentary tectonics.
- *213. **Seminar in Geomorphology.** (2) II. Mr. Higgins
Lecture—2 hours.
Prerequisite: course 117 or the equivalent.
Surficial processes and evolution of land forms.
260. **Seminar and Laboratory in Paleontology.** (2-4) I. Mr. Pessagno
Prerequisite: course 111 or the equivalent.
Morphological and biostratigraphic studies of Mesozoic and Cenozoic invertebrates important as index fossils.
280. **Seminar and Laboratory in Petrology.** (2-4) I. Mr. Emerson
Prerequisite: course 104A or the equivalent.
Origin and classification of rocks.
298. **Directed Group Studies.** (2) I and II. The Staff
299. **Research in Geology.** (1-6) I and II. The Staff

GERMAN

For courses in German see "Foreign Languages" on page 201.

GREEK

For courses in Greek see "Foreign Languages" on page 201.

* Not to be given, 1962-1963.

HISTORY

Walter L. Woodfill, Ph.D., *Chairman of the Department.*
Department Office, 161 Academic Office Building

W. Turrentine Jackson, Ph.D., *Professor of History.*
C. Bickford O'Brien, Ph.D., *Professor of History.*
James H. Shideler, Ph.D., *Professor of History.*
Walter L. Woodfill, Ph.D., *Professor of History.*
Craig B. Fisher, Ph.D., *Assistant Professor of History.*
David L. Jacobson, Ph.D., *Assistant Professor of History.*
Rollie E. Poppino, Ph.D., *Assistant Professor of History.*
Richard N. Schwab, Ph.D., *Assistant Professor of History.*
Philip J. Staudenraus, Ph.D., *Assistant Professor of History.*
Irwin Unger, Ph.D., *Assistant Professor of History.*
Peter Paret, Ph.D., *Visiting Assistant Professor of History.*



William Cunliffe, M.A., *Associate in History.*
Larry M. Thorson, M.A., *Associate in History.*
———, *Associate in History.*

HISTORY

Letters and Science List.—All undergraduate courses in history are included in the Letters and Science List of Courses (see page 91).

Departmental Advisers.—Mr. Fisher, Mr. Jacobson, Mr. O'Brien, Mr. Schwab, Mr. Shideler, Mr. Staudenraus, Mr. Woodfill.

Graduate Adviser.—Mr. Staudenraus.

Introductory Courses.—Course 4A-4B and 17A-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, 176A, 176B, 178A, 178B, 179, 180, 183. See also page 38.

The Major Program

(A) Lower Division Courses.—Required: courses 4A-4B, 17A-17B, Political Science 1A and 1B or 2, and one of the following courses: Economics 1A or Geography 2 or Philosophy 6A or 20A.

(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 6 units each in European and United States history.
- (c) Two sequence courses of two semesters each.

(2) History students must maintain at least a grade C average in the major.

Honors and Honors Program (see page 92).—The honors program comprises course 101, completed with a grade of B or better; course 194H, normally taken in the first senior semester; and course 195H, either a senior thesis or comprehensive examination according to the recommendation of a departmental honors committee. 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.

The Master of Arts Degree in History

The Department offers graduate study leading to the Master of Arts Degree in History to students who have completed with distinction the A.B. Degree in history, or its equivalent. Candidates for graduate study will be recommended for admission to graduate studies in history provided they meet the requirements of the Graduate Division and the Department of History.

The Program for the Master of Arts Degree

Candidates for the M.A. degree must complete satisfactorily the following requirements:

A. *Foreign Language*.—A reading knowledge of one foreign language approved by the Department of History. The candidate should demonstrate to the Department his competence in a foreign language in advance of the semester in which his M.A. degree is to be conferred.

B. Course Work

1. A minimum total of twenty-one units of course work, of which:
 - a. twelve units must be in history courses.
 - b. at least nine units must be graduate courses, including two seminars and a minimum of three units of History 299.
2. Graduate course work must be done under at least two instructors.

C. *Thesis*.—The thesis for the Master of Arts Degree in history shall be the result of the student's original investigations on a topic approved by the faculty committee in charge.

LOWER DIVISION COURSES

- 4A. **History of Western Civilization.** (3) I and II. The Staff
Lecture—2 hours; discussion—1 hour.
The growth of western civilization from ancient times through the seven-teenth century.
- 4B. **History of Western Civilization.** (3) I and II. The Staff
Lecture—2 hours; discussion—1 hour.
Course 4A is not prerequisite to 4B.
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.
Course 17A is not a prerequisite to 17B.
The American nation from the Civil War to the present.

UPPER DIVISION COURSES

101. **Introduction to Historical Method and Historiography.** (3) II. _____
Lecture—3 hours.
- 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.
Course 111A is not prerequisite to 111B.
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.
Course 121A is not prerequisite to 121B.
European history from the tenth century to the Renaissance, with readings from the literary sources.
- 131. The Renaissance and Reformation. (3) I.** Mr. Fisher
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) I.**
Lecture—3 hours. Mr. O'Brien
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.
Offered in alternate years.
- *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. Age of Revolution. (3) II.** Mr. Schwab
Lecture—3 hours.
Intellectual and social history of Europe from the French Revolution to the late nineteenth century. Extensive source readings.
- *134B. Age of Revolution. (3) I.** Mr. Schwab
Lecture—3 hours.
Course 134A is not prerequisite to 134B.
The intellectual and social history of Europe since the late nineteenth century. Extensive source readings.
- *136. The Soviet Union in World Affairs. (3) II.** Mr. O'Brien
Lecture—3 hours.
Primarily a history of Russia in world politics and economics since 1917. The long-range nature and problems of Russian foreign policy will be investigated.
- 137A. History of Russian Civilization. (3) I.** Mr. O'Brien
Lecture—3 hours.
An outline of Russian social, political and economic institutions and intellectual development from earliest times to the end of the nineteenth century.

- 137B. History of Russian Civilization.** (3) II. Mr. O'Brien
Lecture—3 hours.
An outline of Russian social, political and economic institutions and intellectual development in the twentieth century.
- 145. Europe from 1789 to 1871.** (3) I. Mr. Schwab
Lecture—3 hours.
A survey of the history of Western Europe from the French Revolution to the Franco-Prussian War.
- 146. Europe Since 1870.** (3) II. Mr. Schwab
Lecture—3 hours.
The political, social, and economic development of Europe from the Franco-Prussian War to the present.
- 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.
Course 151A is not prerequisite to 151B.
- *152. English Constitutional History.** (3) I. Mr. Woodfill
Lecture—3 hours.
The forming of English constitutional practices and institutions from Anglo-Saxon times to the Settlement of the Glorious Revolution.
- *153. English Society in the Early Modern Period.** (3) II. Mr. Woodfill
Lecture—3 hours.
Reading in the sources and monographs for the sixteenth through the eighteenth centuries. 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. Poppino
Lecture—3 hours.
Course 161A is not prerequisite to 161B.
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 alternate years.
- 165. Twentieth Century Latin-American Social Revolutions.** (3) II. 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.
- 166. History of Mexico.** (3) II. Mr. Poppino
Lecture—3 hours.
The colonial origins and development of the Mexican nation; its political, economic, and social institutions. Emphasis on the period since 1910.
Offered in alternate years.

* Not to be given, 1962-1963.

- 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.
- 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. 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) I.** Mr. Jacobson
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.** Mr. Staudenraus
Lecture—3 hours.
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. Civil War and Reconstruction. (3) II.** Mr. Staudenraus
Lecture—3 hours.
Course 172A is not prerequisite to 172B.
A survey of the major aspects of the Civil War and Reconstruction years; the problems relating to Negro freedom, constitutional readjustments, the rise of the New South, and the role of Big Business.
- 174A. Recent History of the United States. (3) I.** Mr. Shideler
Lecture—3 hours.
A study of political, economic, and cultural aspects of American democracy in recent years. From 1896 to 1928.
Offered in alternate years.
- 174B. Recent History of the United States. (3) II.** Mr. Shideler
Lecture—3 hours.
Course 174A is not prerequisite to 174B.
A study of political, economic, and cultural aspects of American democracy of recent years. From 1928 to the present.
Offered in alternate years.
- 175. Proseminar in American Intellectual History. (3) II.** Mr. Jacobson
Discussion—3 hours.
Intellectual history of the American people, with emphasis on social and political thought.
- *176A. Social and Cultural History of the United States. (3) I.** Mr. Shideler
Lecture—3 hours.
To 1865.
Offered in alternate years.

* Not to be given, 1962-1963.

- *176B. Social and Cultural History of the United States. (3) II.**
Lecture—3 hours. Mr. Shideler
Course 176A is not prerequisite to 176B.
1865 to the present.
Offered in alternate 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.
Course 178A is not prerequisite to 178B.
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.
- *179. Economic Growth of the United States. (3) II.** Mr. Staudenraus
Lecture—3 hours.
A study of the development of capitalism and industrialism and of resultant problems in agriculture, labor, business, and government.
- 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 alternate years.
- 181. Representative Americans. (3) I.** Mr. Staudenraus
Lecture—3 hours.
Prerequisite: course 17A-17B.
A biographical analysis of significant and representative men and women who shaped American history.
- *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.
Offered in alternate years.
- 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.
- 188B. History of Agriculture in the United States. (3) II.** Mr. Shideler
Lecture—2 hours; discussion—1 hour.
Course 188A is not prerequisite to 188B.
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 alternate years.

* Not to be given, 1962-1963.

- 189B. **History of the Pacific Coast and California.** (3) II. Mr. Jackson
Lecture—3 hours.
Course 189A is not prerequisite to 189B.
History of California since 1850.
- 194H. **Special Study for Honors Students.** (3) I. The Staff
Prerequisite: 12 units of United States and European history with an average grade of B. This normally will be History 4 and 17.
Special study for honors students. Normally taken in the first senior semester.
- 195H. **Special Study for Honors Students.** (3) II. The Staff
Prerequisite: 12 units of United States and European history with an average grade of B. This normally will be History 4 and 17.
A senior thesis or comprehensive examination upon recommendation of a departmental Honors Committee.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

GRADUATE COURSES

237. **Seminar in Russian History.** (3) I and II. Mr. O'Brien
Seminar—3 hours.
Prerequisite: course 137 or equivalent.
Topics relating to the political and cultural history of Russia in the seventeenth, eighteenth, and nineteenth centuries.
242. **Seminar in European History.** (3) I and II. Mr. Schwab
Seminar—3 hours.
Prerequisite: a reading knowledge of French or German.
Intellectual and social history in the seventeenth and eighteenth centuries.
May be repeated for credit.
251. **Seminar in English History.** (3) I and II. Mr. Woodfill
Seminar—3 hours.
- *270. **Seminar in Early American History.** (3) I and II. Mr. Jacobson
Seminar—3 hours.
271. **Seminar in the History of the American West.** (3) I and II. Mr. Jackson
Seminar—3 hours.
272. **Seminar in the History of the United States to 1860.** (3) I and II. Mr. Staudenraus
Seminar—3 hours.
288. **Seminar in the Agricultural History of the United States.** Mr. Shideler
(3) I and II
Seminar—3 hours.
299. **Directed Research.** (1-4) I and II. The Staff

PROFESSIONAL COURSE

- *300. **The Teaching of History in the Secondary School and the Junior College.** (2) I. The Staff
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, 1962-1963.

* Not to be given, 1962-1963.

HOME ECONOMICS

Gladys J. Everson, Ph.D., *Chairman of the Department.*
Department Office, 148 Home Economics Building

Gladys J. Everson, Ph.D., *Professor of Home Economics.*
Pauline C. Paul, Ph.D., *Professor of Home Economics.*
Flora Hanning, Ph.D., *Visiting Professor of Home Economics.*
†Richard D. Cramer, M.F.A. (Architecture), *Associate Professor of Design.*
†Lucille S. Hurley, Ph.D., *Associate Professor of Nutrition.*
†Mary Ann Morris, Ph.D., *Associate Professor of Home Economics.*
Daniel Shapiro, *Associate Professor of Design.*
Elizabeth M. Elbert, Ph.D., *Assistant Professor of Home Economics.*
Ruth J. Horsting, M.A., *Assistant Professor of Design.*
Emmy E. Werner, Ph.D., *Assistant Professor of Home Economics.*



R. Lorene Dryden, M.A., *Lecturer in Home Economics.*
Doris F. Heineman, B.A.E., *Lecturer in Design.*
Robert D. Herrmann, M.S., *Acting Assistant Professor of Consumption Economics.*
Arline Johnson, M.S., *Lecturer in Education.*
Anita M. Lear, M.S., *Lecturer in Home Economics.*
Agnes McClelland, M.A., *Lecturer in Home Economics.*
Jane S. Pirkey, B.S., *Lecturer in Home Economics.*

Departmental Major Advisers.—Miss Dryden, Miss Elbert, Miss Everson, Mrs. Heineman, Mrs. Horsting, Mrs. Lear, Miss McClelland, Miss Paul, Mrs. Pirkey, Mr. Shapiro, Miss Werner.

Bachelor of Science Major Program and Graduate Study. See page 58.

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. Lettering.** (2) II. Mr. Shapiro
Laboratory—6 hours.
Prerequisite: course 6B or consent of the instructor.
Lettering and the use of letter and type forms in design; studio exercises.

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.

† Absent on leave, 1962–1963.

- 130L. Interior Design. (1) II.** Mrs. Heineman
 Laboratory—3 hours.
 Prerequisite: course 130 should 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.** _____
 Lecture—3 hours.
 Prerequisite: course 6A or consent of the instructor.
 The tenets of modern architecture as illustrated in the contemporary house.
- 160. Textile Design. (2) II.** Mrs. Heineman
 Laboratory—6 hours.
 Prerequisite: course 6B or consent of the instructor.
 Studio projects in textile printing.
- *191. History of Design. (3) I.** _____
 Lecture—3 hours.
 Prerequisite: one semester of history of art.
 From ancient to modern times.
- 192A-192B. Costume Design. (2-2) Yr.** _____
 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.** _____
 Lecture—3 hours.
 Prerequisite: one semester of history of art.
 From ancient to modern times.
- *196. 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: courses 6B, 130L (may be taken concurrently) and Art 16 or consent of the instructor.
 Studio projects in interior design.
- 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

* Not to be given, 1962-1963.

HOME ECONOMICS

LOWER DIVISION COURSES

- 1A-1B. Experimental Food Study.** (2-2) Yr. Miss Elbert
Lecture—2 hours.
Prerequisite: Chemistry 8. Recommended: Bacteriology 1.
Composition of food, and principles involved in food preservation, meal preparation, and management.
- 1L. Experimental Food Study Laboratory.** (1-1) Yr. Miss Elbert
Laboratory—3 hours.
Prerequisite: course 1A-1B (should be taken concurrently).
Composition of food, and principles involved in food preservation, meal preparation, and management.
- 6. Introduction to Textiles.** (2) II. Miss Dryden
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.
- 12. Euthenics.** (2) I. Mrs. Lear
Lecture—2 hours.
A study of the function of the family and the homemaker in modern society, and of the contributions of the basic sciences and the arts to the solution of present-day social and economic problems of the individual and the family.

UPPER DIVISION COURSES

- 104A-104B. Advanced Food Study.** (4-4) Yr. Miss Paul
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 1B or consent of the instructor.
Application of principles of chemistry to food preparation. Development of experimental attitudes and techniques.
- 112A-112B. Nutrition and Dietetics.** (2-2) Yr. Miss Hanning
Lecture—2 hours.
Prerequisite: course 1A-1B (may be taken concurrently); 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.

112L. Nutrition and Dietetics Laboratory. (1-1) Yr. Miss Hanning
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.

116. Nutrition and Diet Therapy. (3) I. Miss Everson
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. Advanced Nutrition. (4) II. Miss Everson
Lecture—2 hours; laboratory—6 hours.

Prerequisite: elementary nutrition, quantitative chemistry, and biochemistry.

Second-year study of nutrition.

121. Institution Food Study. (4) I. Mrs. Pirkey
Lecture—2 hours; laboratory—6 hours.

Prerequisite: course 1A-1B.

The principles and problems involved in the preparation and service of food in institutions.

122. Institution Organization and Management. (4) II. Mrs. Pirkey
Lecture—2 hours; laboratory—6 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. Child Development. (3) I. _____
Lecture—3 hours.

Prerequisite: Psychology 1 or 2.

The dynamics of human development from conception to adolescence.

133. Laboratory in Child Development (1) I. _____
Lecture—1 hour; laboratory—2 hours for six-week period.

Course 133 must be taken concurrently with course 131.

Laboratory conducted at the nursery school.

136. Adolescent Development. (3) II. Miss Werner
Lecture—3 hours.

Prerequisite: Psychology 1 or 2.

The dynamics of human development during the adolescent period.

137. The Contemporary American Family. (3) II. _____
Lecture—3 hours.

Sociological and psychological factors influencing marriage and the family in present-day society.

140. Home Management. (3) I. _____
Lecture—2 hours; laboratory—3 hours.

Prerequisite: Physiology 1; Psychology 1 or 2.

Use of time, energy, and equipment in the home from the viewpoint of the satisfaction of members of the family.

Field trips are included.

- 140L. Home Management House Residence.** (2) I and II. _____
 Prerequisite: course 140 (may be taken concurrently).
 Residence in the home management house providing integrated experiences in the various phases of home economics. Residence will be for five weeks. A fee is required for living costs.
- 141. Consumers and the Market.** (3) I. Mr. Herrmann
 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. Mr. Herrmann
 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. _____
 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. _____
 Lecture—2 hours; laboratory—3 hours.
 Prerequisite: courses 6 and 6L.
 The chemical and physical structure of textile fibers, and its relations to fiber and fabric properties.
- 162. The Textile Economy.** (3) I. _____
 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. Mrs. Lear
 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. Mr. Herrmann
 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 in Home Economics.** (1) I and II. The Staff
 Seminar—1 hour.
 Prerequisite: consent of the instructor.
 Selected topics in the fields of food, nutrition, or consumer economics.
292. **Seminar in Textiles.** (2) II. _____
299. **Research in Home Economics.** (2-6) I and II. The Staff
 Research in foods, nutrition, consumer economics, or textiles.

PROFESSIONAL COURSE

300. **Teaching Home Economics in Secondary Schools.** (2) I and II.
 Lecture—2 hours. Miss Johnson
 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)

IRRIGATION

Robert M. Hagan, *Chairman of the Department.*

Department Office, 113 Irrigation Building

†Lloyd D. Doneen, Ph.D., *Professor of Irrigation.*
Robert M. Hagan, Ph.D., *Professor of Irrigation.*
‡James N. Luthin, Ph.D., *Professor of Irrigation.*
Frank Adams, M.A., L.L.D., (hon.c.), *Professor of Irrigation, Emeritus.*
Frank J. Veilmeyer, C.E., Ph.D., *Professor of Irrigation, Emeritus.*
Jaime Amorochio, Ph.D., *Associate Professor of Irrigation.*
Robert H. Burgy, M.S., *Associate Professor of Irrigation.*
Delbert W. Henderson, Ph.D., *Associate Professor of Irrigation.*
Verne H. Scott, Ph.D., *Associate Professor of Irrigation.*
Donald R. Nielsen, Ph.D., *Assistant Professor of Irrigation.*
Theodor S. Strelkoff, Ph.D., *Assistant Professor of Irrigation.*
Yoash Vaadia, Ph.D., *Assistant Professor of Irrigation.*



James W. Biggar, Ph.D., *Lecturer in Irrigation.*
John R. Davis, Ph.D., *Lecturer in Irrigation.*
William O. Pruitt, M.S., *Lecturer in Irrigation.*
Brooke E. Sawyer, M.S., *Lecturer in Irrigation.*

Departmental Major Advisers.—Mr. Henderson, Mr. Nielsen, Mr. Vaadia.
Bachelor of Science Major Program and Graduate Study. See page 60.

LOWER DIVISION COURSE

10. Introduction to Irrigation. (3) II.

Lecture—3 hours.

Prerequisite: sophomore standing or consent of the instructor.

An introductory course in irrigation principles including soil characteristics related to irrigation; water supply, conveyance and distribution; land preparation and irrigation methods; irrigation requirements of crops; drainage of irrigated land; and problems of irrigation management.

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.

110. Irrigation Principles and Practices. (4) I.

Mr. Henderson

Lecture—3 hours; laboratory—3 hours.

Prerequisite: Physics 2A.

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.

† Absent on leave, 1962–1963.

‡ Absent on leave, fall semester 1962–1963.

- 115. Water Quality and Salinity as Factors in Irrigation.** (3) I. _____
 Lecture—2 hours; laboratory—3 hours.
 Prerequisite: Chemistry 1A–1B. Recommended: Chemistry 5; Soil Science 1.
 Water quality, water analysis, salinity, soil reclamation, infiltration problems, and soil amendments.
- 118. Irrigation Hydraulics.** (4) I. Mr. Amorocho
 Lecture—3 hours; laboratory—3 hours.
 Prerequisite: Physics 2A–2B; Mathematics 16A–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 and concurrent enrollment in Soil Science 135.
 Irrigation practices as affected by soil properties and topography, irrigation-tillage interrelationships, irrigation-fertility interrelationships, irrigation in relation to fertilizer applications, moisture control during germination and harvest, irrigation practices for water conservation, and influences of salinity and drainage on irrigation management.
- 140. Drainage of Agricultural Lands.** (2) II. Mr. Luthin
 Lecture—2 hours.
 Prerequisite: course 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. Mr. Sawyer
 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) I. Mr. Davis
 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. Davis
 Lecture—1 hour; laboratory—3 hours.
 Prerequisite: senior standing in irrigation science or engineering.
 Laboratory and field exercises on ground water, wells, and pumping plants; soil-moisture characteristics and water-soil-plant relationships; farm irrigation system design and operation; evaluation of water application methods; drainage investigation techniques; and layout of farm drainage systems. Occasional field trips may be scheduled.
- 190. Irrigation Proseminar.** (1) II. Mr. Nielsen
 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
Prerequisite: senior standing.

GRADUATE COURSES

200. **Advanced Water-Soil-Plant Relationships.** (2) II. _____
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 physio-chemical principles governing interactions of ionic constituents in water with soils and plants. Topics include hydro-dynamic dispersion phenomena during leaching, percolating waters and ground-water quality, and irrigation disposal of waste waters.
250. **Physics of Soil Water.** (2) I. Mr. Nielsen
Lecture—2 hours.
Prerequisite: Mathematics 114 or 119 and consent of instructor.
An advanced course on physics of soil water with emphasis on unsaturated flow problems in soils including hydro-dynamics of viscous fluids, miscible and immiscible displacement theories, and methods for solving differential forms of flow equations.
290. **Seminar in Irrigation.** (1) I and II. Mr. Nielsen
Seminar—1 hour.
Required of all graduate students in irrigation science. Discussions of advanced problems in irrigation.
298. **Group Study in Irrigation.** (1-6) I and II. The Staff
Group study on advanced topics in irrigation.
299. **Research in Irrigation.** (1-6) I and II. The Staff
Individual research in irrigation science. May be repeated for credit.



For additional courses in irrigation, drainage, and water resources engineering, see the Engineering course section, pages 176-186.

ITALIAN

For courses in Italian see "Foreign Languages," page 201.

LANDSCAPE HORTICULTURE

Richard W. Harris, Ph.D., *Chairman of the Department.*
Department Office, 106 Landscape Horticulture Building

Richard W. Harris, Ph.D., *Associate Professor of Landscape Horticulture.*
John H. Madison, Ph.D., *Associate Professor of Landscape Horticulture.*
Robert D. Danielson, M.S., *Assistant Professor of Landscape Horticulture.*
Roy Sachs, Ph.D., *Assistant Professor of Landscape Horticulture.*



Philip A. Barker, M.S., *Lecturer in Landscape Horticulture.*

Departmental Major Advisers.—Landscape Horticulture, Mr. Danielson, Mr. Harris; Park Administration, Mr. Harris.

Bachelor of Science Major Program and Graduate Study. See page 61.

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) I. 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. Madison
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 alternate years.
- 105A. **Taxonomy of Landscape Trees.** (3) I. Mr. Barker
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. Barker
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. Barker
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.
- *108. Turf.** (2) I. Mr. Madison
Lecture—1 hour; laboratory—3 hours.
Prerequisite: Botany 1. Recommended: Botany 111.
The basic practices and ecological and physiological principles involved in the selection of turf grasses, turf establishment and maintenance.
Offered in alternate years.
- 109. Principles of Growing Plants in Nurseries.** (2) I. Mr. Sachs
Lecture—1 hour; laboratory—3 hours.
Prerequisite: Pomology 9. Recommended: Botany 111.
The basic practices and physiological principles involved in the growing of woody plants in nurseries.
Offered in alternate years.
- 110. Floriculture.** (2) II. Mr. Sachs
Lecture—1 hour; laboratory—3 hours.
Prerequisite: Botany 1. Recommended: Botany 111, Pomology 9.
The basic practices and physiological principles involved in the growing of economic flowering plants, emphasizing the modification of the environment for flower induction and growth.
Offered in alternate years.
- *111. Arboriculture.** (2) II. Mr. Harris
Lecture—1 hour; laboratory—3 hours.
Prerequisite: Botany 1. Recommended: Botany 111.
The physiological principles and practices involved in the culture of trees and shrubs in the landscape.
Offered in alternate years.
- 198. Directed Group Study.** (1-5) I and II. The Staff
Prerequisite: 3 units of upper division work in landscape horticulture; consent of the instructor.
Selected problems in landscape horticulture.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff (Mr. Harris in charge)
Prerequisite: consent of the instructor.

GRADUATE COURSES

- 290. Seminar in Landscape Horticulture.** (1) I and II. Mr. Sachs
Seminar—1 hour.
- 299. Research in Landscape Horticulture.** (1-6) I and II. Mr. Sachs

* Not to be given, 1962-1963.

RELATED COURSES

- Business Law: Introduction** (Agricultural Economics 18)
Managerial Accounting (Agricultural Economics 111)
Agricultural Business Management (Agricultural Economics 115A-115B)
Weed Control (Botany 107)
Economic Entomology (Entomology 124)
Water-Soil-Plant Relationships (Irrigation 100)
Plant Diseases (Plant Pathology 120)
Principles of Plant Propagation (Pomology 9)
Introduction to Soil Science (Soil Science 1)

PARK ADMINISTRATION

- 110. Introduction to City Planning.** (3) I. _____
 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) II. _____
 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

- Recreation in the Community** (Physical Education 140)
California State and Local Government (Political Science 104)
Elements of Public Administration (Political Science 181)
Problems of Public Administration (Political Science 182)

LATIN

For courses in Latin see "Foreign Languages" on page 201.

MATHEMATICS

Charles A. Hayes, Jr., Ph.D., *Chairman of the Department.*
Department Office, 227 Academic Office Building

———, *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.*

Henry L. Alder, Ph.D., *Associate Professor of Mathematics.*

Hubert A. Arnold, Ph.D., *Associate Professor of Mathematics.*

Donald C. Benson, Ph.D., *Associate Professor of Mathematics.*

Albert C. Burdette, Ph.D., *Associate Professor of Mathematics.*

Peter W. M. John, Ph.D., *Associate Professor of Mathematics.*

Donald A. Norton, Ph.D., *Associate Professor of Mathematics.*

———, Ph.D., *Associate Professor of Mathematics.*

Sherman K. Stein, Ph.D., *Associate Professor of Mathematics.*

Takayuki Tamura, Ph.D., *Visiting Associate Professor of Mathematics.*

Dallas O. Banks, Ph.D., *Assistant Professor of Mathematics.*

Gertrude I. Heller, Ph.D., *Assistant Professor of Mathematics.*

Fred Krakowski, Ph.D., *Assistant Professor of Mathematics.*

Kurt Kreith, Ph.D., *Assistant Professor of Mathematics.*

Fawzi M. Yaqub, Ph.D., *Assistant Professor of Mathematics.*



Leon E. Borgman, Ph.D., *Acting Assistant Professor of Mathematics.*

Shirley A. Goldman, M.A., *Associate in Mathematics.*

Letters and Science List.—All undergraduate courses in mathematics except 19 are included in the Letters and Science List of Courses. (See page 91.)

Major Subject Advisers.—Mr. John, Mr. Krakowski, Mr. Kreith, Mr. Roessler, Mr. Stein.

Bachelor of Arts Major Program

(A) Lower Division Courses.—The student is required to attain a basic knowledge of mathematics equivalent to courses 1, 7, 3A-3B, and 4A-4B or 14. In order to anticipate as much of this work as possible, it is desirable that he complete in high school plane and solid geometry, trigonometry, and two years of algebra.

(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.

Subject to the above requirement of competence, and with the approval of the adviser, the student is at liberty to take a maximum of 6 units of theoretical courses in physical sciences as a part of his 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.—The student is required to attain a basic knowledge of mathematics equivalent to courses 1, 7, 3A-3B, and 14 or 4A-4B, totaling respectively 17 or 18 units.

(B) Upper Division Courses.—The student must pass successfully courses 106, 107, 108, 111, 127, 113 or 116, 119 or 185, and at least 6 additional units in upper division mathematics courses which may, if desired, be chosen from the alternate courses just listed. Total, 26 units.

Honors and Honors Program (see page 92).—The honors program comprises courses 111H, 127H, and either course 113H or 116H; a comprehensive examination in fields of the parent courses 111, 113, 116, 127.

A numbered 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 the prerequisite course.

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 Room 227, Academic Office Building, on or before the Monday of registration week.

LOWER DIVISION COURSES

C. Trigonometry. (3) I and II. The Staff
Lecture—3 hours.

Prerequisite: plane geometry; one and one-half years of high school algebra or course D. Only 2 units credit will be allowed if the student has taken trigonometry in high school. Not open for credit to students who have received credit in course 3B.

The course includes plane trigonometry and spherical right triangles.

Not to be offered after Spring semester of 1963.

D. Intermediate Algebra. (3) I and II. The Staff
Lecture—3 hours.

Prerequisite: one year of high school algebra. One and one-half years of high school algebra is advised. Not open for credit to students who have received credit for two years of high school algebra, or course 16A, or any course for which course D is a prerequisite.

Not to be offered after Spring semester of 1963.

1. College Algebra. (3) I and II. The Staff
Lecture—3 hours.

Prerequisite: two years of high school algebra, or course D; trigonometry (may be taken concurrently).

Selected topics from college algebra including complex numbers, theory of equations, inequalities, determinants, mathematical induction.

3A. Analytic Geometry and Calculus, First Course. (3) I and II. The Staff
Lecture—3 hours.

Prerequisite: two years of high school algebra or course D; plane geometry; plane trigonometry. Only 2 units credit will be allowed if the student has received credit in course 16A.

Introduction to analytic geometry and calculus. The sequence of courses 3A-3B, 4A-4B, or 3A-3B, 14 includes plane and solid analytic geometry,

formal differentiation and integration of elementary functions, infinite series, functions of several variables, partial differentiation, multiple integration with applications.

3B. Analytic Geometry and Calculus, Second Course. (3) I and II. The Staff
Lecture—3 hours.

Prerequisite: course 3A or course 16B. Only 2 units credit will be allowed if the student has received credit in course 16B.

Continuation of course 3A.

4A. Analytic Geometry and Calculus, Third Course. (3) I. The Staff
Lecture—3 hours.

Prerequisite: course 3B. Not open to students who have completed course 14 with a grade of C or better.

Continuation of course 3B.

4B. Analytic Geometry and Calculus, Fourth Course. (3) II. The Staff
Lecture—3 hours.

Prerequisite: course 4A.

Continuation of course 4A.

7. Introduction to Mathematical Structures. (3) I and II. The Staff
Lecture—3 hours.

Prerequisite: course 1 or consent of the instructor.

Topics selected from the theory of sets, functions, axiomatic systems.

13. Elementary Statistics. (3) I and II. The Staff
Lecture—3 hours.

Prerequisite: two years of high school algebra or course D.

Arrays of experimental measurements, measures of central tendency, variation and correlation, significance of measures; elementary reliability and validity of tests.

14. Analytic Geometry and Calculus. (5) I and II. The Staff
Lecture—3 hours. Section meeting—2 hours.

Prerequisite: course 3B. Not open to students who have completed course 4A with a grade of C or better.

Continuation of course 3B.

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 course D, plane geometry, and plane trigonometry. Only 2 units credit will be allowed if the student has received credit in course 3A. Not open for credit to students who have received credit in course 3B.

A short course in analytic geometry and differential and integral calculus. Primarily for students in the College of Agriculture.

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 3B.

A short course in analytic geometry and differential and integral calculus. Primarily for students in the College of Agriculture.

36. Fundamentals of Mathematics. (3) II. Mr. Stein
Lecture—3 hours.

Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics.

***41. Discrete Probability. (3) II.**

Mr. Borgman

Lecture—3 hours.

Prerequisite: course 1.

An introduction to probability theory in the discrete case, using set theory but not calculus.

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.

Mr. Alder

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.

106. Differential Equations. (2) I and II.

Lecture—2 hours.

Prerequisite: course 4B or 14.

An introduction to differential equations designed especially for students in engineering and related fields.

107. Advanced Calculus. (3) I and II.

Lecture—3 hours.

Prerequisite: course 4B or 14.

Vector analysis, series, functions of several variables.

108. Linear Algebra. (3) I.

Mr. Norton

Lecture—3 hours.

Prerequisite: courses 3B, 7.

Vector spaces, linear transformations and matrices, characteristic values, quadratic forms.

111. Introduction to Higher Algebra. (3) II.

Mr. Norton

Lecture—3 hours.

Prerequisite: course 108.

Introduction to formal systems of modern algebra including rings and fields.

***111H. Higher Algebra. (1) II.**

Mr. Norton

Lecture—1 hour.

Prerequisite: honors standing and course 111 (concurrent registration recommended).

Supplementary material to course 111 for honors candidates.

* Not to be given, 1962-1963.

- 112. Higher Geometry. (3) I.** Mr. Fulton
Lecture—3 hours.
Prerequisite: course 1, or consent of the instructor.
Homogeneous point and line coordinates, cross ratio, one- and two-dimensional projective geometry, point and line conics.
Offered in alternate years.
- *113. Synthetic Projective Geometry. (3) II.** Mr. Fulton
Lecture—3 hours.
Prerequisite: course 1, or consent of the instructor.
Duality, perspectivity, harmonic sets, projectivity, definition of conic theorems on conics, pole and polar.
Offered in alternate years.
- *113H. Synthetic Projective Geometry. (1) II.** Mr. Fulton
Lecture—1 hour.
Prerequisite: honors standing and course 113 (concurrent registration recommended).
Supplementary material to course 113 for honors candidates.
- *115A-115B. The Theory of Numbers. (3-3) Yr.** Mr. Alder
Lecture—3 hours.
Prerequisite: course 1.
Divisibility, congruences, diophantine equations; selected topics from the theory of prime numbers; partitions; continued fractions.
Offered in alternate years.
- 116. Metric Differential Geometry. (3) II.** Mr. Fulton
Lecture—3 hours.
Prerequisite: course 4B or 14.
Vector analysis, study of curves and surfaces in three dimensions.
Offered in alternate years.
- *116H. Metric Differential Geometry. (1) II.** Mr. Fulton
Lecture—1 hour.
Prerequisite: honors standing and course 116 (concurrent registration recommended).
Supplementary material to course 116 for honors candidates.
- 119. Theory of Differential Equations. (3) II.** Mr. Kreith
Lecture—3 hours.
Prerequisite: course 106.
Elementary theory of ordinary differential equations with special attention to linear equations, Sturm-Liouville systems, Laplace transforms, introduction to partial differential equations.
- 123. Introduction to the Theory of Finite Groups. (3) I.** Mr. Yaqub
Lecture—3 hours.
Prerequisite: course 7 and senior standing or consent of the instructor.
Topics from the theory of groups including Abelian groups, subgroups, normality, structure of groups, Galois theory.
- 127. Foundations of Analysis. (3) II.** Mr. Hayes
Lecture—3 hours.
Prerequisite: course 4B or 14, and course 7 or consent of instructor.
Set theory, development of properties of the real number system from basic axioms, theory of limits of sequences and real functions, properties of continuous functions.

* Not to be given, 1962-1963.

- *127H. Foundations of Analysis.** (1) II. Mr. Hayes
Lecture—1 hour.
Prerequisite: honors standing and course 127 (concurrent registration recommended).
Supplementary material to course 127 for honors candidates.
- *128A-128B. Numerical Analysis.** (3-3) Yr. _____
Lecture—3 hours.
Prerequisite: course 4B or 14.
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.
Offered in alternate years.
- 129. Theory of Automatic Digital Computers.** (3) II. _____
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 4B or 14.
Organization of a digital computer; instruction code for the University computer; elementary machine language coding; subroutines and assembly programs; code checking. Laboratory work on the University computer.
- 131A-131B. Statistics.** (3-3) Yr. Mr. Borgman
Lecture—3 hours.
Prerequisite: course 4A or 14, or 16B.
A basic introductory course in the theory and applications of statistical methods.
- 168. Linear Programming and Game Theory.** (3) I. Mr. Benson
Lecture—3 hours.
Prerequisite: course 1 and course 3B or 16B.
Introduction to zero-sum two person games. The fundamental theorem for matrix games. Basic concepts of linear inequalities. The duality theorem. The simplex method.
- 185. Introduction to Functions of a Complex Variable.** (3) I. Mr. Burdette
Lecture—3 hours.
Prerequisite: course 4B or 14.
Differentiability of complex functions, Cauchy's integral, power series, Laurent series, residue theorem, conformal mapping.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II.
The Staff (Mr. Hayes in charge)

GRADUATE COURSES

- 200A-200B. Classical Analysis.** (3-3) Yr. Mr. Banks
Lecture—3 hours.
Prerequisite: course 127. Seniors with facility for mathematics may well take this course.
Elements of metric topology, theory of differentiation and integration of functions of one or more real variables, line integration, the role of uniformity in classical analysis, calculus of functions of a complex variable.
- 201A-201B. Functions of a Real Variable.** (3-3) Yr. Mr. Benson
Lecture—3 hours.
Prerequisite: course 127.

Real number system, theory of point sets in Euclidean spaces, content, measure, Riemann-Stieltjes and Lebesgue integration.

Offered in alternate years.

***202A-202B. Functional Analysis.** (3-3) Yr. Mr. Benson

Lecture—3 hours.

Prerequisite: courses 108, 127. Recommended: courses 200A-200B.

General theory of measure and integration; Hilbert and Banach spaces; linear operations.

***205A-205B. Functions of a Complex Variable.** (3-3) Yr. Mr. Arnold

Lecture—3 hours.

Prerequisite: course 127.

Theory of analytic functions, Cauchy integral theorem, power series, analytic continuation, conformal mapping, special functions.

Offered in alternate years.

208. Linear Algebra. (3) II. Mr. Krakowski, Mr. Norton

Lecture—3 hours.

Vector spaces, linear transformations, Euclidean spaces.

Offered in alternate years.

215A-215B. Topology. (3-3) Yr. Mr. Stein

Lecture—3 hours.

Prerequisite: course 127.

Topics selected from general topology (compactness, connectedness, metrization, Euclidean space); algebraic topology (complexes, homology, duality); and applications to analysis, geometry, and algebra.

Offered in alternate years.

216. Integral Equations. (3) II. Mr. Kreith

Lecture—3 hours.

Prerequisite: courses 108, 200B.

Volterra equations, Fredholm equations, symmetric kernels.

Offered in alternate years.

***218. Partial Differential Equations.** (3) I. Mr. Kreith

Lecture—3 hours.

Prerequisite: courses 108, 200B.

Topics from the theory of first order hyperbolic and elliptic partial differential equations.

Offered in alternate years.

***219. Ordinary Differential Equations.** (3) II. Mr. Banks

Lecture—3 hours.

Prerequisite: courses 185, 200A.

The study of ordinary differential equations in the real and complex domains, existence and uniqueness theorems, linear systems, analysis of singular points, Sturm-Liouville theory, asymptotic expansions.

220A-220B. Mathematics for Students in the Physical Sciences. (3-3) Yr.

Lecture—3 hours.

Mr. Kreith

Prerequisite: courses 114, 185 (185 may be taken concurrently with 220A).

Topics in ordinary and partial differential equations, boundary value problems, functions of a complex variable, matrices, calculus of variations.

* Not to be given, 1962-1963.

- 223A-223B. Theory of Groups.** (3-3) Yr. Mr. Tamura
Lecture—3 hours.
Elements of group theory, structure and construction of composite groups, Sylow theory of groups, solvable groups, group extension.
Offered in alternate years.
- *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.
- 228. Advanced Numerical Analysis of Differential Equations.** (3) I. _____
Lecture—2 hours; laboratory—3 hours.
Prerequisite: courses 128A-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.
- 229. Approximation Theory and Applications to Computation.** (2) II. _____
Lecture—2 hours.
Prerequisite: course 128A-128B. Recommended: course 185.
Orthogonal functions and least squares; Chebyshev approximations; rational approximations; approximations in several variables; approximation of analytic functions of a complex variable; approximation by continued fractions; use of approximations in computation.
- 231. Multivariate Analysis.** (3) I. Mr. John
Lecture—3 hours.
Prerequisite: course 131A-131B and course 114 or consent of the instructor.
Multivariate normal distribution, analysis of variance, correlation and regression, chi-square.
Offered in alternate years.
- 232. Theory of Estimation and Testing Hypotheses.** (3) II. Mr. Baker
Lecture—3 hours.
Prerequisite: course 131A-131B and course 114 or consent of the instructor.
Estimates, asymptotic efficiency and normality, theory of statistical tests.
Offered in alternate years.
- 233. Design of Experiments.** (3) II. Mr. John
Lecture—3 hours.
Prerequisite: course 231.
Topics from balanced and partially balanced incomplete block designs, fractional factorials, response surfaces.
- *240A-240B. Differential Geometry.** (3-3) Yr. 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 alternate years.

250A-250B. Algebra. (3-3) Yr.

Mr. Tamura

Lecture—3 hours.

Prerequisite: courses 111, 123 (123 may be taken concurrently with 250A).

The basic tools of commutative algebra: theory of fields; algebraic and transcendental extensions; Galois theory; valuations; ideal theory.

290. Seminars. (1-6) I and II.

The Staff (Mr. Hayes in charge)

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 in Mathematics. (2-6) I and II.

The Staff (Mr. Hayes in charge)

PROFESSIONAL COURSE

300. The Teaching of Mathematics. (2) I.

Mrs. Goldman

Prerequisite: senior or graduate standing; a mathematics teaching major or minor.

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

John W. Kendrick, D.V.M., M.S., *Chairman of the Department.*
Department Office, 1315 Haring Hall

John F. Christensen, D.V.M., Ph.D., *Professor of Veterinary Medicine.*
John W. Kendrick, D.V.M., M.S., *Professor of Veterinary Medicine.*
William R. Pritchard, D.V.M., Ph.D., *Professor of Veterinary Medicine.*
John D. Wheat, D.V.M., *Professor of Veterinary Medicine.*
Robert M. Cello, D.V.M., *Associate 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.*
Blaine McGowan, Jr., D.V.M., *Associate Professor of Veterinary Medicine.*
Edward A. Rhode, Jr., D.V.M., *Associate Professor of Veterinary Medicine.*
Atwood C. Asbury, D.V.M., *Assistant Professor of Veterinary Medicine.*
Murray E. Fowler, D.V.M., *Assistant Professor of Veterinary Medicine.*
Gordon H. Theilen, D.V.M., *Assistant Professor of Veterinary Medicine.*
Alida P. Wind, D.V.M., *Assistant Professor of Veterinary Medicine.*
———, *Assistant Professor of Veterinary Medicine.*
———, *Assistant Professor of Veterinary Medicine.*



Jack W. Abrahams, D.V.M., *Lecturer in Veterinary Medicine.*
Herman Bonasch, D.V.M., *Lecturer in Veterinary Medicine.*
David E. Brown, M.D., *Lecturer in Surgery.*
James S. Browne, D.V.M., *Lecturer in Veterinary Medicine.*
Ronald S. Downey, D.V.M., *Lecturer in Veterinary Medicine.*
Charles E. Grayson, M.D., *Lecturer in Radiology.*
Richard U. Miles, D.V.M., *Lecturer in Veterinary Medicine.*
Virginia D. Perryman, D.V.M., *Lecturer in Veterinary Medicine.*
Troy G. Rollins, M.D., *Lecturer in Dermatology.*

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. Kendrick in charge)

GRADUATE COURSES

203. **Introductory Medicine.** (4) I. Mr. Cello, Mr. Rhode
Lecture—3 hours; laboratory—3 hours.
Prerequisite: Pathology 122A-122B; Physiological Sciences 123A-123B, 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

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. Asbury, Mr. Cello, Mr. Fowler

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. McGowan

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 123A-123B.

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. Fowler

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. Kendrick
Lecture—3 hours; laboratory—3 hours.

Prerequisite: Pathology 122A-122B; Physiological Sciences 123A-123B.

A course in the diagnosis, treatment, and control of diseases affecting the reproductive organs; the normal and disturbed physiology of reproduction; and obstetrics.

235. Therapeutics. (2) II. Mr. Fowler

Lecture—2 hours.

Prerequisite: course 203; Physiological Sciences 123A-123B, 140-140L.

Lectures and discussions of newer developments in the therapy of animal diseases.

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. Kendrick 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. Fowler

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-251B. Clinics. (5-5) Yr. The Staff (Mr. Kendrick in charge)

Laboratory—24 hours.

Prerequisite: courses 203, 220. 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. Kendrick in charge)

Lecture—1 hour.

Prerequisite: course 203.

Discussion of selected cases from the clinic.

256A-256B. Clinic Conference (1-1) Yr.

Lecture—2 hours.

The Staff (Mr. Kendrick in charge)

Prerequisite: fourth-year standing.

Discussion of selected cases from the clinic.

260. Radiology. (2) I.

Mr. Grayson, Mr. Hage

Lecture—1 hour; laboratory—1 hour.

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.

290. Seminar in Veterinary Medicine. (1) I and II.

Seminar—2 hours.

The Staff (Mr. Cello in charge)

299. Research in Veterinary Medicine. (1-6) I and II.

The Staff (Mr. Kendrick in charge)

MILITARY SCIENCE

Donn W. Yoder, Lieutenant Colonel, Infantry; *Chairman of the Department.*
Department Office, 125 Gymnasium

Donn W. Yoder, Lieutenant Colonel, Infantry; *Professor of Military Science.*
Harold V. Kays, Lieutenant Colonel, Infantry; *Associate Professor of Military Science.*

Carl L. Cunningham, Captain, Chemical Corps, *Assistant Professor of Military Science.*

William P. Aguilar, Captain, Artillery, *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, general psychology, effective communication, or political science. Elective subjects selected 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. All units of lower and upper division military science courses combined may be accredited toward this requirement. One hundred eight 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 total 13 units (including three units for summer camp) of which 12 units may be accredited to the remaining 12 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 lower and upper 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 134 units. Eight 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 30, *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 1A-1B, or 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 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 130A-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

Jerome W. Rosen, M.A., *Chairman of the Department.*
Department Office, 107 Music Building

†George Perle, Ph.D., *Associate Professor of Music.*
Jerome W. Rosen, M.A., *Associate Professor of Music.*
Richard G. Swift, M.A., *Associate Professor of Music.*
Larry D. Austin, M.M., *Assistant Professor of Music.*
Robert C. Below, M.M., *Assistant Professor of Music.*



Sidney R. Charles, Ph.D., *Lecturer in Music.*
The Griller Quartet of the University of California, Davis.
Sidney A. Griller, C.B.E., F.R.A.M., *Lecturer in Music.*
Jacob M. Krachmalnick, *Lecturer in Music.*
Harry W. Rumppler, *Lecturer in Music.*
Colin Hampton, F.R.A.M., *Lecturer in Music.*
Charles G. Jacobs, M.A., *Acting Assistant Professor of Music.*
Anne R. Myers, S.M.M., *Associate in Music.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 91).

A student may not receive more than 8 units of credit in performance courses.

Major Subject Advisers.—Mr. Austin, Mr. Rosen, 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, 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 405A-405B. 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, 143, or 144. In addition, eight units must be selected from the following courses: 105A-105B, 108, 112A, 112B, 122, 199.

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.

GROUP I

Courses primarily for students whose major is music.

LOWER DIVISION COURSES

1A-1B. Masterworks of Musical Literature. (2-2) Yr.

Lecture—3 hours.

Mr. Swift, Mr. Jacobs

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.

† Absent on leave, 1962-1963.

- 1C-1D. Masterworks of Musical Literature.** (2-2) Yr.
Lecture—3 hours. Mr. Austin, Mrs. Charles
Prerequisite: courses 1A-1B and 4A-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-1B.
- 4A-4B. Elementary Theory.** (5-5) Yr. Mr. Below
Lecture—5 hours.
Exercises in notation, rhythm, ear-training, beginning counterpoint and harmony.
- 5A-5B. Intermediate Theory.** (4-4) Yr. Mr. Austin
Lecture—4 hours.
Prerequisite: course 4A-4B.
Course 5A is prerequisite to 5B.
A continuation of course 4A-4B.

UPPER DIVISION COURSES

- 104A-104B. Advanced Theory.** (3-3) Yr. Mr. Rosen
Lecture—3 hours.
Prerequisite: course 5A-5B.
Course 104A is prerequisite to 104B.
104A: Two and three part tonal counterpoint leading to the writing of canons, inventions, and chorale preludes.
104B: Homophonic forms, beginning with phrase and period structure.
- 105A-105B. Principles of Composition.** (3-3) Yr. Mr. Swift, Mr. Austin
Lecture—3 hours.
Prerequisite: course 104A-104B.
Course 105A is prerequisite to 105B.
Elementary assignments in free composition.
- *108. Instrumentation.** (3) I. Mr. Austin
Lecture—3 hours.
Prerequisite: course 5A-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 5A-5B.
A study of the principles and techniques of conducting choral ensembles.
Offered in alternate years.
- *112B. Instrumental Conducting.** (2) II. Mr. Austin
Lecture—2 hours.
Prerequisite: course 108.
A study of the principles and techniques of conducting instrumental ensembles.
Offered in alternate years.
- 121A-121B. History and Literature of Music.** (3-3) Yr. Mrs. Charles
Lecture—3 hours.
Prerequisite: courses 2A-2B, 4A-4B or consent of instructor.
Course 121A is prerequisite to 121B.
A study of the development of music from antiquity to the present; lectures, listening, technical analysis, and written reports.

* Not to be given, 1962-1963.

- 122. Music of the Twentieth Century.** (3) II. Mr. Jacobs
Lecture—3 hours.
Prerequisite: course 121A–121B.
Critical and analytical study of works by such composers as Schoenberg, Stravinsky, Milhaud, Bartok, Hindemith, and Sessions; lectures, listening, technical analysis and written reports.
Offered in alternate years.
- 199. Special Study for Advanced Undergraduates.** (1–4) I and II.
The Staff (Mr. Rosen in charge)

GROUP II

Courses open to all students in the University.

LOWER DIVISION COURSES

- 10. Basic Musicianship.** (2) I and II. Mrs. Charles, Mr. Jacobs
Lecture—3 hours.
Fundamentals of music, with singing, ear-training, harmonization of melodies, and conducting.
- 27A. Introduction to Musical Literature.** (3) I and II.
Lecture—2 hours; discussion—1 hour. Mr. Below, Mr. Jacobs
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. Below
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. Swift, Mr. Rosen
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.
- 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
Rehearsal—3 hours; discussion—1 hour.
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. Rosen
 Rehearsal—3 hours; section—1 hour.
 Rehearsal and performance of choral music. May be repeated once for credit.
- 46A-46B. Chamber Music Ensemble.** (1-1) Yr.
 Rehearsal—2 hours. The Griller Quartet (Mr. Griller in charge)
 Course 46A is not prerequisite to 46B.
 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. Mrs. Charles
 Lecture—3 hours.
 Prerequisite: course 27A-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. Mrs. Charles
 Lecture—3 hours.
 Prerequisite: course 27A-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 alternate years.
- *128. Musical Literature: Music in the United States.** (3) II. Mr. Swift
 Lecture—3 hours.
 Prerequisite: course 27A-27B or consent of the instructor. Intended primarily for students whose major is not music.
 A study of the musical scene in America from colonial times to the present. Lectures, reading assignments, and guided listening to representative works of significant composers.
 Offered in alternate years.

Performance Courses

- 141. Advanced University Symphony Orchestra.** (1-2) I and II.
 Prerequisite: 2 semesters in course 41. Mr. Swift, Mr. Rosen
 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
 Rehearsal—4 hours.
 Prerequisite: 2 semesters in course 43.
 May be repeated once for credit.

144. Advanced University Chorus. (2) I and II.

Mr. Rosen

Rehearsal—4 hours.

Prerequisite: 2 semesters in course 44.

May be repeated once for credit.

TEACHING METHODS COURSE

329A. Instrumental Methods. (1) I and II.

Lecture—1 hour.

The Griller Quartet (Mr. Griller in charge)

Prerequisite: courses 1A-1B, 4A-4B or consent of the instructor.

Methods of teaching orchestral instruments; repertory and program planning for secondary schools. Course may be repeated once for credit.

PROFESSIONAL COURSE

405A-405B. Elementary Piano. (1-1) Yr.

Mr. Below

Lecture—2 hours.

Prerequisite: consent of the instructor.

Open to music majors and candidates for the general secondary credential with a minor in music.

NEMATODOLOGY

Merlin W. Allen, Ph.D., *Chairman of the Department.*
Department Office, 223 Soils and Plant Nutrition Building

Merlin W. Allen, Ph.D., *Professor of Nematology.*
†Dewey J. Raski, Ph.D., *Professor of Nematology.*



Bert Lear, Ph.D., *Lecturer in Nematology.*
Benjamin F. Lownsbery, Ph.D., *Lecturer in Nematology.*
Armand R. Maggenti, Ph.D., *Lecturer in Nematology.*
David R. Viglierchio, Ph.D., *Lecturer in Nematology.*

UPPER DIVISION COURSE

100. **General Plant Nematology.** (4) I. Mr. Allen, Mr. Maggenti
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. Maggenti
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.
Lecture—2 hours; laboratory—6 hours. Mr. Allen, Mr. Maggenti
Prerequisite: course 220.
The taxonomy, morphology, and comparative anatomy of soil and fresh-water nematodes.
290. **Seminar in Nematology.** (1) I and II. The Staff (Mr. Allen in charge)
Seminar—1 hour.
299. **Research in Nematology.** (1-6) I and II.
The Staff (Mr. Allen in charge)

† Absent on leave, 1962-1963.

NUTRITION

Charles R. Grau, Ph.D., *Chairman of the Executive Committee.*
Committee Office, 207 Poultry Husbandry Building

Committee in Charge:

Arthur L. Black, Ph.D., *Professor of Biochemistry.*
Floyd D. Carroll, Ph.D., *Associate Professor of Animal Husbandry.*
Donald R. Cordy, D.V.M., Ph.D., *Professor of Veterinary Pathology.*
Perry T. Cupps, Ph.D., *Professor of Animal Husbandry.*
Gladys J. Everson, Ph.D., *Professor of Home Economics.*
Richard A. Freedland, Ph.D., *Lecturer in Biochemistry.*
Charles R. Grau, Ph.D., *Professor of Poultry Husbandry.*
Hubert Heitman, Jr., Ph.D., *Professor of Animal Husbandry.*
Fredric W. Hill, Ph.D., *Professor of Poultry Husbandry.*
†Lucille S. Hurley, Ph.D., *Associate Professor of Nutrition.*
Max Kleiber, Sc.D., *Professor of Animal Husbandry, Emeritus.*
Frank H. Kratzer, Ph.D., *Professor of Poultry Husbandry.*
Glen P. Lofgreen, Ph.D., *Professor of Animal Husbandry.*
James H. Meyer, Ph.D., *Professor of Animal Husbandry.*
Leo C. Norris, Ph.D., *Lecturer of Poultry Husbandry.*
Daniel W. Peterson, Ph.D., *Associate Professor of Poultry Husbandry.*
Magnar Ronning, Ph.D., *Associate Professor of Animal Husbandry.*
George F. Stewart, Ph.D., *Professor of Food Science and Technology.*
Aloys L. Tappel, Ph.D., *Professor of Food Science and Technology.*
William C. Weir, Ph.D., *Professor of Animal Husbandry.*

GRADUATE COURSES

- 250. Concepts of Animal Nutrition.** (2) II. Mr. Lepkovsky, Mr. Hill
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 in Nutrition.** (1) I and II. The Staff
Seminar—1 hour.
Discussion and critical evaluation of advanced topics in nutrition research.

PARASITOLOGY

For courses in parasitology see "Entomology and Parasitology," page 194.

PARK ADMINISTRATION

For courses in park administration see "Landscape Horticulture," page 234.

† Absent on leave, 1962-1963.

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., *Associate Professor of Veterinary Pathology.*
Jack E. Moulton, D.V.M., Ph.D., *Associate Professor of Veterinary Pathology.*



Allen C. Anderson, V.M.D., Ph.D., *Lecturer in Radiopathology.*
William P. C. Richards, M.V.Sc., *Lecturer in Veterinary Pathology.*

UPPER DIVISION COURSES

122A-122B. **Veterinary Pathology.** (5-5) Yr.

I. Mr. Cordy, Mr. Moulton; II. Mr. Cordy, Mr. Kennedy, ———

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.

199. **Special Study for Advanced Undergraduates.** (1-5) I and II.

The Staff (Mr. Cordy in charge)

GRADUATE COURSES

251A-251B. **Necropsy Laboratory** ($\frac{1}{2}$ - $\frac{1}{2}$) Yr.

The Staff (I. Mr. Kennedy, II. Mr. Moulton, 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—6 hours.

Prerequisite: course 122A-122B.

Selected topics in the pathology of non-neoplastic diseases. Mechanisms of disease and patterns of reaction are stressed.

Offered in even-numbered years.

281. **Necropsy and Surgical Pathology.** (1-4) I and II.

Laboratory. The Staff (I. Mr. Kennedy, II. Mr. Moulton, in charge)

Prerequisite: courses 122A-122B, 251A-251B.

Responsible diagnostic casework. Performance of necropsies, slide reading and case reporting. Participation in slide conference constitutes first unit of credit and is required of all students enrolled. Enrollment for additional units is limited. May be repeated for credit.

* Not to be given, 1962-1963.

***282. Tumor Pathology. (2) I.**

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 odd-numbered years.

290. Seminar in Veterinary Pathology. (1) I and II.

Seminar—1 hour.

The Staff (Mr. Cordy in charge)

299. Research in Veterinary Pathology. (1-6) I and II.

The Staff

* Not to be given, 1962-1963.

PHILOSOPHY

Arthur Child, Ph.D., *Chairman of the Department.*
Department Office, 311 Academic Office Building

Arthur Child, Ph.D., *Professor of Philosophy.*
Neal W. Gilbert, Ph.D., *Associate Professor of Philosophy.*
William H. Bossart, Ph.D., *Assistant Professor of Philosophy.*



Philosophy examines the principles that the other intellectual disciplines must take for granted in order to pursue their own work, as well as the characteristics of all the major types of human activity. By examining these principles and characteristics critically, it tries to ascertain their meaning; by examining them constructively, it tries to see their possible relations to each other. Philosophy therefore answers to man's perennial aspiration toward understanding. Moreover, the many attempts to accomplish the aims of philosophy have reacted on the disciplines and activities themselves throughout their long history. Some grasp of philosophy, past and present, is therefore indispensable to a comprehension of the other matters involved in thinking, doing, and making.

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 91).

Departmental Major Adviser.—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 the departmental major adviser. Three of these units, however, may be taken in another department, if the adviser considers that the course contributes directly to the student's major program. Among courses that could be so considered are Economics 101A–101B, English 147, Political Science 113, 114, 118A–118B, and 119. These courses are also recommended as additional to the major in accordance with the direction of the student's interests and talents. 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

6A–6B. Introduction to Philosophy. (3–3) Yr.

Lecture—3 hours.

Mr. Bossart, Mr. Child, Mr. Gilbert

Course 6A is not prerequisite to 6B.

12. Introduction to Logic. (3) I.

Mr. Gilbert

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–20B. History of Philosophy. (3–3) Yr.

I. Mr. Child; II. Mr. Bossart.

Lecture—3 hours.

Prerequisite: sophomore standing. Course 20A is not prerequisite to 20B.

I. From the Pre-Socratics to the Scholastics.

II. From Descartes to Kant.

UPPER DIVISION COURSES

- *103. **Philosophy of the Nineteenth Century.** (3) I. 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 alternate years.
- *104. **Ethics.** (3) I. Mr. Child
Lecture—3 hours.
The principles of intelligent conduct: their status and nature; how they are discovered, known, and proved; and their relationships to the principles of art, science, and logic.
Offered in alternate years.
105. **Kant.** (3) I. Mr. Bossart
Lecture—3 hours.
The *Critique of Pure Reason* and selections from other works.
Offered in alternate years.
111. **Metaphysics.** (3) II. Mr. Bossart
Lecture—3 hours.
The search for being; the meaning of being and the relation of being to ontology. The theory of knowledge. Possible types of world order.
Offered in alternate years.
112. **Philosophy of Religion.** (3) I. Mr. Child
Lecture—3 hours.
The nature of religion; its relations to morality and institutions; sources, status, and kinds of religious knowledge; the existence and nature of God; man's relations to the divine; the significance of death; concepts of survival; relations of church and state.
Offered in alternate years.
116. **Plato.** (3) II. Mr. Child
Lecture—3 hours.
Several dialogues, exemplifying various aspects of Plato's thought, from among such works as the *Gorgias*, *Phaedrus*, *Statesman*, *Theaetetus*, *Timaeus*, *Parmenides*, *Philebus*, and *Sophist*.
Offered in alternate years.
- *117. **Aristotle.** (3) II. Mr. Child
Lecture—3 hours.
The *Metaphysics* and related portions of other treatises.
Offered in alternate years.
124. **Philosophy of Science.** (3) I. Mr. Gilbert
Lecture—3 hours.
Basic concepts and methods of the mathematical, physical, and biological sciences; philosophical reflections on science.
Offered in alternate years.
- 135A. **Contemporary Tendencies: British-American.** (3) II. Mr. Gilbert
Lecture—3 hours.
Idealism, realism, pragmatism, logical empiricism, linguistic analysis.
Offered in alternate years.

* Not to be given, 1962-1963.

- *135B. **Contemporary Tendencies: European.** (3) II. Mr. Bossart
Lecture—3 hours.
Existentialism, phenomenology, and their immediate antecedents.
Offered in alternate years.
- *137. **Aesthetics.** (3) I. Mr. Bossart
Lecture—3 hours.
The nature of art, of artistic creation, of the work of art, and of aesthetic experience; the nature and validity of criticism; and the relations of art to its environment.
Offered in alternate years.
145. **Philosophy of the Visual Arts.** (3) I. Mr. Bossart
Lecture—3 hours.
Aesthetics of the graphic and plastic arts. Offered in alternate years.
- *147. **Theory of History.** (3) I. Mr. Child
Lecture—3 hours.
The nature of historical thinking and of the historical process, and the relations between them.
Offered in alternate years.
169. **Locke and Leibniz.** (3) II. Mr. Gilbert
Lecture—3 hours.
Locke's *An Essay concerning Human Understanding*; and the philosophy of Leibniz with special reference to his criticism of Locke in *New Essays on the Human Understanding*.
Offered in alternate years.

* Not to be given, 1962-1963.

PHYSICAL EDUCATION

Charles R. Kovacic, Ed.D., *Chairman of the Department.*

Department Office, 204 Gymnasium

- Charles R. Kovacic, Ed.D., *Professor of Physical Education.*
Marya Welch, Ed.D., *Associate Professor of Physical Education.*
Willard S. Lotter, Ed.D., *Associate Professor of Physical Education.*
Barbara J. Heller, Ed.D., *Assistant Professor of Physical Education.*
William L. Lakie, Ed.D., *Assistant Professor of Physical Education.*
†Everett D. Ryan, Ed.D., *Assistant Professor of Physical Education.*
———, *Assistant Professor of Physical Education.*
Vernard B. Hickey, A.B., *Lecturer and Supervisor of Physical Education.*
George A. Stromgren, M.S., *Lecturer and Supervisor of Physical Education.*
———, *Supervisor of Physical Education.*
§Herbert A. Schmalenberger, M.A., *Associate Supervisor of Physical Education.*
James L. Sells, Ed.D., *Lecturer and Associate Supervisor of Physical Education.*
Robert R. Brooks, M.A., *Assistant Supervisor of Physical Education.*
Carl E. J. Carlson, M.A., *Assistant Supervisor of Physical Education.*
Ruth J. Rose, M.A., *Lecturer and Assistant Supervisor of Physical Education.*
Jerry W. Hinsdale, A.B., *Junior 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. 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.

Fines are imposed for each formal transaction necessitated by failure of the student to comply with the regulations of the department.

Major Advisers.—Miss Heller, Mr. Kovacic, Mr. Lakie, Mr. Lotter, Mr. Sells, Miss Welch.

The Major Program

(A) Lower Division Courses.—Physical Education 10 for men; Physical Education 22 and 35 for women; Physical Education 20 and 24; Physiology 1-1L; Psychology 1A; Zoology 10 and Zoology 25.

(B) Upper Division Courses.—Twenty-four units of upper division courses in physical education and allied subjects, including courses 103A-103B, 130, 131, 180A-180B; one of the following: 135, 140, 145, 171; Home Economics 131 or 136.

It is also recommended that students elect a 3-unit upper division course in the area of sociology, and a 3-unit upper division course in the area of psychology to be chosen with the approval of the adviser.

LOWER DIVISION COURSES FOR MEN

1. Physical Education for Men. (½) I and II.

The Staff

Laboratory—2 hours.

Sections are organized in baseball, basketball, boxing, football, golf, soccer, tennis, touch football, track, tumbling, handball, wrestling, swimming, lifesaving, and water sports. Men qualified for athletics may enroll in any sport pursued at Davis, such as football and basketball, and receive credit for this elective.

This course may be repeated for credit not to exceed a total of 4 units.

† Absent on leave, 1962-1963.

§ Absent on leave, spring semester, 1963.

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. ($\frac{1}{2}$) I and II.

Laboratory—2 hours. The Staff
 Sections are organized in archery, badminton, volleyball, riding, 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.

Lecture—1 hour; laboratory—2 hours. Miss Rose
 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.

Lecture—2 hours. Mr. Stromgren
 Standard course. Upon successful completion of the course, the Red Cross Certificate is awarded.

20. Introduction to Physical Education. (1) I.

Lecture—2 hours. Mr. Schmalenberger
 An orientation and interpretation of the field of physical education for the prospective major. Open only to students specializing in physical education and candidates for the teaching credential.

24. The Theory of Swimming and Diving. (1) I and II.

Lecture—1 hour; laboratory—2 hours. Mr. Hickey
 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.

Lecture—1 hour; laboratory—2 hours. Mr. Hickey
 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-36B. Dance History and Practice. (2-2) Yr.

Lecture—1 hour; laboratory—3 hours. Miss Rose
 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-37B. Contemporary Dance Theory and Practice.** (2-2) Yr. Miss Rose
Lecture—1 hour; laboratory—3 hours.
Prerequisite: course 36A-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. Mr. Stromgren
Lecture—2 hours.

Use of scientific information, proper attitudes, knowledge and health practices in daily living.

UPPER DIVISION COURSE 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.

UPPER DIVISION COURSES FOR MEN AND WOMEN

103A-103B. Analysis of Human Movement. (4-4) Yr. Mr. Kovacic
Lecture—3 hours; laboratory—3 hours.

Prerequisite: Physiology 1-1L.

Analysis of human movement based upon the integration of kinesiology, physiology of activity and adapted physical education.

110. Psychosocial Factors in Athletic Performance. (3) II. Mr. Ryan
Lecture—3 hours.

Prerequisite: Psychology 1A.

Analysis of various psychological and social factors affecting the development and use of motor skills.

130. Principles and Theory and Physical Education. (3) II. Miss Welch
Lecture—3 hours.

Prerequisite: course 20.

A critical analysis of the assumptions underlying the physical education program.

131. Organization and Administration of Physical Education. (3) I. Mr. Sells
Lecture—3 hours.

Prerequisite: course 130.

Principles and policies pertaining to departmental organization and administration, personnel, academic programming, facilities, equipment and supplies, intramural and interscholastic relationships, public relations and legal practices.

135. Measurement and Evaluation in Physical Education. (3) I. ———
Lecture—3 hours.

Historical background and review of measurement and evaluation in physical education; statistical procedures essential in measurement; basic principles of constructing and selecting tests; interpretation of results; analysis of selected research studies.

* Not to be given, 1962-1963.

140. Recreation in the Community. (2) II.

Mr. Lotter

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.

Mr. Stromgren

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.

180A-180B. Physical Education in the Secondary School. (2-2) Yr.

Lecture—2 hours.

Miss Heller, Mr. Lakie

Prerequisite: course 130 and individual proficiency in activities.

An analysis and study of the principles and methods basic to the physical education program in the secondary school; the role of the teacher in the program and the competencies necessary to carry out the functions of the physical education teacher.

199. Special Study for Advanced Undergraduates. (1-5) I and II.

Prerequisite: consent of department. The Staff (Mr. Kovacic in charge)

PROFESSIONAL COURSE

380A-380B. Methods of Physical Education in the Secondary School.

(2-2) Yr.

Miss Heller, Mr. Lakie

Lecture—1 hour; laboratory 3 hours.

Prerequisite: course 130 and individual proficiency in activities. Course 180A-180B must be taken concurrently.

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

Charles G. Patten, Ph.D., *Chairman of the Department.*

Department Office, 109 Physical Science Building

David B. Beard, 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.*

William J. Knox, Ph.D., *Associate Professor of Physics.*

_____, *Associate Professor of Physics.*

James A. McCray, Ph.D., *Assistant Professor of Physics.*

William W. True, Ph.D., *Assistant Professor of Physics.*

Letters and Science List.—All undergraduate courses in physics are included in the Letters and Science List of Courses (see page 91).

Major Subject Advisers.—Mr. Gardner, Mr. True.

Bachelor of Arts Major Program

(A) Lower Division Courses.—Required: Physics 4A, 4B, 4C, Chemistry 1A, Mathematics 3A–3B, and 14 or their equivalent. Recommended: Mathematics 7 and a reading knowledge of French and German.

(B) Upper Division Courses.—Required: Physics 105A–105B, 108B, 110A–110B, 115, 121, 110L or 121L, and Mathematics 106, 107. Recommended: Physics 104, 129A–129B and Mathematics 185.

Bachelor of Science Major Program

(A) Lower Division Courses.—Required: Physics 4A, 4B, 4C, or the equivalent, Chemistry 1A–1B, or Mathematics 3A–3B, 14 or their equivalent. Recommended: Mathematics 7 and a reading knowledge of French and German.

(B) Upper Division Courses.—Required: Physics 104, 105A–105B, 108B, 110A–110B, 115, 121, 129A–129B, 110L or 121L, and Mathematics 106, 107. Recommended: Physics 107, 112, 121L, or 110L, Mathematics 108, and 185.

Honors and Honors Program (see page 92).—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, 4C are fundamental and are designed to meet the needs of students whose major is physics and of students preparing for applications of physics in the colleges of Engineering and Chemistry. After completing 4A, the order of taking 4B and 4C is immaterial.

Prerequisite for all lower division courses: (1) either high school physics or chemistry; (2) trigonometry (may be taken concurrently).

2A. General Physics Lecture. (3) I and II.

Lecture—3 hours.

_____, Mr. McCray

Prerequisite: (1) either high school physics or chemistry; (2) trigonometry.

Elective in the College of Letters and Science. Required for premedical students.

Mechanics, properties of matter, heat, and sound.

- 2B. General Physics Lecture.** (3) I and II. Mr. McCray, ——
 Lecture—3 hours.
 Prerequisite: course 2A.
 Elective in the College of Letters and Science. Required for premedical students.
 Properties of light, electricity, magnetism, and atomic and nuclear physics.
- 3A. General Physics Laboratory.** (1) I and II. ——, Mr. McCray
 Laboratory—3 hours.
 Required for premedical students. Recommended for all students who elect course 2A.
 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. McCray, ——
 Laboratory—3 hours.
 Required for premedical students. Recommended for all students who elect course 2B.
 Properties of light, electricity, magnetism, and atomic and nuclear physics. Experimental work planned to accompany the lectures in course 2B.
- 4A. General Physics.** (4) II. Mr. Gardner
 Lecture—3 hours; laboratory—3 hours.
 Prerequisite: (1) high school physics or chemistry; (2) Mathematics 3A-3B or its equivalent (Mathematics 3B may be taken concurrently).
 Open to students in all colleges. Together with courses 4B and 4C, required for students in the College of Letters and Science whose major subject is physics, and for students in engineering and chemistry.
 Mechanics, properties of matter.
- 4B. General Physics.** (4) I. Mr. Gardner
 Lecture—3 hours; laboratory—3 hours.
 Prerequisite: course 4A, Mathematics 14 or 4A (may be taken concurrently).
 Open to students in all colleges. Required for students in the College of Letters and Science whose major subject is physics, and for students in engineering and chemistry.
 Electricity and magnetism.
- 4C. General Physics.** (4) II. ——
 Lecture—3 hours; laboratory—3 hours.
 Prerequisite: course 4A, Mathematics 14 or 4A (may be taken concurrently).
 Open to students in all colleges. Required for students in the College of Letters and Science whose major subject is physics, and for students in engineering and chemistry.
 Heat, wave motion, sound, and light.
- 10. Descriptive Introduction to Physics.** (3) I. Mr. Knox
 Lecture—3 hours.
 Open to students with or without high school physics but not open to those who have credit for any of 2A, 2B, 4A, 4B, 4C, or equivalent.
 A brief presentation of some of the more important phenomena in physics with experimental illustrations.

***38A-38B. Supplementary Lecture Course in General Physics. (2-2) Yr.**

Lecture—4 hours.

Prerequisite: course 2A-2B; Mathematics 3A-3B, 4A (may be taken concurrently).

Equivalent to parts of the lecture material in courses 4A, 4B, and 4C. Together with the laboratory courses 3A-3B, this course will supply the student with the necessary basic training required for the upper division program in physics.

Offered in alternate years.

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. (3) I.

Mr. True

Lecture—3 hours.

Elements of vector and tensor analysis with applications to physics.

Offered in alternate years.

105A-105B. Analytic Mechanics. (3-3) Yr.

Mr. Knox

Lecture—3 hours.

Fundamental principles of Newtonian mechanics.

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.

Offered in alternate years.

108B. Physical Optics. (3) I.

Mr. True

Lecture—2 hours; laboratory—3 hours.

The phenomena of diffraction, interference, and polarization of light, and their applications.

Offered in alternate years.

110A-110B. Electricity and Magnetism. (3-3) Yr.

Mr. Beard

Lecture—3 hours.

Prerequisite: Mathematics 106, 107.

Elementary and mathematical theory of electrostatics, magnetostatics, magnetism, steady and varying currents, electron theory, and electromagnetic waves.

Offered in alternate years.

110L. Advanced Electrical Laboratory. (1) I.

Mr. McCray

Laboratory—3 hours.

Prerequisite: course 110A-110B (110B may be taken concurrently), or the equivalent, or consent of the instructor.

The use and calibration of precision electrical instruments and electronic devices.

Offered in alternate years.

112. Heat. (3) II.

Mr. Patten

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.

Offered in alternate years.

* Not to be given, 1962-1963.

115. **Introduction to Quantum Mechanics.** (3) II. Mr. True
Lecture—3 hours.
Prerequisite: courses 105A, 121.
The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.
121. **Introduction to Atomic Structure.** (3) II. Mr. Gardner
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.
- 121L. **Atomic and Nuclear Physics Laboratory.** (1) II. Mr. Knox
Laboratory—3 hours.
Prerequisite: course 121.
Experimental foundation for the theory of atomic structure.
Offered in alternate years.
- 129A-129B. **Nuclear Physics.** (3-3) Yr. ———, Mr. McCray
Lecture—3 hours.
Prerequisite: course 121.
Natural and artificial radioactivity, nuclear radiations and their interaction with matter, general properties of nuclei and the theory of nuclear structure, high energy physics, mesons.
Offered in alternate years.
- 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. Patten
Lecture—3 hours.
Prerequisite: course 105A-105B or the equivalent.
The generalized methods of Lagrange, Hamilton, and Jacobi. Advanced theories leading to the formulation of quantum mechanics.
Offered in alternate years.
- 210A-210B. **Theory of Electricity and Magnetism.** (3-3) Yr. Mr. Jungerman
Lecture—3 hours.
Prerequisite: course 110A-110B or the equivalent, and a working knowledge of differential equations.
Classical description of the electromagnetic field including special relativity and electron theory.
Offered in alternate years.
- 215A-215B. **Quantum Mechanics.** (3-3) Yr. Mr. Beard
Lecture—3 hours.
Prerequisite: courses 115, 205.
Development and interpretation of the Schrödinger wave equation and Heisenberg matrix mechanics. Approximation methods. Applications to atomic, molecular, and solid state problems. Radiation theory. Scattering theory. Dirac wave equations leading to elementary field theory.
Offered in alternate years.

- *219. Statistical Mechanics and Kinetic Theory. (3) II.** Mr. True
Lecture—3 hours.
Prerequisite: courses 115, 205.
Foundations of statistical mechanics. Classical and quantum statistics, with applications to properties of matter; kinetic theory; gases at very low pressure; Boltzmann transport equation; irreversible processes.
Offered in alternate years.
- 229. Nuclear Theory. (3) II.** Mr. True
Lecture—3 hours.
Prerequisite: courses 215A, 215B(may be taken concurrently).
Nuclear structure with emphasis on recent theoretical models of nuclear forces and potentials and the physical properties and behavior of nuclei at low excitation energy. Theoretical problems of experimental interest, such as the penetration of electrons through matter.
Offered in alternate years.
- 290. Seminar. (1-3) I and II.** Mr. Jungerman
Advanced study in various fields of modern physics. Topics will vary from year to year.
- 299. Research. (1-6) I and II.** The Staff
- * Not to be given, 1962-1963.

PHYSIOLOGICAL SCIENCES

Stuart A. Peoples, M.D., *Chairman of the Department.*
Department Office, 2163 Haring Hall

Arthur L. Black, Ph.D., *Professor of Biochemistry.*
Louis W. Holm, Ph.D., *Professor of Physiology.*
Stuart A. Peoples, M.D., *Professor of Comparative Pharmacology.*
Richard A. Freedland, Ph.D., *Assistant Professor of Biochemistry.*
Harold R. Parker, D.V.M., Ph.D., *Assistant Professor of Physiology.*



Allen C. Anderson, V.M.D., Ph.D., *Lecturer in Radiopathology.*
R. 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.

Laboratory—6 hours. Mr. Black, Mr. Freedland

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

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.

Lecture—3 hours; laboratory—3 hours. Mr. Peoples, Mr. Fowler

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

Lecture—6 hours.

Prerequisite: Physiology 1 and 1L or Zoology 1A-1B; 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

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 alternate years.

225. **Fundamentals of Radiation Biology.** (3) II.

Lecture—3 hours.

Mr. Anderson, 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.

- *265. **Experimental Physiology.** (3) I.

Mr. Holm

Lecture—1 hour; laboratory—6 hours.

Prerequisite: course 140-140L or Animal Husbandry 110; Animal Husbandry 101, 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 in Physiological Sciences.** (1) I and II.

The Staff

Seminar—1 hour.

299. **Research in Physiological Sciences.** (1-6) I and II.

The Staff

PHYSIOLOGY

For courses in physiology see "Animal Physiology," page 130, and "Zoology," page 309.

PLANT NUTRITION

For courses in plant nutrition see "Soils and Plant Nutrition," page 298.

* Not to be given, 1962-1963.

PLANT PATHOLOGY

Lysle D. Leach, Ph.D., *Chairman of the Department.*
Department Office, 258 Hunt Hall

†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.*
James E. DeVay, Ph.D., *Associate Professor of Plant Pathology.*
Edward E. Butler, Ph.D., *Assistant Professor of Plant Pathology.*
Robert N. Campbell, Ph.D., *Assistant Professor of Plant Pathology.*
Philip M. Halisky, Ph.D., *Assistant Professor of Plant Pathology.*
Joseph M. Ogawa, Ph.D., *Assistant Professor of Plant Pathology.*
Thomas A. Shalla, Ph.D., *Assistant Professor of Plant Pathology.*
Robert J. Shepherd, Ph.D., *Assistant Professor of Plant Pathology.*

Departmental Major Advisers.—Mr. English, Mr. Grogan.

Bachelor of Science Major Program and Graduate Study. See page 60.

UPPER DIVISION COURSES

120. Plant Diseases. (4) I and II.

Lecture—2 hours; laboratory—6 hours. I. Mr. Campbell, Mr. Shepherd; II. Mr. English, Mr. Halisky.

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. Nyland

Lecture—1 hour; laboratory—6 hours.

Prerequisite: course 120.

The laboratory methods and techniques used in the study of plant diseases.

125. Diseases of Field and Vegetable Crop Plants. (3) I.

Lecture—1 hour; laboratory—6 hours.

Mr. Grogan, Mr. Houston

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.

Lecture—1 hour; laboratory—6 hours.

Mr. Wilson, Mr. Ogawa

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 (Mr. DeVay in charge)

† Absent on leave, fall semester, 1962-1963.

GRADUATE COURSES

- 210. Physiology of Plant Pathogens.** (3) II. Mr. DeVay
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 122; Chemistry 5 and 8 or equivalent. Recommended:
Botany 120A–120B; Biochemistry 101.
Fundamental concepts and current information on the physiology and bio-
chemistry of plant pathogens in relation to host-parasite interactions.
- 215. Advanced Plant Pathology.** (3) II. Mr. Hewitt, Mr. Leach
Lecture—3 hours.
Prerequisite: courses 122, 224.
A study of the factors influencing pathogenicity and of the reaction of
host plants to disease.
- 224. Pathogenic Fungi.** (3) II. Mr. Butler
Lecture—1 hour; laboratory—6 hours.
Prerequisite: Botany 119.
Morphology and taxonomy of fungi, with special emphasis on plant
pathogens.
- *226. Plant Virology.** (3) I. Mr. Shalla
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 120.
Viruses as causal agents of plant diseases; the nature, morphology, chemi-
cal, physical and serological properties of plant viruses; methods of transmis-
sion including insect vector relationships; application of techniques and
equipment used in research.
- 291. Seminar in Plant Pathology.** (1) I and II. Mr. Ogawa
Seminar—1 hour.
- 299. Research in Plant Pathology.** (1–6) I and II. The Staff

* Not to be given, 1962–1963.

POLITICAL SCIENCE

Clyde E. Jacobs, Ph.D., *Chairman of the Department.*
Department Office, 257 Academic Office Building

Vernon J. Puryear, Ph.D., *Professor of Political Science.*
Clyde E. Jacobs, Ph.D., *Associate Professor of Political Science.*
Paul E. Zinner, Ph.D., *Associate Professor of Political Science.*
Alexander J. Groth, Ph.D., *Assistant Professor of Political Science.*
Ernest G. Miller, Ph.D., *Assistant Professor of Political Science.*
John R. Owens, Ph.D., *Assistant Professor of Political Science.*
Marvin Zetterbaum, Ph.D., *Assistant Professor of Political Science.*



John F. Gallagher, M.A., *Acting Assistant Professor of Political Science.*
Stuart A. Scheingold, 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 91.)

Departmental Major Advisers.—Mr. Jacobs, Mr. Groth, Mr. Miller, Mr. Owens, Mr. Puryear, 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, 102, 105, 113, 128A, 157A, 157B, 163, 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 6A 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.

Honors and Honors Program (see page 92).—The honors program comprises course 194H, which will include either a thesis or a comprehensive examination, according to the recommendation of a special honors committee in political science. Before being admitted to the honors program, a student must complete 9 units of political science (normally courses 1A, 1B, and 2), with an average grade of B.

The Master of Arts Degree in Political Science.—The Department offers graduate study leading to the Master of Arts Degree in Political Science. Information concerning admission to candidacy for this degree and requirements for completion may be obtained at the department office.

LOWER DIVISION COURSES

- 1A-1B. American Government.** (3-3) I and II. The Staff
Lecture—2 hours; recitation—1 hour.
Course 1A is not prerequisite to 1B.
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. Zinner
Constitutional principles, governmental institutions, and political problems of selected European governments.
- 3. International Relations.** (3) I and II. Mr. Groth, 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

- *102. State Government and American Federalism.** (3) II. Mr. Miller
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) I. Mr. Miller
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 and central financing; the governmental challenge of metropolitan areas.
- 104. California State and Local Government.** (3) II. Mr. Miller
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 alternate 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.
- 113. American Political Theory.** (3) I. Mr. Zetterbaum
Lecture—2 hours; recitation—1 hour.
Underlying theories and principles of United States government and politics.
- 114. Polity and Economy: Political Foundations of Economic Thought.**
(3) II. Mr. Zetterbaum
Lecture—3 hours.
Interpretation of human nature and institutions underlying the relationship of economic doctrines to political science in classical and modern writers, notably Aristotle, Locke, Mandeville, Montesquieu, Rousseau, Adam Smith, and Marx.

* Not to be given, 1962-1963.

- 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.
Prerequisite: course 118A is not prerequisite to 118B.
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) II.** Mr. Groth
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.
- 122. Principles of International Law. (3) II.** Mr. Scheingold
Lecture—3 hours.
Assessment of functions and limitations of law in world politics, with particular attention to the sources of international law and the institutional framework of world order.
- 124. International Organization. (3) I.** Mr. Puryear
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.
- 139. International Relations in Western Europe. (3) I.** Mr. Scheingold
Lecture—3 hours.
Study of the emerging unity in Western Europe and its implications for the North Atlantic area.
- *141A-141B. Soviet and East European Governments. (3-3) Yr.** 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.

* Not to be given, spring semester, 1963.

- 144. Government in Great Britain and the British Commonwealth.** (3) II.
Lecture—2 hours; recitation—1 hour. Mr. Groth
The democratic process in Britain; party politics; the cabinet system; the colonies; the evolution of the British Commonwealth.
- 147B. Western European Government: Germany.** (3) II. Mr. Scheingold
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.
- 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) I. Mr. Scheingold
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.
- 157A–157B. American Constitutional Law.** (3–3) Yr. Mr. Jacobs
Lecture—1 hour; recitation—2 hours.
Prerequisite: course 1A or History 17A–17B. Course 157A is prerequisite to 157B.
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.
- 166. Public Policy and the Governmental Process.** (3) I. 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.
- 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.

182. **Problems of Public Administration.** (3) II. Mr. Miller
Lecture—2 hours; recitation—1 hour.
Common problems of administrative organization, direction, operation, and control in the public service; management tools and techniques. Analysis by the individual student of a particular administrative organization, program, or problem.
- 194H. **Special Study for Honors Students.** (3) I and II. The Staff
Prerequisite: open to majors with honors standing. May be taken once during the junior year and repeated once during the senior year.
A survey of a defined field of political science. Students will prepare a thesis or pass a comprehensive examination covering their work in the major.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

GRADUATE COURSES

218. **Seminar in Political Theory.** (2) I and II. Mr. Zetterbaum
Seminar—2 hours.
230. **Seminar in American Foreign Policy.** (2) II. Mr. Puryear
Seminar—2 hours.
- 241A-241B. **Seminar in Soviet and East European Governments.** (2-2) Yr. Mr. Zinner
Seminar—2 hours.
244. **Seminar in British Government.** (2) II. Mr. Groth
Seminar—2 hours.
Prerequisite: consent of the instructor.
- 247B. **Seminar in Western European Government.** (2) II. Mr. Scheingold
Seminar—2 hours.
Prerequisite: consent of the instructor.
257. **Seminar in Comparative Public Law.** (2) I. Mr. Scheingold
Seminar—2 hours.
Prerequisite: consent of the instructor.
290. **Seminar in American Public Law.** (2) II. Mr. Jacobs
Seminar—2 hours.
Prerequisite: consent of instructor.
Selected current topics.
295. **Seminar in Political Parties.** (2) I. Mr. Owens
Seminar—2 hours.
Intensive study of selected topics.
296. **Seminar in State and Local Government.** (2) II. Mr. Miller
Seminar—2 hours.
An examination of selected institutions, processes, and problems.
299. **Research in Political Science.** (2-4) I and II. The Staff

PROFESSIONAL COURSE

- 400A-400B. **Field Work in Political Science.** (1-4) Yr. The Staff
Prerequisite: consent of the instructor.
Directed study and internship in a governmental agency, office, or political party.

POMOLOGY

Claron O. Hesse, Ph.D., *Chairman of the Department.*
Department Office, 1043 Horticulture Science Building

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.*
Royce S. Bringham, Ph.D., *Associate Professor of Pomology.*
†Dale E. Kester, Ph.D., *Associate Professor of Pomology.*
———, *Assistant Professor of Pomology.*



Muriel V. Bradley, Ph.D., *Lecturer in Pomology.*
Peter B. Catlin, Ph.D., *Lecturer in Pomology.*
Omund Lilleland, Ph.D., *Lecturer in Pomology.*
Edward C. Maxie, Ph.D., *Lecturer in Pomology.*
†Harold P. Olmo, Ph.D., *Professor of Viticulture.*
Roger J. Romani, *Lecturer in Pomology.*
Eugene F. Serr, Jr., B.S., *Lecturer in Pomology.*

Departmental Major Advisers.—Mr. Bringham, Mr. Crane.
Bachelor of Science Major Program and Graduate Study. See page 60.

LOWER DIVISION COURSES

1. **Introduction to Pomology.** (3) I. Mr. Hansen
Lecture—2 hours; laboratory—3 hours.
Not open to students who have completed course 2.
A survey of the fruit industry, including climatic influences, effect of rootstocks, selection of varieties, pollination requirements, and effect of the essential elements on growth.
2. **Principles of Fruit Growing.** (3) I. ———
Lecture—3 hours.
Prerequisite: Botany 1.
An introduction to the principles underlying the behavior of fruit trees, their response to environment and cultural operations.
3. **Citrus and Other Subtropical Fruits.** (2) II. Mr. Serr
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.

† Absent on leave, 1962–1963.

‡ Absent on leave, fall semester, 1962–1963.

- 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

- 105. The Deciduous Fruit Industries of California. (4)** Mr. Kester
 Lecture—4 hours; laboratory—12 hours; field trips—2 days.
 Prerequisite: course 2 or consent of the instructor.
 A study of the important fruit industries of California as influenced by culture, climate and variety; includes field trips to fruit-growing areas.
 A five-week extra-session course offered in odd-numbered years. Preregistration with the instructor before June 1 required.
- 106A-106B. Fruit Plants. (2-2) I and II.** I. Mr. Crane; II. Mr. Brown
 Lecture—1 hour; laboratory—3 hours.
 Prerequisite: course 2.
 Course 106A is not prerequisite to 106B.
 The principles underlying the growth and development of fruit plants related to species and environment as determinants in fruit-growing practices such as pruning, pollination, and thinning.
- 107. Small-Fruit Plants. (2) I.** Mr. Bringhurst
 Lecture—2 hours.
 Prerequisite: course 2.
 Fundamental principles concerned with growth, reproduction and adaptation of strawberries, blackberries, raspberries, blueberries, currants and gooseberries with emphasis on their botanical origin, physiological and morphological nature and the relationship of these factors to environment.
- 110. Fruit Morphology. (3) I.** Mr. Brooks
 Lecture—1 hour; laboratory—6 hours.
 Prerequisite: Botany 1.
 The morphological development of the flower, fruit, and seed of more than thirty typical horticultural species.
- 112. Handling, Storage, and Transit of Fruits. (3) I.** Mr. Claypool, Mr. Maxie
 Lecture—2 hours; laboratory—3 hours.
 Prerequisite: course 2; Botany 111.
 Fundamentals of certain fruit-handling operations; fruit maturity; pre-cooling; fruit storage and transportation. Particular emphasis is given to the physiological principles underlying these postharvest practices.
- *114. Fruit Breeding. (3) II.** Mr. Olmo
 Lecture—2 hours; laboratory—3 hours.
 Prerequisite: course 2; 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.
- 121. Advanced Pomology. (3) II.** _____
 Lecture—3 hours.
 Prerequisite: course 2; Botany 111; consent of the instructor.
 The physiology of fruit trees, their response to environment and to cultural operations.

* Not to be given, 1962-1963.

198. **Directed Group Study in Experimental Pomology.** (2) I. Mr. Hesse
Lecture—2 hours.

Prerequisite: 3 units upper division work in pomology completed; consent of the instructor.

A critical review and discussion of horticultural research in selected fields. Emphasis is placed on criticism of methods and their application, validity of conclusions, and relation to the development of the field of study.

199. **Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

GRADUATE COURSES

290. **Seminar.** (1) I and II. Mr. Griggs

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 in Pomology.** (1-6) I and II. The Staff

POULTRY HUSBANDRY

Fredric W. Hill, Ph.D., *Chairman of the Department.*

Department Office, 109 Poultry Building

Vigfus S. Asmundson, Ph.D., *Professor of Poultry Husbandry.*
Charles R. Grau, Ph.D., *Professor of Poultry Husbandry.*
Fredric W. Hill, 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).*
Frederick W. Lorenz, Ph.D., *Professor of Poultry Husbandry.*
Arthur H. Smith, Ph.D., *Professor of Poultry Husbandry.*
Lewis W. Taylor, Ph.D., *Professor of Poultry Husbandry (Berkeley campus).*
Wilbor O. Wilson, Ph.D., *Professor of Poultry Husbandry.*
Ursula H. Abbott, Ph.D., *Associate Professor of Poultry Husbandry.*
Hans Abplanalp, Ph.D., *Associate Professor of Poultry Husbandry.*
Daniel W. Peterson, Ph.D., *Associate Professor of Poultry Husbandry.*
Frank X. Ogasawara, Ph.D., *Assistant Professor of Poultry Husbandry.*

A. Wade Brant, Ph.D., *Lecturer in Food Science and Technology.*
Leo C. Norris, Ph.D., *Lecturer in Poultry Husbandry.*
George F. Stewart, Ph.D., *Professor of Food Science and Technology.*

Departmental Major Adviser.—Mr. Ogasawara.

Bachelor of Science Major Program and Graduate Study. See page 55.

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; and related specialized enterprises.

UPPER DIVISION COURSES

103. **Poultry Breeding.** (3) I. Mr. Asmundson
Lecture—3 hours.
Prerequisite: Genetics 100.
Inheritance in poultry and study of the application of genetic principles to problems in poultry breeding (chickens and turkeys).

- 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.
- 105. Avian Nutrition. (3) II.** Mr. Grau, Mr. Kratzer
 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, Mr. Grau
 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. Lorenz
 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) II.** Mr. Lorenz
 Lecture—1 hour; laboratory—3 hours.
 Prerequisite: course 107 (may be taken concurrently); consent of the instructor.
 Selected problems in the physiology of birds.
- 112. Poultry Meat Production. (3) II.** Mr. Asmundson
 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.**
 Lecture—2 hours. Mr. Peterson, Mr. Stewart, Mr. Brant
 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. Wilson
 Lecture—2 hours.
 Prerequisite: Zoology 1A-1B.
 The effect of environmental factors on physiological processes related to animal production.
 Offered in odd-numbered years.
- 198. Directed Group Study. (1-2) II.** The Staff
 Prerequisite: senior standing and consent of the instructor.
 Group study of methods employed in poultry production and management.

* Not to be given, 1962-1963.

199. Special Study for Advanced Undergraduates. (1-5) I and II.

The Staff (Mr. Hill 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.

Lecture—2 hours; laboratory—6 hours.

Mrs. Abbott, Mr. Taylor

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 in Poultry Husbandry. (1) I and II.

Seminar—1 hour.

The Staff (Mr. Hill in charge)

Reports and discussion of recent advances and selected topics of current interest in avian genetics, physiology, and nutrition, and poultry-products technology.

298. Directed Group Study. (1-2) I and II.

The Staff

Group study of advanced topics in the avian sciences.

299. Research in Poultry Husbandry. (1-6) I and II.

The Staff

RELATED COURSES

Fundamentals of Farm Management (Agricultural Economics 140)**Poultry Pathology Laboratory (Avian Medicine 112)****Animal Hygiene (Veterinary Microbiology 111)****Concepts of Animal Nutrition (Nutrition 250)**

PSYCHOLOGY

William F. Dukes, Ph.D., *Acting Chairman of the Department.*
Department Office, 356 Academic Office Building

William F. Dukes, Ph.D., *Associate Professor of Psychology.*

†Paul Dempsey, Ph.D., *Assistant Professor of Psychology.*

Andrew K. Solarz, Ph.D., *Assistant Professor of Psychology.*



Jay S. Caldwell, Ph.D., *Lecturer in Psychology.*

Sumner B. Morris, Ed.D., *Lecturer in Psychology.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 91).

Departmental Major Advisers.—Mr. Caldwell, Mr. Dempsey, Mr. Solarz.

The Major Program

(A) Lower Division Courses.—Required: (1) course 1A–1B or courses 1 and 2; (2) 3 units of statistics; (3) 6 units of biological science, composed of one of these three combinations: Zoology 1A–1B, Zoology 1A 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) one course from each of the following: (a) 108, 150; (b) 130, 131; (c) 145, 168; (d) 147, 165. With the approval of the adviser, 6 units of the 24, exclusive of the specific requirements, may be satisfied by advanced work in closely allied departments.

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.

Honors and Honors Program (see page 92).—The honors program comprises course 194H, which includes an honors thesis, to be taken normally during the senior year.

LOWER DIVISION COURSES

1A. General Psychology. (3) I and II. I. Mr. Dukes; II. Mr. Caldwell
Lecture—3 hours.

Not open to entering freshmen.

An introduction to the facts and principles of psychology.

1B. General Psychology. (3) I and II. I. Mr. Caldwell; II. Mr. Solarz
Lecture—3 hours.

Prerequisite: course 1A.

A continuation of course 1A with a detailed treatment of the application of the scientific method in the study of behavior. Basic assumptions, limitations, and advantages of the method of experiment. Intended primarily for prospective major students.

† Absent on leave, 1962–1963.

- 3. Quantitative Description of Behavior.** (3) II. Mr. Dempsey
Lecture—3 hours.
Prerequisite: course 1A, or 1 or 2 (may be taken concurrently); Mathematics D or equivalent; Mathematics 13.
Principles and problems of measurement in psychology; methods of ordering and comparing measurements; inference and prediction from psychological data.
- 33. Personal and Social Adjustment.** (3) I and II.
Lecture—3 hours. I. Mr. Solarz; II. Mr. Morris
Prerequisite: course 1A, 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

- 108. Physiological Psychology.** (3) I. Mr. Solarz
Lecture—3 hours; laboratory—1 hour.
Prerequisite: course 1A or 1 or 2; Zoology 1B or Physiology 1.
A study of the relationships between behavioral adjustments and receptor-, connector-, effector-systems.
- 112. Developmental Psychology.** (3) II. Mr. Caldwell
Lecture—3 hours.
Prerequisite: course 1A, 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.
- 130. Learning.** (3) I. Mr. Caldwell
Lecture—3 hours; laboratory—1 hour.
Prerequisite: course 1A, 1 or 2.
Consideration of major theories of learning and memory with critical examination of relevant experimental, clinical and social data.
- 131. Perception.** (3) II. Mr. Dukes
Lecture—3 hours; laboratory—1 hour.
Prerequisite: course 1A, 1 or 2.
The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.
Offered in alternate years.
- 145. Social Psychology.** (3) II. Mr. Dempsey
Lecture—3 hours.
Prerequisite: course 1A, 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. Dempsey
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 per-

sonality, together with an exploration and evaluation of some of the principal methods of collecting relevant empirical evidence.

Offered in alternate years.

150. Comparative Psychology. (3) II. Mr. Solarz

Lecture—3 hours; laboratory—1 hour.

Prerequisite: course 1A, 1 or 2.

A phylogenetic account of behavior with emphasis on the similarities and differences in response patternings evident at various levels. The relative influence of internal and external factors on these patternings and their modifiability.

165. Clinical Psychology: Techniques and Problems in Diagnosis. (3) I.

Lecture—2 hours; laboratory—2 hours. Mr. Dempsey

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; an evaluation of empirical results. Laboratory work in interviewing and testing.

Offered in alternate years.

168. Abnormal Psychology. (3) I. Mr. Dempsey

Lecture—3 hours.

Prerequisite: course 1A, 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.

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) II. Mr. Solarz

Seminar—3 hours.

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. Dukes in charge)

PUBLIC HEALTH

William R. Pritchard, D.V.M., Ph.D., *Acting Chairman of the Department.*
Department Office, 1018 Haring Hall

William R. Pritchard, D.V.M., Ph.D., *Professor of Veterinary Medicine.*
John B. Enright, Ph.D., *Associate Professor of Veterinary Public Health.*
Walter W. Sadler, D.V.M., M.P.H., *Associate Professor of Veterinary Public Health.*



Frederick N. Cooper, B.S., *Lecturer in Public Health.*
John H. Jones, M.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
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 in Public Health.** (1) I and II.
Seminar—1 hour. The Staff (Mr. Pritchard in charge)
299. **Research in Public Health.** (1-6) I and II.
The Staff (Mr. Pritchard in charge)

RANGE MANAGEMENT

Henry J. Vaux, Ph.D., *Chairman of the Committee (Berkeley Campus).*
Committee Office, 131 Hunt Hall

Committee in Charge:

Harold H. Biswell, Ph.D., *Professor of Forestry (Berkeley campus).*

Harold F. Heady, Ph.D., *Professor of Forestry (Berkeley campus).*

R. Merton Love, Ph.D., *Professor of Agronomy.*

Henry J. Vaux, Ph.D., *Professor of Forestry (Berkeley campus).*

William C. Weir, Ph.D., *Professor of Animal Husbandry.*



Beecher Crampton, M.A., *Lecturer in Agronomy.*

Glen P. Lofgreen, Ph.D., *Professor of Animal Husbandry.*

William A. Williams, Ph.D., *Associate 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. Lofgreen, Mr. Williams.

Bachelor of Science Major Program and Graduate Study. See page 63.

LOWER DIVISION COURSES

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.

49. **Range Management Field Practice Course.** (No credit) Mr. Love

Approximately four weeks devoted to field studies of range conditions and methods of utilization in various parts of the state. Required of all students with a major in range management.

UPPER DIVISION COURSES

100. **Range Plants.** (3) I. Mr. Crampton

Lecture—1 hour; laboratory—6 hours.

Prerequisite: Botany I.

Systematic relationships and identification of range grasses, legumes, forbs and shrubs; their distribution, environmental requirements and use.

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.

- *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 in Range Management.** (2) I and II. The Staff
 Seminar—2 hours.
 Prerequisite: course 133.
- 299. Research in Range Management.** (1-6) 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 "Foreign Languages" on page 201.

* Not to be given, 1962-1963.

SOCIOLOGY

Edwin M. Lemert, Ph.D., *Chairman of the Department.*
Department Office, 314 Academic Office Building

Edwin M. Lemert, Ph.D., *Professor of Sociology.*

———, *Associate Professor of Sociology.*

Charles D. Bolton, Ph.D., *Assistant Professor of Sociology.*

Kenneth C. W. Kammeyer, Ph.D., *Assistant Professor of Sociology.*



Carlos E. Kruytbosch, 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 91).

Major Advisers.—Mr. Bolton, Mr. Kammeyer, Mr. Kruytbosch, Mr. Lemert.

The Major Program

(A) Lower Division Courses.—Sociology 1, 2; Anthropology 1 or 2; Psychology 1A and a course in statistics approved by the department.

(B) Upper Division Courses.—Required: 24 upper division units in sociology, to include Sociology 105 and either Sociology 165 or Sociology 185 depending upon the needs and interests of the student.

LOWER DIVISION COURSES

1. Introduction to Sociology. (3) I and II. The Staff
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) II. The Staff
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) II. The Staff
Lecture—3 hours.

A general sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement.

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.

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.

- 123. American Society.** (3) I. Mr. Bolton
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.
- 125. Collective Dynamics and Social Movements.** (3) II. Mr. Bolton
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 and popular culture in mass societies.
- 126. Society, Culture, and Personality.** (3) I. Mr. Bolton
Lecture—3 hours.
Prerequisite: courses 1 and 2.
The interrelationships of society, culture and personality in primitive and modern settings with special attention to social roles. Emphasis upon comparative materials.
- 130. Race Relations and Minority Groups.** (3) I. Mr. Kruytbosch
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.
- 144. Rural Society.** (3) II. Mr. Kammeyer
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.
- 150. Criminology.** (3) II. 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.
- 165. Sociological Theory.** (3) II. Mr. Bolton
Lecture—3 hours.
Prerequisite: six units of sociology or consent of the instructor.
Analysis of major theoretical and conceptual systems in sociology.
- 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.

180. Complex Social Organizations. (3) II. Mr. Kruytbosch
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. Mr. Rouse
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)

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.

SOILS AND PLANT NUTRITION

Perry R. Stout, Ph.D., *Chairman of the Department.*
Department Office, 125 Hoagland Hall

†Francis E. Broadbent, Ph.D., *Professor of Soil Microbiology.*
Frank F. Harradine, Ph.D., *Professor of Soil Morphology.*
Perry R. Stout, Ph.D., *Professor of Soil Science.*
Lannes E. Davis, Ph.D., *Professor of Soils, Emeritus.*
Victor V. Rendig, Ph.D., *Associate Professor of Soils and Plant Nutrition.*
James A. Vomocil, Ph.D., *Associate Professor of Soil Physics.*
John L. McMurdie, Ph.D., *Assistant Professor of Soil Physics.*
Lynn D. Whittig, Ph.D., *Assistant Professor of Soil Science.*



Eugene L. Begg, B.S., *Lecturer in Soil Morphology.*
Arthur L. Brown, Ph.D., *Lecturer in Soils and Plant Nutrition.*
†Lloyd D. Doneen, Ph.D., *Professor of Irrigation.*
Emanuel Epstein, Ph.D., *Lecturer in Plant Nutrition.*
Robert M. Hagan, Ph.D., *Professor of Irrigation.*
Delbert W. Henderson, Ph.D., *Associate Professor of Irrigation.*
Jerome J. Jurinak, Ph.D., *Lecturer in Soils.*
James N. Luthin, Ph.D., *Professor of Irrigation.*
Duane S. Mikkelsen, Ph.D., *Associate Professor of Agronomy.*
†James Vlamis, Ph.D., *Lecturer in Soils and Plant Nutrition.*

Departmental Major Adviser.—Mr. McMurdie.

Bachelor of Science Major Program and Graduate Study. See page 64.

PLANT NUTRITION

UPPER DIVISION COURSE

116. **Principles of Plant Nutrition.** (3) II. Mr. Epstein
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.

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 each of the fields of 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.

† Absent on leave, 1962–1963.

UPPER DIVISION COURSES

- 104. Soil Chemistry. (3) I.** Mr. Davis
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. Harradine
Six weeks daily.
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 2A-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.** _____
Lecture—2 hours.
Prerequisite: course 1; Chemistry 1A-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. Overrein
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.

124. **Recent Advances in Soil Science.** (1) II. Mr. Jurinak
Lecture—1 hour.
Prerequisite: senior standing.
135. **Soil Management and Conservation.** (2) II. Mr. Stout
Lecture—2 hours.
Prerequisite: senior standing in soil science or irrigation science and concurrent enrollment in Irrigation 135.
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 106, 107.
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 alternate years.
215. **Physical Chemistry of Soils.** (2) I. Mr. Jurinak
Lecture—2 hours.
Prerequisite: course 104; Chemistry 109; and consent of instructor. Open to qualified seniors.
Physicochemical, colloidal, and surface aspects of the soil system.
Offered in alternate years.
216. **Advanced Soil Biology.** (2) I. Mr. Broadbent, Mr. Epstein, 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.
290. **Seminar in Soil Science.** (1) I. Mr. Jurinak
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 in Soil Science.** (1-6) I and II. The Staff

RELATED COURSE

Water-Soil-Plant Relationships (Irrigation 100)

* Not to be given, 1962-1968.

SPANISH

For courses in Spanish see "Foreign Languages" on page 201.

SPEECH

For courses in speech see "Dramatic Art and Speech" on page 163.

SUBJECT A

Department Office, 176 Academic Office Building

Leonard G. Homann, A.B., *Instruction Supervisor in Subject A.*

Subject A. English Composition. (No credit) I and II. The Staff

Required of all students who do not pass the examination in Subject A. 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 225.

VEGETABLE CROPS

James E. Knott, Ph.D., Sc.D., (hon.c.), *Chairman of the Department.*

Department Office, 152 Hunt Hall

Glen N. Davis, Ph.D., *Professor of Vegetable Crops.*

† James F. Harrington, Ph.D., *Professor of Vegetable Crops.*

James E. Knott, Ph.D., Sc.D., (hon.c.), *Professor of Vegetable Crops.*

John H. MacGillivray, Ph.D., *Professor of Vegetable Crops.*

Louis K. Mann, Ph.D., *Professor of Vegetable Crops.*

Leonard L. Morris, 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.*

John C. Lingle, Ph.D., *Associate Professor of Vegetable Crops.*

Harlan K. Pratt, 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.*

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 60.

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, 1962–1963.

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 will be made.

***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 seed. One or more field trips.

120. 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 will be made.

121. Vegetable Physiology. (3) II. Mr. Mann, Mr. Pratt
Lecture—2 hours; laboratory—3 hours.

Prerequisite: course 1; Botany 111.

Physiological principles involved in the production of vegetables.

190. Proseminar. (1) II. Mr. Knott
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

290. Seminar in Vegetable Crops. (1) I and II.
Seminar—1 hour. The Staff (Mr. Spurr in charge)

291. Seminar in Postharvest Physiology. (1) I and II.
Seminar—1 hour. The Staff (Mr. Pratt in charge)

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.

299. Research in Vegetable Crops. (1-6) I and II. The Staff

VETERINARY MEDICINE

For courses in veterinary medicine, see "Medicine, Surgery, and Clinics," page 246.

* Not to be given, 1962-1963.

VETERINARY MICROBIOLOGY

James R. Douglas, Ph.D., *Chairman of the Department.*
Department Office, 2004 Haring Hall

Hugh S. Cameron, D.V.M., Ph.D., *Professor of Veterinary Microbiology.*
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 N. Stormont, Ph.D., *Professor of Immunogenetics.*
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).*

UPPER DIVISION COURSES

- 111. Animal Hygiene.** (3) II. Mr. Cameron
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. Biberstein, 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. Douglas, 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; Zoology 1A (1B recommended); Chemistry 8.
The pathogenic microorganisms (exclusive of protozoa) affecting man; immunological phenomena especially as related to human disease.
Offered in odd-numbered years.

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 in Microbiology.** (1) I and II. Mr. Biberstein
Seminar—1 hour.
299. **Research in Microbiology.** (1-6) I and II. The Staff

* Not to be given, 1962-1963.

VITICULTURE AND ENOLOGY

James A. Cook, Ph.D., *Chairman of the Department.*
Department Office, 1027 Horticultural Sciences Building

‡Maynard A. Amerine, Ph.D., *Professor of Enology.*
Harold W. Berg, M.S., *Professor of Enology.*
James F. Guymon, Ph.D., *Professor of Enology.*
†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.*
James A. Cook, Ph.D., *Associate Professor of Viticulture.*
Lloyd A. Lider, Ph.D., *Associate Professor of Viticulture.*
Klayton E. Nelson, Ph.D., *Associate Professor of Viticulture.*



Julian C. Crane, Ph.D., *Professor of Pomology.*
George L. Marsh, M.S., *Professor of Food Science and Technology.*
Vernon L. Singleton, Ph.D., *Lecturer in Enology.*

Departmental Major Advisers.—Viticulture, Mr. Lider; Food Science, 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 57.

VITICULTURE

LOWER DIVISION COURSES

1. Introduction to Grape Growing. (2) I. Mr. Weaver
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.

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.

UPPER DIVISION COURSES

105. Systematic Viticulture and Principles of Fruit Handling. (3) I.
Lecture—1 hour; laboratory—6 hours. Mr. Lider, Mr. Nelson

Prerequisite: course 1 or Pomology 2.

Botanical classification of the grape—the principal varieties, rootstocks,

† Absent on leave, 1962–1963.

‡ Absent on leave, fall semester, 1962–1963.

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 Regulators in Horticulture. (2) I. Mr. Crane, Mr. Weaver
Lecture—2 hours.

Prerequisite: course 1 or Pomology 2; Botany 111; or consent of instructor. History, occurrence, extraction, and measurement, chemical nature, developmental and physiological effects, role, and theories of action of plant growth regulators; methods of application and factors altering effectiveness; horticultural applications in the control of plant and fruit responses.

116. General Viticulture. (4) II. Mr. Cook
Lecture—3 hours; laboratory—3 hours.

Prerequisite: course 1 or Pomology 2.
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 Technology 124.

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. Berg
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.

190. Proseminar in Viticulture. (1) I. Mr. Nelson
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 in Viticulture. (1-5) I and II. The Staff

GRADUATE COURSES

217. Microbiology of Wine Production. (2) II. _____

Lecture—1 hour; laboratory—3 hours.

Prerequisite: Bacteriology 1, 105A or 105B; Chemistry 5, 8. Open to properly qualified undergraduates with the permission of the instructor.

Nature, development, physiology, biochemistry and control of yeasts and bacteria involved in the making, aging, and spoilage of wine.

290. Seminar in Viticulture. (1) II.

Mr. Webb

Seminar—1 hour.

Prerequisite: consent of the instructor.

299. Research in Viticulture and Enology. (1-6) I and II.

The Staff

RELATED COURSE

Fruit Breeding (Pomology 114)

ZOOLOGY

Milton A. Miller, Ph.D., *Chairman of the Department.*
Department Office, 249 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.*
———, *Professor of Zoology and Anthropology.*
Loye H. Miller, Ph.D., LL.D., *Professor of Biology, Emeritus.*
Tracy I. Storer, Ph.D., LL.D., *Professor of Zoology, Emeritus.*
Reed A. Flickinger, Ph.D., *Associate Professor of Zoology.*
George W. Salt, Ph.D., *Associate Professor of Zoology.*
———, *Associate Professor of Zoology.*
Ernest J. DuPraw, Ph.D., *Assistant Professor of Zoology.*
Charles R. Goldman, Ph.D., *Assistant Professor of Zoology.*
Jürgen H. H. Jacobs, Ph.D., *Assistant Professor of Zoology.*
Robert L. Rudd, Ph.D., *Assistant Professor of Zoology.*



Norman F. Baker, D.V.M., Ph.D., *Assistant Professor of Parasitology.*
Raymond D. Barnes, A.B., *Associate in Zoology.*
James R. Douglas, Ph.D., *Professor of Parasitology.*
Wilfred J. Wilson, M.A., *Lecturer in Zoology.*

PHYSIOLOGY

Letters and Science List.—Physiology 1, 1L.

LOWER DIVISION COURSES

1. **Introductory Physiology Lecture.** (3) I. Mr. Jacobs
Lecture—3 hours.
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. Jacobs
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 91).

Departmental Major Advisers.—Mr. Goldman, Mr. Hildebrand, Mr. Jameson, Mr. Rudd.

Bachelor of Arts Major Program

(A) Lower Division Courses.—Zoology 1A and 1B; Chemistry 1A and 1B or 8.

(B) Upper Division Courses.—24 units of upper division courses in zoology (not more than 4 units of zoology courses in the 190 series may be counted in this requirement). With the approval of the major adviser, 6 units of the 24 may be satisfied by upper division courses in other sciences related to the student's program.

Bachelor of Science Major Program

The B.S. program is specifically designed as an interdisciplinary major with an area emphasis in wildlife for students with professional orientation in that field. All other zoology majors should take the A.B. program.

(A) Lower Division Courses.—Required: course 1A, 1B; Botany 1; Chemistry 1A, 8; Entomology 1; Mathematics 13. Recommended: Agronomy 1; Bacteriology 1; Geography 1, 3; Geology 1A; Physics 2A, 2B; Soil Science 1.

(B) Upper Division Courses.—Thirty-six units of upper division courses including 21 units of required courses and the remaining 15 to be selected from four groups of electives listed below (at least one course must be taken from each elective group). At least 24 units must be in upper division zoology courses (but with approval of the major adviser, 6 units of the 24 may be satisfied by upper division courses in other sciences related to the student's program).

Required: Agronomy 115; Botany 108; Geography 161; Zoology 116, 125, 125L, and 6 units of upper division electives in zoology.

Elective groups (at least one course from each group is required).

Group 1. Ecology and Limnology.—Botany 117; Entomology 127; Zoology 140-140L.

Group 2. Physiology and Nutrition.—Animal Husbandry 105, 110; Poultry Husbandry 105.

Group 3. Parasitology and Pathology.—Pathology 122A-122B, Veterinary Microbiology 111 and 124.

Group 4. Vertebrate Zoology.—Zoology 133, 134.

Honors and Honors Program (see page 92).—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.

LOWER DIVISION COURSES

- 1A. General Zoology. (4) I.** The Staff
Lecture—2 hours; laboratory—6 hours.
Introduction to the structure, physiology, classification, and interrelations of animals, and the principles of evolution and heredity.
- 1B. General Zoology. (4) II.** Mr. Salt
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 1A.
Structure of the vertebrate body with special reference to the mammal and bird; gross and microscopic anatomy of organs and organ systems.
- 10. General Biology. (3) II.** Mr. Rudd
Lecture—3 hours; demonstration section—1 hour.
Not open for credit to students who have had course 1A, but students who have taken course 10 may elect course 1A 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.** _____
Lecture—2 hours; laboratory—3 hours.
Prerequisite: course 1A or 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.
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. Flickinger
Lecture—2 hours.
Prerequisite: course 100.
Mechanisms of growth and differentiation of embryonic, malignant and regenerating tissues.
- 103L. Experimental Embryology Laboratory. (2) II.** Mr. Flickinger
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. Materials and Methods of Animal Micrology. (3) I.** Mr. DuPraw
Lecture—1 hour; laboratory—6 hours.
Prerequisite: course 1B. (Limited enrollment.)
History, theory, and application of methods for microscopic work in the animal sciences.
- 106. Comparative Anatomy of the Vertebrates. (4) II.** Mr. Hildebrand
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 1B. Recommended: courses 100, 100L.
Evolution and adaptations of organ systems and phylogeny of the major vertebrate groups.
- 107. Microanatomy. (4) I.** Mr. Rosenberg
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 1B.
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 and junior standing.
Structure, life history, and ecology of the groups of protozoa with emphasis on relationships to biological problems.
Minimum enrollment of 5 students.
- 112. Invertebrate Zoology. (4) II.** Mr. Miller
Lecture—2 hours; laboratory—6 hours.
Prerequisite: course 1A and junior standing.
Anatomy, classification and natural history of representative invertebrate animals, excluding protozoans and insects.

116. Economic Vertebrate Zoology. (3) I.

Lecture—2 hours; laboratory—3 hours.

Prerequisite: course 1A and junior standing.

Relation of vertebrate animals to human affairs; effect of settlement, forestry, agriculture, and hunting on wild populations; attention to rodents, deer, carnivorous mammals and birds, fur production, game birds, food and game fisheries; principles and agencies of management and conservation.

Minimum enrollment of 5 students.

121. Experimental Cytology. (2) I.

Mr. DuPraw

Lecture—2 hours.

Prerequisite: junior standing in one of the biological sciences; Chemistry 8 and 9 or the equivalent.

Essential molecular and sub-cellular organization of cells with morphological-physiological analysis of such phenomena as contractility, cell morphogenesis, cell division and synthesis of specific macromolecules.

121L. Experimental Cytology Laboratory. (2) I.

Mr. DuPraw

Laboratory—6 hours.

Prerequisite: course 104 or the equivalent; course 121 (must be taken concurrently); and 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.

Mr. Flickinger

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) II.

Mr. Jameson

Lecture—2 hours; laboratory—6 hours.

Prerequisite: course 1B.

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 spring semester of odd-numbered years.

***134. Biology of Birds and Mammals. (4) II.**

Mr. Jameson

Lecture—2 hours; laboratory—6 hours.

Prerequisite: course 1B.

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.

* Not to be given, 1962-1963.

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. Mr. Jacobs
Lecture—2 hours.
Prerequisite: course 112 (may be taken concurrently); Chemistry 1A; Physics 2A–2B. Recommended: Animal Physiology 100.
Comparison of the physiology of invertebrate organ systems.
- 142L. **Invertebrate Physiology Laboratory.** (2) II. Mr. Jacobs
Laboratory—6 hours.
Prerequisite: course 142 (may be taken concurrently).
Studies and experiments on the physiological mechanisms of invertebrate organ systems.
147. **Zoogeography.** (2) I. Mr. Jameson
Lecture—2 hours.
Prerequisite: course 1A 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 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.
- 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

201. **Zoology Seminar.** (1) I and II. Mr. Flickinger I, Mr. Jacobs II
Seminar—1 hour.
- *290. **Seminar on Systematic Zoology and Evolution.** (1) II. Mr. Budd, Mr. Hildebrand
Seminar—1 hour.
Prerequisite: consent of the instructor.
Reports and discussion on principles of animal classification, speciation, and the evolution of higher categories, with emphasis on modern concepts and pertinent contributions from the fields of genetics and paleontology.

* Not to be given, 1962–1963.

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, Mr. Flickinger
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. Jacobs, 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. 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.
299. **Research in Zoology.** (1-6) I and II. The Staff

* Not to be given, 1962-1963.

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Administrative Bulletins of the University of California 1962-1963

The administrative bulletins of the University of California present information concerning the colleges, schools, and departments of the University. Copies of general bulletins and other information concerning instruction may be obtained from the following:

Registrar, University of California, Berkeley, Berkeley 4.

Registrar, University of California, Davis, Davis.

Registrar, University of California, Los Angeles, Los Angeles
24.

Registrar, University of California, Riverside, Riverside.

Registrar, University of California, Santa Barbara, University.

The bulletins of the schools and colleges at the University of California, San Francisco Medical Center, San Francisco 22, may be obtained by contacting the deans in charge.



PURPOSES OF A UNIVERSITY...

*... to explore the world
of men and things
and ideas*

*The ability and the willingness to take responsibility, to go to the lonely outposts of thought and action, and to persuade others to follow you there—truly, this ability is the rarest of commodities in the world . . . We live in a world of tremendous numbers, of mass pressures, of enormous forces working for the leveling out of talent and conformity of opinion. The only way to keep this world a good world, and to make it better, is to assert creative and constructive individualism, which is to me another way of saying “leadership.”

EMIL M. MRAK
Chancellor at Davis