

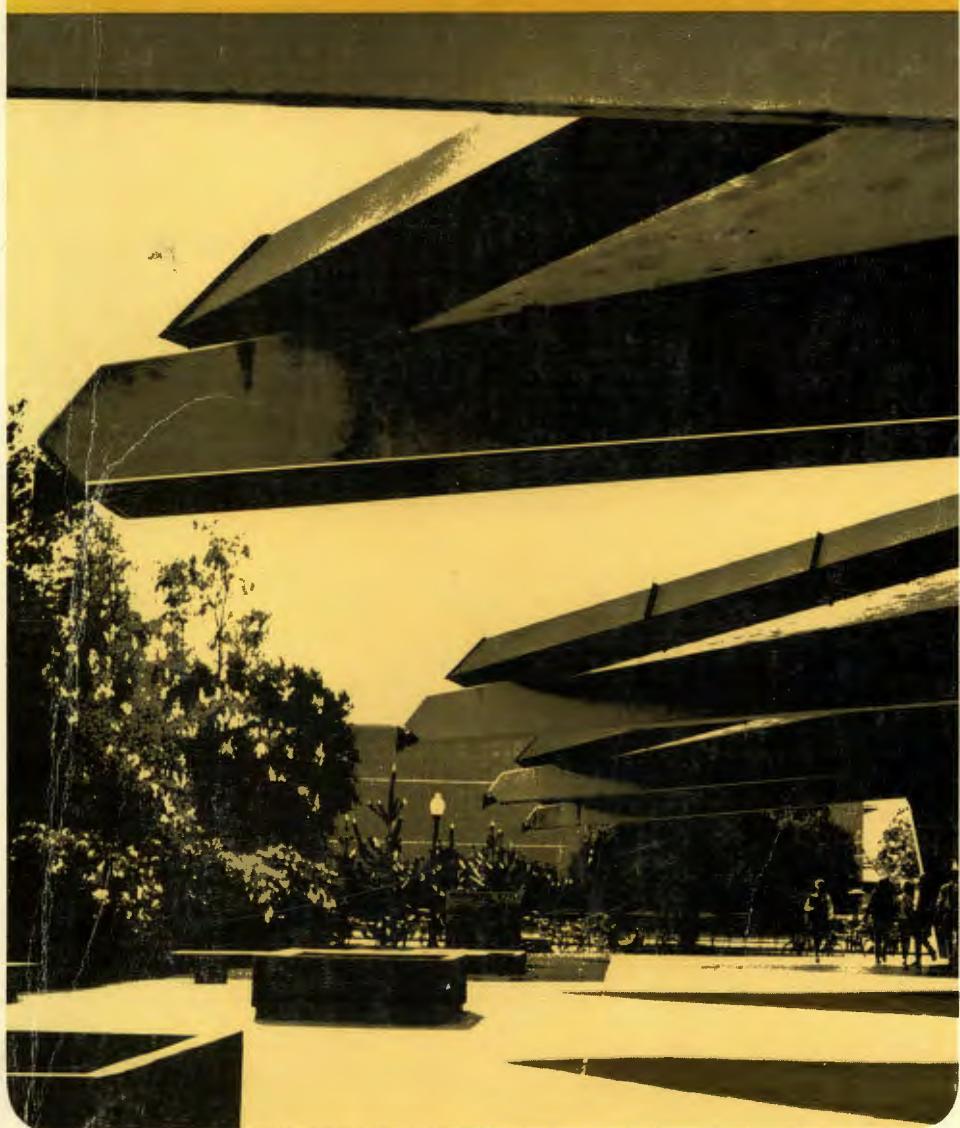
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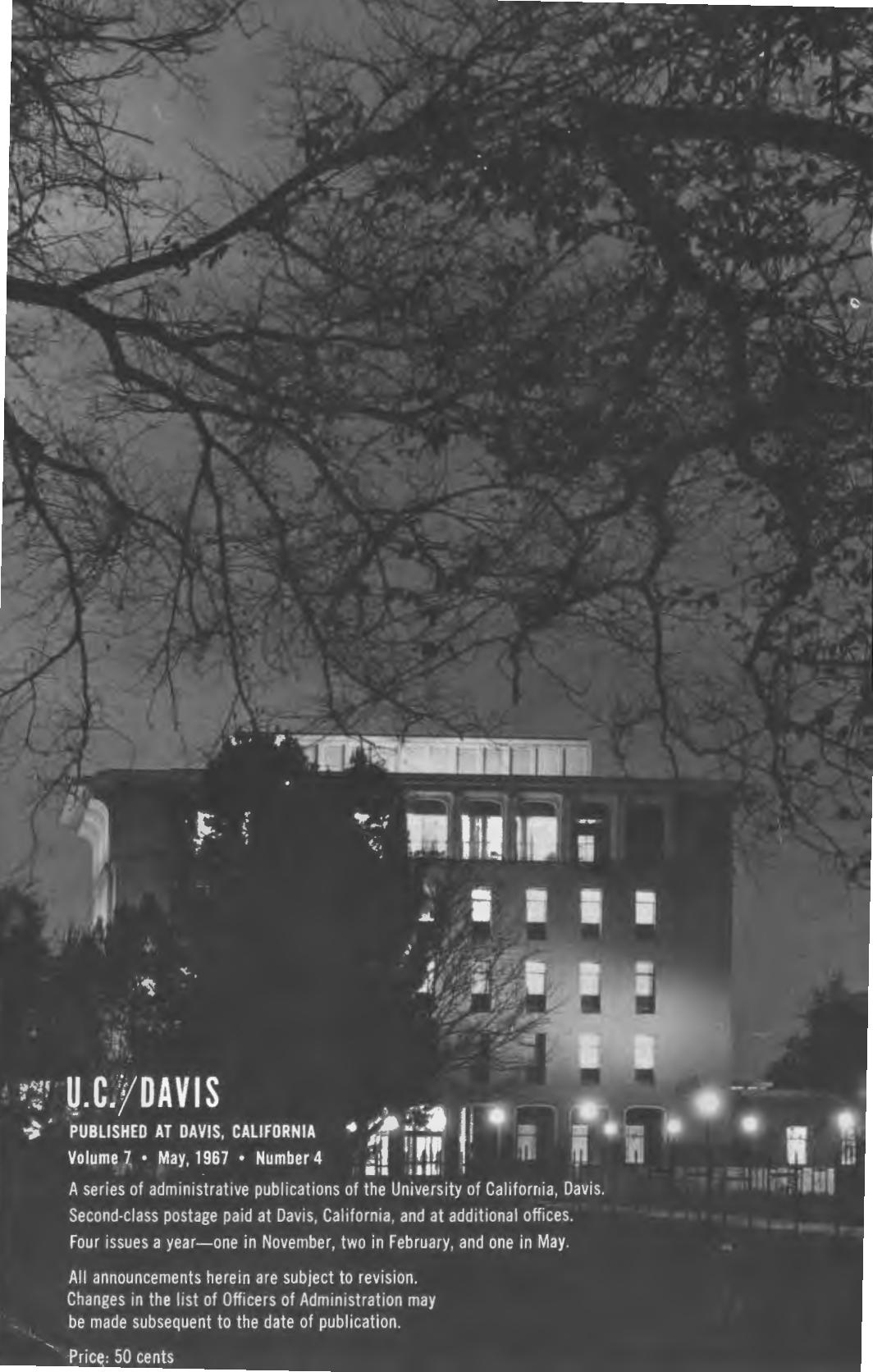
U.C./DAVIS

GENERAL CATALOG

1967-68

UNIVERSITY OF CALIFORNIA, DAVIS





U.C./DAVIS

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GENERAL CATALOG

Davis

**Fall, Winter, and Spring Quarters
1967-1968**



May, 1967

UNIVERSITY OF CALIFORNIA · DAVIS

Contents

GENERAL	1
Calendar, 5. The Regents of the University of California, 9. Administrative Officers of the University, 9. General Administrative Officers—Davis Campus, 10. Davis Campus, 13. The Honor Spirit, 14. University Library, 15. Education Abroad, 15. Summer Sessions, 16. University Extension, 16. Foreign Language Training, 17. The Statewide University, 17	
ADMISSION AND REGISTRATION	2
Admission to Freshman Standing, 19. Admission to Advanced Undergraduate Standing, 22. Admission of Applicants from Other Countries, 23. Requirements for Admission to Graduate Standing, 23. Special Admission Categories, 23. Application Procedures, 24. General Registration Procedure, 27. Adding or Dropping Courses, 28. Changes of Major, College or School, 28. Change of Name, 28. Withdrawals, 28. Readmission After an Absence, 28. Rules Governing Residence, 28.	
SCHOLASTIC REQUIREMENTS	3
Evaluations, 31. Scholastic Deficiencies, 31. Transcripts of Record, 32. Mid-Term Warning Notices, 33. Final Examinations, 33. Graduation Requirements, 33. Honors and Prizes, 35.	
STUDENT EXPENSES, HOUSING, AND FINANCIAL AIDS	4
Financial Aids Program, 37. Expenses, 37. Application Procedure, 38. Scholarships, 39. Educational Opportunity Grants, 39. College Work Study Program, 40. Loans, 40. Miscellaneous, 41. Living Accommodations, 42.	
STUDENT SERVICES AND ACTIVITIES	5
Student Health Program, 45. Placement Services, 46. Counseling Center, 47. Selective Service, 47. Military Science, 48. International Student Services, 48. Student Conduct and Discipline, 48. The Associated Students and Student Activities, 49.	
REQUIREMENTS AND CURRICULA	6
College of Agriculture, 53	School of Medicine, 115.
College of Engineering, 83	School of Veterinary Medicine, 121
College of Letters and Science, 97	Graduate Division, 127
School of Law, 111	
INDEX OF COURSE OFFERINGS	7
COURSES OF INSTRUCTION	8
Explanatory Note, 137. Symbols, 138.	
INDEX	9



UNIVERSITY CALENDAR

1967-1968

Davis Campus

Fall Quarter 1967

March 1, Wednesday

*May 8, Monday
May 16, Tuesday

*May 11, Thursday
May 16, Tuesday
May 17, Wednesday
May 19, Friday
May 17, Wednesday
July 31, Monday
June 30, Friday

July 15, Saturday

September 1, Friday

September 4, Monday

September 25, Monday
September 25, Monday
September 30, Saturday
September 28, Thursday
September 29, Friday
September 29, Friday

October 2, Monday
October 6, Friday

October 13, Friday

October 20, Friday

November 1, Wednesday

Applications for admission to undergraduate standing, including applications for intercampus transfer, for the fall quarter 1967 must be filed with complete credentials with the Office of Admissions on or before this date.

} Pick up registration and course enrollment materials for fall quarter 1967 from the Registrar's Office (continuing students only).

} Obtain adviser's approval of preferred program for fall quarter 1967 (continuing students only).

} Turn in course enrollment material for fall quarter 1967 (continuing students only).

} Return registration materials for fall quarter 1967 with fee payment (continuing students only).

Candidates who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in December 1967 must file applications for candidacy with the Dean of the Graduate Division on or before this date.

Credentials and applications for admission to graduate standing for fall quarter 1967 must be filed with the Dean of the Graduate Division on or before this date.

Applications for readmission to graduate status for fall quarter 1967 must be filed with the Registrar on or before this date.

Applications for readmission to undergraduate status for fall quarter 1967 must be filed with the Registrar on or before this date.

Fall quarter begins.

} Orientation and testing.

} Registration in person.

Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in December 1967 must be filed with the committees in charge on or before this date.

Instruction begins.

Candidates who expect to complete work for masters' degrees to be conferred in December 1967 must file applications for candidacy on or before this date.

Petitions to enroll or add courses to study lists must be filed on or before this date.

Last day to register.

Petitions to drop courses without scholarship penalty must be filed with the Registrar on or before this date.

Candidates who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in March 1968 must file applications for candidacy with the Dean of the Graduate Division on or before this date.

Candidates who expect to complete work for A.B. and B.S. degrees to be conferred in December 1967 must file announcement of candidacy with the Registrar on or before this date.

Applications for admission to undergraduate standing, including applications for intercampus transfer, for the winter quarter 1968 must be filed with complete credentials with the Office of Admissions on or before this date.

* Weekends and holidays excepted.

November 4, Saturday	Homecoming Day.
November 6, Monday	Pick up registration and course enrollment materials for winter quarter 1968 (continuing students only).
November 14, Tuesday	Obtain adviser's approval of preferred program for winter quarter 1968 (continuing students only).
November 9, Thursday	Turn in registration and course enrollment material for winter quarter 1968 (continuing students only).
November 14, Tuesday	Credentials and applications for admission to graduate standing for winter quarter 1968 must be filed with the Dean of the Graduate Division on or before this date.
November 15, Wednesday	Theses for masters' degrees to be conferred in December 1967 must be filed in final form with the committees in charge on or before this date.
November 17, Friday	November 17, Friday
November 23, Thursday	Thanksgiving holiday—academic and administrative holiday.
November 24, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in December 1967 must be filed with the Dean of the Graduate Division on or before this date.
November 27, Monday	Applications for readmission to graduate status for winter quarter 1968 must be filed with the Registrar on or before this date.
December 8, Friday	Instruction ends.
December 9, Saturday	Final examinations.
December 11, Monday	Applications for readmission to undergraduate status for winter quarter 1968 must be filed with the Registrar on or before this date.
December 16, Saturday	Theses for masters' degrees to be conferred in December 1967 must be filed with the Dean of the Graduate Division on or before this date.
December 12, Tuesday	Fall quarter ends.
December 15, Friday	December 15, Friday
December 16, Saturday	Christmas holiday—academic and administrative holiday.
December 22, Friday	New Year's holiday—academic and administrative holiday.
December 25, Monday	Applications for admission to the School of Medicine for 1968-69 must be filed with the School before this date.
January 1, Monday	
December 31, Sunday	
Winter Quarter 1968	
January 2, Tuesday	Winter quarter begins. Registration in person.
Jan 2, Tuesday	
January 3, Wednesday	
January 4, Thursday	Orientation and testing.
January 5, Friday	Instruction begins.
January 12, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in March 1968 must be filed with the committees on charge on or before this date.
January 17, Wednesday	Candidates who expect to complete work for masters' degrees to be conferred in March 1968 must file applications for candidacy on or before this date.
January 17, Wednesday	Last day to register.
January 24, Wednesday	Candidates who expect to complete work for A.B. and B.S. degrees to be conferred in March 1968 must file announcement of candidacy with the Registrar on or before this date. Petitions to enroll or add courses to study lists 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. Candidates who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1968 must file applications for candidacy with the Dean of the Graduate Division on or before this date.

- February 1, Thursday Applications for admission to undergraduate standing including applications for intercampus transfer, for the spring quarter 1968 must be filed with complete credentials with the Office of Admissions on or before this date.
- February 5, Monday Applications for fellowships and graduate scholarships for 1968-69 must be filed on or before this date.
- February 14, Wednesday Applications for 1968-69 undergraduate scholarships for current students must be filed on or before this date.
- February 8, Thursday } Pick up registration and course enrollment materials from the Registrar's Office for winter quarter 1968 (continuing students only).
- February 14, Wednesday } Obtain adviser's approval of preferred program for spring quarter 1968 (continuing students only).
- February 12, Monday Lincoln's birthday—academic and administrative holiday.
- February 15, Thursday Applications for 1968-69 undergraduate scholarships for new students must be filed on or before this date.
- Credentials and applications for admission to graduate standing for spring quarter 1968 must be filed with the Dean of the Graduate Division on or before this date.
- February 15, Thursday } Turn in registration and course enrollment material for spring 1968 (continuing students only).
- February 19, Monday Theses for masters' degrees to be conferred in March 1968 must be filed in final form with the committees in charge on or before this date.
- February 16, Friday Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in March 1968 must be filed with the Dean of the Graduate Division on or before this date.
- February 23, Friday Applications for admission to the School of Veterinary Medicine for 1968-69 must be filed with the Office of Admissions on or before this date.
- February 28, Wednesday Applications for readmission to graduate status for spring quarter 1968 must be filed with the Registrar on or before this date.
- March 1, Friday Applications for admission to undergraduate standing, including applications for intercampus transfer, for the fall quarter 1968 must be filed with the complete credentials with the Office of Admissions on or before this date.
- March 4, Monday Applications for readmission to undergraduate status for spring quarter 1968 must be filed with the Registrar on or before this date.
- March 9, Saturday Instruction ends.
- March 11, Monday } Final examinations.
- March 16, Saturday Theses for masters' degrees to be conferred in March 1968 must be filed with the Dean of the Graduate Division on or before this date.
- March 15, Friday Winter quarter ends.
- Spring Quarter 1968**
- March 25, Monday Spring quarter begins.
Registration in person.
- March 25, Monday } Orientation and testing.
- March 26, Tuesday Instruction begins.
Candidates who expect to complete work for masters' degrees to be conferred in June 1968 must file applications for candidacy with the Graduate Division on or before this date.
- March 27, Wednesday Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1968 must be filed with the committees in charge on or before this date.
- March 29, Friday

April 9, Tuesday	Last day to register. Petitions to enroll or add courses to study lists must be filed on or before this date.
April 12, Friday	Academic and administrative holiday. Candidates who expect to complete work for A.B. and B.S. degrees to be conferred in June 1968 must file announcement of candidacy with the Registrar on or before this date.
April 16, Tuesday	Petitions to drop courses without scholarship penalty must be filed with the Registrar on or before this date.
April 20, Saturday	Picnic Day—academic and administrative holiday.
May 1, Wednesday	Applications for admission to the School of Law for 1968-69 must be filed with the School on or before this date.
May 10, Friday	Theses for masters' degrees to be conferred in June 1968 must be filed in final form with the committees in charge on or before this date.
May 24, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1968 must be filed with the Dean of the Graduate Division on or before this date.
May 30, Thursday	Memorial Day—academic and administrative holiday.
June 4, Tuesday	Instruction ends.
June 5, Wednesday	{ Final examinations.
June 11, Tuesday	Spring quarter ends.
June 11, Tuesday	Theses for masters' degrees to be conferred in June 1968 must be filed with the Dean of the Graduate Division on or before this date.

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1

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...the campus will preserve the tone of its nonurban traditions; the spirit of service, and of involvement and integration of all its units with every other unit. Its students and its faculties will strive to maintain its traditional atmosphere of closeness and friendliness.

—UCD Long-Range Development Plan

Davis Campus

The University of California, Davis, is a publicly supported institution of higher learning, dedicated to the tasks of increasing and disseminating human

knowledge through the primary functions of teaching and research. As an institution, the University is committed to the achievement of academic excellence. To fulfill this commitment it is essential that all members of the University community qualify for their roles by superior preparation, intellectual curiosity, freedom from prejudice, and a desire to contribute significantly to the cultural advancement of humanity.

Along with the pursuit of academic excellence, a spirit of service and an atmosphere of closeness and friendliness are traditional attitudes at Davis. They grew naturally from the first days of regular instruction in 1909, when the student body consisted of twenty-eight young men who wanted to become efficient farmers.

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

The need for greater educational opportunities increased rapidly, and in 1922, in conjunction with the Berkeley College of Agriculture, the degree of Bachelor of Science in Agriculture became available to the Davis student. A few years later the Davis campus had its own College of Agriculture. In 1946, the School of Veterinary Medicine was established to satisfy the need for professional veterinary medical education in California. Meanwhile, from a few basic, practical courses emphasizing agriculture, a full-fledged University campus was beginning to emerge.

The period of most rapid change and expansion began in 1951 when the College of Letters and Science was founded, and more and more degree programs became available. Although Davis had long offered courses in the humanities and social sciences, these disciplines now joined with the natural sciences to offer fully developed University curricula. By 1961, graduate programs were so extensive and so numerous that a Graduate Division was established as a separate academic unit. The College of Engineering was formed in the following year, and it, too, owed much to the foundation already provided by the curriculum in agricultural engineering which had been offered on the campus for many years. The more recently founded School of Law held its first classes in the fall of 1966, and the School of Medicine is expected to begin instruction in the near future.

Adding to the strength of the campus and to its role in serving the people of California are the National Center for Primate Biology, the Radiobiology Laboratory, the Institute of Governmental Affairs, the Agricultural History Center, the International Agricultural Center, the Crocker Nuclear Laboratory, and the Laboratory for Research in Fine Arts and Museology.

Although the face of the campus is constantly changing to accommodate the increasing student population, long-range building plans envision the preservation of features that give Davis its particular character. The Quadrangle, traditional focus of campus activity, will continue to be the center of academic life, with the Library to the south and the Memorial Union complex extending the length of its north side. The cork oaks surrounding the Quad are an enduring part of the landscape, as is the plane tree court behind the Library, where Commencement exercises were once held. Today the court is enclosed by the expanding Library building, providing a spacious open-air retreat, easily accessible from the general reading rooms of the Library.

An important addition to campus buildings is Freeborn Hall, an assembly hall that is part of the Memorial Union complex; it seats 1,800 for concerts, lectures, and special events.

The Wyatt Pavilion Theatre, a feature unique to the Davis campus, is another example of the transformations that are taking place. The framework of the theatre is a 55-year-old livestock judging pavilion. After the pavilion was moved from the site of the new chemistry building to the "bankside" of Putah Creek, architects fashioned an intimate theatre modeled on earlier and larger Elizabethan structures. It was opened during the year of the Shakespeare Quadrcentennial, in December 1964, and the first play produced was, appropriately, Shakespeare's *Richard II*. Since that time plays ranging from Aristophanes' *Lysistrata* to John Whiting's *A Penny for a Song* have been staged here.

Concerts, lectures, and film classics have long been provided for the University community. With the development of the College of Letters and Science, however, the cultural program has expanded. A number of distinguished artists—musicians, novelists, and poets—have been guests of the University, remaining in residence for a semester or more as performers, lecturers, and consultants. The Department of Art maintains exhibits of student work and traveling art shows in the Memorial Union and the Library, as well as open-air displays of sculpture and frescos.

THE HONOR SPIRIT

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

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

UNIVERSITY LIBRARY

The Library on the Davis campus contains about 550,000 volumes and annually receives 15,000 current periodicals and serials including government publications. Its holdings in the natural sciences and agriculture are outstanding, and collections in the humanities, social sciences, fine arts, engineering, law, and medicine are being rapidly developed. In addition to the main library, there are branch libraries for health sciences, physical sciences, and agricultural economics, a law library, and several specialized departmental collections.

To accommodate the rapidly growing collection and satisfy the need for additional reading space, a wing was added to the General Library in 1964, and a second wing, ready for use in 1967, will double the space available for books and readers. Plans for development anticipate 900,000 volumes by 1970.

The Library is operated on the "open stack" principle, permitting direct access to volumes shelved there. The Reference Department provides orientation and assistance in using the collection. In addition to the main stack collection, there are a number of special collections, including a Bibliographic Center collection, over 275,000 items on various forms of microscopy, some 16,000 maps, more than 108,000 pamphlets, a number of speech and music phonorecords, about 205,000 items in the F. Hal Higgins Library of Agricultural Technology, and a rare book collection of 8,500 volumes.

The Documents Department provides service for readers requiring use of government publications. The Library is an official depository for United States government publications, for all publications of the State of California, and for the Atomic Energy Commission, which has made available over 126,000 publications of great value to scientific research.

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

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

EDUCATION ABROAD

The Education Abroad Program provides outstanding students the opportunity to participate in the life of a university overseas. Its study centers, administered by faculty members drawn from all campuses of the University, are located in Colombia, France, Germany, Greece, Hong Kong, Italy, Japan, Spain, Sweden, and the United Kingdom.

Students from all campuses are eligible to participate in the program, which is administered by the Santa Barbara campus for the entire University. Requirements for qualification are: junior standing in the University, a B average (overall and in the language), seriousness of purpose, and an indication of ability to

adapt to a new culture. A Faculty Selection Committee on each campus recommends students who meet these standards.

Participants spend nine to eleven months abroad, beginning the year with a special language orientation program of six or seven weeks. The time allowed provides for a full academic year in the university of their choice and some vacation travel. Students enrolled in the program receive full academic credit for courses satisfactorily completed. The estimated total cost, including a modest allowance for spending money and vacation travel, ranges from \$1,800 to \$2,400.

A free publication listing courses offered at the study centers is available at the International Students' office on this campus. Further information can be obtained from the academic adviser for Undergraduate Study Abroad, at the International Students' office.

SUMMER SESSIONS

In 1967 there will be two regular six-week Summer Sessions beginning on June 19 and on July 31. The Summer Sessions will offer a number of lower division, upper division, and graduate courses of interest to students who may wish to maintain or accelerate progress toward their degree objectives. A substantial offering of upper division and graduate courses of interest to teachers and teacher candidates will also be provided, including courses for teacher candidates who have been admitted to internship programs and for other qualified graduate students who may wish to complete requirements for teaching credentials or degrees. In addition, the courses numbered 199 for advanced undergraduates and graduate research courses numbered in the 299 series will be available for qualified students in many departments.

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

Announcements concerning summer sessions in 1968 will be issued by the Registrar and the Office of Summer Sessions.

UNIVERSITY EXTENSION

By a variety of methods the University of California Extension makes the resources of the University available to individuals and organizations throughout the state. Its aims are the intellectual and cultural development of adults; the dissemination of new knowledge resulting from teaching and research within the University; continuing professional, scientific, and technical training; development of special educational programs for public and private organizations, and education in public affairs.

Detailed information is available at the Extension office on any campus of the University or at the following additional locations: 1100 South Grand

Avenue, Los Angeles 90015, Tel: (213) 747-4321; 55 Laguna Street, San Francisco 94102, Tel: (415) 861-6833; 3620B West 182nd Street, Torrance 90504, Tel: (213) 323-4773.

FOREIGN LANGUAGE TRAINING

Research and field work overseas may be facilitated by oral proficiency training in any of twenty-eight languages taught at the Defense Language Institute at the Presidio of Monterey. This unique program is available on a limited basis to University graduate students and faculty. For additional information, the campus Language Training Adviser may be consulted. Application forms may be obtained from the Secretary, University of California Language Training Advisory Committee, University of California, Santa Cruz, California 95060.

THE STATEWIDE UNIVERSITY

The University of California had its beginnings in 1868, 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 has nine campuses to serve the State of California. Davis continues to be the center for agricultural teaching and research. The other campuses are Berkeley, Irvine, Los Angeles, Riverside, San Diego, San Francisco, Santa Barbara, and Santa Cruz. Each campus has its own distinct atmosphere and special features, but all share the same high standards and adhere to the same admission regulations.

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

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



Admission and Registration

The admission requirements of the University of California are uniform on all its campuses and are based on two assumptions: first, that the best assurance of success in the University is shown by high quality of scholarship in previous work; and second, that the study of certain specified subjects will give the student good preparation for University work.

Admission to the University qualifies the student to attend the campus of his choice within the limits of curricular offerings and student capacity.

2

ADMISSION TO FRESHMAN STANDING

An applicant for admission to freshman standing must meet the requirements listed below. Special requirements for nonresident applicants will be found on page 21.

Graduation from High School

SUBJECT REQUIREMENTS

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

a. History, 1 unit

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

b. English, 3 units

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

c. Mathematics, 2 units

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

d. Laboratory Science, 1 unit

This consists of 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) unit

This is to be chosen from the following:

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

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

Science, 1 unit of either chemistry or physics in addition to the science offered under *d*.

Electives

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

Test Requirement

The Board of Admissions has proposed that students applying for the fall of 1968 be required to submit the College Entrance Examination Board's Scholastic Aptitude and Achievement tests. It is suggested, for further information, that applicants consult the *Undergraduate Admissions Circular* which will be published in September 1967.

SCHOLARSHIP REQUIREMENTS

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

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

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

Not more than 2 high school units of the *a* to *f* pattern may be repeated.

Note: The following revised rules concerning the repetition of courses will apply to all applicants for admission for the fall quarter 1968 and thereafter.

Courses taken in the ninth year or earlier in which a grade of D or lower is received may be repeated to establish subject credit.

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

Admission by Examination

A high school graduate who has not satisfied the entrance requirements as a result of his high school record and who has not attempted college work

subsequent to high school (except during summer session immediately following high school graduation) may qualify for admission if he achieves the prescribed minimum scores in the following tests taken after the first half of the eleventh grade:

College Entrance Examination Board Scholastic Aptitude Test and
Three Achievement Tests:

1. English
2. One in either Social Science or Foreign Language
3. One in either Natural Science or Mathematics

Arrangements to take the tests should be made with the Educational Testing Service, P. O. Box 1025, Berkeley, California 94701, or P. O. Box 592, Princeton, New Jersey 08540. The fees are to be paid to the Educational Testing Service. Scores will be regarded as official only if they are received by the Office of Admissions directly from the Educational Testing Service. Applicants should arrange to take the tests as early as possible so that the scores can be reported in time for consideration.

The tests may be taken at different times. To improve a score, a test may be repeated *once*, and the score earned on the repetition will be accepted; however, the scores earned on the Scholastic Aptitude Test, which has two parts, must come from the same sitting. The total score on the Scholastic Aptitude Test must be at least 1,000; the scores on the three Achievement Tests must total 1,650, and the score on any one Achievement Test must not be less than 500.

Requirements for Out-of-State Applicants

GRADUATION FROM HIGH SCHOOL

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

SUBJECT REQUIREMENTS

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

SCHOLARSHIP REQUIREMENTS

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

ADMISSION BY EXAMINATION

A nonresident applicant who is ineligible for admission to freshman standing and who has not attempted college work subsequent to high school (except during the summer session immediately following high school graduation) may qualify for admission by examination.

The requirements for a nonresident applicant are the same as those for a

resident except that the total score on the Scholastic Aptitude Test must be at least 1,100 and the scores on the three Achievement Tests must total at least 1,725.

High School Preparatory Subjects

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

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

ADMISSION TO ADVANCED UNDERGRADUATE STANDING

Applicants who have registered since high school graduation in any collegiate institution, including junior colleges, summer school, or extension courses, must apply for admission in advanced standing. An applicant may *not* disregard his previous college record and apply as a freshman.

Regulations applying to admission in advanced standing are as follows:

1. Those eligible for admission from high school, but who attended another collegiate institution, must present from that institution a statement of good standing and a grade-point average of 2.0 (2.8 for nonresidents).
2. Those *ineligible* for admission from high school because of subject deficiencies may establish eligibility by completing, at an accredited college, the required courses with at least C grades, and by maintaining an average of 2.0 (2.8 for nonresidents).
3. Those *ineligible* for admission from high school because of grade-point deficiency may establish eligibility by taking, at an accredited college, a minimum of 56 acceptable semester units (or 84 quarter credits), with an average of 2.4 or better (2.8 for nonresidents).
4. Subject deficiencies of not more than 2 units may be waived for those who present the 56 or more semester units (or 84 quarter credits) and the 2.4 grade-point average mentioned above (2.8 for nonresidents). Deficiencies in excess of 2 units must be satisfied.

The University grants credit for courses consistent with its curriculum that have been completed in accredited colleges and universities. The University accepts approved transfer courses completed with satisfactory grades in the public junior colleges of the state. Frequently, students who intend to complete their advanced studies at the University will find it to their advantage to complete the first two years of the college work in a California public junior college. After a student has earned 105 quarter units (70 semester units) acceptable

toward a degree, no further units will be granted for courses completed at a junior college, although subject credit may still be earned.

The acceptability of extension courses taken at an institution other than the University is decided by the Office of Admissions. The faculty of the particular school or college in which the student plans to enroll, however, decides upon the applicability of such course work in satisfaction of degree requirements.

ADMISSION OF APPLICANTS FROM OTHER COUNTRIES

Applicants from other countries will be admitted in accordance with the general regulations governing admissions. An application, official certificates, and detailed transcripts of record should be submitted to the Office of Admissions early in the appropriate filing period (see page 24). Doing so will allow time for exchange of necessary correspondence and, if the applicant is admitted, will help him in obtaining the necessary passport visa.

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

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

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

REQUIREMENTS FOR ADMISSION TO GRADUATE STANDING

See page 128 or the *Announcement of the Graduate Division*.

SPECIAL ADMISSION CATEGORIES

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

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

Special Status

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

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

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

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

Limited Status

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

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

Applicants for a Second Bachelor's Degree

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

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

APPLICATION PROCEDURES

Applicants are expected to study the admission requirements (starting on page 19) to determine as closely as possible their eligibility before following the steps outlined below. Application should be directed to only one campus of the University.

Freshman Standing

1. Application Form

An application for admission is obtained by writing the Office of Admissions, University of California, Davis, California 95616. Applicants are urged to write early in the appropriate period as follows:

1968 Winter Quarter (begins January 4):
May 1, 1967 through November 1, 1967.

1968 Spring Quarter (begins March 27):
August 1, 1967 through January 1, 1968.

1968 Fall Quarter (begins September 30):
October 1, 1967 through March 1, 1968.

2

2. Application Fee

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

3. Transcript of Record

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

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

4. Notification of Eligibility

Applicants will be notified of eligibility in order of date of application providing appropriate transcripts are on file. A delay will occur if required documents or fees have not been received. Applicants will be notified of their eligibility status as soon as their records have been evaluated.

5. "Statement of Intention to Register" Form

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

6. Smallpox Vaccination Certificate

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

7. Change of Campus

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

8. Reapplication

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

Advanced Undergraduate Standing

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

Intercampus Transfer

An undergraduate student who is registered on any campus of the University, or who was previously registered in a regular session of the University and has not since been registered in another institution may apply for transfer to another campus of the University by filing the proper forms *on the campus where he last registered*. The intercampus transfer application forms and application for transcript of record forms may be obtained from the Office of the Registrar and must be filed with that office by November 1, 1967, for the 1968 winter term, by January 1, 1968, for the 1968 spring term, and by March 1, 1968, for the 1968 fall term.

Graduate Standing

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

Professional Schools

School of Law

The requirements for admission to the School of Law are described on page 111. More detailed information and the appropriate application form may be obtained by writing the School of Law, University of California, Davis 95616.

School of Veterinary Medicine

The requirements for admission to the School of Veterinary Medicine are described on page 121. More detailed information may be obtained by writing the School of Veterinary Medicine, University of California, Davis 95616. The application form may be obtained from the Office of Admissions, University of California, Davis 95616.

GENERAL REGISTRATION PROCEDURE

All students must complete the necessary registration requirements. These requirements include:

1. Obtaining registration materials from the Registrar at the designated time and place. (Detailed information may be found in the *Schedule and Directory* available from the Student Bookstore on campus shortly before the opening of each quarter.)

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

2. Preparing with the faculty adviser a study program of courses in accordance with the following regulations, and obtaining the adviser's signature on the Study List Card.

a. Entering students must enroll in the Subject A course if they have not satisfied this requirement (see page 34).

b. Students who wish to continue a foreign language studied only in high school, will take a placement test to determine the appropriate level of language ability for proper placement in class.

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

3. Paying the prescribed fees (see page 37).

a. For all nonimmigrant foreign students, the Associated Students Supplementary Health Insurance program is required (see page 45).

4. Passing a physical examination given by the University Medical Examiners (see page 45).

5. Submitting a Statement of Residence. This is required of all new and returning students, including new graduates who may have been registered previously as Davis campus undergraduates, and those whose residency status has changed recently (see page 28).

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

ADDING OR DROPPING COURSES

Adding or dropping courses after the registration materials have been submitted to the Registrar requires the approval of the adviser and the appropriate dean on a petition which is subsequently presented to the Registrar.

CHANGES OF MAJOR, COLLEGE, OR SCHOOL

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

CHANGE OF NAME

Petition forms for this purpose may be obtained from the Registrar.

WITHDRAWALS

Withdrawals may be granted by the University for emergency reasons or *for good cause*. Immediately upon ceasing class attendance, students receiving veteran benefits and those who have been deferred by Selective Service because of registration in the University must report in person or write to the Dean of Students. Unauthorized withdrawals may jeopardize the student's registration privileges and result in failing grades.

READMISSION AFTER AN ABSENCE

All former students who wish to re-enter the University of California, Davis, must file an application for readmission with the Registrar. Official transcripts of all work attempted in the interim must be submitted. Final dates for filing for readmission are listed on pages 5-7.

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 student who is not a citizen is directed to the fact that he is a nonresident unless, in addition to the general California 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 Registrar at once. Application for a change in classification with respect to a previous quarter 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.

The final determination of the eligibility of a student to register as a resident will be made by the Attorney in Residence Matters, 590 University Hall, University of California, Berkeley, California 94704 or by his deputy in the Registrar's office.

Students classified as nonresidents are required to pay a tuition fee of \$327 each quarter. 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 quarter during which the minor proposes to attend the University. It is the responsibility of the student to file official verification of this fact from the parent's commanding officer. This verification should be addressed to the Registrar and filed when the student declares residency.)



Scholastic Requirements

EVALUATIONS

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

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

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

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

Pass (P) or Not Pass (NP): Subject to regulation by the faculties of the various colleges and schools, a student in good standing is authorized to undertake one course each term on the average on a *Passed* or *Not Passed* basis. Units thus earned shall be counted in satisfaction of degree requirements, but such courses will be disregarded in determining the student's grade-point average. Students wishing to exercise this option should familiarize themselves with the requirements of their particular college or school.

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

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

$$A = 4; B = 3; C = 2; D = 1; I \text{ and } F = 0.$$

All grades except I are final when filed by an instructor in his end-of-term course report. No final grade except I may be revised by re-examination. A student may repeat only those courses in which he has received a grade of D or F.

Except as authorized by the appropriate dean, no student may repeat more than once a course in which he has received a grade of D or F. When a course is repeated, the units completed shall be credited toward a degree only once, but the student's grade-point average will be computed on the total number of units attempted. At each repetition the student will receive the grade assigned by the instructor and the corresponding grade points.

The **QUANTITY** of work attempted by the student is measured in quarter units (see page 137) which are assigned by the faculty for each individual course. To convert these units to semester units they should be multiplied by 2/3; from semester to quarter units by 3/2.

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

SCHOLASTIC DEFICIENCIES

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

Probation. A student shall be placed on probation if at the end of the term

his grade-point average is less than C (2.0) computed on the total of all courses undertaken in the University, including courses graded I (incomplete).

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

Dismissal. A student shall be subject to dismissal from the University if:

a. His grade-point average falls below 1.5 for any term, or

b. After one term on probation he has not achieved an overall grade-point average of at least C (2.0) on all work attempted in the University of California, including courses graded I (incomplete).

The School of Veterinary Medicine has the following provisions:

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

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

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

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

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

A student who fails to meet the minimum scholastic requirements specified above is subject to such supervision as the faculty of his college or school may determine. The faculty may:

a. Dismiss such a student from the University, or

b. Suspend his dismissal, continuing him on probation, or

c. Authorize the return on probation of a dismissed student.

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

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

TRANSCRIPTS OF RECORD

Upon written request to the Office of the Registrar, a student will be provided with an official transcript of his work completed at the Davis campus of the University of California. Work completed at any other University campus

or any other institution must be requested directly from the school concerned. University Extension transcripts must be requested from the University Extension Office, University of California, Berkeley, California.

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

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

MID-TERM WARNING NOTICES

Students wishing to know their class standing at the mid-quarter may inquire from their instructor. Those who have deficient grades (D or F) should confer with their adviser. The Dean of Students Office may also be of assistance.

FINAL EXAMINATIONS

The *Schedule and Directory* lists the final examination groups. This information is available at the beginning of the term so that students can avoid final examination conflicts.

Final examinations are mandatory in all undergraduate courses, except as follows:

a. They are not normally required in laboratory courses or their equivalent; however, a department, at its option, may require a final examination in any laboratory course if prior announcement has been made in the *Schedule and Directory*.

b. Final examinations may be omitted in any undergraduate course with the approval of the appropriate committee on courses and upon recommendation of the department concerned.

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

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

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

GRADUATION REQUIREMENTS

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

The University requirements are as follows:

Subject A: English Composition

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

1. By achieving a minimum score of 600 in the College Entrance Examination Board Achievement Test, English Composition, after completing the eleventh grade in high school.
2. By passing a Subject A examination given under the jurisdiction of the University of California at various centers in the state annually in April or May or at the campus upon arrival.
3. By entering the University with credentials showing the completion in an accredited college of a composition course (with a grade not lower than C), deemed by the Statewide Subject A committee to be acceptable in satisfaction of the Subject A requirement.
4. By enrolling in and satisfactorily completing the Subject A course (see page 313).
5. By enrolling in the Subject A course and qualifying for a special examination through superior scholastic achievement during the early weeks of the course.

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

American History and Institutions

Every student must demonstrate a knowledge of American History and Institutions. Every graduating student should have at least a minimum knowledge of the background of this country's development and an understanding of the political, economic, and social interrelationships of its way of life.

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

1. By passing a special examination in American History and Institutions. Students electing to take this examination should do so before the senior year. No unit credit is given for completing this requirement by examination.
2. By completing any two of the following courses: History 17A, 17B, 170A, 170B, 170C, 171A, 171B, 171C, 174A, 174B, 175A, 175B, 176A, 176B, 178A, 178B, 179A, 179B, 180, 183A, 183B; Political Science 1A, 1B, 100, 102, 103, 104, 105, 106, 113, 128A, 163, 164, 166. 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.
3. By presenting evidence that the requirement has been satisfied at another collegiate institution whose credits are acceptable for transfer to the Davis campus of the University of California. Transfer students should consult with their faculty adviser or the Supervisor of the American History and Institutions Requirement to make sure they have satisfied this requirement soon after their arrival on the Davis campus.

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

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

Residence Requirement

The minimum residence requirement for a bachelor's degree at the University of California is one academic year. Each summer session in which a student completes a course of at least 3 quarter units may be counted as half a quarter's residence. Thirty-six of the final 45 quarter units completed by each candidate must be earned in residence in the college or school of the University of California in which the degree is to be taken. No more than 18 of the 36 quarter units may be completed in summer session courses on the campus of residence.

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

Scholarship Requirement

To receive a bachelor's degree, except the Bachelor of Laws, a student must obtain twice as many grade points as units for all courses attempted by him in the University. An exception to this rule is authorized for honors students undertaking certain courses (see "Credit by Examination" page 33).

Unit Requirement

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

Filing for Degree Candidacy

Each candidate for graduation must file an Announcement of Candidacy with the Registrar at the beginning of the quarter in which he plans to graduate. The dates for filing are published on pages 5-8 of this catalog and in the *Schedule and Directory*.

HONORS AND PRIZES

Honors at Entrance

All entering freshmen are considered for Honors at Entrance on the basis of outstanding scholarship achieved in high school. Certificates are presented to the honors recipients shortly after registration in the University.

Deans' Honors List

The names of all students who have completed a minimum of 12 units of work on the Davis campus and who have achieved a 3.0 grade-point average or better in all work undertaken in the University and in the college will be listed by the various deans and submitted to the Registrar for publication in the *Student Directory* the following quarter. Students achieving this distinction have the following privilege.

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

Graduation Honors

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

Prizes

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

Student Expenses, Housing, and Financial Aids

FINANCIAL AIDS PROGRAM Introduction

The primary purpose of the Financial Aids Program at Davis is to provide financial assistance and advice to students who

would be unable to pursue their education at the University without such help. In addition to budgetary advice and counsel, financial assistance consists of scholarships, grants, loans, and employment offered singly or in various combinations to meet the difference between the student's resources and the cost of attending the University.

In determining the type and amount of financial assistance necessary to meet a student's financial deficit, the University expects the parents to make a maximum effort to assist their sons and daughters with college expenses. It also expects that all students will provide a part of the total cost of attending the University from summer employment. The financial assistance given by the University of California, Davis, should be viewed only as supplementary to the assistance and resources of the applicant and family. The desire to be independent of parents and reject their support is not held to be a valid reason for being granted financial aid.

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

EXPENSES

If you are a legal resident of California, you are not required to pay tuition at the University. (Students classified as nonresidents must pay tuition of \$980 per year.) Nevertheless, there are certain other expenses, such as supplies, room and board, and incidentals, that you will have to consider. Although you must determine your own budget in keeping with your needs and resources, you may find the following approximated costs a helpful guide:

Registration (includes the incidental fee \$73,		<i>Annually—</i>
Memorial Union fee \$3.50 and Student Body membership \$5.00)	<i>Quarterly</i>	(3 Quarters)
Room and board	\$ 81.50	\$ 244.50
Books and supplies	50.00	150.00
Student Health Insurance*		20.00
Parking of cars on campus*		16.00
Subject A (if needed, see page 34)	45.00	

* Optional.

** Subject to change.

	<i>Annually—</i>	
	<i>Quarterly</i>	<i>(3 Quarters)</i>
Registration (<i>Cont.</i>)		
Miscellaneous (includes travel, laundry, recreation, etc.—approximate costs)	180.00	500.00
Total for California residents	\$ 676.50	\$1,850.50
Tuition for nonresidents	327.00	980.00
Total for nonresidents (approximate costs)	\$1,003.50	\$2,830.50

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

Refunds. For students who withdraw with official approval before the end of any quarter, part of the fees enumerated above may be refunded. A schedule of refunds and other information will be found in the circular *Student Fees and Deposits*, obtainable from the Registrar.

APPLICATION PROCEDURE

Application forms may be obtained from the Office of Financial Aids, South Hall, University of California, Davis, California 95616.

Application Form. To facilitate the granting of monies to students, one application form has been developed to handle all of the scholarships, loans (including NDEA and Educational Opportunity Grants), and Work-Study jobs administered by the Davis campus.

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

Thus, a student applicant is first considered for a scholarship, and then is automatically considered for a grant, a loan, and/or a job until the student's financial need (the difference between student and family resources and the cost of attending the University) has been met.

A Parents' Confidential Statement must accompany the student's personal and budget information page in order for the application to be complete and to permit an evaluation of need. The Parents' Confidential Statement form may be obtained from the high school or college and must be sent to the College Scholarship Service, P.O. Box 1025, Berkeley, California 94701 for evaluation not later than two weeks before the application deadline (see below).

Application Deadline. Applications are available in November for the following academic year. In order to be given consideration for a scholarship, the application must be received by the Financial Aids Office no later than

February 1—for continuing students

February 5—for entering students

For other types of financial assistance (loans, jobs, grants) applications must be received no later than

April 15—for continuing students

June 30—for entering students

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

NOTIFICATION OF AWARDS will be made to students by

April 30—for scholarships

August 15—for other types of financial aid, i.e., work-study, loans, etc.

SCHOLARSHIPS

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

The stipend accompanying each scholarship is based on the student's financial need. Awards may be honorary in nature or may be accompanied by a stipend to cover the difference between family resources and the yearly standard cost of education at the University. All Regents Scholars receive an honorarium of \$100 annually, regardless of financial need. *If you wish* to be considered for a Regents Scholarship with honorarium only, you should so indicate, and you need not file a Parents' Confidential Statement.

The term of appointment is four years for students entering from high school (three and one-half years for midyear entrants who will have completed one semester of college work) and two years for students appointed on completion of the sophomore year. Regents Scholars are expected to maintain at least a "B" average in course work undertaken at the University.

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

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

EDUCATIONAL OPPORTUNITY GRANTS

Eligibility for Educational Opportunity Grants is limited to undergraduate students of exceptional financial need, as measured on an absolute scale of parent contribution which has been established by the Federal Government. Upon receipt of the Financial Aids Application and the Parents' Confidential Statement, parent contribution is determined by the Financial Aids Office using College Scholarship Need Analysis procedures. The amounts of the grants range

from \$200 to \$800 per academic year. The amount of grant may not exceed one-half of the total financial aid award, as the grant must be matched on an equal basis with some other form of financial aid (i.e., a scholarship or loan from the University, or a scholarship or loan from outside sources). Wages from the College Work-Study Program may not be used as matching funds.

COLLEGE WORK-STUDY PROGRAM

The College Work-Study Program, established under the Economic Opportunity Act of 1964, enables the University to offer employment to financially qualified students during the school year and vacation periods. The program is designed to assist those students who are from low or middle-income families, who need funds to continue their education, and who are enrolled or accepted for enrollment for a full-time course of study at the University. The on-campus and off-campus jobs are limited to 15 hours per week during the school year and are specifically awarded to assist students in meeting their college expenses and in gaining valuable work experience related to their educational endeavors. In other cases of demonstrated financial need, Work-Study jobs may be awarded during the summer on a full-time basis.

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

LOANS

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

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

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

Up to 50 per cent of the loan (and interest thereon) may be forgiven those entering the teaching profession, at the rate of 10 per cent for each year of full-

time teaching in public or nonprofit (1) elementary and/or secondary schools or (2) institutions of higher education. An additional cancellation of 5 per cent is made for each year of service as a full-time teacher in a public or other non-profit elementary or secondary school which, as defined by the Commissioner of Education, has a high concentration of students from low-income families. Hence, the total amount of the loan may be cancelled by teaching in a deprived area for seven years.

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

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

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

MISCELLANEOUS

Graduate Scholarships and Fellowships. Information about scholarships or fellowships, etc., for graduate students may be obtained from the Dean of the Graduate Division, Room 252, Administration Building. Applications for fellowships and graduate scholarships must be filed with the Dean of the Graduate Division, University of California, Davis 95616 not later than February 1 prior to the academic year for which the award is sought.

Army ROTC Scholarship Program. Applications may be obtained from the Department of Military Science, University of California, Davis 95616 during the month of April. Selection will be based upon academic and military records and potential officer qualities. Notification will be made before July 15 of each year.

Veterans Benefits. Students who qualify for veterans benefits under the new program established on July 1, 1966, by Public Law 89-358, will be certified to the Veterans Administration by the Financial Aids Office.

Eligibility for educational benefits is dependent on service in the U. S. Armed Forces for at least 181 days, any part of which was after January 31, 1955. For each month of active duty, a veteran is entitled to one month of educational assistance, up to a maximum of 36 months. The allowance for a single student enrolled in a full-time course of study is \$100 per month. Married students with

one dependent will receive \$125 a month or \$150 a month with two or more dependents.

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

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

Guaranteed Loans. The Federal Government, the State of California, California lenders (banks, credit unions, and savings and loan associations) and California colleges are partners in a program to provide students with loans to help them in financing their education beyond high school. Under this plan the State Scholarship and Loan Commission, utilizing federal funds, guarantees the repayment of loans made to students by California lending institutions. Under the plan adopted by the State Scholarship and Loan Commission, students whose adjusted family income is under \$15,000, who are legal residents of the State of California for educational purposes; are citizens of the United States or admitted as permanent residents; are full-time students as defined by his college and the U. S. Commissioner of Education; are undergraduates or graduates in degree, credential, or certificate programs; who agree to use the loan funds only for educational purposes; are in good standing as defined by their college or accepted for admission; and have a social security number, are eligible to receive a State-guaranteed loan. Such students are also eligible to receive a complete interest subsidy of 6 per cent while they are full-time students and 3 per cent or one-half of the interest after they cease to be full-time students which is also the time when the repayment of the principal of the loan commences. The maximum loan for all full-time students is \$1,000 per academic year.

Separate applications for this program are available in the Dean of Students Office—Financial Aids Division.

LIVING ACCOMMODATIONS

Residence Halls

As a residential campus, the University attempts to provide housing for students who wish to live on campus. At the present time the University operates five coed halls of 400 students each; four 200-student halls, two for men and two for women; and three 45-student residences, for graduate students. An advisory staff in residence in each hall maintains close personal contact with all students in that hall and is readily available for assistance.

Each hall maintains its own council, elected by the residents, to act on matters concerning their welfare, and residents pay annual dues averaging \$12. The Residence Hall Association is a coordinating governing body for all the residence halls.

The cost for room and board for the academic year is \$920 (1966-67 rate); this includes 20 meals a week. All students planning to live in residence halls sign a contract for one academic year. Payment is usually made in installments according to a payment schedule. Rooms in the residence halls contain the necessary furniture, linen, blankets, and study lamps; charges include the weekly laundering of linen. Further information and applications for housing are sent when students apply for admission to the University. Specific questions should be directed to the Housing Office. Since accommodations are limited, early application is advised. A deposit of \$100 is required when a contract is signed and returned.

Housing for Married Students

There are 475 apartments for married students on the Davis campus. Some of these apartments have one bedroom, but most are two-bedroom units. Both furnished and unfurnished accommodations are available. Costs in married student housing are (1966-67 rates): one bedroom, unfurnished, \$83; two bedrooms, unfurnished, \$95; two bedrooms, furnished, \$110; all rates include utilities. Applications should be addressed to the Housing Office, University of California, Davis 95616.

Off-Campus Accommodations

The Housing Office maintains a listing service for those interested in off-campus housing. Students, faculty, and staff associated with the University of California should consult that office for assistance in locating off-campus accommodations.

Over 700 students are housed in privately owned off-campus residence halls. These halls meet all the standards of approval set by the University and adhere to the same rules and regulations that apply to a University residence hall. In addition, there are recommended housing units for women, which meet certain University requirements such as supervision and the establishment of student government.

Students living off campus in private rooms or apartments may have meals at the Memorial Union Dining Commons or at the residence hall dining room on one of several meal-ticket plans.

Fraternities

Twelve national fraternities are represented on the Davis campus, providing living quarters and meals for their undergraduate members and pledges. The fraternities, under their system of self-government, provide social, recreational, and academic programs for their members as well as some experience with business activities. A faculty member acts as adviser for each fraternity. The cost of living in a fraternity is comparable to that of the residence halls.

Membership in fraternities is by invitation only. Men who are interested in fraternities should write to or call on the Assistant Dean of Students for Fraternities and plan to attend the Interfraternity Council Smoker held on the Saturday and Sunday following the first week of classes of the fall quarter.



Student Services and Activities

STUDENT HEALTH PROGRAM

Medical Evaluation

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

Applicants with contagious diseases will be excluded. Any having physical conditions that grossly disturb the classwork of other students should not apply for admission and will be disqualified when detected.

Each prospective student is advised to have a physical examination by his own physician to determine his fitness for college work before coming to the University. 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.

Supplementary Health Insurance

A supplementary health insurance plan is available at the time of registration. This insurance supplements the Student Health program and is used for medical care needed between quarters and when away from the campus. It likewise provides for surgical-professional fees and other benefits as outlined in the Supplementary Health Insurance brochure. Procurement of this insurance is strongly urged, and a waiver must be signed if it is not obtained.

Foreign Students. The acquisition of health insurance is a condition of registration for all nonimmigrant foreign students. At the time of registration, all nonimmigrant foreign students will enroll in the Associated Students supplementary health plan. Students who present documentary evidence of equivalent insurance coverage or sponsored students who do not pay the incidental fee may petition the Office of International Student Services for permission to waive the Associated Students Supplementary Health Plan.

Student Health Service

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

Each regularly enrolled student may have such medical care as the Student Health Service is staffed and equipped to provide from the first day of the

quarter through the last day of the quarter. Additional services may be provided for seven days after the last day of the quarter at the discretion of the Director of the Student Health Service. Hospitalization up to ten days per quarter be provided for illnesses. When, in the opinion of the Director of Student Health, serious illness or injury requires prolonged care and will obviously prevent continuation in college during the current quarter, the patient will be returned to his community or home for definitive treatment.

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

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

PLACEMENT SERVICES

The services of the centralized Placement Center are available without cost to students and alumni of the Davis campus and other campuses of the University of California. Services offered are of three types.

Student Part-Time and Summer Employment

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

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

Educational Placement Service

Placement service is available to students and alumni who are interested in teaching. Information on the background, training, and professional experience of its candidates, which is kept in confidential files, enables this office to match qualifications with specifications of available positions. Placement advisers

counsel candidates, communicate with employers, receive vacancy data, and arrange interviews. The University reserves the right to refer only those persons who are considered to be fully qualified.

Agricultural and Industrial Placement Service

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

Occupational Information

A library of vocational information is maintained by the Placement Service and the Counseling Service (see below). Students may use this library at their convenience. Placement advisers are willing to discuss various occupations with students throughout their academic careers.

COUNSELING CENTER

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

Help students with personal problems.

Assist students in their choice of academic majors and future occupations.

Establish developmental-reading classes and study-skills classes on a non-credit, voluntary basis.

Provide a wide range of psychological testing when appropriate.

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

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

5

SELECTIVE SERVICE

The Office of the Dean of Students will assist students in matters pertaining to their registration and possible educational deferment (II-S) under current Selective Service regulations. It is, however, each student's personal responsibility to keep in touch with his local draft board, which has exclusive authority to make determinations regarding all educational deferments.

Under present Selective Service regulations, any student who receives an educational deferment extends his liability to age 35. Students desiring a deferment on the basis of participation in the University ROTC program should consult the Department of Military Science.

All male students (undergraduate and graduate) will find it to their advantage to continually keep themselves aware of Selective Service laws and procedures. Any question or request for assistance may be brought to the Office of the Dean of Students at any time.

MILITARY SCIENCE

The University has an Army Reserve Officers' Training Corps unit that offers both basic and advanced courses in general military science at Davis. Enrollment in military science is on a voluntary and selected basis. The ROTC Program is described in detail with the course offerings of the Department of Military Science on page 260.

INTERNATIONAL STUDENT SERVICES

International Students

An adviser is available to assist students from abroad in all matters pertaining to their attendance at the University and to their residence in the United States.

Education Abroad

Administrative assistance in the nonacademic aspects of the University's Education Abroad Program (see page 15) is provided by the Office of International Student Services. Application forms and information about the program may be obtained at this office, as well as information regarding other aspects of travel and study abroad.

Information pertaining to other means of study, travel, and employment opportunities abroad is also available in the Office of International Student Services.

STUDENT CONDUCT AND DISCIPLINE

Students enrolling in the University assume an obligation to conduct themselves in a manner compatible with the University's function as an educational institution. If a student fails to meet this responsibility or neglects his academic duties, appropriate action may be taken.

Administration

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

Types of Discipline

The major types of discipline are:

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

Censure: Written reprimand for violation of specified regulation;

Disciplinary Probation: Exclusion from participation in privileges or extra-curricular University activities as set forth in the notice of disciplinary probation for a specified period of time;

Restitution: Reimbursement for damage to or misappropriation of property. Reimbursement may take the form of appropriate service to repair or otherwise compensate for damages;

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

Suspension: Exclusion from classes and other privileges or activities as set forth in the notice of suspension for a definite period of time;

Dismissal: Termination of student status for an indefinite period. The student may be readmitted to the University only with the specific approval of the Chancellor of the campus to which he applies;

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

Student Honor Council

The Honor Council of the Associated Students deals with student welfare, student conduct, student-faculty relations, and ASUCD Constitution interpretation. The Council fosters the honor spirit, a code which places the responsibility for classroom and campus conduct with the individual student.

THE ASSOCIATED STUDENTS AND STUDENT ACTIVITIES

The entire undergraduate student body holds membership in the Associated Students, University of California, Davis (ASUCD). The ASUCD, through its elected Legislative Assembly and appointed activities chairmen, is responsible for organized student activities on campus.

Independent student organizations are administered by the Dean of Students Office. Included in this category are departmental, honor, service, special-interest, political, and religious organizations, as well as an International Club.

A major effort of the ASUCD is *Picnic Day*, the campus open house welcoming the public each spring. Other special ASUCD events or activities include *Judging Day* (competition in agricultural skills and knowledge for high school students), *Little International* (livestock show for Aggie students), *Cal Aggie Camp* (an annual summer encampment for underprivileged children in the area, financed by student fund-raising events), *Cal Aggie Study Center Project* (a weekly tutoring program for disadvantaged primary and secondary school children in Sacramento area schools), *Homecoming*, *Wild West Days*, *Radio KCD*, *Speakers Bureau*, *Student Forums*, *Blood Bank*, and the all-important *Orientation* for incoming students. The University Band is supported by the ASUCD, and the Memorial Union Student Council presents in the Memorial Union a continuing educational and recreational program for students, as well as a concert series and a Spring Festival of the Arts.

The ASUCD publishes the *California Aggie*, a daily campus newspaper; *El Rodeo*, the yearbook; and *Motley*, a literary magazine.

The *Associated Women Students* is composed of all undergraduate women students. It is an organization concerned with the general welfare of the women students and their role in the social, cultural, and intellectual activities of the University.

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



The University of California, Davis, is a member of the Far Western Inter-collegiate Athletic Conference and stresses intramural and recreational as well as intercollegiate athletics. Included are football, basketball, track, rifle, baseball, tennis, wrestling, golf, swimming, and water polo. Independent student clubs provide opportunities to participate locally or in independent leagues in the following activities: rugby, cricket, badminton, rodeo, gymnastics, sailing, skiing, fencing, judo and karate. The Women's Athletic Association sponsors sports and recreational activities for all women students, including intercollegiate playdays in basketball, volleyball, hockey, softball, badminton, tennis, rifle, and swimming.

Unity of student life on all campuses of the University is emphasized by the California Club, an organization of student leaders.



Requirements and Curricula

COLLEGE OF AGRICULTURE

Curricula in the College of Agriculture are career oriented. They are designed to prepare students for a wide variety of employment opportunities in research, management, specialized services and education in agricultural and related industries: natural resources management, conservation, and recreation. The goal is not merely accumulation of knowledge, but the wise use of knowledge—from the biological, physical and behavioral sciences—to meet the needs of man and his environment.

Today, rapid and dramatic technological changes are taking place in the broad fields of agriculture and resource management. Such transformations include changing methods of production, processing and marketing and their related socio-economics problems, new products, expanding research, and greater involvement with renewable natural resources. Agriculture has become so broad and diverse that many different talents are needed, and it is obviously not necessary for a student to have an agricultural background.

Since food is now and will continue to be the most critical universal concern of populations throughout the world, international agriculture also offers expanding opportunities for leadership and service.

Career opportunities are no longer restricted to rural areas, or to men. Women are finding increasing employment as agricultural scientists, particularly in areas of concern to the family and consumer.

To prepare students to excel now and to keep abreast of inevitable changes in the future, curricula in the College are designed to produce graduates with both fundamental and in-depth, technical training. A distinctive feature of the College is its multidisciplinary approach, i.e., focusing of several disciplines on the solution of problems. Students first establish a foundation in the natural sciences, social sciences and humanities, and then in their upper division work develop competencies in chosen areas of agricultural, biological, or family and consumer sciences.

Specific requirements for the Bachelor of Science degree in the eight curricula offered in the College of Agriculture at Davis begin on page 57. The two-year curricula in preforestry and preveterinary medicine, required for admission to the forestry and veterinary medical schools, are also majors in the College. Requirements of these preprofessional programs begin on page 78.

Requirements for the Bachelor of Science Degree

The University of California awards the degree of Bachelor of Science to candidates who satisfy the general University requirements, the College requirements, and the specific major requirements.

General University Requirements

The bachelor's degree is awarded to those candidates who satisfy the University requirements (pages 33-35) in regard to:

Subject A	American History and Institutions
Scholarship	Residence Application for Degree Candidacy

College of Agriculture Requirements

The Bachelor of Science candidate must complete a minimum of 180 units of University work. This total may include not more than 6 units of performance courses in each of the following: lower division physical education, art, dramatic art, music, and rhetoric. Of the total, 54 units must be in upper division courses (courses numbered 100–199). A maximum of 9 units of courses in the 300 and 400 series will be accepted toward satisfaction of the 54-unit upper division requirement.

The student must satisfy the requirements of one of the curricula in the College of Agriculture. These consist of *core requirements* common to all majors in the curriculum and the *major requirements* that give depth to the program.

Curricula Requirements of the College

The eight curricula offered are designed to provide extensive preparation in the natural, physical, and social sciences and in the humanities so that the student will gain breadth of learning as well as depth in specific areas. With the exception of Family and Consumer Sciences, each curriculum contains the following minimum unit requirements in subject matter:

Agricultural and closely related subjects	36
Natural and physical sciences	36
Social sciences and humanities	36
Unrestricted electives	24

Pass or Fail Courses

The College wishes to stimulate intellectual curiosity and encourages its students to investigate new areas that may interest them. Hence, a student in good standing (not on probation) may register for one elective course on the average each term on a Pass or Fail basis without jeopardizing his grade-point average. Units earned shall be counted in satisfaction of degree requirements, but shall be disregarded in calculating the grade-point average. Requirements that may be satisfied on this basis are indicated under the various curricula by an asterisk (*). Permission of the instructor, adviser, and Dean is required on forms available at the Registrar's and Dean's offices. The forms must be completed and filed by the deadline set for adding courses to the study list each term.

Faculty Advisers and Majors

Students are assigned advisers according to the major selected and must consult with their advisers each quarter for guidance in planning their academic programs both as to required and optional courses to be taken the following quarter. Advisers are listed by major in the front portion of the *Schedule and Directory*. It is the student's responsibility to see that he fulfills the University, the College, and the major requirements for graduation. If the student requests a credit check at the start of his senior year, he will be notified of the remaining requirements to be fulfilled prior to graduation.

A program of fewer than 12 or more than 18 units must be approved by the

Dean of the College. However, a lower division course in physical education of not more than one unit may be added to the maximum number without such approval.

Entering students who are undecided about the area of agriculture in which they wish to major may, for purposes of registration, specify Agricultural Science as a major. Temporary advisers will be assigned by the Dean's office until an appropriate major is selected. Enrollment in introductory courses (Animal Science 1, 2; Plant Science 1, 2, etc.) is recommended to provide background for selection.

Students may change their major within the College at any time, but in order to receive term credit in the new major the change must be made prior to the last day to add courses to the study list each term. Petitions for Change of Major are available at the Registrar's or the Dean's office. See page 28 concerning change from one college to another.

Work Experience Opportunities

One of the really unique programs available to all students on the Davis campus is the Agricultural Practices work-experience program. It enables students to acquire initial and advanced work experience in nearly all phases of the agricultural industry, including production, processing, marketing, and distribution. Summer placement on farms and ranches, with State and Federal Divisions of Forestry in range or wildlife management, and in the production, distribution and service organizations of agriculture, enables students to combine earning and learning activities in a broad and impressive spectrum of employment opportunities. Students, who are uncertain about the selection of a major, may use the experience to identify occupations leading to satisfying, productive careers.

Made possible by grant from the late Fred H. Bixby, the voluntary noncredit program enables students to supplement their academic training with supervised work experience. Instruction in the operation, care and maintenance of both basic and specialized agricultural equipment is provided in the course, Agricultural Practices 49 (see Agricultural Practices page 144).

Students wishing to participate in this program should register during Orientation at the Agricultural Practices Office and complete a work-experience questionnaire.

Honors

Undergraduate Honors

The Dean's Honors List appears each quarter in the *Student Directory*. It includes the names of all students in the College of Agriculture who, in the preceding quarter, 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.

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

Honors at Graduation

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

<i>Units Completed at the University</i>	<i>Grade-Point Average</i>	<i>Honors</i>	<i>Highest Honors</i>
135 or more	3.15	3.50	
90-134	3.35	3.70	
45- 89	3.45	3.80	
Less than 45			not eligible

College of Agriculture Medal

Each year the outstanding graduating senior in the College is awarded a silver medal bearing the University Seal and known as the "Agriculture Medal." Scholastic excellence is the primary basis for choosing the recipient, but other considerations also receive attention.

Scholarships

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

Approximately one-third of the scholarships administered by the Committee on Undergraduate Scholarships are awarded to students in the College of Agriculture. Students with high scholastic standings who need additional financial support are, therefore, encouraged to apply (see page 39).

Graduate Instruction

Graduate instruction is under the jurisdiction of the Dean of the Graduate Division, and inquiries concerning the graduate program should be addressed to him. In addition to pursuing advanced studies, the graduate student may qualify for an assistantship to work with members of the research staff in the Agricultural Experiment Station. A number of assistantships providing half-time employment during the academic terms and full-time summer employment are available to outstanding students.

Programs for certain graduate degrees are offered by faculty of individual departments, and the degree normally bears the name of the department. Other graduate programs are offered by groups composed of faculty members from several departments, and the degree bears the name of the group, such as Agricultural Chemistry, Plant Physiology, Comparative Biochemistry, International Agricultural Development, etc. The *Announcement of the Graduate Division* should be consulted for complete information regarding graduate instruc-

tion, but work leading to advanced degrees may be pursued in the following departments of the College:

Agricultural Economics	International Agricultural Development
Agricultural Education	Landscape Horticulture
Agricultural Engineering	Nematology
Agricultural Toxicology	Nutrition
Agronomy	Plant Pathology
Animal Husbandry	Pomology
Animal Physiology	Poultry Husbandry
Biochemistry and Biophysics	Soils and Plant Nutrition
Consumer Sciences	Vegetable Crops
Entomology	Viticulture and Enology
Food Science and Technology	Water Science and Engineering
Genetics	

Teaching Credentials

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

Curriculum in Agricultural Biosciences

Majors: Animal Science, Entomology, Plant Science, Range Management, Plant Protection

The Agricultural Biosciences curriculum provides a broad training in the physical and biological sciences and in their application to the production and processing of animals and plants for human use. It furnishes a basic background necessary for success in agricultural production and related industries.

The curriculum provides an excellent base for graduate study in such fields as agricultural chemistry, agronomy, animal husbandry, animal physiology, botany, comparative biochemistry, endocrinology, entomology, genetics, horticulture, nutrition, plant pathology, plant physiology, poultry science, range management, soil science, and vegetable crops.

Undergraduates may select one of the five general majors or, within the animal science and plant science majors, they may choose a field of specialization.

Requirements for the major and for the field of specialization are met largely by upper division courses. The student's first two years should, therefore, be devoted chiefly to meeting core requirements, many of which are satisfied by courses in the lower division. The following subjects and units constitute the *core requirements* for the curriculum in Agricultural Biosciences:

Biological sciences (including one animal-oriented and one plant-oriented course)	20
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Chemistry (including organic chemistry)	15
English and/or rhetoric	8
Mathematics (including calculus and statistics)	7
Physics	9
Social sciences and humanities electives*	28
Unrestricted electives†	24
 <i>Major requirements (see below)*</i>	 69
Total units required for the Bachelor of Science degree	180

The requirements given above allow for considerable flexibility, permitting the student to make certain selections in accordance with his academic preparation and his particular interests. The following program is offered only as a guide:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 1A, 1B	5	5	-
Biology 1	-	-	6
English or Rhetoric 1A, 1B	4	4	-
Animal and Plant Science 1	3	3	-
Electives†	3	3	9
 	 15	 15	 15
<i>Sophomore Year</i>			
Bacteriology 2 or Botany 2	-	5	-
Chemistry 8	5	-	-
Physics 2A, 2B, 2C	3	3	3
Mathematics 13, 16A	4	3	-
Electives*	3	4	12
 	 15	 15	 15

Animal Science Major Requirements

This major centers on the basic science disciplines of nutrition, physiology, and genetics as they apply to animal and poultry production. A concentrated study program may be arranged in the following fields of specialization: *animal husbandry, nutrition, physiology, and poultry husbandry*. Students should consult the department for specific information concerning the specialization.

Subject and unit requirements are:

Biochemistry	6
Genetics	5
Nutrition	5

* Elective courses may be taken on a pass or fail basis.

† Electives to satisfy the requirements for the major; social sciences and humanities, including American History and Institutions; and unrestricted electives.

Physiology	6
Laboratory units in biochemistry, genetics, nutrition, or physiology	4
Specialized courses in animal sciences	18
Electives approved by adviser†	25
	—
	69

A course in bacteriology (Bacteriology 2) and Animal Science 1 and 2 are recommended; these courses partially satisfy the biological sciences core requirement.

Students may also pursue a program in animal science under the Agricultural Science and Management curriculum described on page 65.

Entomology Major Requirements

This major provides an introduction to the many branches of entomology, such as the role of insects in the transmission of plant and animal diseases; control of insects with natural enemies and chemicals; bee biology; and a study of the insects themselves, their behavior, classification, and intricate structure. Graduates are eligible to work in many commercial fields and in local, state, and federal agencies. The course work also provides a basis for graduate studies.

Subject and unit requirements are:

Bacteriology	5
Botany or zoology (in addition to core requirements)	12
Genetics	5
Plant physiology, plant pathology, or biochemistry	4
Introduction to entomology (Entomology 1)	5
Structure and function of insects (Entomology 101)	4
Insect physiology (Entomology 102)	4
Systematic entomology (Entomology 103)	4
Insect ecology (Entomology 104)	4
Field taxonomy and ecology (Entomology 109)	5
Electives approved by adviser†	17
	—
	69

Plant Science Major Requirements

Opportunities for concentrated study in areas of plant science include the following fields of specialization: *agronomy, floriculture, landscape horticulture, park administration, plant pathology, pomology, vegetable crops, and viticulture*. Students should consult the department for specific information concerning the specialization.

Subject and unit requirements are:

Entomology	4
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† Electives to satisfy the requirements for the major; social sciences and humanities, including American History and Institutions; and unrestricted electives. May be taken on a pass or fail basis.

Genetics	5
Nematology or weed science	2
Plant pathology	4
Plant physiology	5
Soil and water science	6
Electives approved by adviser:	
a) Biochemistry, botany, chemistry, genetics, geography, geology, mathematics, microbiology, physics, or zoology	6
b) Entomology, nematology, plant nutrition, plant pathology, plant science, soils, water science, or weed science	9
c) Electives to complete major†	28
	—
	69

Plant Science 1 and 2 are recommended; these courses partially satisfy the biological sciences core requirements.

Students may also pursue a program in Plant Science under the Agricultural Science and Management curriculum described on page 65.

Range Management Major Requirements

Students are prepared for careers as range technicians in state and federal agencies, as farm advisers, and as managers of commercial operations. This major also provides a basis for graduate studies. Emphasis is on the sciences needed in the sound management of lands used primarily for grazing—animal husbandry, agronomy, range management, forestry, wildlife, and soils and water science.

Subject and unit requirements are:

Animal sciences (in addition to core requirements)	9
Botany (in addition to core requirements)	14
Engineering	3
Genetics	5
Geology	4
Soil and water science	6
Specialized courses in range management and agronomy	22
Electives approved by adviser†	6
	—
	69

Certain courses are required for the major and, where applicable, may be used in satisfaction of core and major requirements listed above: Animal Science 1 and 2; Zoology 2 or Animal Physiology 101; Botany 2; Economics 1A; Economics 1B or Agricultural Economics 1 and 2; Engineering 1; Animal Nutrition 103; Animal Science 118; Botany 108 and 111; Botany 117 or Plant Science 101; Range Management 100, 103, 105, and 133; and Agronomy 112.

† Electives to satisfy the requirements for the major; social sciences and humanities, including American History and Institutions; and unrestricted electives.

Plant Protection Major Requirements

This major is for students interested primarily in control of agricultural pests, whether insects, nematodes, plant diseases, vertebrates, or weeds. Career opportunities are available in technical sales and service with chemical companies, food-processing firms, Farm Advisers' Offices, and growers' organizations. Students who are eligible may benefit by one or more years of graduate study in entomology, plant pathology, or plant physiology (weed science).

Subject and unit requirements are:

Agricultural toxicology	3
Animal science (wildlife in land use)	4
Botany (physiology and weed science)	12
Entomology	12
Nematology	9
Plant pathology	12
Electives approved by adviser†	17
	—
	69

The core requirements in social sciences must include three units of economics.

Curriculum in Agricultural Economics and Business Management

Majors: Agricultural Economics, Agricultural Business Management

This curriculum is concerned with the economics of the agricultural industry. Its basic goal is to improve the student's knowledge of economic forces and the environment in which agricultural production and distribution take place. The programs offered enable students to develop a specialization in land economics, management, marketing, and policy.

The requirements for the major are met largely by upper division courses. The student should, therefore, devote his first two years chiefly to meeting core requirements. The following subjects and units constitute the *core requirements* for this curriculum:

Accounting	6
Agriculture other than agricultural economics	18
Chemistry and physics	9
Economics	9
English	4
English or rhetoric	4
Mathematics (discrete, analytical geometry, and calculus)	6
Natural science electives‡*	17
Statistical methods	4

* Elective courses may be taken on a pass or fail basis.

† Electives to satisfy the requirements for the major; social sciences and humanities, including American History and Institutions; and unrestricted electives.

‡ Mathematics 16B or the equivalent is required for Agricultural Economics majors.

Social sciences and humanities electives approved by adviser*	19
Unrestricted electives*	24
<i>Major requirements (see below)†</i>	60
Total units required for the Bachelor of Science degree	180

The requirements given above allow for considerable flexibility, permitting the student to make certain selections in accordance with his academic preparation and his particular interests. The following two-year program is offered only as a guide:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
English 1A, English or rhetoric	4	4	-
Physics 10	4	-	-
Chemistry 1A	-	5	-
Biology 10 (natural science elective)	-	-	4
Political Science 1A, 1B (social science elective)	4	-	4
Plant Science 1, 2	-	3	3
Electives†	3	3	4
	—	—	—
	15	15	15

<i>Sophomore Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Economics 1A, 1B	5	5	-
Mathematics 15, 16A or equivalent	3	3	-
Soil and Water Science 1, 2	3	3	-
Electives†	4	4	15
	—	—	—
	15	15	15

Agricultural Economics Major Requirements

This major considers the economics of agricultural production, marketing, use of resources, prices, and policy. It permits the student a choice of specialization best adapted to his plans.

Subject and unit requirements are:

Agricultural Economics 100A, 100B, 100C, 106A, 106B	15
Agricultural economics electives	15
Macro-economic theory, upper division	3
Senior research project in major field	3
Electives approved by adviser†	24
	—
	60

* Elective courses may be taken on a pass or fail basis.

† Electives to satisfy the requirements for the major; agriculture other than agricultural economics; natural science; social sciences and humanities, including American History and Institutions; and unrestricted electives.

† Mathematics 16B or the equivalent is required for Agricultural Economics majors.

Agricultural Business Management Major Requirements

This major provides training in the managerial aspects of agricultural business. It emphasizes the decision-making function of management, the use of management controls, personnel policies, and procurement and marketing methods.

Subject and unit requirements are:

Agricultural Economics 18, 100A, 100B, 100C, 106A, 106B, 112, 116, 117..	30
Senior research project in major field	3
Electives approved by adviser†	27
	—
	60

Curriculum in Agricultural Education and Development

Majors: Agricultural Education, International Agricultural Development

In this program coordinated training in agricultural and related biological and physical sciences is combined with a solid liberal arts education.

The requirements for these majors are satisfied largely by upper division courses. The student should, therefore, devote his first two years chiefly to meeting *core requirements*, which are as follows:

Agricultural science (introductory)	3
Biological sciences (including genetics)	21
Chemistry (including organic)	15
Economics	5
English	8
Mathematics (statistics)	4
Physics	6
Social sciences and humanities electives*	15
Unrestricted electives*	24
	—
<i>Major requirements (see below)*</i>	<i>79</i>
Total units required for the Bachelor of Science degree	180

The requirements given above provide considerable flexibility, allowing the student to make certain selections in accordance with his academic preparation and particular interests. The following two-year program is offered only as a guide:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
English 1A, 1B	4	4	—
Chemistry 1A, 1B	—	5	5
Agricultural science (introductory)	3	—	—

* Elective courses may be taken on a pass or fail basis.

† Electives to satisfy the requirements for the major; social sciences and humanities, American History and Institutions; unrestricted electives.

<i>Freshman Year (Cont.)</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Mathematics 13	—	4	—
Electives†	8	2	10
	—	—	—
	15	15	15
<i>Sophomore Year</i>			
Economics 1A	—	5	—
Chemistry 8	5	—	—
Physics 2A, 2B	—	3	3
Biology 1	6	—	—
Electives†	4	7	12
	—	—	—
	15	15	15

Agricultural Education Major Requirements

This curriculum should be particularly useful to students considering careers in agricultural teaching, production, or service, or in foreign service activities in educational, commercial or technical fields. Its breadth also provides excellent preparation for advanced study in several areas of the agricultural sciences.

The following subjects and units constitute the requirements for the major:	
Agricultural Education 160 or 187, 320A	4
Agricultural economics	9
Agricultural engineering	11
Animal science	16
Plant and soil science	16
Social sciences and humanities†	8
Electives approved by adviser (including Animal Nutrition 103, Entomology 110, Plant Pathology 120, Soil and Water Science 1, Water Science 110A, 110B)	15
	—
	79

Curricula for Teacher Education

Students may make appointments with credential counselors and obtain a statement of the complete requirements for the credential at the departmental office.

Required courses for professional preparation include: Education 110, 120; Agricultural Education 160, 320B, 320C, 320E, 323; and 9 quarter units of subject-matter courses.

International Agricultural Development Major Requirements

Graduates in International Agricultural Development may enter the Foreign Agricultural Service or other governmental agencies with overseas activities via civil service examinations, or join commercial firms with foreign branches or departments. The Peace Corps, the International Voluntary Services, and similar

† Electives to satisfy the requirements for the major; social sciences and humanities, American History and Institutions; unrestricted electives.

organizations continually seek recruits with such training for two-year, or similarly brief, assignments. Experience in these positions often leads to career opportunities in technical assistance and development with governmental agencies, foundations, and private agencies. Graduates in this major also find employment in cooperatives, chambers of commerce, and other United States employers concerned with public relations. A B.S. degree in this major is an excellent foundation for the graduate training essential for many professional careers in overseas development or technical assistance.

The student will partially satisfy the social sciences and humanities core requirements in the upper division. He must select three courses from the following: History 174A, 174B, 176A, 176B, 178A, 178B, 179A, 179B, and 180; Political Science 102, 105, 113, 128A, 163, and 166.

Basic requirements, subjects and units, for the major are:

International Agricultural Development 101 or 102, 190	6
Economics or agricultural economics	6
Foreign language,‡ humanities, and social sciences (anthropology or sociology, geography and/or psychology)	32
Primary field of specialization: animal science or plant science	14
Secondary field of specialization: agricultural economics, agricultural engineering, animal science, plant science, or soil and water science (at least 8 units upper division)	12
Agricultural and other science electives approved by adviser (to be selected from agricultural engineering, animal physiology, bacteriology, biochemistry, entomology, nutrition, plant pathology, soil science, water science, and weed science)	9
	—
	79

Curriculum in Agricultural Science and Management

Major: Agricultural Science and Management

Graduates of this curriculum are prepared for production-management positions in California's complex and changing agriculture. It provides alternatives of a four-year program leading to a B.S. degree or a five-year program leading to the M.S. degree. In bringing several disciplines to bear on the same problem, its approach is that of the professional school, introducing the student to the opportunities in agricultural production, processing, and marketing.

During the first three years the undergraduate develops a firm foundation in basic science and the humanities in addition to a broad introduction to agriculture. The student has the option of two programs depending upon his objectives and his grades.

1. He can complete the requirements for the Bachelor of Science degree in one additional year. During this final year he pursues intensive study in a technical field of agricultural science and in agricultural economics.

† The language requirement is proficiency in a single foreign language equivalent to passing course 4.

2. He can select a program leading to the Master of Science degree. During these two years he specializes in a) the *economics of agricultural management* and b) a technical field of agricultural science chosen from *animal science, plant science, food technology, or resource technology*.

Preprofessional Curriculum

Preprofessional requirements for this curriculum are:

Introductory agricultural science (to be selected from the following: Agricultural Economics 1 and 2, Animal Science 1 and 2, Food Science and Technology 100, Plant Science 1 and 2, Soil and Water Science 1 and 2)	20
Biological sciences	16
Chemistry (including organic)	15
Economics	10
English or rhetoric	8
Mathematics (statistics, calculus, and discrete mathematics recommended)	10
Physics	9
Social sciences and humanities electives*	18
Unrestricted electives†	24
<hr/>	
<i>Major requirements (see below)*</i>	50
<hr/>	
Total units required for the Bachelor of Science degree	180

The requirements given above allow for considerable flexibility, enabling the student to make certain selections in accordance with his academic preparation and his particular interests. The following two-year program is offered only as a guide:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
English 1A, 1B	4	4	-
Chemistry 1A, 1B	5	5	-
Animal Science 1, 2	3	-	3
Plant Science 1, 2	-	3	3
Biology 1	-	-	6
Mathematics 16A, 16B	-	3	3
Electives†	3	-	-
<hr/>		<hr/>	<hr/>
	15	15	15

Sophomore Year

Chemistry 8	5	-	-
Economics 1A, 1B	5	5	-
Soil and Water Science 1, 2	3	3	-

* Elective courses may be taken on a pass or fail basis.

† Electives to satisfy the requirements for the major: social sciences and humanities, including American History and Institutions; and unrestricted electives.

	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Agricultural Economics 1, 2	-	3	3
Bacteriology 2, or Botany 2	-	-	5
Physics 2A, 2B, 2C	3	3	3
Mathematics 13	-	-	4
	—	—	—
	16	14	15

Program Leading to the Bachelor of Science Degree

Requirements beyond the completion of the three-year preprofessional curriculum:

Agricultural Economics	15
Animal science, food technology, plant science or resource technology specialization	18
Electives approved by adviser†	17
	—
	50

Total units required for the Bachelor of Science degree 180

Certain courses are required. All students must complete the requirements in Economics of Agricultural Management and one other specialization.

Economics of Agricultural Management

Agricultural Economics: recommended for the Bachelor of Science program, course 100A and two chosen from 112, 114, 116, 117, and 140; recommended for students who may take the program leading to the M.S. degree, courses 100A–100B, 106A–106B, and Economics 1A–1B, 11A–11B.

Animal Science

Animal Genetics 107, and 107A, 107B, 107C, or 107D; Animal Nutrition 103 or 110;† Animal Science 114A–114B,† 116A–116B,† 118, or any two from Animal Science 10,† 11,† 12, or 149;† 5 units animal science electives. The indicated (†) courses are recommended for students who may change to the program leading to the M.S. degree.

(Students may also pursue a program in the animal sciences under the Agricultural Biosciences curriculum described on page 57.)

Food Technology

Bacteriology 2; Biochemistry 101A–101B; food science, 18 units including Food Science and Technology 100, 101, 104A–104B, and a food-processing course. Recommended: Chemistry 5.

Plant Science

Biology 1; Botany 2, 111; Plant Science 2, 101, 102; Soil and Water Science 1, 2; 12 units related to agronomy, floriculture, landscape horticulture, park

† Electives to satisfy the requirements for the major; social sciences and humanities, including American History and Institutions; and unrestricted electives.

administration, plant pathology, pomology, vegetable crops, or viticulture; 8 units from Entomology 110, Genetics 100, Plant Pathology 120, Nematology 110, or Plant Science 120.

(Students may also pursue a program in the plant sciences under the Agricultural Biosciences curriculum described on page 57.)

Resource Technology

A new area of study intended for students who need broad preparation in subject matter relating to the evaluation, conservation, renewal, and management of land, water, and atmospheric resources for human use and enjoyment. Some of the fields demanding such training are park administration, water resource development, wilderness protection, soil conservation, and land appraisal.

Plant Science 101; Soil Science 120A; Water Science 110A; 10 units to be selected from Geography 161, 162, Geology 102B, 112, Water Science 110B, 150, Soil Science 105, 120B, 135, Agricultural Engineering 106, 107, Plant Science 102, 116, Botany 111, 117, Genetics 100, or related courses with approval of the adviser.

Program Leading to the Master of Science Degree

Requirements beyond the completion of the three-year preprofessional curriculum:

1. Complete the Bachelor of Science program or equivalent:	
Agricultural economics	15
Animal science, food technology, plant science or resource technology	18
Electives approved by adviser*	17
	—
	50
Total units to complete the Bachelor of Science degree	180
2. Complete the Graduate Division requirements of one year of graduate residence and 36 units, including 21 units of graduate credit, in addition to the requirements for a Bachelor of Science degree.	
a. Graduate units (200 series)	
Seminar	3
Agricultural economics	6
Animal science, food technology, plant science, or resource technology	6
Additional graduate work in agricultural economics or the specialization	6
	—
	21
b. Electives approved by adviser (upper division or graduate)	15
	—
	36
3. A comprehensive oral examination in agricultural economics and the second field of specialization	00
	—
Total units required for the Master of Science degree	216

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

All students must complete the requirements in Economics of Agricultural Management and one other specialization. Certain courses are required.

Economics of Agricultural Management

Agricultural Economics including 100A-100B, 106A-106B, 3 units from 155, 160, 170, 176, and Economics 1B, 11B. The 6 graduate units must be selected from Agricultural Economics 250, 253A-253B, 257, and 260.

Animal Science

Biochemistry, 6 units; physiology (excluding 101, 101L), 6 units.

The indicated (‡) courses listed under the one-year program (see page 67) are recommended.

Food Technology

Program of courses to be developed in consultation with the adviser.

Plant Science

Entomology 110; Genetics 100; Plant Pathology 120; and Nematology 110 or Plant Science 120.

Resource Technology

Soil Science 105, 120B; Water Science and Engineering 110B; a course in climatology.

Recommended: Geography 161; Political Science 181.

Curriculum in Family and Consumer Sciences

Majors: Child Development, Design, Dietetics and Nutrition, Foods, Home Economics, Textile Science.

This curriculum combines broad preparation in natural and social sciences and humanities with studies which emphasize the interests and problems of people in families and as consumers. The major in *Child Development* prepares students for work with children and for further study in such areas as teaching, clinical psychology, research with children, counseling or pediatric nursing. The *Design* major emphasizes interior design, costume design, and textile design, with supporting courses in drawing, painting, sculpture, graphic design, architecture, and ceramics. The design major is preliminary to further study in graduate or professional school. The major in *Dietetics and Nutrition* can qualify the student for a one-year postgraduate internship which leads to professional work as a dietitian in institutions and hospitals, or in teaching and research. This major also prepares students for technical work on nutritional properties and formulation of human foods and animal feeds, and for nutrition work in community and governmental agencies. The major in *Foods* emphasizes the chemical and physical properties of foods, and why they behave as they do in processing and preparation for the table. The student is prepared for such careers as technical work in test kitchens, control laboratories in food processing, and for industrial work in food production and marketing. The *Textile Science* major emphasizes study of fibers, yarns and fabrics with an emphasis on end-use properties

and performance. The major offers two options, one stresses the sciences and the other combines textile science and design. It prepares students for careers such as technicians in business, industry and research, and in merchandising. General studies over the entire field comprise the *Home Economics* major which leads to an academic major for a secondary teaching credential. The various majors provide preparation for advanced studies at the graduate level in preparation for careers in research, college teaching or extension work.

Graduate Study. The departments whose teaching programs provide the multi-disciplinary curriculum in Family and Consumer Sciences also participate in graduate study programs leading to advanced degrees in Agricultural Chemistry (Ph.D.), Nutrition (M.S., Ph.D.) and Agricultural Economics (M.S., Ph.D.). The Master of Science degree in Home Economics is offered with specialization in nutrition, textile science, foods, consumer economics, or child development. The Master of Education degree is offered in the family sciences.

Natural Sciences

Chemistry, one course	
Physics, one course	
Statistics or other mathematics, one course	
One course in each of two areas of biological sciences	
Additional courses in the natural sciences to make a total of*	27

Social Sciences

One course in each of two areas of:	
Psychology, sociology, cultural anthropology	
One course in each of two areas of:	
Economics, political science, history†	

Additional courses in the social sciences to make a total of* 27

Humanities

English, 8 units	
Design, one course	
Literature, foreign language, or philosophy, one course	
Art, dramatic art, rhetoric, or music, one course	
Additional courses in the humanities to make a total of*	27

Major requirements and electives (see below)* 99

Total units required for the Bachelor of Science degree 180

Since many of the courses required for the various majors are in the lower division, the entering student can begin to satisfy both core and major requirements in the first year. English 1A, 1B, for example, which is required of every major in this curriculum, also satisfies the core requirement of 8 units of English.

* Elective courses may be taken on a pass or fail basis.

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

Similarly, other courses required for a major contribute to satisfying their corresponding core subject requirements.

Although there is wide variation among the six majors, the following two-year program is offered only as a guide:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 1A, 1B	—	5	5
Art 2	4	—	—
English 1A, 1B	4	4	—
Biology 1	—	—	6
Psychology 1A	4	—	—
Electives†	3	6	4
	—	—	—
	15	15	15

<i>Sophomore Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Bacteriology 2	—	—	5
Physiology 2 or Animal Physiology 101	4	—	—
Chemistry 8	5	—	—
Economics 1A	—	5	—
Mathematics 13	—	—	4
Physics 10	4	—	—
Textiles and Clothing 7	—	—	2
Electives†	2	10	4
	—	—	—
	15	15	15

The requirements for each of the six majors are as follows:

Child Development Major

Anthropology 2; Biology 1; Chemistry 1A; English 1A, 1B; Genetics 115; Human Development 131, 133, 136, 137, 138A, 138B, 139; statistics, one course; Nutrition 10; Physiology, one course; Psychology 1A, 1B, 1C; Sociology 1, 2, 126.

Design Major

Anthropology 2; Art 2, 3, 16; Design 160A, 160B, 160C, 191, 192A-192B or 196A-196B, 193 or 195, 197; English 1A, 1B; Philosophy 123; Psychology 1A, 1C; two courses chosen from the following list: Art 12A, 12B, 14A, 14B; three courses in the history of art.

Dietetics and Nutrition Major

Bacteriology 2; Biochemistry 101A, 101B; Biology 1; Chemistry 1A, 1B, 8; Economics 1A, 1B; English 1A, 1B; Foods 100A, 100B, 101A, 101B; Mathe-

† Electives to satisfy the requirements for the major; social sciences and humanities, including American History and Institutions; and unrestricted electives.

matics 13; Nutrition 112A, 112B, 113A, 113B; Physiology with laboratory; Psychology 1A; plus either group A (dietetics) or group B (nutrition) as follows:

Group A: Economics 11A, 11B; Education 110; Home Management 121, 122A, 122B; Nutrition 116.

Group B: Biochemistry 101L; Chemistry 1C, 5; Nutrition 117.

Foods Major

Bacteriology 2; Biochemistry 101A; Biology 1; Chemistry 1A, 1B, 1C, 5, 8; Consumer Economics 141; English 1A, 1B; Foods 100A, 100B, 101A, 101B, 104A, 104B, 104C; Food Science and Technology 107; Mathematics 13; Nutrition 112A, 112B, 113A, 113B; Physics 2A, 2B, 2C; Physiology, one course; Psychology 1A.

Home Economics Major

Bacteriology 2; Biology 1; Chemistry 1A, 1B, 8; Consumer Economics 142; Design 130, 150; Economics 1A; English 1A, 1B; Foods 100A, 100B; Human Development 131, 133, 137; Mathematics 13; Nutrition 112A, 112B; Physiology 2 or Animal Physiology 101; Psychology 1A; Home Management 140; Textiles and Clothing 7, 160. Students planning to meet the secondary teaching credential requirements or to qualify for agricultural extension positions should also complete the following: Design 130L; Foods 101A, 101B; Nutrition 113A, 113B; Home Management 140L; Textiles and Clothing 160L, 172, 370, 375.

Textile Science Major

Biology 1; Chemistry 1A, 1B, 8; Consumer Economics 141; Economics 1A, 1B; English 1A, 1B; Mathematics 13; Psychology 1A; Textiles and Clothing 7, 160, 161, 162, 172; plus either Group A or Group B as follows:

Group A: Bacteriology 2; Chemistry 1C, 5; Mathematics 15, 16A, 16B; Physics 2A, 2B, 2C.

Group B: Art 2, 3; Design 160A, 160B, 160C, 192A, 192B, 193; Textiles and Clothing 370; two courses in the history of art.

Curriculum in Food Science

Major: Food Science

Food science is the key to converting animal and plant products into a wide variety of processed and preserved foods. It applies physical and biological sciences in solving fundamental problems leading to technological advances in the processing of foods.

The chemical, microbial, and engineering aspects of food processing are emphasized in this program. The curriculum is sufficiently flexible to satisfy a student's individual interests and needs in specialized areas. Such specializations include *brewing technology*, *dairy technology*, *enology*, *fruit and vegetable technology*, and the *technology of meat and poultry processing*.

Graduates qualify for supervisory, technical, sales, and executive positions in the food and allied industries. Students who pursue graduate work in food science find additional opportunities, such as research and teaching positions in universities or research in governmental and industrial organizations.

The requirements for the major are met largely by upper division courses. The student should, therefore, devote his first two years chiefly to meeting core requirements. The following subjects and units constitute the core requirements for this curriculum:

Bacteriology	5
Biochemistry	9
Biology	6
Chemistry (including physical)	29
English and/or rhetoric	8
Mathematics (including calculus and statistics)	13
Physics	12
Social sciences and humanities electives*	28
Unrestricted electives†	24
<hr/>	
<i>Major requirements (see below)*</i>	<i>46</i>
<hr/>	
Total units required for the Bachelor of Science degree	180

The requirements given above allow for considerable flexibility, permitting the student to make certain selections in accordance with his academic preparation and his particular interests. The following two-year program is offered as a guide:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Biology 1	-	-	6
Chemistry 1A, 1B, 1C	5	5	5
English and/or Rhetoric 1A, 1B	4	4	-
Food Science 1	3	-	-
Mathematics 13	-	-	4
Electives†	3	6	-
<hr/>		<hr/>	
	15	15	15

6

Sophomore Year

Bacteriology 2	-	5	-
Chemistry 5	-	-	4
Chemistry 8	5	-	-
Mathematics 16A, 16B, 16C	3	3	3
Physics 2A, 2B, 2C	3	3	3
Physics 3A, 3B, 3C	1	1	1
Electives†	3	3	4
<hr/>		<hr/>	
	15	15	15

* Elective courses may be taken on a pass or fail basis.

† Electives to satisfy the requirements for the major; social sciences and humanities, including American History and Institutions; and unrestricted electives.

Food Science Major Requirements

Introduction to food science (Food Science 1)	3
Food chemistry (Food Science 101, 103)	8
Food engineering (Food Science 110A, 110B)	8
Food microbiology (Food Science 104A, 104B, 105A, 105B)	8
Electives approved by adviser†	19
	—
	46

(A food technology specialization is available to interested students under the Agricultural Science and Management curriculum described on page 65.)

Curriculum in Quantitative Biology

Majors: Biochemistry, Nutrition, Physiology.

The quantitative biology curriculum is designed primarily for students who plan to pursue study in biochemistry, nutrition, or physiology. By providing intensive basic training in biology, chemistry, physics, and mathematics, it will also thoroughly prepare students for advanced or professional study in these or other fields of quantitative biology such as biophysics or molecular biology, or in medicine.

Employment opportunities are available in government and industry programs of institutional research and teaching, and, following advanced preparation, in medical and academic institutions.

Requirements for the major are largely met by upper division courses. The students' first two years should, therefore, be devoted chiefly to meeting core requirements, many of which are satisfied by courses in the lower division. The early phases of study in the three majors are sufficiently similar to allow students to enter the curriculum and decide on a major after the first year if they wish.

The following subjects and units constitute the *core requirements* for the curriculum:

Biology	21
Preparation: Biology 1; one additional course chosen from Bacteriology 2, Botany 2, Zoology 2, or Physiology 101 and 101L.	
Upper Division Biology Core: at least one upper division course from two areas, other than the major subject: biochemistry, genetics, nutrition, physiology.	
Chemistry	25
English and/or rhetoric	8
Mathematics (including one year of calculus)	12
Physics (any courses, except Physics 10, and including at least one laboratory course)	12
Social science and humanities*	28
Unrestricted electives*	24

* Elective courses may be taken on a pass or fail basis.

† Electives to satisfy the requirements for the major; social sciences and humanities, including American History and Institutions; and unrestricted electives.

<i>Major requirements (see below)*</i>	50
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Total units required for the Bachelor of Science degree	180
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The requirements for each of the three majors are as follows:

Biochemistry

The science of biochemistry considers the quantitative, organic, and physical chemical aspects of living systems as these relate to the broad areas of zoology, botany, microbiology, and chemistry.

Core requirements must be met in part by an upper division course in genetics and at least 3 units of physics laboratory.

The major requirements are satisfied by:

Biochemistry 101A, 101B, 101L	9
Additional biochemistry or closely related courses	16
Chemistry 110A, 110B, 110C, 112C	14
Electives approved by the adviser; the students must include a course in, or present reading knowledge of, one of the following: German (preferably), French, Russian, or Japanese	11

Nutrition

50

This science is the study of the components of food which are basic to life and health. The biochemical and physiological aspects of these factors in the animal body are of primary interest.

Core requirements must be met in part by Bacteriology 2, English 1A, Physiology 101, 101L, and an upper division course in genetics.

The major requirements are satisfied by:

Biochemistry 101A, 101B, 101L (or Animal Biochemistry 102)	9
Animal Nutrition 110	5
Additional nutrition or closely related courses	20
Animal Physiology 110A, 110B, 111A, 111B	8

Electives approved by the adviser

Physiology

50

Physiology is concerned with the vital functions of living things which include a systematic study of the functional properties of tissues and organs, and comparisons of processes among different kinds of animals.

The core requirements must include at least 5 units each of physical and organic chemistry (Chemistry 112A is suggested for the latter), upper division courses in both genetics and nutrition, and Animal Physiology 101, 101L.

The major requirements are satisfied by:

Biochemistry 101A, 101B and laboratory (preferably Animal Biochemistry 102)	10
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* Elective courses may be taken on a pass or fail basis.

† Electives to satisfy the requirements for the major; social sciences and humanities, including American History and Institutions; and unrestricted electives.

Animal Physiology 100A, 100B, 100L, 110A, 110B, 111A, 111B.....	15
Additional physiology courses	10
Electives approved by the adviser (Chemistry 112D, 112E, and gross and microscopic anatomy are suggested)	15
	50

Curriculum in Soil, Water, and Atmospheric Sciences

Majors: Soil and Water Science, Atmospheric Science

The development, conservation, and proper utilization of the resources of soil, water, and air are recognized as critical in the welfare of nations. Management of these vital resources requires increasing numbers of technically qualified persons to deal with the complex, interdisciplinary problems posed by population pressures on these limited resources.

This curriculum provides fundamental training in the natural and physical sciences along with an understanding of the principles of resource management. Topics considered in the program leading to the major in Soil and Water Science include surface and ground-water supply, soil fertility and irrigation management, water quality and pollution, drainage, soil salinity, and reclamation, land preparation and irrigation methods, land classification and use, soil-water-plant relationships, and water rights. The program for the major in Atmospheric Science includes studies of the basic meteorological elements including atmospheric circulation and weather systems, solar and terrestrial radiation, turbulence and diffusion, meteorological instruments, and the applications of atmospheric science in agriculture.

Excellent employment opportunities are available for graduates of this curriculum in organizations such as irrigation or air pollution control districts, water companies, state and federal agencies, consulting firms and other domestic and international organizations dealing with the use and conservation of resources, fertilizer, irrigation, and air sampling equipment companies and other agricultural businesses, public utilities, agricultural extension service, and in private employment as technical specialists and farm operators.

Students interested in graduate work may progress toward higher degrees in the fields of soil, water, and plant science. (A resource technology specialization is available to interested students under the Agricultural Science and Management curriculum described on page 65.)

Courses specifically required for the majors occur entirely in the upper division. The student's first two years should, therefore, be devoted chiefly to meeting core requirements.

The following subjects and units constitute the *core requirements* for the curriculum:

Biology	6
Botany	5
Chemistry	10
Economics	5
English	8

Geology or physical geography	4
Mathematics (including calculus)	9
Physics	12
Plant science	3
Soil and water science	6
Social sciences and humanities electives*	23
Unrestricted electives†	24
	—
<i>Major requirements (see below)*</i>	<i>65</i>
	—
Total units required for the Bachelor of Science degree	180

The following two-year program is offered as a guide for the Soil and Water Science major:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 1A, 1B, 1C	5	5	5
English 1A, 1B	4	4	—
Biology 1	—	—	6
Plant Science 1	—	3	—
Mathematics 16A, 16B, 16C	3	3	3
	—	—	—
	12	15	14
<i>Sophomore Year</i>			
Physics 2A, 2B, 2C	3	3	3
Physics 3A, 3B, 3C	1	1	1
Soil and Water Science 1, 2	3	3	—
Chemistry 5	—	—	4
Geology 1, 1L	4	—	—
Electives†	4	8	3
Botany 2	—	—	5
	—	—	—
	15	15	16

Soil and Water Science Major Requirements

Chemistry (in addition to core requirements—including quantitative analysis)	9
Field of specialization electives	9
Physics of soil and water systems (Soil and Water Science 101)	5
Soil and water chemistry (Soil and Water Science 102)	5
Water quality, salt control, and reclamation (Soil and Water Science 103)	4
Water-soil-plant relationships (Soil and Water Science 104)	4
Electives approved by adviser†	29
	—
	65

* Elective courses may be taken on a pass or fail basis.

† Electives to satisfy the requirements for the major: social sciences and humanities, including American History and Institutions; and unrestricted electives.

The following two-year program is offered as a guide for the Atmospheric Science major:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Mathematics 1A, 1B, 1C	4	4	4
Physics 4A, 4B	-	4	4
Chemistry 1A, 1B	5	5	-
Biology 1	-	-	6
Geology 1, 1L, or Geography 1	4	-	-
Plant Science	-	3	-
Electives†	3	-	3
	—	—	—
	16	16	17
<i>Sophomore Year</i>			
Mathematics 2A, 2B, 2C	4	4	4
Physics 4C, 4D	4	4	-
English 1A, 1B	4	4	-
Botany 2	-	-	5
Atmospheric Science 20	-	-	4
Soil and Water Science 1, 2	3	3	-
Electives†	-	-	3
	—	—	—
	15	15	16

Atmospheric Science Major Requirements

Field of specialization electives	10
Thermodynamics and statics of the atmosphere (Atmospheric Science 120)	3
Dynamics of the atmosphere (Atmospheric Science 121)	3
Radiation in the atmosphere (Atmospheric Science 122)	3
Micrometeorology in agriculture (Atmospheric Science 123)	4
Meteorological instruments and observations (Atmospheric Science 124)	4
Mathematics (in addition to core requirement)	15
Physics (in addition to core requirements)	4
Electives approved by adviser†	19
	—
	65

Preparatory Curricula for Professional Schools

Preforestry

The School of Forestry, located on the Berkeley campus, educates men for the profession of forestry through its undergraduate and graduate programs. For admission to the School of Forestry, a student must have at least 84 quarter units of credit, including the prescribed subjects listed below, and a grade average of C or higher. The preforestry curriculum given at Davis prepares the student for the School of Forestry.

† Electives to satisfy the requirements for the major: social sciences and humanities, including American History and Institutions; and unrestricted electives.

The undergraduate forestry program has three parts:

1. *The preforestry curriculum*, which occupies the two lower division years and provides the necessary foundation in natural and social sciences.

2. *The summer field program*, Forestry 46, 47, 48, which is prerequisite to all required courses in the upper division forestry curriculum. This ten-week program, normally taken after the sophomore year, is offered only at Meadow Valley in Plumas County.

3. *The forestry curriculum*, which occupies the last two undergraduate years and provides the basic core of professional subject matter needed to insure thorough grounding in the principles of forestry. This curriculum is offered only at Berkeley.

The following required subjects and units make up the two-year lower division preforestry curriculum:

Biological sciences (including the equivalent of at least 4 units of botany and at least 3 units of zoology, genetics, or microbiology)	12
Chemistry (including not less than 5 units of organic chemistry or biochemistry)	10
Economics (elements of economics)	8
Engineering (plane surveying)	3
English and/or rhetoric	8
Geology	3
Mathematics (calculus required; linear algebra recommended)	8
Physics (general physics)	9
Statistical methods	4
<hr/>	
Total quarter units of preforestry requirements	63
Minimum quarter units of electives	21
Minimum quarter units to enter School of Forestry	84

The two-year program shown below is designed to serve as a guide in planning an efficient distribution of courses covering these requirements.

Freshman Year	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 1A, 1B, 8	5	5	5
English 1A-1B or Rhetoric 1A-1B	4	4	-
Physics 2A, 2B, 2C	3	3	3
Economics 1A	-	-	5
Electives†	4	4	3
<hr/>		—	—
	16	16	16

† Electives to complete the requirements of the curriculum; social sciences and humanities, including American History and Institutions; and unrestricted electives.



<i>Sophomore Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Biology 1	6	-	-
General Botany 2	-	5	-
Zoology 2	-	-	6
Economics 1B	-	5	-
Engineering 1	3	-	-
Mathematics 16A, 15, 13	3	3	4
Geology	3	-	-
Electives†	-	-	4
	—	—	—
Preveterinary Medicine	15	13	14

Students must complete at least 90 quarter units, including the required courses listed below. This normally requires a minimum of two years of study and satisfies the course requirements for admission to the School of Veterinary Medicine. For further information see page 121.

Subject and unit requirements for the preveterinary medical curriculum are:

Chemistry (general, qualitative, organic, and quantitative)	24
Physics (general)	9
Biology, zoology, embryology	17
English composition and additional English or rhetoric	8
Animal science**	3
Restricted electives in social sciences and humanities†	17
Additional electives in social sciences, humanities or agriculture.....	12
	—
	90

† Electives to complete the requirements of the curriculum; social sciences and humanities, including American History and Institutions; and unrestricted electives.

** May be waived if not available.

† Art, anthropology, economics, foreign languages, geography, history, music, philosophy, political science, psychology, and/or additional English, rhetoric, and mathematics.



COLLEGE OF ENGINEERING

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

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

Admission to Freshman Standing

General requirements for admission to the University are given on page 19.

High School Preparation for Engineering

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

	<i>Units</i>
Algebra*	2
Plane geometry*	1
Trigonometry*	½
Chemistry or physics (both are desirable)	1
Mechanical drawing	1

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

Advancement to Upper Division Standing

The student who enters the College of Engineering in lower division standing is eligible for advancement to the upper division when he completes the lower division program with an overall grade-point average of 2.00 or better.

Admission to Upper Division Standing

To qualify for admission to the College of Engineering in upper division standing, the applicant must have completed at least 56 semester units (or 84 quarter units), including the following subjects, with an overall C (2.00) average.

	<i>Minimum number of semester units</i>
Analytic geometry and calculus	12
Chemistry (for engineering and science students)	8
Physics (for engineering and science students)	10
Engineering (subjects such as graphics, properties of materials, surveying, engineering measurements, statics, and circuit theory)	10
Humanistic-social studies (must be selected from the list of courses approved by the Committee on Undergraduate Study)	6

* Or equivalent integrated courses covering the same subject material.

*Minimum number of
semester units*

Unspecified subjects (6 units may be in humanistic-social studies; the remaining units should be in engineering, science, and mathematics, and may include units in mathematics, physics, chemistry and engineering in addition to the minimum numbers specified above. Students preparing for the Chemical Engineering curriculum at Davis should take in their sophomore year quantitative analysis and one course in organic chemistry with laboratory. None of these units may be in military science or physical education)	10
	— 56

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

Note that the above subject requirements are *minimum*. Students who enter with only 56 semester units will probably require more than six quarters to complete an upper division engineering curriculum in the University.

With certain minor exceptions noted in the lower division program, students registered in the College of Engineering are not permitted to enroll in upper division engineering courses until they have been admitted to upper division standing.

The Bachelor of Science Degree

GENERAL UNIVERSITY REQUIREMENTS

The degree of Bachelor of Science is awarded to those candidates who satisfy the requirements of the University (pages 33-35) in regard to:

- Subject A
- American History and Institutions
- Scholarship
- Residence
- Application for Degree Candidacy

COLLEGE OF ENGINEERING REQUIREMENTS

The candidate for the degree of Bachelor of Science in Engineering must:

1. Satisfactorily complete the subjects and units prescribed in one of the engineering curricula.
2. Attain a grade C average in all courses of upper division level taken in satisfaction of required technical subjects and technical electives in the curriculum.

HONORS WITH THE BACHELOR'S DEGREE

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

FACULTY ADVISERS AND STUDY-LIST REQUIREMENTS

Upon admission to the College, each student is assigned to a faculty adviser and is under the guidance of the Dean of the College of Engineering and the Committee on Undergraduate Study. All programs of study 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 deviations from a regular program of study should be discussed with the adviser and resolved at the earliest possible date.

A student who gives full time to University responsibilities is expected to enroll for the number of units specified in the curriculum in which he intends to graduate. Students may not enroll for more than 19 units or less than 14 units, exclusive of physical education, without the approval of the Dean of the College of Engineering.

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

HUMANISTIC-SOCIAL STUDIES

The curricula, in conformance with the regulations of the College of Engineering, include a minimum of 27 quarter 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 areas of learning other than engineering and the physical sciences. At least 9 quarter units (or 6 semester units) must be completed while the student is in the lower division and at least 8 quarter units of upper division courses must be completed after he 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 Committee on Undergraduate Study. The list includes courses from such fields as history, economics, government, literature, sociology, and fine arts; it does not include such courses as accounting, hygiene, industrial management, finance, and personnel administration.

TECHNICAL ELECTIVES

Each upper division program includes a substantial number of technical elective units and lists suggested courses that may be taken as technical electives.

With the adviser's approval, other appropriate courses in engineering, science, or mathematics may be taken in partial satisfaction of the technical elective requirement. A student who wishes to combine two or more technical areas may arrange such a program with the help of his adviser. Students who expect to undertake graduate study should elect additional courses in mathematics, the sciences, and basic engineering subjects as early as possible in their undergraduate program. The entire upper division program should be planned, at least tentatively, early in the junior year. Careful attention should be given to course sequences so that prerequisite courses will be taken at the proper time.

Lower Division Program

The following two-year program is prescribed for all lower division students in the College of Engineering. It provides the beginning student with the fundamentals of science, mathematics, and engineering essential as preparation for the engineering sciences and professional studies of the upper division. The 9 units of elective courses scheduled in the sophomore year may be used for military science. Students enrolling in ROTC will thus normally enroll in one more unit per quarter during the freshman year and one less unit per quarter during the sophomore year than indicated in the program.

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 3A ... 2	Engineering 3B 2	Chemistry 1C 5	
Chemistry 1A 5	Chemistry 1B 5	Mathematics 1C ... 4	
Mathematics 1A ... 4	Mathematics 1B ... 4	Physics 4B 4	
Humanities-Social Sciences 4	Physics 4A 4	Humanities-Social Sciences 4	
—	—	—	—
15	15	15	17

<i>Sophomore Year</i>			
Technical Elective* 3(4)	Engineering 35 3	Technical Elective* . 4(3)	
Engineering 5 2	Mathematics 2B ... 4	Mathematics 2C ... 4	
Mathematics 2A ... 4	Physics 4D 4	Physics 4E 4	
Physics 4C 4	Humanities-Social Sciences 3	Elective† 3	
Elective 3	Elective 3		
—	—	—	—
16(17)	17	17	15(14)

Upper Division Curricula

The upper division curricula in the several engineering areas (Aerospace, Agricultural, Chemical, Civil, Electrical, and Mechanical) are described in the following pages. Several courses required in the first quarter of the junior year are the same in most of the programs. The total undergraduate curriculum normally requires twelve quarters of study and leads to the Bachelor of Science degree.

* Students who plan to follow the upper division program in Chemical Engineering take Chemistry 5 and Engineering 102A; all others take Engineering 4 and Engineering 45.

† Engineering 107 may be taken as an elective in the sophomore year.

AEROSPACE ENGINEERING CURRICULUM (188 Units)

Aerospace engineering is the application of scientific knowledge to flight in the atmosphere and beyond. Specific objectives are the design, development, and manufacture of airplanes, helicopters, missiles, rockets, satellites, and space stations. The undergraduate curriculum combines the study of basic engineering disciplines with courses in aerodynamics, guidance, propulsion, and structures. A broad range of technical elective courses is available from which the student may select subjects of a more specialized nature such as aeronautics, aerostructures, and astronautics.

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

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 102A ... 3	Engineering 100 2	Engineering 103B ... 3	
Engineering 104A ... 3	Engineering 101 2	Mechanical	
Engineering 105A ... 3	Engineering 102B ... 3	Engineering 111 .. 4	
Engineering 107 3	Engineering 103A ... 3	Mechanical	
Humanities-Social	Engineering 104B ... 3	Engineering 121 .. 3	
Sciences 4	Engineering 105B ... 3	Electrical	
		Engineering 160A . 3	
		Electrical	
		Engineering 161A . 2	
	—	—	—
	16	16	15
<i>Senior Year</i>			
Mechanical	Engineering 106 3	Engineering 190 3	
Engineering 123A . 2	Mechanical	Mechanical	
Mechanical	Engineering 128 .. 3	Engineering 123B . 2	
Engineering 127 .. 3	Humanities-Social	Humanities-Social	
Engineering 185 3	Sciences 4	Sciences 4	
Humanities-Social	Technical Elective .. 6	Technical Elective .. 6	
Sciences 4			
Technical Elective .. 3			
	—	—	—
	15	16	15

Suggested technical electives are: Engineering 180, 183, 186, 187; Applied Science 100, 115; Civil Engineering 131A, 131B, 135; Electrical Engineering 180, 181A, 182, 187A, 187B; Mechanical Engineering 124, 125, 130A, 130B, 135, 185A, 185B, 188.

AGRICULTURAL ENGINEERING CURRICULUM (191 Units)

The program of study in agricultural engineering prepares the student to apply engineering principles to the problems of agriculture and related industries. Agricultural engineering involves extensive utilization of basic knowledge and techniques from several other fields of engineering; it is unique in that it

also requires a general understanding and appreciation of biological and soil-management aspects of agriculture.

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

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

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

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

Junior Year	Fall	Winter	Spring
Engineering 100 . . . 2	Engineering 102B . . . 3	Engineering 103B . . . 3	
Engineering 101 . . . 2	Engineering 103A . . . 3	Engineering 104B . . . 3	
Engineering 102A . . . 3	Engineering 104A . . . 3	Technical Elective* . . . 6	
Engineering 105A . . . 3	Engineering 105B . . . 3	Humanities-Social	
Engineering 107 . . . 3	Electrical	Sciences 4	
Humanities-Social	Engineering 160A . 3		
Sciences 4			
—		—	
17		15	
			—
			16

Senior Year

Agricultural	Agricultural	Agricultural
Engineering 114 . . . 4	Engineering 125 . . . 4	Engineering 116 . . . 4
Engineering 185 . . . 3	Engineering 106 . . . 3	Agricultural
Mechanical	Engineering 190 . . . 3	Engineering 132 . . . 4
Engineering 118 or	Technical Elective* . . . 3	Technical Elective* . . . 3
Civil Engineering	Humanities-Social	Humanities-Social
131A 3	Sciences 4	Sciences 4
Technical Elective* . . . 6		
—		—
16		17
		—
		15

* The 18 units of technical electives must include at least 3 units of agricultural engineering courses from the list of suggested technical electives and 6 units in agricultural science fields (animal science, plant science, soil and water science). Students not electing military science should consider taking a lower division agricultural science course in their sophomore year.

Suggested technical electives are: Agricultural Economics 140; Agricultural Engineering 106, 117, 118, 126; Agronomy 100; Animal Science 2; Applied Science 115; Civil Engineering 131B, 132A, 132B, 132C, 142; Engineering 184; Electrical Engineering 160B; Mathematics 105A; Mechanical Engineering 114, 115, 121, 122; Plant Science 2; Soil and Water Science 1; Water Science and Engineering 110A, 160; Vegetable Crops 100.

CHEMICAL ENGINEERING CURRICULUM (193 Units)

Chemical engineering is concerned with converting raw materials into useful products. 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 knowledge of the engineering and chemical sciences so that he may achieve competence in treating not only current technical problems but also those that will arise in the technologies of the future. In the upper division, attention is focused on basic engineering courses, particularly thermodynamics, fluid mechanics, and energy and mass transfer. In the senior year these fundamentals are drawn together and applied in process and plant design. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

The curriculum includes several technical electives which allow for special training in an area of particular interest. For example, Davis offers a unique opportunity for specialization in 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.

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 104A . . . 3	Engineering 103B . . . 3	Chemical	
Engineering 103A . . . 3	Engineering 105A . . . 3	Engineering 152 . . . 3	
Chemical	Chemistry 112A . . . 5	Engineering 185 . . . 3	
Engineering 151 . . . 3	Chemistry 110B . . . 3	Chemistry 112D . . . 3	
Chemistry 110A . . . 3	Humanities-Social	Chemistry 110C . . . 3	
Mathematics Elective* 3	Sciences 4	Chemistry 111 4	
—	—	—	—
15	18		16

* A course to be selected from the suggested list of mathematics electives.

<i>Senior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 100 2	Chemical	Chemical	
Engineering 101 2	Engineering 155A . 1	Engineering 155B . 2	
Engineering 107 3	Chemical	Chemical	
Chemical	Engineering 154B . 3	Engineering 158 .. 3	
Engineering 154A . 3	Chemical	Chemical	
Technical Elective ... 3	Engineering 156A . 3	Engineering 156B . 3	
Humanities-Social Sciences 4	Technical Elective ... 3	Technical Elective ... 3	
	Economics Elective† . 3	Humanities-Social Sciences 4	
	Humanities-Social Sciences 4		
—	—	—	
17	17		15

Suggested technical electives are: Engineering 102B, 104B, 186; Applied Science 115; Bacteriology 2; Biochemistry 101A, 101B; Biology 1, 4; Chemistry 121, 124, 126A, 126B, 131, 150A, 150B; Civil Engineering 142, 148; Electrical Engineering 160A, 160B, 180, 181A, 181B, 182; Food Science and Technology 101, 103, 104A, 104B, 106; Mathematics 118A, 118B, 119, 127A, 127B, 128A, 128B, 131A, 131B, 131C, 132A, 132B, 185; Mechanical Engineering 125, 185A, 185B; Physics 115A, 115B, 121, 129A, 129B, 140.

CIVIL ENGINEERING CURRICULUM (190 Units)

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

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

Structural Engineering and Mechanics is concerned with the conception, design, and construction of structures. Structural engineering involves buildings, bridges, highways, dams, economics of the construction industry, and construction practices. Consideration is given to the response of structures not only to gravity loading but also to earthquake, wind, and blast loading. Structural mechanics emphasizes the more analytical aspects of structural engineering. Principles of structural analysis applicable to structures of all kinds, from office buildings to space vehicles, are examined. Special topics include the mechanics of deformable bodies and the theory of elasticity.

Water Resources Engineering includes programs in Hydraulics, Irrigation and Drainage, and Water Resources Systems Design. *Hydraulics* is concerned with flow in pipe and open-channel water-distribution systems and through hydraulic structures, and depends upon a strong foundation in fluid mechanics, systems analysis, and hydrology. *Irrigation and Drainage* provides a unique program aimed at the solution of water-oriented agricultural problems by emphasizing

† To be chosen from Engineering 106, Agricultural Economics 18, or Economics 1A.

the application of hydrologic sciences, hydraulic engineering, agricultural sciences, and system analysis to the design and operation of irrigation and drainage projects. Special topics include study of water-soil-plant relations, water rights, land preparation and water application, water quality, and soil and water pollution. *Water Resources Systems Design* is concerned with the comprehensive development of water resources for multiple use. Emphasis is placed on principles of planning, analysis, and engineering design and operation as related to the water needs and wastes of industry, agriculture, recreation, and other activities. The program may include elective courses in the geography, economics, and politics of water resources.

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 100 ... 2	Engineering 102B ... 3	Engineering 103B ... 3	
Engineering 101 ... 2	Engineering 103A ... 3	Civil Engineering	
Engineering 102A ... 3	Engineering 104B ... 3	131A 3	
Engineering 104A ... 3	Civil Engineering	Civil Engineering	
Engineering 105A ... 3	132A 3	132B 3	
Engineering 107* ... 3	Humanities-Social Sciences 4	Civil Engineering	
		132C 2	
		Civil Engineering 171 3	
		Geology 1A 2	
	—	—	—
	16	16	16
<i>Senior Year</i>			
Civil Engineering	Engineering 106 ... 3	Engineering 190 ... 3	
131B 2	Technical Elective ... 9	Technical Elective ... 9	
Civil Engineering	Humanities-Social Sciences 4	Humanities-Social Sciences 4	
172 2			
Civil Engineering 142 4			
Humanities-Social Sciences 4			
Technical Elective ... 3			
—	—	—	—
15	16	16	16

Suggested technical electives are:

Environment Engineering: Agricultural Engineering 106; Bacteriology 2; Biochemistry 101A, 101B; Chemistry 8, 110A-110B; Civil Engineering 145, 146, 147, 148, 149; Geography 3; Mechanical Engineering 185A-185B; Park Administration 110.

Structural Engineering and Mechanics: Engineering 180, 183, 187; Agricultural Engineering 125, 126; Applied Science 115; Civil Engineering 134, 135, 137, 138, 160, 173; Mathematics 185B; Mechanical Engineering 122, 184, 188.

Water Resources Engineering: Applied Science 115; Chemistry 5; Civil Engineering 141, 143, 144, 145, 146, 148; Electrical Engineering 180, 182; Mechanical Engineering 185A-185B; Soil and Water Science 103; Water Science 10, 110A, 116, 141, 150, 160, 170.

* Engineering 107 may be taken in sophomore year concurrently with Mathematics 2C.

ELECTRICAL ENGINEERING CURRICULUM (190 Units)

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

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

Technical electives are a substantial part of the senior-year program. They may be selected from a wide range of courses in electrical engineering, other engineering fields, mathematics, and the physical and biological sciences. Typical fields of specialization are information and data processing, control theory, computers, communications, electronics, biomedical engineering, system theory, solid state, and high-frequency phenomena and devices.

The variety of course offerings permits the student to prepare himself for graduate study in electrical engineering, or to stop at the bachelor level with a sound background in his specialty. In the electrical engineering curriculum the close correlation between theory and experiment is emphasized.

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 100 2	Electrical	Electrical	
Engineering 101 2	Engineering 160A . 3	Engineering 160B . 3	
Engineering 102A 3	Electrical	Electrical	
Engineering 104A 3	Engineering 161A . 2	Engineering 161B . 2	
Engineering 105A 3	Electrical	Electrical	
Engineering 107 3	Engineering 181A . 3	Engineering 170 3	
	Electrical	Electrical	
	Engineering 182 3	Engineering 181B . 3	
	Humanities-Social	Engineering 103A 3	
	Sciences 4	Physics 121 3	
	—	—	—
	16	15	17

Senior Year

Electrical	Engineering 106 3	Engineering 190 3
Engineering 166 3	Technical Elective 6	Technical Elective 9
Electrical	Mathematics or	Humanities-Social
Engineering 169 2	Physics Elective 3	Sciences 4
Humanities-Social	Humanities-Social	
Sciences 4	Sciences 4	
Technical Elective 6	—	—
	15	16
	—	—
	15	16

Suggested technical electives are: Applied Science 115; Electrical Engineering 163, 164, 165A, 165B, 165C, 167, 171A, 171B, 171C, 180, 187A, 187B; Mathematics 105A, 105B, 128A, 128B, 128C, 129, 131A, 131B, 131C, 132A, 132B, 150A, 150B, 151A, 151B, 185; Mechanical Engineering 124; Engineering 180; Physics 115A, 115B, 129A, 129B, 140.

MECHANICAL ENGINEERING CURRICULUM (188 Units)

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

The mechanical engineering curriculum is based on a common core of engineering courses taken in the first two years. The third year is spent in further study of fundamental courses, and in the fourth year the student may tailor his studies to his own interests by selecting courses in the fields of heat transfer, fluid mechanics, thermodynamics, mechanical design, or material science. With the range of electives available, the student can prepare himself for graduate study in mechanical engineering, or obtain a broad background for entering engineering practice at the bachelor's level.

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 102A ... 3	Engineering 100 2	Engineering 103B ... 3	
Engineering 104A ... 3	Engineering 101 2	Mechanical	
Engineering 105A ... 3	Engineering 102B ... 3	Engineering 111 .. 4	
Engineering 107 ... 3	Engineering 103A ... 3	Mechanical	
Humanities-Social	Engineering 104B ... 3	Engineering 121 .. 3	
Sciences 4	Engineering 105B ... 3	Electrical	
		Engineering 160A . 3	
		Electrical	
		Engineering 161A . 2	
	—	—	—
	16	16	15
<i>Senior Year</i>			
Engineering 185 3	Engineering 106 3	Engineering 190 3	
Mechanical	Humanities-Social	Mechanical	
Engineering 118 .. 3	Sciences 4	Engineering 123B . 2	
Mechanical	Technical Elective ... 9	Humanities-Social	
Engineering 123A . 2		Sciences 4	
Humanities-Social		Technical Elective ... 6	
Sciences 4			
Technical Elective ... 3			
	—	—	—
	15	16	15



Suggested technical electives are:

Heat transfer—fluid mechanics—thermodynamics option: Engineering 180, 186; Applied Science 100, 115; Electrical Engineering 160B, 180, 181A, 182, 187A, 187B; Mechanical Engineering 124, 125, 127, 128, 130A, 130B, 135, 185A, 185B.

Mechanical Design option: Engineering 122, 180, 183, 187; Agricultural Engineering 118; Applied Science 115; Civil Engineering 131A, 131B, 135; Electrical Engineering 160B, 161B, 163, 180, 182, 187A, 187B; Mechanical Engineering 114, 115, 120, 124, 129A, 129B, 140, 184, 188.

Graduate Study

The Departments of Agricultural Engineering, Applied Science (Davis-Livermore), Chemical Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering offer courses of study leading to the degrees of Master of Science and Doctor of Philosophy. These programs are particularly appropriate for those wishing to prepare themselves for careers in teaching, research or analytical design. Professional programs emphasizing design and leading to the degrees of Master of Engineering and Doctor of Engineering are offered by the Departments of Agricultural Engineering, Civil Engineering, and Mechanical Engineering.

At both master's and doctoral levels, the student plans his course of study with the help of an adviser or guidance committee. He is permitted wide latitude in the selection of courses and thesis subjects so long as his program is purposeful and well-integrated.

The graduate courses offered in the College of Engineering are described in the departmental listings (pages 193-209).

General information on graduate study may be found in the "Announcement of the Graduate Division" which can be obtained by writing to the Dean of the Graduate Division. Detailed information on graduate engineering programs is contained in the bulletin "Graduate Study in Engineering" obtainable from the Associate Dean, Graduate Studies, College of Engineering. Students interested in programs in Applied Science should request a copy of the "Announcement of the Department of Applied Science" from the Department of Applied Science, P.O. Box 808, Livermore, California 94551.



COLLEGE OF LETTERS AND SCIENCE

The College of Letters and Science offers curricula that enable the student to pursue fundamental knowledge primarily for its own sake and to learn basic intellectual disciplines. Programs of study in the College expose the student to man's social, aesthetic, and material achievements, as well as to the challenge of his ethical, political, and physical environment. In many cases the pursuit of cultural truths will also lead the student to an appreciation of the individual's capacity for unique creative expression. Such a liberal education has increasing vocational value, since more and more career opportunities presuppose a basic letters and science degree; nevertheless, the main emphasis in the College rests on the ends of living rather than on the means. A well-balanced liberal education, including specialized knowledge in his major field, prepares the graduate for a satisfying life whatever his career.

Graduation from the College of Letters and Science presupposes fulfillment of the general University requirements. In addition, to achieve its educational objectives, the College has established certain specific standards relating to scholarship, senior residence, and unit distribution within the student's program of study. The two most important standards determining the unit-distribution pattern are those which relate to the Breadth Requirements, and to the Departmental Major Requirement. The *Breadth Requirements* are designed to provide a broad background of knowledge and to promote a sensitivity in the student for cultural interrelationships. The *Major Requirement* enables the student to gain intellectual depth and competence in his chosen field of specialization. Requirements within the various departmental major programs are determined and administered by the separate departments, or, in the case of interdepartmental or individual group majors, by an interdepartmental committee or group.

The College offers the undergraduate degrees of Bachelor of Arts and Bachelor of Science. These degrees are conferred upon completion of the general University and College requirements, detailed below for each of these degrees. *Every student is responsible for seeing that he meets the University, College, and departmental or committee requirements for graduation.*

Should need arise, from the standpoint of the student, for changes at any time in the composition or unit load of his program of studies, the student is expected to take the initiative by promptly contacting his instructor, adviser, and—if necessary—the academic dean to insure effective action within the established deadlines. It is also the student's responsibility throughout the academic term to apprise himself of the quality of his performance by means of consultation with his instructors during their designated office hours.

The specific subject requirements for the bachelor's degree may be satisfied only by:

1. Courses in regular sessions of the University of California or University summer session courses identified with the letter "S."
2. Courses for which transfer credit is granted from another college or university.

3. With the written permission of the academic Dean, courses in University Extension, University of California, with numbers having the prefix "X" either singly or combined with other letters. The Dean of the College only under exceptional circumstances permits students in residence to enroll in Extension courses for elective credit. No grade points are assigned for courses completed in University Extension.

General University Requirements

All candidates for the bachelor's degree are obligated to satisfy the University requirements (pages 33-35) in regard to:

Subject A

American History and Institutions

Scholarship

Maximum Unit Credit from Junior Colleges (see page 22)

Residence (for additional College stipulations, see page 99)

Application for Degree Candidacy

College of Letters and Science Requirements

UNIT DISTRIBUTION REQUIREMENTS

Satisfactory completion of a minimum of 180 units is required for graduation from the College of Letters and Science.

A. At least 150 units must be completed in courses given by departments in the College of Letters and Science (page 100) so as to provide the following distribution:

1. Breadth Requirements. (No course applied toward satisfaction of one breadth requirement may be offered to satisfy another.)

a. *English 1A-1B* (English Reading and Composition), to be completed directly after meeting the Subject A requirement.

b. *Foreign Language* (for details of this requirement see page 102).

<i>A.B. degree:</i> 18 units or the equivalent in one language.	<i>B.S. degree:</i> 18 units or the equivalent in one language begun in high school, or 12 units in one language begun in college.
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c. *Area Requirements* (see pages 108-109 for classification of courses).

<i>A.B. degree:</i>	<i>Units</i>	<i>B.S. degree:</i>	<i>Units</i>
Humanities		Humanities	
Natural Sciences	{	Social Sciences }	22
Social Sciences	52	Natural Sciences	90
(20 units in each of two of the above areas, 12 in the third.)			—
			112

2. At least 54 units must be in upper division courses in Letters and Science departments.

B. Not more than 45 upper division units in one department may be counted toward the A.B. degree. For exceptions applying to honors students, see page 107.

C. Study programs totaling less than 12 units per quarter must be approved by the Dean of the College. The maximum program permissible without special approval by the Dean is 17 units for all freshmen, as well as for transfer students who are in their first quarter of residence.

SCHOLARSHIP REQUIREMENTS

In addition to the general University requirements of a C average (2.00) for all University work, the College stipulates separate averages of at least C for:

1. All courses required in the major program, and for
2. All upper division courses required for the major program.

At the option of the department or interdepartmental committee administering the major, students failing to meet the above conditions may be denied the privilege of pursuing that major.

Passed or Not Passed Privilege. A student not on academic probation has the option of registering for one course each quarter on a "Passed" or "Not Passed" basis under the following conditions:

1. A grade of "Passed" shall be awarded only for work which would otherwise receive a grade of "C" or better.
2. Intent to enroll in courses under these circumstances must be filed with the Registrar on or before the last day to add courses to study lists (see University Calendar) and may not be reversed after that date.
3. More than one course per quarter may be taken on this basis by accumulating options unused in previous quarters.
4. A part-time student may enroll in courses on a "Passed" or "Not Passed" basis in the same proportion of his *total* program as permitted to a full-time student (one who undertakes at least 12 units each quarter).
5. Units earned with a "Passed" grade count toward the degree, but the course whether passed or not passed is disregarded in computing grade-point average.

Readmission after Dismissal. A student dismissed from the University for scholastic reasons may apply for readmission after a year's waiting period. Favorable consideration will be given students whose grade-point deficit is not excessive and who can demonstrate a readiness to return (e.g., "B" average from another collegiate institution school attended while in dismissed status, good performance in University summer session, etc.).

SENIOR RESIDENCE REQUIREMENT

All candidates for the bachelor's degree must complete 36 of the final 45 quarter units in the College in residence courses of instruction. While up to nine of the final 45 quarter units may thus be completed in another college, any student planning to take senior-year work elsewhere should secure the approval

of the College before undertaking such work. He should realize that a delay in granting the degree may result since credit is not allowed until an official transcript is received from the institution attended.

Students entering the College in senior standing from another institution or from another college or school within the University, must include in the final 36 units at least 27 quarter units of work in upper division courses offered by departments in Letters and Science, including at least 18 units in the major program.

REQUIREMENTS IN THE MAJOR

The number of upper division units a student must complete in the subject of his major varies among departments, the requirement ranging from 36 to 45 units. Major programs are designed by the Faculty of the College to insure that all students pursuing the same major will acquire certain knowledge in common. In addition, each student is encouraged to engage in independent study within the major.

A student must declare his major program by the time he has completed 84 units, but he may designate his preference as early as he wishes. As soon as a student has been accepted for a major program, he is assigned an adviser by his major department.

A student may change from one major to another with the approval of the Dean of the College and with the consent of the department or committee in charge of the new major. Petitions for change of major are made on forms obtainable from the Dean of the College. After the beginning of the senior year, a student may not transfer from one major program to another, or from B.S. to A.B. (or vice versa). A student may not elect an individual group major after beginning the final quarter of his junior year.

Three types of programs satisfy requirements for the major: departmental, interdepartmental, and individual group programs.

A. Departmental Majors. The requirements for departmental major programs are described in detail under departmental listings. Any student who fulfills the major requirements of two departments in the College of Letters and Science may elect to receive a bachelor's degree in both fields. Major programs leading to a Bachelor of Arts degree are offered in the following departments; those departments also offering programs leading to a Bachelor of Science degree are indicated by an asterisk (*):

Anthropology	Geography	Physical Education
Art	Geology*	Physics*
Bacteriology*	German	Political Science
Botany*	Greek	Psychology
Chemistry*	History	Rhetoric
Dramatic Art	Latin	Russian
Economics	Mathematics*	Sociology
English	Music	Spanish
French	Philosophy	Zoology*

B. Interdepartmental Majors. These programs are intended for students interested in broader scope than that provided by a departmental major. Interdepartmental major programs leading to a Bachelor of Arts degree are offered in:

American History and Literature (see page 146)

Biological Sciences (see page 168)

International Relations (see page 251)

The Biological Sciences and the Physical Sciences programs also offer a Bachelor of Science degree.

C. Individual Group Majors. An individual group major may be organized for a student having a specific academic interest not represented by an established major. Such a major involves interrelated courses from two or more departments and must consist of not fewer than 45 upper division units or more than 54. After preliminary consultation with the Dean of the College about this special program, the student plans his major with a member of the department in which he will do most of his work. He then submits the proposed program to the Dean at least four quarters before graduation for final approval by the Executive Committee of the College. This proposal must include: (1) a description of the special educational aims of the major and (2) a list of lower division prerequisites for the major and the required upper division courses. It must also be accompanied by a Petition for Change of Major.

BACHELOR'S DEGREE CANDIDATES

Senior Degree Check. At the beginning of his senior year, each student should request a *Degree Check* from the Dean's Office. Shortly after filing this request, the student will be sent a statement indicating any unfulfilled *University* and *College* degree requirements. Information about progress in completing requirements in the *major* should be obtained by conferring with his academic adviser.

Filing for Candidacy. Each candidate for graduation must file an Announcement of Candidacy with the Registrar at the beginning of the quarter in which he plans to graduate. The dates for filing are published on pages 5-8 of this catalog.

Planning the Program

Before instruction begins each quarter, the student should prepare a tentative program of study. He will then meet with his faculty adviser to review the proposed program and to obtain approval of an official study list. Faculty advisers are assigned to each new student at the beginning of the registration period. The official study list as approved must be filed with the Registrar according to the procedures described in the *Schedule and Directory*, available at the beginning of each quarter.

Undeclared Status. Entering freshmen and sophomores are officially designated as *Undeclared*. To insure counseling by the appropriate academic adviser,

however, each student is asked to indicate a field of interest or unofficial major while in undeclared status. (Preprofessional students see page 104.)

Declaration of Major. A student may declare his official major at the end of his freshman year; he must do so by the end of his sophomore year. After securing a petition for Change of Major at the Dean's office, he should report to the departmental office of his major choice for adviser assignment. (Biological and Physical Science majors report to the Dean's office.)

Study List Regulations. A study list totaling fewer than 12 units requires the approval of the Dean of the College, and will be allowed only in cases of poor health or regular outside employment. Freshmen and transfer students in their first quarter of residence may not undertake more than 17 units without special permission from the Dean. For purposes of calculating program load, the total number of units shown on the study list must include the unit value of repeated courses and of any course work not carrying degree credit (for example, Subject A and foreign language courses which duplicate high school training).

No course may be added to the study list after the tenth day of instruction, and, except in the case of prolonged illness or emergency, students will receive a grade of F in any course dropped after the third week of instruction.

Faculty Advisers. The purpose of the faculty adviser in the College of Letters and Science is to counsel the student on his overall program and to insure that he acquires a meaningful liberal education, makes normal progress toward completion of degree requirements, and undertakes an appropriate program of studies each quarter. The student may consult his adviser or the Dean of the College about any additional academic problems.

1. *Entering freshmen who participate in the summer advising program* are assisted in planning their fall quarter program by a temporarily assigned summer adviser. Assignments to regular advisers are indicated on rosters posted in the Administration Building at the beginning of the fall quarter.

2. *Other entering lowerclassmen* are assigned faculty advisers following the Letters and Science Assembly scheduled during Orientation Week at the beginning of each quarter.

3. *New upperclassmen* report directly to the departmental office of their major during Orientation Week. (Biological and Physical Science majors report to the Dean's office.)

4. *Limited students and special students* are under the direct supervision of the Dean of the College. Their study lists must be presented to the Dean each quarter for approval.

ENTERING FRESHMEN

Because of the wide choice of subjects open to the Letters and Science student, a sample first-year program is not feasible. The entering freshman should, however, be able to plan his first-year program satisfactorily by keeping in mind the following points.

1. English 1A-1B should be completed after the Subject A requirement has been met.

2. The foreign language requirement should be completed by the end of the first or second year, as program priorities permit. Upon admission to the College, a student electing to continue a language studied in high school must take the Foreign Language Placement Test in that language. The placement test does not yield unit credit; it only determines whether the requirement has been met or whether additional work in the language is required. Students whose scores place them below the course level expected on the basis of high school preparation (see table below) will receive reduced unit credit as follows:

- for placement into a course just preceding the normal continuation course, one-half the unit value of the course will be granted;
- for placement into any lower course, no unit credit will be allowed.

*Foreign Language Placement Equivalences
for French, German, Italian, Latin and Spanish**

<i>Level of High School Language</i>	<i>College transfer courses (4-unit semester equivalence)</i>	<i>Normal quarter-course continuation</i>
0	0	first
1	0	first
2**	1	third
3	2	fourth
4	-	fifth
-	3	sixth

Students continuing a language studied in high school must complete the first 18-unit sequence.

Students beginning the study of a language at the University and enrolled in an A.B. program must also complete the first 18-unit sequence, or in most languages through the fifth-quarter course, while those enrolled in a B.S. program are obliged to complete the first 12-unit sequence, or through the third-quarter course.

3. The Area Requirements in the humanities, natural sciences, and social sciences, for students enrolled in an A.B. program, call for a total of 52 units, which should be completed by the junior year (see pages 108-109 for the three Area Lists).

These area requirements are particularly important for the entering freshman who has not decided on a major. Careful consultation with his adviser and thoughtful selection from each of the three groups will help the student to determine his preference for a major. Entering freshmen who feel certain of their major field should consult the requirements of that major in planning their first-year program, as a first-year course may be a prerequisite for further studies in that field.

* A student continuing a language not listed above should consult the Dean of the College of Letters and Science if placement or credit is in question.

** For students at this level placing in (or for transfer students electing) course 2, which would partially duplicate previous work, only one-half the unit value of the course will be granted.

CREDIT BY ADVANCED PLACEMENT TESTS

Students may fulfill a part of the breadth requirements in the College at the time of admission by credit allowed for College Entrance Examination Board Advanced Placement Test scores of 5, 4, or 3. Advanced Placement Test credit will fulfill breadth requirements in the College of Letters and Science as follows:

<i>Test</i>	<i>Breadth Requirement Met, and Graduation Credit Allowed.</i> (Equivalent courses and quarter unit values indicated)
Biology	Biology 10; 4 units toward natural science requirement.
Chemistry	No Area credit, but 4.5 units credit toward graduation.
English	English 1B; 4 units of English reading and composition. (Does not exempt students from Subject A requirement.)
Foreign Language	French 6, or Spanish 6; fulfills foreign language requirement. Five units allowed toward humanities requirement.
History (American) (European)	History 17B; 4 units toward humanities requirement. History 4B; 4 units toward humanities requirement.
Mathematics	Mathematics 1A, 1B; 8 units toward natural science requirement.
Physics	Physics 10; 4 units toward natural science requirement.

Preparation for Admission to Professional Schools

Since preprofessional programs are not major programs, students preparing for admission to a professional school are expected to follow the procedures governing the declaration of majors outlined on page 100 and to select courses which fulfill College requirements as well as their professional needs.

Since there are no specially designated preprofessional advisers in the College of Letters and Science, students planning to seek admission to a professional school should communicate as early as possible with the deans of the professional schools of their choice for precise admission requirements. Official announcements of admission requirements for the following schools within the University of California may be obtained from the Registrar:

Business Administration	Nursing
Dental Hygiene	Optometry
Dentistry	Pharmacy
Law (see page 111)	Physical Therapy
Medicine (see page 115)	

Those curricula preparing students for admission as undergraduates to professional schools in the University of California (Bay Area) are described below. (Scholarship stipulations refer to students with permanent legal residence in California.)

Business Administration

A minimum scholarship average of 2.00, completion of 90 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. American History and Institutions.
- b. English 1A-1B; 4 additional units in the Departments of English, Rhetoric or Dramatic Art.
- c. Mathematics: 1A or 16A (may be counted toward the natural science requirement).
- d. Statistics: Mathematics 13 or Economics 12.
- e. Foreign Language: 12 units (through 3rd-quarter course) in one language, or the high school equivalent (6 units for the first two years, 6 units for each subsequent year). See additional requirement for B.S. degree in Business Administration.
- f. Natural Sciences: 2 courses (see additional degree requirement).
- g. Social Sciences: Economics 1A-1B, 11A-11B; Psychology 1A or Sociology 1; Anthropology 2, or Psychology 1A, or Sociology 1.

Dental Hygiene

A minimum scholarship average of 2.50, completion of 90 quarter units of unduplicated college work and fulfillment of the following specific requirements:

- a. American History and Institutions.
- b. English 1A-1B.
- c. Chemistry 1A, 1B; 8.
- d. Biology 1; Zoology 2.
- e. Psychology 1A and one additional psychology course.
- f. Social Science, humanities or foreign language: 30 units must be selected from these fields.

Dentistry

A minimum scholarship average of 2.50, completion of 90 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. American History and Institutions.
- b. English 1A-1B.
- c. Chemistry: 1A, 1B, 1C; 5, 8.
- d. Physics: 2A, 2B, 2C; 3A, 3B, 3C.
- e. Biology 1; Zoology 2.
- f. Humanities, Social Science or Foreign Language: 20 units must be selected from these fields (including at least one, one-year sequence in one of these). A maximum of one course of mathematics may be substituted in partial satisfaction of this requirement.

Nursing

A minimum scholarship average of 2.20, completion of 90 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. American History and Institutions.

- b. English 1A-1B.
- c. Chemistry 1A-1B.
- d. Biological Sciences: Biology 1; Bacteriology 2; Physiology 2, 2L; Zoology 102.
- e. Foreign Language: 15-16 units (through 4th-quarter course) in one language, or the high school equivalent.
- f. Humanities: 16 units.
- g. Social Sciences: 16 units, including Psychology 1A and Sociology 1.

Optometry

A minimum scholarship average of 2.25, completion of 90 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. American History and Institutions.
- b. English 1A-1B.
- c. Mathematics 16A-16B.
- d. Physics 2A, 2B, 2C; 3A, 3B, 3C.
- e. Psychology 1A-1B, 1C or 33.
- f. Biology 1; Bacteriology 2; Physiology 2, 2L.
- g. Chemistry 1A-1B, 8.

One quarter of Psychology 1C or 33 or Bacteriology 2 may be deferred until after admission to the School.

Pharmacy

A minimum scholarship average of 2.00, completion of 90 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. American History and Institutions.
- b. English 1A-1B.
- c. Chemistry 1A, 1B, 1C.
- d. Physics 2A, 2B, 2C; 3A, 3B, 3C.
- e. Mathematics 16A, 16B, 16C.
- f. Biology 1; Botany 2; Zoology 2.
- g. Humanities, Social Science or Foreign Language: 9 units must be selected from these fields.

Physical Therapy

A minimum scholarship average of 2.50, completion of 135 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. American History and Institutions.
- b. English 1A-1B.
- c. Chemistry 1A-1B.
- d. Physics 10.
- e. Psychology 1A, 168.
- f. Foreign Language: 15-16 units (through 4th-quarter course) in one language or the high school equivalent. (This may be counted from high school at the rate of 4 quarter units per year in the same foreign language.)
- g. Physiology 2, 2L; Zoology 102.

- h. Natural Sciences: 39 units (courses such as general biology, kinesiology, and bacteriology may be used to satisfy this requirement). This requirement applies only if the bachelor's degree is earned before admission to the School.
- i. Humanities: 16 units (may include 4 units of American History and Institutions requirement).
- j. Social Sciences: 16 units (may include Psychology 1A and 168).

Preparation for postgraduate training in *Medical Technology* can be accomplished by completing the regular undergraduate major programs in Bacteriology and Biological Sciences (see pages 164 and 168).

Students preparing for postgraduate training in *Social Welfare* are referred to the introduction to Sociology course offerings (see page 301).

The Teaching Credential

The teacher-training program is administered by the Graduate Division. Certain undergraduate courses, however, are required as preparation for the program. Students interested in obtaining the elementary or general secondary teaching credential should consult the appropriate adviser in the Department of Education as early as possible, preferably by the end of the freshman year (see also page 130).

Honors

THE DEAN'S HONORS LIST

The College publishes in the *Student Directory* an honors list, which includes the names of all students who have completed at least 12 units in the College and who also have at least grade B averages for all College, all University, and all collegiate transfer work undertaken.

Senior students on the honors list gain certain privileges:

1. Their study list may total less than 12 units per quarter.
2. They may earn more than 45 units of upper division degree credit in one department.
3. The department or committee supervising their major program may waive its requirements concerning specific courses or sequences in the major program.

HONORS PROGRAMS

Special programs for honors students are available in connection with certain major programs. These are described in the introduction to the department's course offerings. Interested students should consult their major advisers.

A student on the honors list may enroll, upon recommendation of his major adviser, in the honors program in his major at any time not later than the first quarter of his senior year.

BACCALAUREATE HONORS

Students on the Dean's Honor List who have attained a minimum 3.30 University grade-point average may qualify for honors, high honors, or highest honors with the bachelor's degree upon recommendation of the department or committee supervising the major program, the Committee on Honors, and the Executive Committee of the College of Letters and Science.

A list of students so honored is published in the annual Commencement Program.

AWARDS FOR ACADEMIC EXCELLENCE

In addition to eligibility for the University Medal (see page 36) graduating seniors with superior scholastic records in the College may be recommended by the faculty for the Letters and Science Medal. Academic excellence is the primary basis for choosing the recipient of this award.

Each year the College also honors high scholastic achievement through its award of the Herbert A. Young-Letters and Science Medal to a student with a distinguished academic record in the College.

Area Requirement Lists

The undergraduate courses in the subjects listed below will be accepted in fulfillment of the area requirements of the College. No course applied toward satisfaction of one area requirement may be offered to satisfy another. No courses marked with an "H," or numbered 198 or 199 may be counted toward the breadth requirements.

HUMANITIES LIST

Art.	Music.
Classics.	Oriental Languages. All courses except Chinese 1, 2, 3, 4, 5; Hebrew 1, 2, 3, 4, 5; Japanese 1, 2, 3, 4, 5; Tamil 20; Telugu 1.
Dramatic Art.	
English. All courses except 1A, 1B, 25, 26.	Philosophy.
French. All courses except 1, 2, 3, 4, 5.	Portuguese. All courses beyond 18 units.
German. All courses except 1, 2, 3, 11, 12, 12R.	Rhetoric.
Greek. All courses except 1, 2, 3, 101.	Russian. All courses except 1, 2, 3, 4.
History.	Sanskrit.
Italian. All courses except 1, 2, 3, 4, 5.	Spanish. All courses except 1, 2, 3, 4, 5.
Latin. All courses except 1, 2, 3, 4, 5.	

NATURAL SCIENCES LIST

Anthropology. Accepted: 1, 151, 152, 153, 154, 155.	Biology.
Astronomy.	Botany.
Bacteriology.	Chemistry.
	Entomology. Accepted: 1.

Genetics.

Geography. Accepted: 1, 3.

Mathematics.

Physics.

Physiology.

Psychology. Accepted: 1B, 106, 108,
131, 131L, 150, 150L.

Zoology.

SOCIAL SCIENCES LIST

Anthropology. All courses except 1,
151, 152, 153, 154, 155, 195, 196.

Economics.

Education.

Geography. All courses except 1, 3,
105, 161.

Political Science.

Psychology. All courses except 1B, 3,
106, 108, 131, 131L, 150, 150L,
165.

Sociology.



SCHOOL OF LAW

The School offers a three-year curriculum of graduate study leading to the degree of Bachelor of Laws. In the fall of 1967 there will be only first-year and second-year classes.

The primary purposes of the School are to prepare students for the practice of law and to foster legal research and development. Particular attention (especially in research and public service) is paid to problems involving agriculture, natural resources, and state and local government.

Preparation for the Study of Law

No specific college major is required for admission to the School of Law, and there is no prescribed prelegal program. Degrees from the Colleges of Agriculture, Engineering, and Letters and Science are all acceptable. The individual student's college record and Admission Test score must, of course, demonstrate that he is qualified for law study.

Prelegal students should plan a course of study that will give them a broad cultural background and include intensive work for a substantial period of time in a selected field of study. It is most important that prelegal students obtain mastery of the English language. They should be able to read rapidly and with comprehension and to express themselves clearly, completely, and concisely, both orally and in writing.

Requirements for Admission to the School of Law

Applicants for admission to the professional curriculum of the School of Law, leading to the degree of Bachelor of Laws, must have received a bachelor's degree or an equivalent degree from a college or university of approved standing before beginning their work in the School of Law. The applicant's college record must be of sufficiently high quality to demonstrate that he is qualified for the study of law. The work of the last two college years will be considered more heavily than that of earlier years.

The applicant must also achieve a satisfactory score on the Law School Admission Test. All applications are reviewed by the Law School Admissions Committee. Students are admitted only on a full-time basis and only in September.

Law School Admission Test

All applicants are required to take the Law School Admission Test administered by the Educational Testing Service. Testing centers have been established for the convenience of applicants in all parts of the United States and in many foreign countries. Applicants are urged to take the test as early as possible, and in any event not later than February in the academic year prior to that in which they seek admission to the School.

Applicants should write to: Law School Admission Test, Educational Testing Service, Princeton, New Jersey 08540, to obtain application forms and information about the test and the location of testing centers.



Admission Procedures

1. Application for admission to the School of Law and to the Graduate Division of the University should be made on forms which will be supplied by the School and should be addressed to: Dean, School of Law, University of California, Davis, California 95616. *The application must be accompanied by a \$10 nonrefundable application fee* in the form of a check or money order made payable to The Regents of the University of California. The last date for filing completed application forms is May 1 of the year in which admission is sought, but earlier filing is strongly recommended.
2. Two copies of transcripts of college work through the first semester or quarter of the applicant's senior year should accompany or immediately follow his application forms. As soon as they are available, the applicant should submit two copies of supplementary transcripts to cover any work he completes *after* making application.
3. The applicant should take the Law School Admission Test and request that his score be reported to the School of Law.
4. Acceptance by the School of Law is always subject to the admissions action taken by the Graduate Division of the University. Normally, applicants accepted by the School of Law will also be accepted by the Graduate Division.

Professional Curriculum and Degree

The course of study in the professional curriculum requires nine quarters for completion and extends over a period of three years. The work of the first year is prescribed; courses constituting the first-year curriculum are listed on page 252. This work provides the essential foundation for subsequent legal study, and the satisfactory completion of the first-year courses is in all cases a prerequisite to courses of the second and third years. First-year students who fail to attain satisfactory grades at the end of their first year may be required to withdraw from the School.

The second-year curriculum—part of which is prescribed and part elective—is set forth on page 252.

A third-year curriculum will be introduced in October of 1968.

The curriculum of the School is designed for full-time students only.

Students who have been admitted to the School as candidates for the professional degree and who have completed satisfactorily the professional curriculum and the required period of resident study will be recommended for the degree of Bachelor of Laws.



SCHOOL OF MEDICINE

The School of Medicine will admit its initial class to a course of professional instruction commencing in the fall quarter 1968.

The degree of Doctor of Medicine requires the satisfactory completion of a four-year course of study comprised of 15 quarters. Initially, course work will be conducted in the temporary Medical School facilities on the Davis Surge Campus and in nearby affiliated hospitals. The current main clinical teaching unit is the recently renovated 650-bed Sacramento County Hospital. Permanent facilities will be available in 1971 with the completion of the combined Human Medicine—Veterinary Medicine Health Sciences Complex. Construction of a University hospital will be completed in 1973. An adjoining 740-bed Veterans Administration Hospital is proposed for concurrent construction. This building complex will provide a unique physical expression of the philosophical concept of a closely correlated exposition of health and disease in man as well as other species.

Premedical Requirements

Applicants for admission to the professional curriculum must have satisfactorily completed a minimum of three years (90 semester units; 135 quarter units) of college level work. However, in most instances completion of a four-year course of study leading to a bachelor's degree is recommended. A maximum of two years (60 semester units; 90 quarter units) of junior college work may be credited toward this requirement. Although a specific major in science is not necessary, the following course content is required:

- One year of English composition or its equivalent
- One year of biological science or its equivalent
- One year of general chemistry or its equivalent
- One year of organic chemistry* or its equivalent
- One year of physics or its equivalent
- Mathematics, *through* integral calculus

The student is strongly encouraged to fill out his program with course work in the humanities and social sciences.

A prospective student must have completed the Medical College Admissions Test (MCAT) at such a time as to permit the availability of MCAT score results when the application is considered. This examination is given twice yearly, in May and October, at many colleges and universities. Further information may be obtained by writing: Medical College Admission Test, Psychological Corporation, 304 East 45th Street, New York, New York 10017.

Application

Application forms for the initial class will be made available May 1, 1967. All information must be completed and submitted no later than December 31, 1967. Early return of the completed application will enable early processing, which is normally advantageous. Application forms and additional information are avail-

* This course must be the one normally offered for chemistry majors rather than one of a brief, or survey, character.

able from the Office of the Dean, School of Medicine, University of California, Davis, California 95616.

Transcripts of all college work should be sent directly from the school of origin to the Office of the Dean. For undergraduate applicants not registered at a campus of the University of California, an additional transcript of high school records is required. Final college transcripts should include a statement of good standing or honorable dismissal from the last college attended.

Admission Procedure

The initial first-year class will be limited to 48 students selected on the basis of intellectual achievement and personal characteristics which would lead the Admissions Committee to believe there was a reasonable likelihood of satisfactory completion of the requirements of the medical curriculum and subsequent effective discharge of the considerable demands of the profession. Factors taken into consideration include the applicant's scholastic record to date, MCAT performance, and reports of his teachers and advisers with regard to intellectual capacity, motivation, emotional stability and personal dedication.

A personal interview will normally be required. Prospective students whose applications are rejected during the initial screening procedure will be so notified and will not be called for an interview. Out-of-state interviews may be arranged in occasional cases in which a trip to Davis would be considered an undue hardship; in rare instances the Admissions committee may waive the requirement for interview entirely.

Applicants may be requested to authorize their student health service or personal physician to send pertinent health information to the Admissions Committee.

In accordance with approved procedures of the Association of American Medical Colleges, applicants will usually be notified of the status of their application as early as September 15 of the year preceding that for which admission is sought. In some instances, a decision may not be made until March 31; however, an effort will be made to reach an early decision and to notify the applicant promptly.

The majority of places in each entering class will be awarded to students who are legal residents of the state of California; however, a certain number will be awarded to out-of-state students. This School of Medicine will also participate in the program of the Western Interstate Commission for Higher Education. In this program are a number of states which do not offer professional graduate medical education within the state. Applicants found eligible by both the School of Medicine and their own states are charged resident, rather than nonresident, tuition. Further information may be obtained by communicating with this Commission, whose address is University East Campus, 30th Street, Boulder, Colorado 80300.

Graduates of foreign universities will be considered on an individual basis by the Admissions Committee. Certain additional requirements apply to such applicants and detailed information is available from the Office of the Dean of Medicine.

Medical Curriculum and Degree

The course of professional study covers a period of 15 consecutive academic quarters extending over four calendar years. Successful completion of the prescribed curriculum will normally result in a recommendation by the faculty and the Dean leading to the award of the degree of Doctor of Medicine.

The faculty of this new school accepts the principles that it is impossible for the student to master in its entirety the rapidly expanding body of knowledge comprising modern medical science of today and that the gap between developing knowledge and an individual's ability for assimilation will widen each year. Accordingly, the curriculum will be presented in the context of *problem-solving*, based on a foundation in the sciences basic to medicine and the application of the scientific method to diagnosis, therapy and research in health and disease states. Correlation of the basic and clinical sciences will be emphasized during all stages of the professional program. Teaching by the faculty will be carried out by means of integrated exercises utilizing appropriate modern instructional methods and including the facilities of multidiscipline laboratories. To promote a habit of self-education throughout his professional life, the student will be encouraged to seek out individually available source material pertaining to the problems under consideration. Sufficient free time will be scheduled to permit pursuit of such studies in depth.

In general, the curriculum is designed around a core program of instruction in basic, behavioral and clinical sciences during the first three years, with the fourth year consisting of elective courses under faculty guidance. A graduate student orientation will prevail throughout the curriculum. At the same time, individual attention to the student will be emphasized.

The *first academic year* (quarters 1, 2, 3) consists of a formal core program designed to equip the student with the vocabulary, tools, techniques and concepts of the Sciences Basic to Medicine, including molecular and cell biology, organ and system biology, and behavioral science. Supplementing this core are conjoint conferences designed to introduce the student to patients and clinical problems at the earliest feasible time.

The *second academic year* (quarters 4, 5, 6, 7) consists of a presentation of representative clinical problems illustrating the correlation of the basic and clinical sciences in understanding both the normal and abnormal states. The concept of a definition of the problem and the steps taken to solve it is stressed rather than preoccupation with the presentation of a large body of factual detail. Free time for study in depth is provided as well as an introduction to electives in areas of developing individual interest. There will be a general orientation toward the principles of community medicine, including exposure to family practice, with consideration of the impact of socio-economic factors on the individual and his disease.

The *third academic year* (quarters 8, 9, 10, 11) consists of clinical clerkships oriented toward a problem-solving approach to disease by bringing the student into direct contact with the patient and emphasizing the responsibilities of patient care. Elective time is provided to permit students to extend their clinical experience in areas of particular interest or to carry out individual research.



The *fourth academic year* (quarters 12, 13, 14, 15) presents an opportunity for widely varied electives or, where appropriate (and recommended by the faculty), courses selected for certain students to round out their experience or strengthen areas of recognized deficiencies.

By means of the above curriculum, the faculty intends to develop in the student the ability to pursue a plan of postgraduate studies leading to a career in private practice, teaching, research, preventive medicine, administration or any combination of these. It seeks to provide a comprehensive foundation upon which the individual student can more effectively realize his own interests, abilities and personal motivation. It is believed that through this approach the individual patient and the public may best be served.

Detailed information of the curriculum as it develops will become available through periodic Announcements of the School of Medicine issued by the Office of the Dean, School of Medicine.



SCHOOL OF VETERINARY MEDICINE*

The degree Doctor of Veterinary Medicine may be obtained by pursuing a course of study requiring a minimum of six years. The final four years must be spent in the professional veterinary medical curriculum.

Students planning a career in veterinary medicine should consider broadening their educational experience by completing the baccalaureate degree before applying to the professional school.

Preveterinary Medical Requirements

Students must complete a minimum of 90 quarter units (60 semester units) of college work including the required courses listed in the preveterinary medical curriculum (page 122) before they will be admitted to the School of Veterinary Medicine. Those who have met these requirements with excellent scholastic achievement may be admitted at the end of two years of study. However, all preveterinary medical students, in addition to satisfying the preprofessional course requirements, should plan their program so they can obtain a baccalaureate degree in four years.

Application

Students are admitted to the School of Veterinary Medicine in the fall of each year. Application forms may be obtained after October 1 from the Admissions Officer, University of California, Davis 95616. The completed application must be filed with the Admissions Officer between January 1 and February 28 in order to be considered for the fall of the year in which application is made. Students may apply before completing all the requirements. However, they must submit a detailed list of courses in progress and a list of all courses to be completed by June 15 of the year they wish to be considered. *Applications lacking this information will not be processed.*

Admission to the School of Veterinary Medicine

Enrollment is limited, and applicants are selected primarily on the basis of scholarship with particular emphasis placed on achievement in chemistry, physics, and zoology. In addition, candidates should have sufficient experience with animals to justify their decision to pursue a lifetime career in veterinary medicine.

Personal qualifications also receive consideration. An interview may be required to enable the Committee on Admissions to make the most accurate judgment possible. Applicants will be notified before July 15 of their admission status.

Scholastic achievement, particularly in the required courses, is a very important criteria for admission to the School of Veterinary Medicine. Preveterinary medical students are, therefore, cautioned to use the passed or not passed option as sparingly as possible.

The School of Veterinary Medicine at the University of California participates in the student program administered by the Western Interstate Commission for

* For additional information prospective students should consult the *Announcement of the School of Veterinary Medicine*, obtainable without charge from the Dean, School of Veterinary Medicine, University of California, Davis.

Higher Education (WICHE). Students residing in western states without a school of veterinary medicine who wish to participate in this program must be certified by their home state. For addresses of state certifying officers, write to the Western Interstate Commission for Higher Education, University East Campus, 30th Street, Boulder, Colorado.

AFTER ADMISSION

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

Preveterinary Medical Curriculum

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

1. Mathematics through trigonometry; * Subject A; and American History and Institutions.
2. At least 90 quarter units or 60 semester units of credit in the University of California or other accredited institution, including the prescribed subjects listed below. (Minor shortages may be waived by the Admissions Committee of the School of Veterinary Medicine.)
3. Subject Requirements:

	<i>Quarter Units</i>
Chemistry (general, qualitative, organic, and quantitative)	24
Physics (general)	9
Biology, zoology, embryology	17
English composition and additional English or rhetoric	8
Animal science†	3
Restricted electives in social sciences and humanities‡	17
Additional electives in social sciences, humanities or agriculture ..	12
	—
	90

Students completing the preveterinary medical requirements in institutions other than University of California, Davis, are urged to check the catalog of their college carefully to be sure they are taking equivalent courses.

Plan of Study

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 1A, 1B, 1C	5	5	5
English 1A and additional English or rhetoric	4	4	—
Biology 1	—	—	6
Animal Science 2	—	—	3
Electives	6	6	1
	—	—	—
	15	15	15

* Should be completed in high school.

† May be waived if not available.

‡ Art, anthropology, economics, foreign languages, geography, history, music, philosophy, political science, psychology, sociology, and/or additional English, rhetoric, and mathematics.

<i>Sophomore Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Physics 2A, 2B, 2C	3	3	3
Chemistry 8, 5	5	—	4
Zoology 2	—	6	—
Zoology 100 (vertebrate embryology)	—	—	5
Electives	7	6	3
	—	—	—
	15	15	15

Requirements for the Degree Doctor of Veterinary Medicine

1. The candidate for the degree Doctor of Veterinary Medicine must have completed the general University requirements for a baccalaureate degree (pages 33-35).

2. He must possess good moral character.

3. He must have studied veterinary medicine for the equivalent of twelve quarters of twelve weeks each. The last six quarters must have been spent in the University of California School of Veterinary Medicine.

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

Plan of Study

<i>First Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Anatomy 150	3	Anatomy 155	Anatomy 160
Anatomy 151	4	Anatomy 156	Anatomy 161
Anatomy 152	1	Anatomy 157	Physiological Sciences
Genetics 100	3	Physiological Sciences	123
Physiological Sciences		101B	Physiological Sciences
101A	4	Physiological Sciences	140B
Physiological Sciences		102B	Physiological Sciences
102A	1	Physiological Sciences	141B
		140A	Electives
		141A	Anatomy 170
			Animal Science
			Mathematics 13
	—	—	—
	16	18	17

Second Year

Pathology 122A	5	Epidemiology and Preventive Medicine	Anatomy 180	4
Physiological Sciences		140	Clinical Sciences 103.	4
124	4	Pathology 122B	Pathology 122C	4
Veterinary		Veterinary	Veterinary	
Microbiology 120	2	Microbiology 122	Microbiology 125	5
Veterinary		Veterinary		
Microbiology 121	3	Microbiology 123		
Animal Nutrition 109.	3	Veterinary		
		Microbiology 124		
	—	—	—	—
	17	16	17	



<i>Third Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Clinical Pathology 201	3	Epidemiology and Preventive Medicine	Clinical Pathology 202
Clinical Sciences 204A	3	208	3
Clinical Sciences 210A	1	Clinical Sciences 204B	Clinical Sciences 204C
Clinical Sciences 220	4	4	1
Clinical Sciences 230	6	Clinical Sciences 210B	Clinical Sciences 222
		1	. 5
		Clinical Sciences 221	Epidemiology and
		. 5	Preventive Medicine
		Clinical Sciences 260	240
		. 2	3
		Veterinary Microbiology 201	Epidemiology and
		. 2	Preventive Medicine
			250
			2
	—	—	—
	17	17	17

Fourth Year

Epidemiology and Preventive Medicine	Clinical Pathology	Clinical Pathology
209	250B	250C
2	1	1
Clinical Pathology	Clinical Sciences 204E	Clinical Sciences 204F
250A	3	3
1	Clinical Sciences 250B	Clinical Sciences 250C
Clinical Sciences 204D	8	7
5	Clinical Sciences 270	Pathology 250C
Clinical Sciences 250A	1	1
8	Pathology 250B	Electives
Pathology 250A	1	5
	—	—
	17	17
		—
		17

Requirements for the Degree Bachelor of Science

Upon recommendation of the Faculty of the School of Veterinary Medicine the degree Bachelor of Science with a major in Veterinary Science is granted to students in the School of Veterinary Medicine who do not hold a baccalaureate and who:

1. Satisfy the general University requirements (pages 33-35).
2. Complete in the School of Veterinary Medicine all courses prescribed in the first two years of the professional curriculum. Exceptions may be made to students admitted in advanced standing.

Admission in Advanced Standing

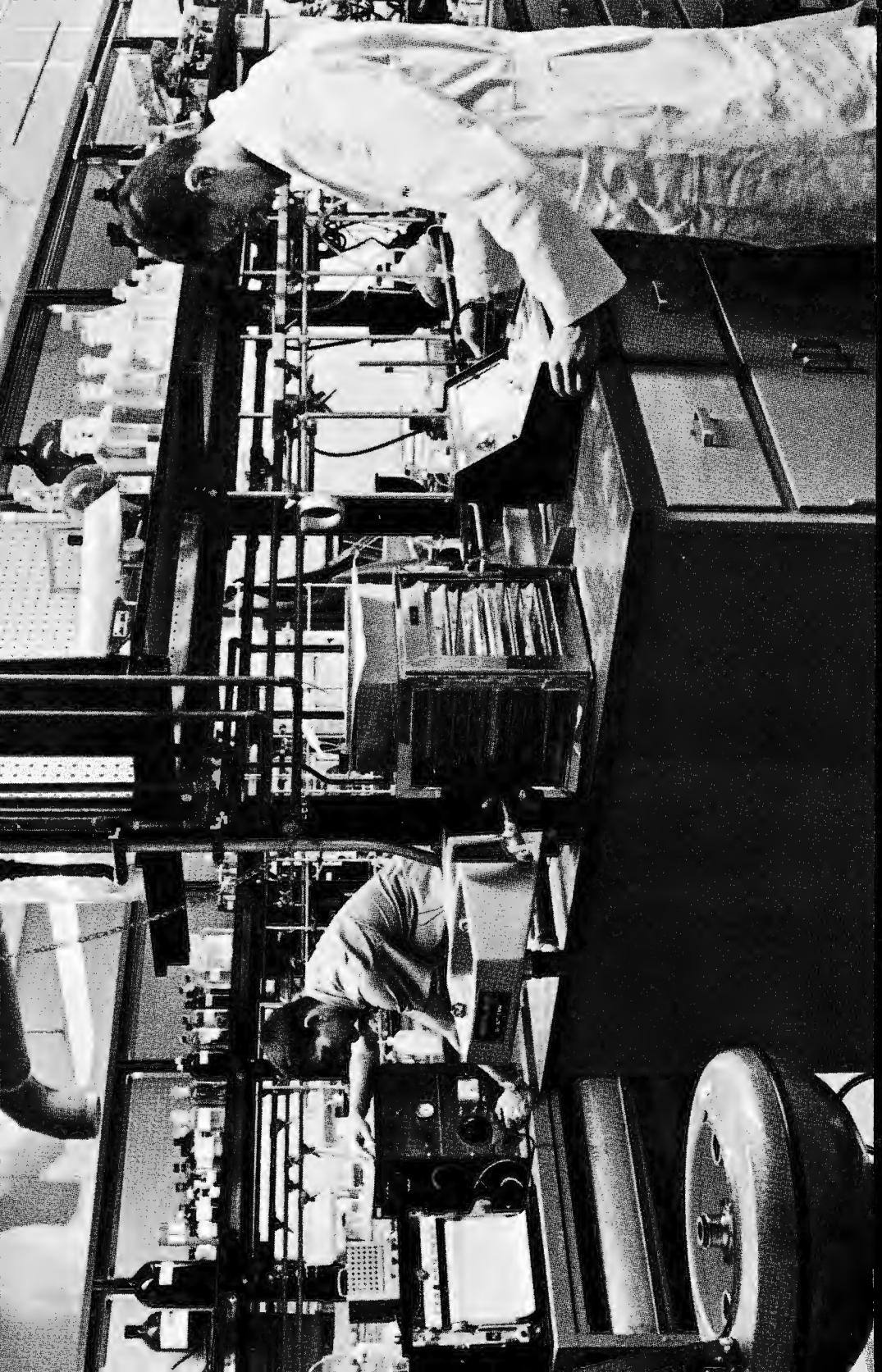
An applicant requesting admission to advanced standing in the School of Veterinary Medicine may be accepted under the following conditions:

1. He must furnish evidence that he was eligible for admission to the first quarter of the School of Veterinary Medicine.
2. He must show that he has satisfactorily completed courses equivalent in kind and amount to those given in the School of Veterinary Medicine in the quarter or quarters preceding that in which admission is desired.
3. He may be required to pass examinations in any or all subjects for which credit is asked.

Graduate Study

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

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



GRADUATE DIVISION

Graduate study and research are administered by the Graduate Council, elected by the Academic Senate at Davis, and by the Dean of the Graduate Division. A University-wide Coordinating Committee on Graduate Affairs determines certain policies and establishes common procedures. Detailed information appears in the *Announcement of the Graduate Division*.

Advanced Degrees

On the Davis campus the following advanced degrees are offered: Master of Arts, Master of Science, Master of Education (in Agriculture), Master of Engineering, Bachelor of Laws, Doctor of Engineering, Doctor of Veterinary Medicine, and Doctor of Philosophy.

The majors for graduate study and the advanced degrees offered in each are shown below:

Organization of Graduate Study

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

This list is under constant revision as graduate work expands into new areas of study, and prospective students seeking further information should consult the Graduate Division Office. The general requirements for these degrees are published in the *Announcement of the Graduate Division*, and the specific requirements are generally available from the office of the department concerned. The group majors, those which are sponsored by more than one department, are listed below and if a student is interested in one or more of these he should write to the group chairman as shown for more information as to specific requirements for the advanced degree.

Agricultural Chemistry—Walter G. Jennings, Ph.D., chairman, 106 Roadhouse Hall

Agricultural Science and Management—William C. Weir, Ph.D., Chairman, 162 Animal Science

Anatomy—Larry Z. McFarland, D.V.M., Ph.D., Chairman, 1042 Haring Hall

Biophysics—Richard S. Criddle, Ph.D., Chairman, 555B Hutchison Hall

Botany—Elizabeth G. Cutter, Ph.D., Chairman, 278 Robbins Hall

Comparative Biochemistry—Jack Preiss, Ph.D., Chairman, 578 Hutchison Hall

Comparative Pathology—Peter C. Kennedy, D.V.M., Ph.D., Chairman, 1222 Haring Hall

Comparative Pharmacology and Toxicology—Stuart A. Peoples, M.D., Chairman, 2147 Haring Hall

Endocrinology—Moses T. Clegg, Ph.D., Chairman, 218 Animal Science

Food Science—Lloyd M. Smith, Ph.D., Chairman, 204 Roadhouse Hall

Genetics—Sidney R. Snow, Ph.D., Chairman, 201B Hutchison Hall

Horticulture—Dillon S. Brown, Ph.D., Chairman, 1043 Wickson Hall.

International Agricultural Development—Duane S. Mikkelsen, Ph.D., Chairman, 109 Hunt Hall

Linguistics—Benjamin E. Wallacker, Ph.D., Chairman, 331 Voorhies Hall

Microbiology—Herman J. Pfaff, Ph.D., Chairman, 217 Cruess Hall

Nutrition—Howard F. Kratzer, Ph.D., Chairman, 214 Poultry Husbandry

Physiology—James M. Boda, Ph.D., Chairman, 118 Animal Science

Plant Physiology—C. Ralph Stocking, Ph.D., Chairman, 141 Robbins Hall

Range Management—R. Merton Love, Ph.D., Chairman, 131 Hunt Hall

Soil Science—Victor V. Itendig, Ph.D., Chairman, 251 Hoagland Hall

Admission Standards

Students seeking admission to graduate status at the University of California must hold a bachelor's degree or its equivalent from an institution of acceptable standing. The program of preparation should be substantially equivalent in both the distribution of academic subject matter and in scholarship achievement to the requirements for a comparable degree at the University of California. Applications for admission are evaluated in terms of scholastic qualifications and formal preparation for the graduate field of study.

The Dean of the Graduate Division or the department in which the applicant wishes to pursue an advanced degree may deny him admission if his scholastic record or his undergraduate program of study is judged not adequate as a

foundation for advanced academic or professional study. This procedure applies to all applicants, whether they come from schools or colleges within the University of California or elsewhere. Individual departments may have special requirements for admission to graduate status, and certain departments and schools require an additional and special application for admission to their advanced-degree program.

Application for Admission

Students seeking admission for graduate work may obtain application forms from the Office of the Graduate Division of the University at Davis. Applications should be filed as early as twelve weeks before the date of registration but in no case later than July 15, 1967, November 15, 1967, and February 15, 1968, for the fall, winter, and spring quarters respectively. The application must be accompanied by a money order or bank draft for \$10.00, made payable to The Regents of the University of California, in payment of the application fee, which will not under any circumstances be refunded. If the complete record as specified below is not filed in time, the student may not be allowed to register or he may be allowed to register late on payment of an additional fee of \$10.00.

Official transcripts of record covering all college and university work completed to date, together with official evidence of degrees conferred, must accompany or immediately follow the application. A separate original and official record must be presented from each institution previously attended. Unless all of these are on file in the Graduate Division, registration cannot be permitted. In addition, the student should have in his possession a second copy of his official records for his use in conference with departments.

A separate and additional application is required for admission to the School of Law and the School of Veterinary Medicine. Students are referred to pages 111 and 121 for further details.

Every new student and every student returning to the University after an absence of one or more quarters must satisfy the medical requirements as described under "Medical Evaluation" (see page 45).

Readmission

Persons formerly registered in a regular session as graduate students who wish to return after an absence must apply for readmission. The form for this purpose is obtainable from the Registrar, and no fee is charged.

Foreign Students

Applicants for admission to the Graduate Division on credentials from universities and colleges in foreign countries are advised to make their initial inquiry as early as six months before the date of intended enrollment to permit processing of their records.

Students whose undergraduate preparation has been in a language other than English should furnish positive evidence that their command of both spoken and written English will permit them to profit by the instruction offered and to compete with American students. Certificates of proficiency in English by

individuals (usually professors) are helpful, and consular testing at the time the I-20 form is processed is valuable, but neither of these is standardized or quantitative. A number of other tests given by authorized examiners abroad are acceptable. These include the Michigan Test (English Language Institute Test, University of Michigan), the interview reports supervised by the directors of the Institute of International Education overseas office, and the American University Language Center (A.U.L.C.) Test. Prospective students are encouraged, however, to submit scores on the Test of English as a Foreign Language (TOEFL) administered by the Educational Testing Service for the College Board. These tests are given at many testing centers abroad three times a year, and full information is available from the Educational Testing Service, Princeton, New Jersey 08540.

On arrival all foreign students take the special University examination in English; those who do not pass are assigned to remedial courses which may delay their graduate program. Even though the student has been admitted, his registration may be delayed until he acquires an adequate command of English.

Admission Without an Advanced Degree Objective

Students who do not wish to become candidates for a higher degree may be admitted to a specified field of study for course work only. Their program, which requires the approval of the Dean, must have a definite scholarly or professional purpose. The scholastic requirements for admission are the same as for those who are candidates for degrees. All such students who are not residents of the State of California will have to pay the regular tuition fee.

Program of Study

When the student registers and declares his degree objective he is assigned to the appropriate adviser, who will advise him on his program of study. This will depend to some degree on the undergraduate training, and the student may be assigned to undergraduate courses to complete deficiencies.

Each student must satisfy the specific requirements for the degree sought as published in the *Announcement of the Graduate Division*. The general program in an area of study, as established by the department or group and approved by the Graduate Council, often includes a core of required courses, but considerable flexibility is permitted to suit the individual student's needs or main interest. More detailed information is available from the department or group concerned. Undergraduates at Davis who plan to pursue graduate study should confer with their major adviser early in their senior year to guarantee adequate preparation.

Teacher Credential Program

Programs leading to a Standard Teaching Credential with specialization in elementary teaching and in secondary teaching are offered under the jurisdiction of the Graduate Division. Graduate students who are prospective candidates for

an advanced degree may take special professional courses and qualify for the junior college teachers credential.

The curricula for teacher education are offered by the Department of Education and the Department of Agricultural Education, and interested students should obtain detailed information at either department. The courses in professional education required for the credential are specified in this catalog under the Departments' listing of courses of instruction (see pages 141 and 188). Subject-matter requirements for the teaching major and minor are specified with departmental offerings.

Only students who have completed the bachelor's degree are eligible, and they must be admitted to the program by the Graduate Division. Final filing dates and the application forms may be obtained from the Graduate Division Office. The student must maintain a scholarship record of 2.75 or better in all graduate work undertaken.

Since the requirements for the credential are set up by both the State Department of Education and by the University, all students who intend to work for the credential are urged to consult the adviser in one of the departments named above early in their undergraduate career (preferably by the end of their freshman year).

Curricula are offered which lead to the Standard Teaching Credential with a specialization in elementary teaching or in secondary teaching and to the secondary credentials required for teaching classes reimbursed under the National Vocation Acts. Two routes for obtaining each type of credential are available: a student-teaching program (the usual route) and an internship program (limited in enrollment). Application for the intern program should be made to the department early in the senior year.

Intercampus Exchange Program

A graduate student registered on any campus of the University may become an Intercampus Exchange Student with the approval of his graduate adviser and the Dean of the Graduate Division on both the home and the host campus. The Intercampus Exchange Student has library, infirmary, and other student privileges on the host campus but is considered as a graduate student in residence on his home campus. The grades obtained in courses on the host campus are transferred to his home campus and entered on his official record. Forms for application for the intercampus exchange may be obtained at the office of the Dean of the Graduate Division.

Fellowships, Assistantships, and Loans

Fellowships are awarded by the Fellowship Committee of the Graduate Council on the bases of scholarship and promise of outstanding academic and professional contribution. For further information as to the awards available and application forms the student may consult the Fellowship announcement published in November for the following academic year. Applications with all the supporting records should be filed by February 1 to receive consideration.

Teaching assistantships and research assistantships are available in many departments, and interested students should inquire at the office of the department in which they wish to study.

Certain departments may be authorized to offer a limited number of fellowships under the National Defense Education Act and traineeships under the National Science Foundation or the National Institute of Health. For these the student may write directly to the department or to the Graduate Division of the University. Information regarding Graduate Fellowships supported by various federal agencies and others is also available at the Office of the Graduate Division.

Application for loan funds for graduate students should be addressed to the Office of the Dean of Students (see page 40).

AN INDEX TO COURSE OFFERINGS BY COLLEGE OR SCHOOL AND BY DEPARTMENTS, COMMITTEES, AND GROUPS

College of Agriculture

AGRICULTURAL ECONOMICS	139
AGRICULTURAL EDUCATION	141
AGRICULTURAL ENGINEERING	143
AGRICULTURAL PRACTICES	144
AGRICULTURAL SCIENCE AND MANAGEMENT (<i>a Committee</i>)	144
AGRICULTURAL TOXICOLOGY (<i>a Committee</i>)	146
Agronomy	282
Animal Biochemistry	152
Animal Genetics	152
Animal Nutrition	153
Animal Physiology	154
ANIMAL SCIENCES (<i>a Committee</i>)	149
Animal Science	150
Atmospheric Science	307
BIOCHEMISTRY AND BIOPHYSICS	166
Consumer Economics (under FAMILY AND CONSUMER SCIENCES)	221
Design (under FAMILY AND CONSUMER SCIENCES)	221
ENTOMOLOGY	216
FAMILY AND CONSUMER SCIENCES (<i>a Committee</i>)	220
FOOD SCIENCE (<i>a Committee</i>)	225
FOOD SCIENCE AND TECHNOLOGY (under FOOD SCIENCE)	226
Foods (under FAMILY AND CONSUMER SCIENCES)	222
GENETICS	233
Home Economics Education (under FAMILY AND CONSUMER SCIENCES)	222
Home Management (under FAMILY AND CONSUMER SCIENCES)	223
Human Development (under FAMILY AND CONSUMER SCIENCES)	222
Institution Management (under FAMILY AND CONSUMER SCIENCES)	223
INTERNATIONAL AGRICULTURAL DEVELOPMENT (<i>a Committee</i>)	250
Landscape Horticulture	283
NEMATOLOGY	266
Nutrition (under FAMILY AND CONSUMER SCIENCES)	223
Park Administration	285
Physiology	285
Plant Pathology	285
Plant Science	282, 307
PLANT SCIENCES (<i>a Committee</i>)	280
Pomology	286
RANGE MANAGEMENT (<i>a Committee</i>)	297
Soil Science	307
Soil and Water Science	308

SOIL, WATER AND ATMOSPHERIC SCIENCES (<i>a Committee</i>)	306
Textiles and Clothing (under FAMILY AND CONSUMER SCIENCES)	224
Vegetable Crops	287
Viticulture and Enology (under FOOD SCIENCE and PLANT SCIENCES)	228, 288
WATER SCIENCE AND ENGINEERING	309

College of Engineering

ENGINEERING (<i>Core Courses</i>)	191
ENGINEERING: AGRICULTURAL	193
ENGINEERING: APPLIED SCIENCE	194
ENGINEERING: CHEMICAL	198
ENGINEERING: CIVIL	200
ENGINEERING: ELECTRICAL	204
ENGINEERING: MECHANICAL	207

School of Law

LAW	252
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School of Medicine

MEDICINE	259
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College of Letters and Science

AMERICAN HISTORY AND LITERATURE (<i>a Committee</i>)	146
ANTHROPOLOGY	156
ART	160
Astronomy (under PHYSICS, DEPARTMENT OF)	275
BACTERIOLOGY	164
BIOLOGICAL SCIENCES (<i>a Committee</i>)	168
BIOLOGY	169
BOTANY	169
CHEMISTRY	173
CLASSICS	176
Chinese	267
DRAMATIC ART	181
ECONOMICS	185
EDUCATION	189
ENGLISH	210
FRENCH	230
GEOGRAPHY	234
GEOLOGY	237
GERMAN	239
Greek	177
Hebrew	267
HISTORY	244

INTERNATIONAL RELATIONS (<i>a Committee</i>)	251
ITALIAN	230
Japanese	267
Latin	177
LINGUISTICS (<i>a Committee</i>)	253
MATHEMATICS	254
MILITARY SCIENCE	260
MUSIC	262
ORIENTAL LANGUAGES	267
PHILOSOPHY	269
PHYSICAL EDUCATION	271
PHYSICS	274
Physiology (under ZOOLOGY, DEPARTMENT OF)	316
POLITICAL SCIENCE	289
Portuguese	311
PSYCHOLOGY	294
RHETORIC	298
RUSSIAN	300
Sanskrit	178
SOCIOLOGY	301
SPANISH	310
SUBJECT A	313
Tamil	267
Telugu	267
ZOOLOGY	315

School of Veterinary Medicine

ANATOMY	147
CLINICAL PATHOLOGY	179
CLINICAL SCIENCES	179
EPIDEMIOLOGY AND PREVENTIVE MEDICINE	218
PATHOLOGY	268
PHYSIOLOGICAL SCIENCES	278
VETERINARY MICROBIOLOGY	314

Graduate Groups

AGRICULTURAL CHEMISTRY	139
COMPARATIVE BIOCHEMISTRY	181
MICROBIOLOGY	260
NUTRITION	266



Courses of Instruction

Explanatory Note

Credit for academic work undertaken at the University is evaluated in terms of units. The value of a course is reckoned at the rate of one unit for three hours' work per week per quarter, on the part of the student. Included in these three hours may be one hour of lecture or discussion, or two to three hours of laboratory. For most courses, it is expected that the average student will spend two hours in preparation for one hour of lecture or recitation. If the number of hours of lecture or discussion given in the catalog is less than the number of units of credit assigned to the course, this means that some form of additional non-classroom work (for example, a term paper) is required of the student in that course. Students should inquire of the instructor at the first class meeting concerning this point.

The credit value of each course in quarter units is indicated for each quarter by a number in parentheses following the title.

The quarter in which the course is given is shown as follows: I, fall quarter (September to December); II, winter quarter (January to March); III, spring quarter (April to June); Yr., throughout the three quarters.

When a course is listed as offered in even-numbered years or odd-numbered years, this refers to the calendar year in which the involved quarter occurs. For example:

"Philosophy 132. III. Offered in odd-numbered years," would be given in the spring quarter of 1967, 1969, and so on, whereas

"Philosophy 146. III. Offered in even-numbered years," would be given in the spring quarter of 1966, 1968, and so on.

Information concerning class hours is given in the *Schedule and Directory*.

A course number followed by two or three letters (for example, Mathematics 131A-131B-131C) is continued through three successive quarters, ordinarily from September to June; occasionally, however, a course of two quarters may begin in the winter quarter. The first quarter of such courses is prerequisite to the second, and the second to the third. Where A and B portions of a course are listed separately (for example, Economics 100A and Economics 100B), the A course is not prerequisite to B unless it is specifically mentioned in the listing of the B course.

Classification and Numbering

Courses are classified and numbered as follows:

Undergraduate courses. These are of two kinds, *lower division* (numbered 1-49) and *upper division* (numbered 100-199). Freshman and sophomore students are not normally encouraged to take upper division courses.

Special study courses (numbered 198 and 199) are designed for 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. Credit in special study courses may not exceed 5 units per quarter.

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.

Graduate courses. Graduate courses (numbered 200-299) are open only to students who have adequate preparation; admission is subject to the approval of the instructor in charge.

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

Professional courses in departments other than the Department of Education are numbered 400-499.

Extra-session courses. Extra-session courses (laboratory, field, or other individual work done out of session under the direction of a department of instruction) may be accepted upon the recommendation of the department in partial fulfillment of the residence requirement for the bachelor's degree.

University Extension courses. Simultaneous enrollment in resident courses and in extension courses is permitted only when the entire program of the student is duly approved by the appropriate dean or study-list authority.

Credit for summer session work at other schools. It is possible for students to gain credit for courses taken during the summer at other institutions, provided the courses parallel those given in the University of California. However, assurance that such credit will be accepted can be given only after the courses have been completed. Students should arrange to have the transcripts of their summer session grades sent to the Registrar for evaluation.

SYMBOLS

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

¹ Absent on leave, 1967-68.

² Absent on leave, fall quarter 1967.

³ Absent on leave, winter quarter 1968.

⁴ Absent on leave, spring quarter 1968.

⁵ Sabbatical leave in residence, 1967-68.

⁶ Sabbatical leave in residence, fall quarter 1967.

⁷ Sabbatical leave in residence, winter quarter 1968.

⁸ Sabbatical leave in residence, spring quarter 1968.

^{*} Not to be given, 1967-68.

[†] Not to be given, fall quarter 1967.

[‡] Not to be given, winter quarter 1968.

[§] Not to be given, spring quarter 1968.

To be given if a sufficient number of students enroll.

AGRICULTURAL CHEMISTRY (A Graduate Group)

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

Graduate Courses

290. Seminar (1) I, II.

Seminar—1 hour. Prerequisite: consent of instructor.
Mr. Jennings

299. Research. (1-9) I, II, III, S.

Prerequisite: graduate standing and consent of instructor. Open to qualified graduate stu-

dents who wish to pursue original investigation. Arrangements should be made well in advance with a member of the Group in Agricultural Chemistry who will supervise the research and determine the credit value.

The Staff

AGRICULTURAL ECONOMICS

J. Herbert Snyder, Ph.D., *Chairman of the Department*
Department Office, 117 Voorhies Hall

Professors:

- Harold O. Carter, Ph.D.
- Gerald W. Dean, Ph.D.
- Daniel B. DeLoach, Ph.D., D.Lit.
- J. Edwin Faris, Jr., Ph.D.
- Jerry Foytik, Ph.D.
- Benjamin C. French, Ph.D.
- Trimble R. Hedges, Ph.D.
- Gordon A. King, Ph.D.
- Chester O. McCorkle, Jr., Ph.D.
- J. Herbert Snyder, Ph.D.
- James M. Tinley, Ph.D. (*Emeritus*)

agricultural industry and its relation to the U.S. and world economies; production and supply, marketing and demand for agricultural products.

Mr. McCorkle

2. Economic Basis of the Agricultural Industry. (3) III.

Lecture—3 hours. Prerequisite: course 1. Nature of agricultural land, capital, and labor markets; economic and social problems of agriculture in an urban and industrialized economy, particularly those relevant to California.

Mr. Snyder

18. Business Law. (4) I.

Lecture—4 hours. Prerequisite: sophomore standing. Not open to students with credit for Business Administration 18. Introduction to law; contracts, sales, and agency.

Mrs. Taylor

49. Field Practice. (1) III.

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

Associate Professor:

- Stephen H. Sosnick, Ph.D.

Assistant Professors:

- Hoy F. Carman, Ph.D.
- Warren E. Johnston, Ph.D.
- Alexander F. McCalla, Ph.D.

◇ ◇ ◇

Professor:

- Wilfred Candler, Ph.D. (*Visiting*,

Lecturer:

- Alice R. Taylor, LL.B. (*Business Law*)

Department Major Advisers.—See Schedule and Directory Listing.

Bachelor of Science Major Program and Graduate Study. See pages 53 and 127.

Lower Division Courses

1. Economic Basis of the Agricultural Industry. (3) II.

Lecture—3 hours. Prerequisite: Economics 1A. Brief history of agriculture and man; the

Upper Division Courses

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

Lecture—3 hours. Prerequisite: Economics 1A, 1B. Theory of production and supply of agricultural products, with particular reference to the individual firm; pricing, output determination, and employment of resources under pure competition.

Mr. Faris

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

Lecture—3 hours. Prerequisite: course 100A. Theory of individual consumer and market demand for agricultural products; pricing, output determination, and employment of resources under imperfect competition.

Mr. McCalla

100C. Economic Analysis in Agriculture. (3) III.

Lecture—3 hours. Prerequisite: course 100B. Theory of regional specialization, location, and trade for agricultural products; general economic equilibrium.

106A–106B. Quantitative Methods in Agricultural Economics. (3–3) II–III.

Lecture—2 hours; laboratory—2 hours. Prerequisite: Mathematics 13 and 16A. Evaluation and treatment of agricultural economics data, including sampling methods, statistical inference, and estimation of relationships among variables. II. Mr. Johnston; III. Mr. Foytik

112. Fundamentals of Business Organization and Management. (3) I.

Lecture—3 hours. Principles and practices of organization and management; nature and structure of business; functions and operations; management tools; decision-making processes; taxation.

Mr. DeLoach

113. Cooperative Organization and Management. (3) II.

Lecture—3 hours. Prerequisite: course 112. Scope and objectives of agricultural cooperation; management and operating policies and practices; legal, political, and social aspects.

Mr. DeLoach

114. Production Management. (3) III.

Lecture—3 hours. Prerequisite: course 112. Principles and procedures for efficient use of resources in production; production scheduling; materials purchasing and handling; methods analysis; plant layout; and job evaluation.

Mr. Carman

116. Financial Organization and Management. (4) II.

Lecture—3 hours; discussion—1 hour. Recommended: course 112. Principles of credit; capital needs of agricultural industries; agencies; government credit policy. Occasional field trips.

Mr. Carter

117. Managerial Accounting. (4) III.

Lecture—4 hours. Prerequisite: Economics 11A–11B. Recommended: course 112. Basic concepts of accounting as a managerial tool; procedures for financial reporting; systems and internal control; cost accounting; budgeting; interpretation of administrative reports.

Mr. Hedges

120. Agricultural Policy. (3) I.

Lecture—3 hours. Analytical treatment of recent and current economic problems and governmental policies and programs affecting American agriculture.

Mr. Johnston

125. Comparative Agriculture. (4) II.

Lecture—4 hours. The agriculture of the principal countries of the world, with special

reference to the influence of food supply upon the development of man.

Mr. Hedges

130. Agricultural Marketing. (4) I.

Lecture—4 hours. The nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing.

Mr. Sosnick

140. Farm Management. (5) III.

Lecture—4 hours; laboratory—2 hours. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business.

Mr. Hedges

145. Farm and Rural Resources Appraisal. (3) I.

Lecture—3 hours. Principles of farm and ranch appraisal; land utilization in relation to problems of development and valuation. One field trip is required.

Mr. Johnston

148. Economic Planning for Regional and Resource Development. (3) II.

Lecture—3 hours. Relation of resources to economic growth, including regional problems; planning economic development with particular emphasis on resource used in agriculture; selected resource development programs in the United States and certain foreign countries, including land reform experiences.

Mr. McCalla

155. Quantitative Analysis for Business Decisions. (3) I.

Lecture—3 hours. Prerequisite: course 106B; Mathematics 16A. Introduction to selected topics in operations research, including mathematical programming, applied decision theory, game theory, and inventory models.

Mr. French

160. Advanced Agricultural Marketing. (3) III.

Lecture—3 hours. Recommended: course 155. The marketing firm in its economic context: market structures; pricing and price policies; empirical demand analysis; marketing cost and efficiency; public policies toward marketing.

Mr. King

170. Advanced Farm Management. (3) II.

Lecture—3 hours. Prerequisite: course 155. The farm firm in its economic context: resource and enterprise combinations; size of firm; uncertainty considerations; replacement policies; demand for inputs; nonfarm influences.

Mr. Faris

176. Economic Analysis in Resource Use. (3) III.

Lecture—3 hours. An analytical treatment of resource use problems, including public policy issues; economic productivity and natural resources; determinants, principles, and patterns

of natural resource use; resource conservation; land tenure problems and policies. Mr. Snyder

190. Senior Research Project. (3) II, III.

Supervised research and reporting. May be repeated for additional credit.

II. Mr. Sosnick; III. ——

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: senior standing and approval of department. Limited to majors in agricultural economics with a B average or higher.

The Staff

Graduate Courses

200A-200B-200C. Economics of Agricultural Production, Consumption and Trade.

(3-3-3) I-II-III.

Lecture—3 hours. Theory of the firm and industry, with particular reference to production; market structures, single and multiple products, uncertainty; theory of demand and consumption; and location theory and interregional trade.

I. Mr. French; II. Mr. King; III. Mr. Sosnick

210. Econometric Methods. (4) III.

Lecture—4 hours. Prerequisite: Mathematics 131B. Statistical models and their use in estimation of economic relationships; single and multiple equation systems.

220. Agricultural Policy. (4) I.

Lecture—4 hours. Welfare considerations and efficiency criteria as related to agricultural policy; an appraisal of agricultural policy in a changing economy.

Mr. McCalla

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

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.

Mr. DeLoach

253A-253B. Quantitative Analysis of Operational Problems. (3-3) I-II.

Lecture—3 hours. Selected topics in operations research, including mathematical programming, decision theory, inventory, waiting line, and replacement models; simulation of business operations; statistical quality control.

I. Mr. Carter; II. Mr. Faris

257. Production Planning and Market Analysis. (3) III.

Lecture—3 hours. Quantitative analysis of production systems by statistical, economic, and engineering methods; sales analysis for the individual firm; problems of investment, location, scale of operations.

Mr. Carman

260. Administrative Organization and Policy Formation. (3) III.

Lecture—3 hours. Concepts and techniques of administration in the business firm; formulation and implementation of management goals; planning, procuring, organizing, and controlling physical factors and personnel.

Mr. Foytik

280A-280B-280C. Analysis of Research in the Economics of Agriculture. (3-3-3) I-II-III.

Lecture—3 hours. Current research problems and methods of analysis in agricultural economics. A comprehensive approach to economic problems of agriculture, including analysis of production, supply, and demand for firm and industry; regional economics and interregional trade.

I. Mr. Carter; II. Mr. King; III. Mr. French

299. Individual Study. (1-4) I, II, III.

The Staff

299D. Special Study for Doctoral Dissertation.

(1-9) I, II, III.

The Staff

AGRICULTURAL EDUCATION

Orville E. Thompson, Ph.D., *Chairman of the Department*

Department Office, TB-10

Professors:

Frederick L. Griffin, M.S. (*Emeritus*)

Glenn R. Hawkes, Ph.D.

Elwood M. Juergenson, Ph.D. (*also Coordinator of Vocational Teacher Education*)

Sidney S. Sutherland, M.S. (*Emeritus*)

Orville E. Thompson, Ph.D.

Associate Professor:

Emmy E. Werner, Ph.D.

Assistant Professors:

Robert F. Barnes, Ph.D.

Mary C. Regan, Ph.D.



Assistant Professor:

Isao Fujimoto, Ph.D. (*Acting*)

Lecturers:

Arline Johnson, M.S. (Also Supervisor of Teacher Training—Home Economics)
Jane N. Welker, M.A.

Departmental Major Advisers—See Schedule and Directory Listing.

Credential Counselors: _____.

Secondary Credentials—Agriculture.—Mr. Juergenson
Secondary Credentials—Homemaking.—Miss Johnson
Junior College Credentials—Agriculture.—Mr. Juergenson

Bachelor of Science Major Program and Graduate Study. See pages 53 and 127.

Lower Division Course**10. Introduction to Agricultural Education. (3) I.**

Lecture—3 hours. Survey of entire field of education in agriculture. Vocational surveys, occupational analysis. The role and relationship of agriculture in California and the nation to occupational opportunities. Study of professions relating to agriculture. Mr. Thompson

Upper Division Courses**160. Vocational Education. (3) III.**

Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture, commerce, home economics, and industry. Mr. Thompson

186. Research Design and Analysis. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 13 or consent of the instructor. Survey of major types of research design in agricultural extension and agricultural education. Tests of statistical significance such as Chi square, analysis of variance, and related topics. Use of computer in data processing. Miss Regan

187. Extension Education in Agriculture and Home Economics. (3) III.

Lecture—2 hours; laboratory—3 hours. A study of the Agricultural Extension Service in California, the United States, and other countries. Emphasis on organization and programs. Miss Regan

188. Technical Journalism. (4) I.

Lecture—4 hours. Style structure, organization, and presentation of technical information. Includes mass communication theory, mass media analysis, and audience analysis. Miss Regan

189. Adult Education. (3) II, III.

Lecture—3 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. Mr. Barnes

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Thompson in charge)

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

The Staff (Mr. Thompson in charge)

Graduate Courses**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Reports and discussions of topics of interest in the fields of agricultural education, home economics education, agricultural extension, and adult education.

Mr. Thompson, Miss Regan

299. Research. (1-6) I, II, III.

Research in agricultural education, home economics education, vocational education, agricultural extension, or adult education.

The Staff (Mr. Thompson in charge),

Supervised Teaching Courses**320A. Introduction to Teaching. (1) I, II, III.**

Lecture—1 hour. Observations and participation in some form of public school work.

Mr. Juergenson

320B. Instructional Materials and Procedures. (3) III.

Lecture—2 hours; laboratory—3 hours. Introduction to the materials and procedures used in teaching. Use of audio-visual, radio and other teaching aids. Preparation of teaching materials; collecting, organizing, processing, and evaluating community resources.

Mr. Juergenson

320C. Supervised Teaching; Sec. 1, Agriculture. (12) I, II, III.

Field work—student teaching—36 hours. Prerequisite: course 320A; course 320E must be taken concurrently. Directed teaching for candidates for the credential in agriculture

Mr. Juergenson

320C. Supervised Teaching: Sec. 2. Home Economics. (12) I, II, III.

Field work—student teaching—36 hours. Prerequisite: course 320A; course 320E must be taken concurrently. Directed teaching for candidates for the credential in home economics.

Miss Johnson

320E. Curriculum and Instruction Procedures: Sec.**1. Agriculture. (3) I, II, III.**

Discussion—3 hours. Prerequisite: all students enrolled in 320E must enroll in 320C con-

currently. Planning and organizing an effective curriculum. Selection, organization, evaluation, and use of resource material for teaching.

Mr. Juergenson

320E. Curriculum and Instruction Procedures: Sec.

2. Home Economics. (3) I, II, III.

Discussion—3 hours. Prerequisite: all stu-

dents enrolled in 320E must enroll in 320C concurrently. Planning and organizing an effective curriculum. Selection, organization, evaluation, and use of resource material for teaching.

Miss Johnson

320E. Curriculum and Instruction Procedures: Sec.

2. Home Economics. (3) I, II, III.

Discussion—3 hours. Prerequisite: all stu-

AGRICULTURAL ENGINEERING—See also Engineering: Agricultural

AGRICULTURAL ENGINEERING

Coby Lorenzen, Jr., M.S., *Chairman of the Department*

Department Office, 2030 Engineering I

Professors:

Norman B. Akesson, M.S.

Roy Bainer, M.S. (*Agricultural Engineering and Engineering*)

Kinsell L. Coulson, Ph.D.

John R. Goss, M.S.

Samuel A. Hart, Ph.D.

S. Milton Henderson, M.S.

Clarence F. Kelly, M.S.

Robert A. Kepner, B.S.

Coby Lorenzen, Jr., M.S.

Loren W. Neubauer, Ph.D.

Michael O'Brien, Ph.D.

Herbert B. Schultz, Ph.D. (*Agricultural Engineering and Lecturer in Geography*)

Wesley E. Yates, M.S.

Associate Professors:

William J. Chancellor, Ph.D.

Robert B. Fridley, M.S.

John C. Harper, D.Sc.

Assistant Professors:

Stanton R. Morrison, Ph.D.

Leonard O. Myrup, Ph.D.

Errol D. Rodda, Ph.D.

Cletus E. Schertz, Ph.D.

◊ ◊ ◊

Lecturers:

John B. Dobie, M.S.

Roger E. Garrett, M.S.

Joe P. Gentry, M.S.

Bachelor of Science Major Program and Graduate Study (College of Engineering).
See pages 53 and 95.

Lower Division Course

12. Engineering in Agricultural Operations. (3) II.

Lecture—3 hours. Introduction of engineering principles to tillage, harvesting, application

of power, utilization of heat, materials handling, processing, structures, environment control, and systems concept.

Mr. Lorenzen, Mr. Dobie

Upper Division Courses

103. Agricultural Power. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 2A-2B or 4A-4B; open to qualified lower division students by permission. Principles of operation, construction, and utilization of internal-combustion engines; tractors and electric motors.

Mr. Neubauer

104. Agricultural Machinery. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 2A or 4A. Principles of construction, operation, selection, and utilization of equipment for tillage, planting, harvesting, and the application of agricultural chemicals.

Mr. Yates

105. Farm Structures. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 2A or 4A. Functional and structural design of unified physical plants for livestock production and other enterprises; principles of feed mills, materials conveying, water and electrical systems, feed storage; labor-efficiency studies; materials for and design of beams, columns, trusses, and tanks.

Mr. Schertz

106. Micrometeorology in Agriculture. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 16B or equivalent. Solar and terrestrial radiation; temperature and moisture fields near the surface; momentum and turbulent transfers; energy balance near the surface; practical applications to agriculture and air pollution.

Mr. Coulson

107. Agricultural Meteorology. (3) I.

Lecture—3 hours. Prerequisite: Geography 1 or 3. Daytime radiation intensities, nocturnal heat losses, climatic elements over different ground cover and terrain. Modification of microclimate by sheltering, frost-protection devices,

and windbreaks. Probabilities of temperatures, rainfall, and climatic hazards to agriculture (risk figures).
Mr. Schultz

110. Principles of Application of Agricultural Chemicals. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Math 13, Physics 2A–2B (or consent of instructor). Principles of fluid flow and atomization in relation to formulations and machine applications. Small particle behavior, micro-weather, chemical drift. Analysis of ground machines and aircraft systems for application of defoliants, fertilizers, pesticides and trace chemicals. Metering and calibration. Economics.
Mr. Akesson

140. Atmospheric Turbulence. (3) III.

Lecture—3 hours. Prerequisite: Atmospheric Science 121. Basic theory of atmospheric turbulence, observed characteristics of turbulence, eddy transports of mass, momentum, and thermal energy, effects of turbulence in diffusion processes in the atmosphere.
Mr. Myrup

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of the instructor.
The Staff

199. Special Study for Advanced Undergraduates. (1–5) I, II, III.

The Staff

Graduate Courses

298. Group Study. (1–5) I, II, III.

The Staff

AGRICULTURAL PRACTICES

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

Department Office, 2 TB-6

Lecturer:

Harry O. Walker, Ed.D.

Assistant Supervisors:

George F. Hanna, M.Ed.

Gene E. Rapp, M.Ed.

299. Research. (1–6) I, II, III. The Staff

Professional Courses

314A. Agricultural Engineering Problems and Techniques for Teachers. (3) II.

Laboratory—9 hours. Prerequisite: Agricultural Education major or consent of instructor. The application of engineering and mechanical principles to the construction, maintenance, and repair of agricultural structures, machinery, and utilities. Offered in even-numbered years.
Mr. Gentry

314B. Agricultural Engineering Problems and Techniques for Teaching. (3) II.

Laboratory—9 hours. Prerequisite: Agricultural Education major or consent of instructor. The application of engineering and mechanical principles to the construction, maintenance, and repair of agricultural structures, machinery, and utilities. Offered in odd-numbered years.
Mr. Garrett

317. Problems in Teaching Farm Mechanics. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: 12 units in Agricultural Engineering including courses 314A, 314B; Physics 2A–2B or 4A–4B. Demonstrations of and practice in the methods of teaching farm mechanics in secondary schools. School-shop planning including the selection, arrangement, and management of equipment. Curriculum planning, including the relation of teaching materials, references, and visual aids.
Mr. O'Brien

Lower Division Course

49. Field Practice in Agriculture.

(No credit) I, II, III.

Laboratory—3 hours. Operation and maintenance of tractors and specialized equipment used for producing and harvesting food and forage crops; familiarization with basic soil, water, and land management techniques. For students planning careers in production, processing, distribution, or service elements of the agricultural industry.

AGRICULTURAL SCIENCE AND MANAGEMENT

William C. Weir, *Chairman of the Committee*
Committee Office, 162 Animal Science

Committee in Charge:

Walter L. Dunkley, Ph.D. (*Food Science and Technology*)

J. Edwin Faris, Ph.D. (*Agricultural Economics*)

Thomas A. Nickerson, Ph.D. (*Food Science and Technology*)

Harry O. Walker, Ed.D. (*Agricultural Practices*)

William C. Weir, Ph.D. (*Animal Husbandry*)

Lynn D. Whittig, Ph.D. (*Soils and Plant Nutrition*)

William A. Williams, Ph.D. (*Agronomy*)

Major Advisers.—See *Schedule and Directory Listing*.

Bachelor of Science Major Program and Graduate Study. See pages 53 and 127.

Lower Division Course

11. Natural and Social Sciences in Agriculture (Summer Laboratory). (1).

Lecture—2 hours. A survey of major activities of the departments in the College of Agriculture and tours of departmental facilities. Contributions of the natural, physical, and social sciences to agricultural research, education, and management. The importance of agriculture to our society and the opportunities it has to offer.

Mr. Nelson

Graduate Course

290. Seminar. (1) I.

Seminar—1 hour.

The Staff (Mr. Meyer in charge)

Agricultural Economics

Lower Division Courses

1. Economic Basis of the Agricultural Industry. (3) II.

Lecture—3 hours. Prerequisite: Economics 1A. Brief history of agriculture and man; the agricultural industry and its relation to the U. S. and world economies; production and supply, marketing and demand for agricultural products.

Mr. McCorkle

2. Economic Basis of the Agricultural Industry. (3) III.

Lecture—3 hours. Prerequisite: course 1. Nature of agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy, particularly those relevant to California.

Mr. Snyder

Animal Science

Lower Division Courses

1. Domestic Animals and Man. (3) I.

Lecture—2 hours; discussion—1 hour. Animal domestication and the ecologic historic social and economic factors affecting characteristics and distribution of species. Their use by man for food, work, fiber, drugs, research, and recreation; projected effects of population expansion, urbanization, and multiple land usage.

Mr. Weir

2. Introductory Animal Science. (3) III.

Lecture—2 hours; laboratory—3 hours. Recommended: course 1; Biology 1. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals; the application of sciences to animal production.

Mr. Bradford

Plant Science

Lower Division Courses

1. Plants and Man. (3) (II)

Lecture—3 hours. Plants as a basic resource for food, fiber, shelter, and recreation; their use and effect on man, past, present, and future.

Mr. Smeltzer, Mr. Williams

2. Production of Cultivated Plants. (3) III.

Lecture—2 hours; laboratory—3 hours. Recommended: course 1. Principles of crop improvement, propagation, production, processing, storage, and marketing; conservation and utilization of land and water resources.

Mr. Flocker, Mr. Lider

Soil and Water Science

Lower Division Courses

1. Soil, Water, and Air Resources. (3) I.

Lecture—3 hours. Prerequisite: Biology 1 or consent of instructor. Interrelationships of man and environmental factors; utilization and development of renewable natural resources; characteristics of soil, water, and air and their relation to management and planning concepts. Open to non-majors.

Mr. Henderson

2. Soil, Water, and Air Resources. (3) II.

Lecture—3 hours. Prerequisites: course 1; Biology 1; recommended: Physics 2A. Development and properties of soils; source and properties of water; properties of the atmosphere; soil, water, and air management in relation to crop production; planning concepts related to agricultural development and production.

Mr. Whittig

Food Science and Technology

Upper Division Course

100. Processing Agricultural Products. (5) I.

Lecture—4 hours; laboratory—3 hours. Prerequisites: Biology 1; Chemistry 8. Processing of foods, feeds, and fibers to provide desirable qualities such as convenience, economy and utility. Principles used in raw product selection, conversion, preservation, and quality control.

Mr. Miller, Mr. Dunkley

AGRICULTURAL TOXICOLOGY

Donald G. Crosby, Ph.D. *Chairman of the Committee*

Department Office, 109 Agricultural Toxicology Building

Committee in Charge:

Herman F. Beckman, Ph.D. (*Entomology*)

Paul A. Castelfranco, Ph.D. (*Botany*)

Donald G. Crosby, Ph.D. (*Food Science and Technology*)

Wendell W. Kilgore, Ph.D. (*Food Science and Technology*)

Eugene M. Stafford, Ph.D. (*Entomology*)

George F. Stewart, Ph.D. (*Food Science and Technology*)

Upper Division Course

180. Agricultural Toxicology. (3) I.

Lecture—3 hours. Prerequisite: Chemistry 8 or 112B. Recommended: Biochemistry 101A. A unified introduction to the principles of agricultural toxicology. Pesticides, food additives, natural toxicants; their legal, commercial, and health significance.

Mr. Beckman, Mr. Crosby, Mr. Kilgore

Graduate Courses

203. Chemistry of Toxicants. (3) II.

Lecture—3 hours. Prerequisite: Chemistry 112 (or equivalent), or Chemistry 8 and consent of instructor. Toxic substances: selected topics

illustrating their occurrence, structure, and reactions indicative of metabolism and environmental transformations.

Mr. Crosby

214. Mechanisms of Toxic Action. (4) II.

Lecture—4 hours. Prerequisite: Biochemistry 101A, 101B and consent of instructor. Biochemical and physiological mechanisms underlying toxicity and detoxification.

Mr. Castelfranco, Mr. Kilgore

220. Analysis of Toxicants. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Chemistry 5 or 7B, Chemistry 9 or 112B, Agricultural Toxicology 180 recommended. Principles of the chemistry of toxicants as applied to micro-analytical techniques, theoretical considerations regarding sampling, sample processing, cleanup and isolation techniques and detection systems.

Mr. Beckman

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

298. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Topics such as trace analysis of toxicants, natural toxicants, and new pesticides.

The Staff (Mr. Crosby in charge)

299. Agricultural Toxicology. (1-12) I, II, III.

Discussion and research.

The Staff

AGRONOMY—See Plant Sciences

AMERICAN HISTORY AND LITERATURE

David L. Jacobson, Ph.D., *Chairman of the Committee*

Committee Office, 222 Sproul Hall

Committee in Charge:

Associate Professors:

Paul Goodman, Ph.D. (*History*)

David L. Jacobson, Ph.D. (*History*)

Daniel E. Snyder (*Dramatic Art*)

Assistant Professors:

Gerald Friedberg, Ph.D. (*Political Science*)

H. Phelps Gates, Jr., Ph.D.
(*Classics and Sanskrit*)

John L. Magnus, Jr., Ph.D. (*English; Acting*)

Guenther Roth, Ph.D. (*Sociology*)

Group Major Adviser.—Mr. Jacobson.

The Major with Honors.—See description, page 107.

Major Adviser.—See *Schedule and Directory Listing*.

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

Preparation for the Major.—Required: History 17A, 17B, and English 30A, 30B, 30C. In addition, History 4A, 4B, 4C is required for students electing History in Group 3. Recommended: English 46A, 46B, 46C for those electing History in Group 3; History 4A, 4B, 4C for those electing literature in group 3.

The Major Program.—A total of 52 units in upper division courses, distributed as follows:

Group 1. Sixteen units of history selected from the following courses: History 170A, 170B, 170C; 171A, 171B, 171C; 174A, 174B; 175A, 175B; 176A, 176B; 178A, 178B; 179A, 179B.

Group 2. Sixteen units of literature selected from the following courses: English 140, 141, 142, 143, 144; 146, 147, 152, 158A, 158B, 175; Dramatic Art 150.

Group 3. In consultation with his adviser, the student must select 20 additional units in either English or History. Those students who elect History in this group must take History 101A or 101B.

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

Teaching Major.—Elementary and Secondary Credentials.

Subject Representative: Mr. Jacobson

Teaching Major.—Requirements are the same as for the departmental major. There is no teaching minor in American History and Literature.

Upper Division Courses

194H. Special Study for Honors Students.

(4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: enrollment limited to honors students in American History and Literature. The Staff

197H. Special Study for the Comprehensive Examination for Honors Students.

(4) I, II, III.

Prerequisite: completion of all other major requirements for the A.B. degree in American History and Literature. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

ANATOMY

Walter S. Tyler, D.V.M., Ph.D., *Acting Chairman of the Department*

Department Office, 1042 Haring Hall

Professors:

Logan M. Julian, D.V.M., Ph.D.

Walter S. Tyler, D.V.M., Ph.D.

Associate Professor:

Larry Z. McFarland, D.V.M., Ph.D.

Assistant Professors:

Leslie J. Faulkin, Jr., Ph.D.

Benjamin L. Hart, D.V.M., Ph.D.

(Anatomy and Psychology)

◇ ◇ ◇

Senior Lecturer:

Ida G. Schmidt, Ph.D.

Lecturer:

Marjan Merala, Ldo.Vet., M.S. (*Medical Bibliography*)

Upper Division Courses

*100. Systematic Anatomy. (3) II.

Lecture—3 hours. Prerequisite: Zoology 2 and consent of instructor. Course 100L should be taken concurrently. Lectures emphasizing the typical structure of the major anatomical systems of the ruminant, carnivore, fowl, and primate. Offered in even-numbered years.

The Staff (Mr. McFarland in charge)

*100L. Systematic Anatomy Dissection. (5) II.

Laboratory—15 hours. Prerequisite: course

* Not to be given, 1967-68.

100 (should be taken concurrently). Dissection and demonstration of the major anatomical systems of the sheep, dog, chicken, monkey, and man, with comparisons to related species. Offered in even-numbered years. The Staff (Mr. McFarland in charge)

110. Ultramicroscopic Anatomy. (3) I.

Lecture—3 hours. Prerequisite: Zoology 107. The electron microscopic appearance of cells, tissues, and organs of animals emphasizing the structural basis for their physiological functions. Offered in even-numbered years.

Mr. Tyler, Mr. McFarland, Mr. Faulkin

150. Functional Comparative Anatomy of the Locomotor and Nervous Systems: Lecture. (3) I.

Lecture—3 hours. Prerequisite: freshman standing in School of Veterinary Medicine, or Zoology 100 and consent of instructor. Gross, subgross, light microscopic and electronmicroscopic anatomy of the locomotor and nervous systems of domesticated species.

Mr. Julian, Mr. Hart, Mrs. Schmidt

151. Functional Comparative Anatomy of the Locomotor and Nervous Systems: Gross Laboratory. (4) I.

Laboratory—12 hours. Prerequisite: course 150 (should be taken concurrently). Dissection and demonstration of the locomotor and nervous systems of domesticated species.

Mr. Julian, Mr. Hart, Mrs. Schmidt

152. Functional Comparative Anatomy of Locomotor and Nervous Systems: Microscopic Laboratory. (1) I.

Laboratory—3 hours. Prerequisite: course 150 (should be taken concurrently). Microscopic anatomy of the basic tissue types as represented in the locomotor and nervous systems.

Mrs. Schmidt, Mr. Julian, Mr. Hart

155. Functional Comparative Anatomy of Internal Organ Systems: Lecture. (2) II.

Lecture—2 hours. Prerequisite: freshman standing in School of Veterinary Medicine, or Embryology and consent of instructors. Functional comparative gross, subgross, light microscopic, and electronmicroscopic anatomy of the organs in the abdomen and thorax.

Mr. Tyler, Mr. Faulkin, Mrs. Schmidt

156. Functional Comparative Anatomy of Internal Organ Systems: Gross Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 155 (to be taken concurrently). Dissection and demonstration of organ systems in abdomen and thorax. Mr. Tyler, Mr. Faulkin, Mrs. Schmidt

157. Functional Comparative Anatomy of Internal Organ Systems: Microscopic Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 155 (to be taken concurrently). Laboratory study and demonstration of microscopic and submicroscopic structure of organs of abdomen and thorax.

Mr. Faulkin, Mr. Tyler, Mrs. Schmidt

160. Functional Comparative Anatomy of Poultry and Experimental Animals: Lecture. (2) III.

Lecture—2 hours. Prerequisite: course 155 or consent of instructor. The gross, subgross, microscopic, and submicroscopic anatomy of poultry and conventional laboratory mammals.

The Staff (Mr. Julian in charge)

161. Functional Comparative Anatomy of Poultry and Experimental Animals: Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 160 (should be taken concurrently). Dissection and demonstration of the gross and microscopic anatomy of poultry and conventional laboratory mammals. The Staff (Mr. Julian in charge)

170. Principles of Normal and Abnormal Animal Behavior. (3) III.

Lecture—3 hours. Prerequisite: course 150 and Physiological Sciences 140A–140B or consent of instructor. An examination of normal behavioral patterns of domestic animals with emphasis on the historical, environmental, and organismic determinants of behavior. An analysis of factors contributing to abnormal behavior in domestic animals.

Mr. Hart

180. Surgical Anatomy. (4) III.

Laboratory—12 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Topographical, radiological, and regional anatomy as applied to the clinical sciences.

Mr. McFarland

198. Directed Group Study. (2–5) I, II, III.

Laboratory—6–15 hours. Prerequisite: consent of instructor.

The Staff

199. Special Study for Advanced Undergraduates. (1–5) I, II, III.

Laboratory—3–15 hours. Prerequisite: consent of instructor.

The Staff

Graduate Courses

200. Functional Comparative Neuroanatomy. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: one of the following: course 100, 100L; Animal Science: Physiology 110A–110B, 120A; Anthropology 155, Psychology 108; Zoology 106A–106B, 107 or the equivalent. A comparative gross and microscopic study of the nervous system of birds and mammals, with strong emphasis on function. Animals studied include the chicken, Japanese quail, rat, dog, cat, rabbit, cow, sheep, subhuman primates, sea mammals and man. Offered in odd-numbered years.

Mr. Hart, Mr. McFarland

202. Organology. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 157, and consent of instructor. The comparative development, growth patterns, and composition of selected animal organs: liver, kidney, lung, brain, a viscera and a skeletal muscle. Offered in odd-numbered years.

The Staff (Mr. Julian in charge)

***204. Functional Comparative Anatomy of the Reproductive Systems. (3) I.**

Lecture—3 hours. Gross, microscopic, and ultramicroscopic structure of the male and female reproductive systems in birds and mammals. Offered in odd numbered years.

Mr. McFarland, Mr. Faulkin

210. Principles of Histochemistry. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Zoology 107, Biochemistry 101A. Principles of enzyme histochemistry of animal tissues applicable to light and electron microscopy. Offered in odd-numbered years.

Mr. Tyler

217. Experimental Endocrinology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Animal Science: Physiology 130. Gross, microscopic, and ultramicroscopic struc-

* Not to be given, 1967–68.

ture of the endocrine organs, and the applications of basic techniques used to demonstrate the physiological effects of these organs. Offered in even-numbered years.

Mr. Faulkin, Mr. McFarland

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

297. Advanced Group Study in Surgical Anatomy. (2-4) I, II, III.

Laboratory—6-12 hours. Prerequisite: course 180. Selected topics in topographical, radiologi-

cal, or regional anatomy as they apply to the clinical sciences.

Mr. McFarland

298. Advanced Group Study. (2-5) I, II, III.

Laboratory—6-15 hours. Prerequisite: consent of instructor.

The Staff

299. Research (2-12) I, II, III.

Laboratory—6-36 hours. Prerequisite: consent of instructor.

The Staff

ANIMAL SCIENCES

Hubert Heitman, Jr., Ph.D., *Chairman of the Committee*
Committee Office, 130 Animal Science Building

Committee in Charge:

G. Eric Bradford, Ph.D. (*Animal Husbandry*)

Hubert Heitman, Jr., Ph. D. (*Animal Husbandry*)

Fredric W. Hill, Ph.D. (*Nutrition*)

Frederick W. Lorenz, Ph.D. (*Animal Physiology*)

Magnar Ronning, Ph.D. (*Animal Husbandry and Nutrition*)

Wilbor O. Wilson, Ph.D. (*Poultry Husbandry*)

Participating Departments:

ANIMAL HUSBANDRY

Hubert Heitman, Jr., Ph.D., *Chairman of the Department*
Department Office, 130 Animal Science Building

Professors:

James M. Boda, Ph.D. (*Animal Husbandry and Animal Physiology*)

Floyd D. Carroll, Ph.D.

Moses T. Clegg, Ph.D. (*Animal Husbandry and Animal Physiology*)

Harold H. Cole, Ph.D., LL.D. (*Emeritus*)

Perry T. Cupps, Ph.D.

Alex S. Fraser, Ph.D.

Irving I. Geschwind, Ph.D.

Harold Goss, Ph.D. (*Emeritus*)

Paul W. Gregory, Sc.D. (*Emeritus*)

Hubert Heitman, Jr., Ph.D.

Carroll E. Howell, M.S. (*Emeritus*)

Max Kleiber, LLD. Sc. D. (*Emeritus*)

Robert C. Laben, Ph.D.

Glen P. Lofgreen, Ph.D.

Sylvester W. Mead, M.S. (*Emeritus*)

James H. Meyer, Ph.D.

Wade C. Rollins, Ph.D.

William C. Weir, Ph.D.

James F. Wilson, M.A., LL.D. (*Emeritus*)

Associate Professors:

Ransom L. Baldwin, Jr., Ph.D.

G. Eric Bradford, Ph.D.

William N. Garrett, Ph.D.

Magnar Ronning, Ph.D. (*Animal Husbandry and Nutrition*)

Assistant Professor:

Graham A. E. Gall, Ph.D.

ANIMAL PHYSIOLOGY

Frederick W. Lorenz, Ph.D., *Chairman of the Department*
Department Office, TB 30

Professors:

James M. Boda, Ph.D. (*Animal Physiology and Animal Husbandry*)

Moses T. Clegg, Ph.D. (*Animal Physiology and Animal Husbandry*)

Frederick W. Lorenz, Ph.D.

Edward A. Rhode, Jr., D.V.M. (*Animal Physiology and Clinical Sciences*)

Arthur H. Smith, Ph.D.

Irving H. Wagman, Ph.D.

Associate Professors:

- Ray E. Burger, Ph.D. (*Animal Physiology and Poultry Husbandry*)
 Harry W. Colvin, Jr., Ph.D.
 Frank X. Ogasawara, Ph.D. (*Animal Physiology and Poultry Husbandry*)

Assistant Professors:

- Barry W. Wilson, Ph.D. (*Animal Physiology and Poultry Husbandry*)
 Dorothy E. Woolley, Ph.D.

◇ ◇ ◇

Associate Professors:

- Ronald J. Baskin, Ph.D. (*Zoology*)
 Victor W. Burns, Ph.D. (*Physiological Sciences*)

Assistant Professor:

- Stanton R. Morrison, Ph.D. (*Agricultural Engineering*)

Lecturers:

- Walter E. Howard, Ph.D.
 Charles Winget, Ph.D.

NUTRITIONFredric W. Hill, Ph.D., *Chairman of the Department*

Department Office, 231 Home Economics Building

Professors:

- Gladys J. Everson, Ph.D.
 Fredric W. Hill, Ph.D.
 Lucille S. Hurley, Ph.D.
 Aloys L. Tappel, Ph.D. (*Nutrition and Food Science and Technology*)

◇ ◇ ◇

Professor:

- Robert E. Hungate, Ph.D. (*Bacteriology*)

Associate Professors:

- Richard A. Freedland, Ph.D. (*Physiological Sciences*)
 Marvin Goldman, Ph.D. (*Physiological Sciences*)

Lecturer:

- Rocco J. Della Rosa, Ph.D. (*Physiological Sciences*)

Associate Professors:

- Magnar Ronning, Ph.D. (*Nutrition and Animal Husbandry*)

Assistant Professors:

- Betty E. Haskell, Ph.D.
 Frances J. Zeman, Ph.D.

POULTRY HUSBANDRYWilbor O. Wilson, Ph.D., *Chairman of the Department*

Department Office, 109 Poultry Husbandry Building

Professors:

- Ursula H. Abbott, Ph.D.
 Hans Abplanalp, Ph.D.
 Vigfus S. Asmundson, Ph.D. (*Emeritus*)
 C. Richard Grau, Ph.D.
 F. Howard Kratzer, Ph.D.
 Samuel Lepkovsky, Ph.D. (*Emeritus, Berkeley Campus*)
 Lewis W. Taylor, Ph.D. (*Berkeley Campus*)
 Wilbor O. Wilson, Ph.D.

Assistant Professors:

- Edward E. Kriechhaus, Ph.D.
 Barry W. Wilson, Ph.D. (*Poultry Husbandry and Animal Physiology*)

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Lecturers:

- A. Wade Brant, Ph.D. (*Food Science and Technology*)
 Leo C. Norris, Ph.D.

Major Advisers.—See *Schedule and Directory* listing.

Bachelor of Science Major Program and Graduate Study.—See pages 53 and 127.

Associate Professors:

- Ray E. Burger, Ph.D. (*Poultry Husbandry and Animal Physiology*)
 Frank X. Ogasawara, Ph.D. (*Poultry Husbandry and Animal Physiology*)
 Daniel W. Peterson, Ph.D.

Animal Science

Lower Division Courses

1. Domestic Animals and Man. (3) I.

Lecture—2 hours; discussion—1 hour. Animal domestication and factors affecting characteristics and distribution of species. Their use by man for food, work, fiber, drugs, research, and recreation; projected effects of population expansion and urbanization on these uses.

The Staff (Mr. Weir in charge)

2. Introductory Animal Science. (3) III.

Lecture—2 hours; laboratory—3 hours. Recommended: course 1; Biology 1. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals; the application of sciences to animal production.

The Staff (Mr. Bradford in charge)

10. Poultry Production. (4) I.

Lecture—4 hours. A survey of principles and practices involved in poultry production. Designed for students not specializing in avian sciences.

Mr. Ogasawara

11. Laboratory in Poultry Production. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 10 (may be taken concurrently) or consent of instructor. Laboratory studies in poultry biology; techniques and economics of poultry production. Mr. Ogasawara

12. Survey of Poultry and Allied Industries. (3) II.

Lecture—2 hours; conference—1 hour. A survey of industries concerned with poultry products in the U. S. A. and various regions of the world: hatchery industry, feed industry, egg and meat production, poultry products, specialized enterprises.

Mr. Peterson

21. Livestock and Dairy Cattle Judging. (2) III.

Laboratory—6 hours. Prerequisite: courses 1 and 2. Conformation, finish, and quality in relation to ideal type. Relationship of form to function. Change in body proportions with growth and maturity. Correlation between types in live meat animals and carcass quality.

Mr. Cupps

Upper Division Courses

101. Avian Anatomy Laboratory. (1) I.

Laboratory—3 hours. Prerequisite: Physiology 101 and 101L, or Zoology 2. The gross and microscopic anatomy of birds; problems in the physiological adaptations of birds.

Mr. B. W. Wilson

111. Type Evaluation in Livestock and Dairy Cattle. (2) I.

Laboratory—6 hours. Prerequisite: course 21. Studies of recognized type evaluation in livestock and dairy cattle. Critical evaluation of the bases for the criteria used in establishing these standards.

Mr. Carroll

114A-114B. Advanced Dairy Cattle Production. (3-3) II-III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 110; Physiology 110B. 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.

Mr. Laben

115. Horse Production. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 100B; Nutrition 103 or 110; Physiology 110B. Feeding, breeding, and management of horses; application of the principles of basic animal sciences to problems of production of all classes of horses.

116A-116B. Meat Animal Production. (3-3) II-III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 103 or 110; Physiology 110B. Application of the sciences of nutrition, physiology and genetics to the development of efficient management programs for beef, sheep, and swine production. Similarities and differences among these species affecting management practices. Methods of improving carcass and meat quality.

Mr. Bradford, Mr. Garrett

118. Meat and Dairy Production. (5) III.

Lecture—5 hours. Prerequisite: course 2; Genetics 100B; Nutrition 103 or 110. Improvement of meat and dairy production through selection for heritable traits; comparative reproductive and feed efficiency; environmental adaptability and distribution; management for efficient yield of meat and milk. Not open for credit to animal science majors.

Mr. Carroll

121. Poultry Products Technology. (3) I.

Lecture—3 hours. Prerequisite: consent of instructor. Physical, chemical, and nutritional composition of poultry products; quality criteria and standards; physical, chemical, and microbiological factors influencing keeping quality.

Mr. Peterson, Mr. Brant

149. Environmental Management of Domestic Animals. (1) I.

Discussion—1 hour. Prerequisite: Physiology 149 (may be taken concurrently). Application of physiological principles to environmental management of domestic animals.

Mr. W. O. Wilson

151. Wildlife in Land Use. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biology 1 or a course in natural history. Wildlife and plant protection; population dynamics of vertebrates under various types of land use; applications of ecological principles to resource management-wildlife conflicts.

Mr. Howard

190. Proseminar in Animal Science. (1) I, II, III.

Seminar—1 hour. Prerequisite: senior standing in Animal Science or consent of instructor. Reports and discussions of recent advances in animal science.

The Staff (Mr. Heitman in charge)

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to animal science majors who are honor students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. The Staff (Mr. Heitman in charge)

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Selected topics relating to the animal (including avian) sciences The Staff (Mr. Heitman in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor. Problems in animal (including avian) biology related to nutrition, breeding, and physiology of large domestic livestock and poultry and their products. The Staff (Mr. Heitman in charge)

Graduate Courses**202. Experimental Incubation and Avian Teratology. (3) II.**

Lecture—3 hours. Prerequisite: Chemistry 8; Zoology 100. Recommended: Zoology 107. Problems of embryonic development, causes of embryonic mortality and terata in poultry. Offered in odd-numbered years. Mrs. Abbott, Mr. Taylor

202L. Laboratory in Avian Experimental Embryology and Teratology. (3) II.

Laboratory—9 hours. Prerequisite: course 202 (may be taken concurrently). The causes of abnormal morphogenesis in avian embryos including genetic, chemical, and physical-environmental factors; the application of transplantation, organ culture, and other experimental techniques. Offered in odd-numbered years.

Mrs. Abbott

290. Seminar. (1) I, II, III.

Seminar—1 hour. Reports and discussions of topics of interest in genetics, nutrition, technology, and physiology as they apply to animal (including avian) husbandry.

The Staff (Mr. Heitman in charge)

298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Lectures and discussions of advanced topics in the animal (including avian) sciences.

The Staff (Mr. Heitman in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Heitman in charge)

Animal Biochemistry**Upper Division Course****102. Animal Biochemistry Laboratory. (4) II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biochemistry 101B (may be taken concurrently). Laboratory procedures employed in the study of physiological and biochemical processes.

Mr. Baldwin

Graduate Courses**201. Protein Biochemistry. (3) II.**

Lecture—4 hours. Prerequisite: Biochemistry 201C. 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.

Mr. Geschwind

230. Biochemical Aspects of Endocrinology. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101B; Physiology 110B. 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 odd-numbered years.

Mr. Geschwind

Animal Genetics**Upper Division Courses****107. Animal Breeding and Genetics. (3) I.**

Lecture—3 hours. Prerequisite: Genetics 100B. Qualitative and quantitative inheritance in relation to animal breeding; review of selection and breeding experiments with reference to livestock and poultry improvement.

Mr. Gall

107A. Animal Breeding Laboratory. (1) I.

Laboratory—3 hours. Prerequisite: course 107 (may be taken concurrently). Laboratory exercises in quantitative genetics using Drosophila. Selection, inbreeding and line crossing experiments alternate with statistical analyses using the collected data.

Mr. Gall

107B. Animal Breeding Laboratory. (1) I.

Laboratory—3 hours. Prerequisite: course 107 (May be taken concurrently). Experiments on qualitative and quantitative genetics using the laboratory mouse; segregation; linkage; evaluation of effects of inbreeding and line crossing; maternal influence on different kinds of traits.

Mr. Bradford

107C. Discussion of Animal Breeding Experiments and Methods. (1) III.

Discussion—1 hour. Prerequisite: course 107. Review of literature and discussion relating to animal breeding experiments and programs. Emphasis on cattle, sheep and swine.

Mr. Rollins

107D. Discussion of Poultry Breeding Experiments and Methods. (1) II.

Discussion—1 hour. Prerequisite: course 107. A discussion of genetic experiments and breeding plans specifically related to poultry.

Mr. Abplanalp

108. Methods in Quantitative Animal Breeding. (3) II.

Lecture—3 hours. Prerequisite: course 107; a course in statistics. Principles, methods and procedures in quantitative animal breeding; heritability, intra- and inter-population selection methods, including selection index, family, pedigree and progeny selection; genetic correlation; relationship and inbreeding.

Mr. Rollins

108L. Animal Breeding Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 108 (may be taken concurrently). Laboratory in quantitative animal breeding methods. Estimation of heritabilities, genetic correlations and repeatabilities, calculation of inbreeding and relationship co-efficients, adjustment of data for environmental effects, construction of selection indexes, estimation of selection response and hybrid vigor.

Mr. Rollins

109. Developmental Genetics in Animals. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: Genetics 100B, Zoology 100. Gene and gene action in vertebrates; the gene in relation to genetic background and developmental environment.

Mrs. Abbott

Graduate Courses**207. Quantitative Genetics and Animal Breeding. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 105B. Recommended: Mathematics 16A. The genetic theory of selection, population structure, and induced variation, and its implications in the design of animal breeding experiments.

Mr. Abplanalp

299. Research. (1-12) I, II, III.

The Staff (Mr. Bradford in charge)

Nutrition**Lower Division Course****10. Discoveries and Concepts in Nutrition. (3) III.**

Lecture—3 hours. Nutrition as a science; its historical development; the properties of foods.

Upper Division Courses**103. Animal Nutrition and Feeding. (4) II.**

Lecture—3 hours; discussion—1 hour. 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

and poultry; the balancing of rations. Not open for credit to animal science majors. Mr. Garrett

109. Nutritional Principles of Livestock Feeding. (3) I.

Lecture—3 hours. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. The principles of nutrition and their application to the solution of problems in animal feeding. Nutritive requirements for maintenance and productive functions, nutritional disorders, composition and use of feed-stuffs.

Mr. Lofgreen

110. Principles of Nutrition. (5) II.

Lecture—4 hours; discussion—1 hour. Prerequisite: Biochemistry 101B (may be taken concurrently); a course in physiology or zoology. The fundamental principles of the nutrition of man and other animals. The nutrients in relation to physiological processes of growth, maintenance, and reproduction. Nutritional disorders.

_____, Mr. Grau

112A-112B. Nutrition and Dietetics. (3-4) I-II.

Lecture—3-4 hours. Prerequisite: Chemistry 8; Physiology 1. An introduction to the principles of nutrition; study of the nutrients and their chemical and physiological roles in metabolism; nutrient requirements of man at various phases of the life cycle.

Miss Everson

113A-113B. Nutrition and Dietetics Laboratory. (1-1) I-II.

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.

Miss Everson

114. Physiological Processes in Child Development. (4) I.

Lecture—4 hours. Prerequisite: course 112B; Biochemistry 101B or consent of instructor. Physical development, physiological changes, and nutritional needs during the embryological period, infancy, childhood, and youth.

Mrs. Hurley

116. Nutrition and Diet Therapy. (5) I.

Lecture—5 hours. Prerequisite: course 112B; Biochemistry 101B. Physiological basis for the use of special diets. Problems in the planning and computation of dietaries for normal and pathological conditions.

Mrs. Haskell

117. Problems in Human Nutrition. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112B; Biochemistry 101B; Chemistry 5. Evaluation of methods of assessing nutritional status in humans. Application of chemical, microbiological, chromatographic, and enzymatic techniques to current problems in human nutrition.

Mrs. Haskell

121. Animal Nutrition Laboratory. (2) III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 110. Studies, demonstrations, and exercises in the measurement of nutritional values of feeds, nutrient requirements for physiological functions, and ration formulation. Students who have completed course 122 and/or 123 will have units of credit reduced by one unit per course.

Mr. Lofgreen

122. Ruminant Nutrition. (3) III.

Lecture—3 hours. Prerequisite: course 110; Bacteriology 2; Physiology 110B. A study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in the ruminant. Students who have completed course 121 may only receive 2 units of credit.

Mr. Ronning

123. Nutrition of Non-Ruminant Animals. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110. Application of nutrition principles to the feeding of non-ruminant species, including swine, poultry and laboratory animals. Students who have completed course 121 may only receive 2 units of credit.

Mr. Kratzer

125. Metabolism and Food Utilization. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110; Physiology 110B. Bioenergetics; a study of energy expenditures of animals and of factors influencing the utilization of food energy.

Mr. Ronning

194H. Special Study for Honors Students.**(1–5) I, II, III.**

Prerequisite: open only to honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Hill in charge)

198. Directed Group Study. (1–5) I, II, III. The Staff**199. Special Study for Advanced Undergraduates.****(1–5) I, II, III.**

The Staff

Graduate Courses**201A. Advanced General Nutrition. (3) I.**

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of protein and amino acid metabolism; animal energetics and energy metabolism. Comparative aspects.

The Staff (Mr. Hill in charge)

201B. Advanced General Nutrition. (3) II.

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a

course in nutrition. Advanced studies of problems in nutrition with emphasis on minerals; water balance. Comparative aspects.

The Staff (Mr. Kratzer in charge)

201C. Advanced General Nutrition. (3) III.

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of metabolic function and nutritional importance of vitamins; essential fatty acids; deficiency and degenerative diseases. Comparative aspects.

The Staff (Mrs. Hurley in charge)

250. Concepts of Animal Nutrition. (3) II.

Lecture—3 hours. Prerequisite: courses 201A, 201B, 201C. Dynamic interrelationships between food, animal, and environment, including concepts in food intake, digestion, absorption, and utilization of nutrients.

290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion and critical evaluation of advanced topics in nutrition research.

The Staff (Mr. Norris in charge)

298. Group Study. (1–5) I, II, III.

Discussion—1–5 hours.

The Staff (Mr. Hill in charge)

299. Research. (1–12) I, II, III.

The Staff (Mr. Hill in charge)

Physiology**Upper Division Courses****100A–100B. General Physiology. (3–3) I–II.**

Lecture—3 hours. Prerequisite: Biology 1; Chemistry 8; Physics 2C. Chemical, mathematical, and physical characteristics of the life process common to living things, with particular reference to the cell and its regulatory mechanisms.

Mr. Colvin

100L. General Physiology Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 100B (may be taken concurrently). Laboratory in the physical and chemical processes of cells and tissues.

Mr. Colvin

101. Functions of Organ Systems. (4) III.

Lecture—4 hours. Prerequisite: Biology 1. Physiology of organ systems; concepts of integrative and homeostatic mechanisms, especially in adaptation, growth, and reproduction.

Mr. Lorenz, Mrs. Woolley

101L. Organ Function Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 101 (which should be taken concurrently). Dissections, primarily of domestic animals, and selected experiments to illustrate functional relationships.

Mr. Lorenz, Mrs. Woolley

102. Physiology of Growth. (3) III.

Lecture—3 hours. Prerequisite: Bacteriology 2; Botany 2; Zoology 2; or courses 101, 101L. Recommended: course 100B; Biochemistry 101B; Mathematics 13. Biological, physical, and chemical aspects of the growth of organisms.

Mr. Smith

103. Physiology of Animal Cells. (3) III.

Lecture—3 hours. Prerequisite: course 100B; Biochemistry 101B. Recommended: Bacteriology 130; Mathematics 16B; Zoology 121. Organization of metazoan systems at the cellular level; cell and tissue culture; tissue regulation; embryonic development.

Mr. B. W. Wilson

***104. Relationships of Form and Function. (3) II.**

Lecture—3 hours. Prerequisite: courses 101 and 101L, or Zoology 2. Relationships between form and function of biological systems from the molecular to the animal levels as exemplified by the adaptations of birds and other animals.

Mr. B. W. Wilson

107. Avian Physiology. (3) III.

Lecture—3 hours. Prerequisite: courses 101 and 101L, or Zoology 2. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and the nervous system.

Mr. Burger

107L. Avian Physiology Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 107 (may be taken concurrently); and consent of instructor. Selected problems in the physiology of birds.

Mr. Burger

108A-108B. Biodynamics. (2-2) I-II.

Lecture—2 hours. Prerequisite: course 110B; Mathematics 16B; Physics 2C. Rates and dynamics of physiological processes.

Mr. Morrison

110A-110B. Mammalian Physiology. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 101 and 101L, or Zoology 2; Chemistry 8. The physiology of the neuromuscular, central nervous, circulatory, respiratory, digestive, endocrine, reproductive, and excretory systems of mammals.

Mr. Boda,

111A-111B. Mammalian Physiology Laboratory.

(1-1) I-II.

Laboratory—3 hours. Prerequisite: course 110A-110B (may be taken concurrently).

Mr. Boda,

120A. Comparative Physiology. (3) I.

Lecture—3 hours. Prerequisite: courses 101 and 101L. Comparisons of physiological functions in the animal kingdom: neural and humoral integrative mechanisms.

Mr. Lorenz, Mrs. Woolley

* Not to be given, 1967-68.

120B. Comparative Physiology. (3) II.

Lecture—3 hours. Prerequisite: course 101 and 101L. Comparisons of physiological functions in the animal kingdom: respiration and circulation.

Mr. Smith, Mr. Rhode

120C. Comparative Physiology. (3) III.

Lecture—3 hours. Prerequisite: course 101 and 101L. Comparisons of physiological functions in the animal kingdom: digestion and excretion.

Mr. Colvin, Mr. Boda

121. Physiology of Reproduction. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110B. The physiological mechanisms related to reproduction, breeding efficiency, and fertility, with special reference to domestic animals.

Mr. Cupps

130. Physiology of the Endocrine Glands. (5) I.

Lecture—4 hours; discussion—1 hour. Prerequisite: course 110B. Control of endocrine secretion and the physiological effects of the hormones, with emphasis on endocrine problems relating to domestic animals.

Mr. Clegg

149. Environmental Physiology of Domestic Animals. (3) I.

Lecture—3 hours. Prerequisite: courses 101 and 101L, or Zoology 2. The influences of environmental factors on physiological processes related to domestic animals.

Mr. W. O. Wilson

151. Physiological Basis of Higher Nervous Function. (4) III.

Lecture—4 hours. Prerequisite: course 110A; Psychology 108. Relations between the structure and function of the brain and problems of emotion, motivation, and learned behavior.

Mr. Kreickhaus

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to animal science majors who are honor students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Lorenz in charge)

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Lorenz in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Lorenz in charge)

Graduate Courses**200A. Advanced General Physiology. (3) I.**

Lecture—3 hours. Prerequisite: course 100B or Zoology 158, Biochemistry 101B and Chemistry 110B; or consent of instructor. Physico-

chemical bases of living systems with emphasis on recent investigations in membrane physiology.
Mr. Baskin

200B. Advanced General Physiology. (3) II.

Lecture—3 hours. Prerequisite: course 100B or Zoology 158, Biochemistry 101B and Chemistry 110B; or consent of instructor. Physico-chemical bases of living systems with emphasis on recent investigations in cellular dynamics.
Mr. B. W. Wilson

210. Advanced Systemic Physiology. (5) III.

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 110B. Advanced treatment of systemic physiology, with special emphasis on current developments; laboratory exercises illustrating modern physiological concepts and procedures.
The Staff

214A–214B. Neurophysiology. (2–2) I–II.

Lecture—2 hours. Prerequisite: courses 110B, 111B. Recommended: course 100B. Electrical activity of neurons and neuroeffector junctions; physiology of the nervous system as studied by its electrical activity.
Mr. Wagman

215A–215B. Neurophysiology Laboratory. (3–3) I–II.

Laboratory—9 hours. Prerequisite: course 214A–214B, course 298 (2 units) (both courses to be taken concurrently), and consent of an advisory committee. Mr. Burger, Mr. Wagman

220. General and Comparative Physiology of Reproduction. (3) I.

Lecture—3 hours. Prerequisite: course 110B; Biochemistry 101B; Genetics 100B. Basic phenomena of sexual and asexual reproduction and comparisons of processes in a wide variety of animals: gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproductive cycles; behavioral aspects.

Mr. Clegg, Mr. Ogasawara, Mr. Cupps

ANTHROPOLOGY

Daniel J. Crowley, Ph.D., *Chairman of the Department*

Department Office, 331 Voorhies Hall

Professors:

Daniel J. Crowley, Ph.D. (*Anthropology and Art*)

David L. Olmsted, Ph.D.

Associate Professors:

Martin A. Baumhoff, Ph.D.

¹Yehudi A. Cohen, Ph.D.

Assistant Professors:

Warren G. Kinzey, Ph.D. (*Anthropology and Zoology*)

Melvin K. Neville, Ph.D.

¹ Absent on leave, 1967–68.

225. Physiology of Lactation. (3) III.

Lecture—3 hours. Prerequisite: course 110B; Biochemistry 101B. The physiology and biochemistry of milk formation, with special reference to the metabolic pathways leading to the synthesis of milk in various species of mammals. Offered in even-numbered years. Mr. Baldwin

231. Selected Topics in Neuroendocrinology. (2) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: course 120A or 130 or consent of instructor. Neuralendocrine interactions; neurosecretion; neural regulation of endocrine systems; hormonal modifications of neural development and activity. May be repeated once for credit.
Mr. Clegg, Mrs. Woolley

242. Physiological Rhythmicity. (1) I.

Lecture—1 hour. General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronization in areas of pharmacology and space medicine; telemetry; mathematical methods; chronometry; tidal, lunar, and annual periods; periodic desynchronization.
Mr. Winget

290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. The Staff (Mr. Lorenz in charge)

291. Seminar in General Physiology. (1) III.

Seminar—1 hour. Discussion of selected topics concerning the physical and chemical processes of cells and tissues.
Messrs. Colvin, Burns

298. Group Study. (1–5) I, II, III.

Lectures and/or group discussions of advanced physiological subjects.
The Staff (Mr. Lorenz in charge)

299. Research. (1–12) I, II, III.

The Staff (Mr. Lorenz in charge)

¹William C. Smith, Ph.D.

Delbert L. True, Ph.D.

Stephen A. Tyler, Ph.D.



Professor:

Harold E. Driver, Ph. D. (*Visiting*)

Assistant Professor:

Donald G. Lindburg, M.A. (*Acting*)

Denise O'Brien, A.B. (*Acting*)

Lecturer:

Jay W. Ruby, M.A.

Departmental Major Advisers.—Mr. Neville, Miss O'Brien.

The Major Program

Lower Division Courses.—Required: Anthropology 1, 2, 3, 13 and Geography 1.

Upper Division Courses.—Required: Anthropology 102, 103A, 110A, 110B, 110C or 120, 128A, 195 or equivalent; 4 units of physical anthropology; 4 units of ethnography; and 8 additional units selected from other upper division courses in anthropology, Art 150, Genetics 100, or Genetics 115.

Graduate Study.—The department offers a program of study leading to the M.A. and Ph.D. degrees in anthropology. Further information regarding graduate study may be obtained at the department office and at the Graduate Division.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Required: 30 quarter units of anthropology.

Subject Representative: Miss O'Brien

Lower Division Courses

1. Physical Anthropology. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Human biology and physical anthropology; the relation of man and the animals; the origin and antiquity of man; fossil man; anthropometry, the criteria of race and racial classification; current racial theories; race problems.

Mr. Neville, Mr. Lindburg

2. Cultural Anthropology. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Diversity of cultures considered from the aspects of language, economics, kinship, art, magic, and religion; culture change.

3. Introduction to Archaeology. (4) III.

Lecture—3 hours; discussion—1 hour. Development of archaeology as an anthropological study; objectives and methods of modern archaeology; prehistory and growth of culture; the origins and early development of civilization in the Old and New World.

Mr. Ruby

13. Quantitative Method in Anthropology. (4) I.

Lecture—3 hours; discussion—1 hour.

Mr. Baumhoff

Upper Division Courses

102. Ethnology. (4) II.

Lecture—3 hours; discussion—1 hour. 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. Archaeological Theory and Method. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 3, and 13. Theory and method of prehistoric archaeology. Mr. True

103B. Old World Archaeology. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A. Comparative prehistory and archaeology of the Eastern Hemisphere.

Mr. Ruby

103C. New World Archaeology. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A. Comparative prehistory and archaeology of the Western Hemisphere.

Mr. True

105A. Indians of North America. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. An introductory survey of the Indians of North America: origins, languages, civilizations, and history.

Mr. Driver

105B. The Indians of South America. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. An introductory survey of the Indians of South America: origins, languages, civilizations and history.

Mr. Driver

110A. Elementary Linguistic Analysis. (3) I.

Lecture—2 hours. Phonetics and phonemics.

Mr. Olmsted

110B. Intermediate Linguistic Analysis. (3) II.

Lecture—2 hours. Prerequisite: course 110A. Morphophonemics, morphemics and tactics.

Mr. Olmsted

110C. Comparative Linguistics. (3) III.

Lecture—2 hours. Prerequisite: course 110B. Linguistic prehistory, historical linguistics and reconstruction; dialect geography. Mr. Olmsted

119A. Culture and Personality. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. Methods and theories in the study of the relationships among culture, society, and personality. The development of culture and personality as a subdiscipline in anthropology.

119B. Culture and Personality. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 119A. An examination of empirical investigations of preliterate and contemporary societies in relation to the techniques of culture and personality studies.

120. Language and Culture. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B. Language and thought; classification of languages; linguistic aspects of culture; language, nation, and state. Mr. Tyler

121. Folklore. (4) III.

Lecture—3 hours; discussion—1 hour. Pre-requisite: 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.

Mr. Crowley

***122. Economic Anthropology. (4) III.**

Lecture—3 hours; discussion—1 hour. Pre-requisite: consent of the instructor. Economic behavior in nonindustrial societies; its social and cultural setting, and its modern changes.

Miss O'Brien

***124. Comparative Religion. (4) III.**

Lecture—3 hours; discussion—1 hour. Pre-requisite: 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.

128A. Kinship and Social Organization. (4) II.

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 2. Theoretical: discussion of theories of social organization with primary emphasis on typology and classification of family and kinship systems.

Mr. Tyler

128B. Kinship and Social Organization. (4) III.

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 128A. Methodological: demonstration of field methods and discussion of analytic models. Primary emphasis will be placed on componential and transformational analysis.

Mr. Tyler

***139. Peoples of Africa. (4) I.**

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 2 or consent of the instructor. Peoples and cultures of Africa: survey and comparative analysis of representative societies and cultures in the area.

Mr. Crowley

***140. Peoples of Afroamerica. (4) I**

Lecture—3 hours; discussion—1 hour. A study of the cultural implications of slavery and the contribution of Africans to the national cultures of the Americas.

Mr. Crowley

143. Peoples of India. (4) I.

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 2 or consent of the instructor. Development of Indian cultural traditions; social organization and social trends.

Mr. Tyler

147A. Peoples of the Pacific. (4) I.

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 2. The aboriginal cultures of Australia and Melanesia in prehistoric and modern times; changes arising from European contact and colonization.

Miss O'Brien

147B. Peoples of the Pacific. (4) II.

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 2. The aboriginal cultures of Polynesia and Micronesia in prehistoric and modern times; changes arising from European contact and civilization.

Miss O'Brien

151. Primate Evolution. (4) III.

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 1; recommended: Zoology 2. The origin and relationships of the prosimians, monkeys, and apes.

Mr. Kinzey

152. Human Evolution and Fossil Man. (4) III.

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 1. Nature and results of the evolutionary processes involved in the formation and differentiation of mankind.

Mr. Neville

153. Living Races of Man. (4) III.

Lecture—3 hours; laboratory—3 hours. Pre-requisite: course 1. Physical characters, distribution, and relationships.

Mr. Neville

154. Primate Behavior and Ecology. (4) I.

Lectures—3 hours; discussion—1 hour. Pre-requisite: course 1. The social behavior, organization, and ecology of monkeys and apes, their relevance to the evolution of human behavior and social groups.

Mr. Lindburg

155. Comparative Primate Anatomy. (4) II.

Lecture—3 hours; laboratory—3 hours. Pre-requisite: Zoology 2. The functional anatomy of the locomotor, digestive, reproductive, and nervous systems of monkeys and apes. Emphasis on the anatomical evidence for their interrelationships.

Mr. Kinzey

***160A. Contemporary Civilization. (4) II.**

Lecture—3 hours; discussion—1 hour. The application of anthropological concepts and methods to the study of contemporary civilization. Emphasis will be placed on the development and evolution of American culture from its beginnings to the present.

***160B. Contemporary Civilization. (4) II.**

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 160A. An anthropological analysis of special problems in contemporary civilization, such as family and kinship organization, community organization, and political integrations. Comparisons of American culture with other societies in contemporary civilization.

***162. Peasant Society and Culture. (4) II.**

Lecture—3 hours; discussion—1 hour. Pre-requisite: consent of the instructor. Comparative study of peasant communities, utilizing historical and ethnographic sources; analysis of urban rural relations; problems of economic development and culture change.

Mr. Smith

* Not to be given, 1967-68.

***165. Culture Change. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. Introduction to the analysis of socio-cultural stability and change; theories of innovation, diffusion, acculturation, and cultural evolution; problems of social planning. Miss O'Brien

+195. Field Course in Archaeological Method.

(3) I, III.

Laboratory—8 hours. Prerequisite: course 3. Lectures, museum preparation, and weekend excavations. Enrollment limited to twenty students. May be repeated for credit with consent of the instructor. Mr. True

196. Archeological Method. (3) II.

Laboratory—6 hours. Prerequisite: course 195 and the consent of the instructor. Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. Enrollment limited to eighteen students. May be repeated for credit with consent of the instructor. Mr. True

***198. Directed Group Study. (3) I, III.**

Discussion—3 hours. Prerequisite: consent of the instructor. Directed reading and group discussion of selected anthropological problems. Mr. Smith

199. Special Study for Advanced Undergraduates.

(1-3) I, II, III.

The Staff (Mr. Olmsted in charge)

Graduate Courses**201. History of Anthropological Theory. (4) I.**

Lecture—2 hours; discussion—1 hour. The historical development of the various fields of Anthropology with emphasis upon their interrelationships. Required of all first-year graduate students in Anthropology. Mr. Kinzey

210. Aspects of Culture Structure. (4) III.

Seminar—3 hours. Analysis of various phases of culture, such as religion, economics, law, and folklore. Mr. Driver

215. Film in Anthropology. (4) I.

Seminar—3 hours. A study of anthropological film techniques and an analysis of the use of film in anthropological field work and teaching. Mr. Ruby

216. Problems in Archaeological Method. (4) II.

Seminar—3 hours. Techniques for analyzing archaeological data; application to various prehistoric cultures. Mr. True

***219. Culture and Personality. (4) III.**

Seminar—3 hours.

220. Field Course in Linguistics. (4) III.

Seminar—2 hours; laboratory—2 hours. Prerequisite: courses 110A and 110B. Techniques of eliciting, recording, and analyzing; work with a native speaker. Mr. Olmsted

225. Kinship and Social Structure. (4) II.

Seminar—3 hours. Componential analysis of kinship systems and discussion of descent group and alliance theories. Mr. Driver

***226. Evolution of Social Organization. (4) II.**

Seminar—3 hours. Diachronic and synchronic analyses of social organization.

***239. Problems in African Society and Culture. (4) II.**

Seminar—3 hours. Diachronic analyses of traditional institutions in sub-Saharan Africa. Mr. Crowley

***242. Problems in African Prehistory. (4) III.**

Seminar—3 hours. Mr. Baumhoff

245. Ethnology of Northern and Central Asia. (4) I.

Seminar—3 hours. Prerequisite: a reading knowledge of German, Russian, Chinese, or Japanese. Lectures on the culture aboriginally found north of the Caucasus-Korea line. Supervised study of the primary and secondary sources. Work with informants when available. Mr. Olmsted

247. Peoples and Cultures of Oceania. (4) I.

Seminar—3 hours. Miss O'Brien

250. Theory and Method of Anthropology. (4) II.

Seminar—3 hours. Mr. Baumhoff

***253. Concepts and Problems in Physical Anthropology. (4) I.**

Seminar—3 hours. Mr. Kinzey

254. Primate Social Behavior. (4) II.

Seminar—3 hours. Analysis of primate social behavior, with particular emphasis on field studies. Mr. Neville

***265. Concepts and Problems in Applied Anthropology. (4) III.**

Seminar—3 hours. Case studies of directed culture change; problems of planning and evaluation; uses of anthropological theory and data in professional fields such as agriculture, public health, administration, and international technical assistance. Mr. Smith

***292. Seminar in Anthropological Linguistics. (4) II.**

Seminar—3 hours. Mr. Olmsted

299. Research. (3-8) I, II, III.

The Staff (Mr. Olmsted in charge)

* Not to be given, 1967-68.

† Not to be given, fall quarter 1967.

ARTRichard D. Cramer, M.F.A., *Chairman of the Department*

Department Office, 101 Art

Professors:Richard D. Cramer, M.F.A. (*Architecture*)Daniel J. Crowley, Ph.D. (*Art and Anthropology*)Richard L. Nelson, M.A. (*Director, Laboratory for Research in the Fine Arts and Museology*)

Daniel Shapiro

Wayne Thiebaud, M.A.

Associate Professors:

Tio L. Giambruni, M.A.

Ruth J. Horsting, M.A.

Seymour Howard, Ph.D.

Ralph M. Johnson, M.A.

Roland C. Petersen, M.A.

Assistant Professors:

Robert C. Arneson, M.F.A.

Susan R. McKillop, Ph.D.

William T. Wiley, M.F.A.

◊ ◊ ◊

Lecturers:Joseph A. Baird, Jr., Ph.D. (*Curator of Collections*)

Roy R. DeForest, M.A.

Charles M. Muskatitch, H.D., F.I.I.C.
(*Curator, Laboratory for Research in the Fine Arts and Museology*)**Associate:**

Jane B. Garritson, M.A.

Departmental Major Advisers.—See the *Schedule and Directory*.**Preparation for the Major:**Practice of Art: ^① 3 courses from the following list: Art 2, 3, 4, 12A, 12B, 14A, 14B, 15, 16 (see prerequisites for upper division courses); 8 units chosen from courses 1A, 1B, 1C, 1D.

History of Art: Courses 1A, 1B, 1C, 1D; one course in drawing, graphics, or painting; and one course in sculpture or ceramics.

The Major:Practice of Art: ^② 18 units of Group A courses¹ Absent on leave, 1967-68.^② Students interested in drawing and painting should take courses 2, 3, and 4; one three-dimensional course is recommended: 12A or 14A.

Students interested in sculpture, should take courses 14A, 14B, and 15; courses 2 and 12A are recommended.

Students preparing for graduate work in any of the environmental design professions should take courses 2, 12A or 14A, 16, 121A, 121B, 121C, 121D, 149, 160, or 168, 184.

under three different artists; course 148 or 149; 8 units from Group C; and 6 units chosen from Group A, B, or C.

History of Art: Two art history courses within each of two periods (e.g., 154A, 154B, and 178B, 178C); courses 180, 189, and 12 units chosen from Group C. Students planning to do advanced work in the History of Art should develop their knowledge of foreign languages (especially German) as early as possible.**Transfer Students.**—Before enrolling in Art courses at Davis, ask your faculty adviser to evaluate transfer courses in art.**Graduate Study.**—The Department of Art offers 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 *Announcement of the Graduate Division*.**Teaching Major.**—The A.B. degree with a major in the practice of art or in the history of art. Depending on the credential, certain other courses are required. For information see the subject representative.**Teaching Minor.**—30 units in Art. These must be selected in consultation with the subject representative.**Subject Representative:** Mrs. Garritson.**Lower Division Courses****1A. History of Art: Prehistoric through Early Christian. (4) I.**

Lecture—4 hours. Art from 1500 B.C. to 500 A.D.: Lascaux, Jericho, Ur, Thebes, Knossos, Troy, Mycenae, Corinth, Athens, Pergamum, Cerveteri, Rome, and Ravenna; Imhotep, Phidias, Polykleitus, Praxiteles, Scopas, Lysippus, Agesander, and Apollodorus. Mr. Howard

1B. History of Art: Byzantine through Renaissance. (4) II.

Lecture—4 hours. European art from the seventh through the sixteenth centuries: Sutton-Hoo, Constantinople, Aachen, Hildesheim, Chartres, Salisbury, Florence, Siena, Rome, Venice; Giotto, the van Eycks, Brunelleschi, Donatello, Piero della Francesca, Botticelli, Leonardo, Michelangelo, Titian, Dürer, and El Greco. Mrs. McKillop

1C. History of Art: Baroque through Modern. (4) I, III.

Lecture—4 hours. European art after 1600: Caravaggio, Bernini, Rubens, Rembrandt, Velazquez, Vermeer, Wren, Watteau, Mansart, Gainsborough, Reynolds, Canova, Goya, Blake, Con-

stable, Delacroix, Ingres, Manet, Whistler, Richardson, Rodin, Cezanne, Matisse, Picasso, Brancusi, Corbusier, and Klee.

***1D. History of Art: Oriental Art. (4) III.**

Lecture—4 hours. The art of India, China, and Japan. Mr. Crowley

2. Elementary Form and Color. (4) I, II, III.

Laboratory—12 hours. Form in composition using black and white media. Introduction to color in composition. The Staff

3. Intermediate Form and Color. (4) I, II, III.

Laboratory—12 hours. Prerequisite: course 2. Color and form in composition. The Staff

4. Introductory Figure Painting. (4) I, II, III.

Laboratory—12 hours. Prerequisite: course 2. Form in composition, with the human figure as subject.

10. Introduction to Art. (3) I, II, III.

Lecture—3 hours. The understanding and appreciation of painting, sculpture, architecture, and industrial art. Illustrated lectures. Intended for students not specializing in art. Mr. Nelson

12A. Ceramics. (4) I, II, III.

Laboratory—12 hours. Prerequisite: course 2. Beginning ceramics; an introduction to ceramic forms and processes.

12B. Ceramics. (4) II, III.

Laboratory—12 hours. Prerequisite: course 12A. Beginning ceramics; introduction to ceramic color and glaze research.

14A. Elementary Sculpture. (4) I, II, III.

Laboratory—12 hours. Form in space using clay and plaster. Mr. Giambruni, Mrs. Horsting

14B. Intermediate Sculpture. (4) II, III.

Laboratory—12 hours. Prerequisite: course 14A. Form in space using clay and plaster.

Mr. Giambruni, Mrs. Horsting

15. Introductory Figure Sculpture. (4) III.

Laboratory—12 hours. Prerequisite: course 14A. Form in space with the human figure as subject. Mr. Giambruni, Mrs. Horsting

16. Descriptive Drawing and Rendering. (3) I, II.

Lecture—1 hour; laboratory—6 hours. Methods of objective drawing and of space description; rendering in various media.

Upper Division Courses

Group A: Practice of Art

***101. Painting: Materials and Carriers. (3) I.**

Laboratory—9 hours. Prerequisite: course 3. Experimentation in media and their supports; fresco, egg tempera, Renaissance oil and mixed

techniques, watercolor, gouache, traditional oil lacquers, acrylics. Mr. Petersen

102. Advanced Drawing and Painting. (3) I, II, III.

Laboratory—9 hours. Prerequisite: courses 3, 4. Drawing and painting in various media including oil and polymers. May be repeated for credit. Messrs. Johnson, DeForest

_____, Shapiro

104. Advanced Form and Figure Composition.

(3) I, II, III.

Laboratory—9 hours. Prerequisite: course 4. Problems of light, color, and space that involve the human figure and its environment. May be repeated for credit. Messrs. Johnson, DeForest

_____, Shapiro

***110. Photography. (3) II.**

Laboratory—9 hours. Prerequisite: courses 3 or 128A. Photography as a creative medium using the view camera and the miniature camera.

Mr. Petersen

121A. Architectural Design. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: two courses in art practice or design; or consent of instructor. Studio projects in architectural design. Mr. Cramer

121B. Architectural Design. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 121A. Studio projects in architectural design. Mr. Cramer

***121C. Architectural Design. (3) III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: 121B. Studio projects in architectural design. Mr. Cramer

***121D. Architectural Design. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 121C. Studio projects in architectural design. Mr. Cramer

128A. Graphic Arts. (3) I, II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: two courses in art practice. Beginning experimental methods in relief and intaglio printmaking, etching, engraving, aquatint, woodcut, and related media. Mr. Shapiro

128B. Graphic Arts. (3) II, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 128A. Intermediate experimental methods in relief and intaglio printmaking, etching, engraving, aquatint, woodcut, and related media. Mr. Shapiro

128C. Graphic Arts. (3) I, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 128B. Advanced experimental

* Not to be given, 1967-68.

methods in relief and intaglio printmaking, etching, engraving, aquatint, woodcut, and related media.
Mr. Shapiro

141. Sculpture: Materials and Methods. (3) I.

Laboratory—9 hours. Prerequisite: course 14B. Influences of material and technique on sculptural form; clay, wood, metal, plastics.
Mr. Giambruni, Mrs. Horsting

142. Advanced Figure Sculpture. (3) III.

Laboratory—9 hours. Prerequisite: courses 15, 141. Problems of shape, surface, and space using the human figure as subject. May be repeated for credit. Mr. Giambruni, Mrs. Horsting

143. Casting Techniques and Theories of Cast Sculpture. (3) II.

Laboratory—9 hours. Prerequisite: course 14B. Projects in various casting techniques and media with emphasis on bronze and the lost wax process. May be repeated for credit.
Mr. Giambruni, Mrs. Horsting

144. Advanced Sculpture. (3) II, III.

Laboratory—9 hours. Prerequisite: course 141. Problems of form and space in relief and in the round. May be repeated for credit.
Mr. Giambruni, Mrs. Horsting

***146. Ceramic Sculpture. (3) I, II, III.**

Laboratory—9 hours. Prerequisite: course 12B. Clay as material for sculpture in round and relief. May be repeated for credit. Mr. Arneson

Group B: Theory and Criticism

148. Theory and Criticism: Painting and Sculpture. (4) II, III.

Lecture—3 hours. Prerequisite: course 2 or 14A, and one art lecture course. Study of forms and symbols in historic and contemporary painting and sculpture.
Mr. Thiebaud

***149. Theory and Criticism: Architecture. (4) II.**

Lecture—3 hours. Prerequisite: course 2 or 14A; one art lecture course, or consent of instructor. Aesthetic theories of design styles, historic and contemporary.
Mr. Cramer

Group C: History of Art

150. The Arts of Africa, Oceania, and Prehistoric Europe. (4) I.

Lecture—3 hours. The traditional arts of Africa and Oceania and of the prehistoric and folk populations of Europe and Asia in their cultural contexts.
Mr. Crowley

151. The Art of the Indians of the Americas. (4) II.

Lecture—3 hours. Arts of the extinct societies of Mexico, Peru, and related regions, and contemporary Indian arts and crafts.
Mr. Crowley

***154A. Greek Art: The Helladic through Archaic Periods. (4) I.**

Lecture—3 hours. The art of Classical Greece to the Persian invasions. The Geometric, Orientalizing, and Archaic styles: the Doric temple, black- and red-figure vase painting, the *Kore* and *Kouros*. Corinth, Selinus, Paestum, Polymedes, Kleitias, Exekias, Epictetus, Euthymides, Kritios, and Kalamis.
Mr. Howard

154B. Greek Art: The Gold and Silver Ages. (4) II.

Lecture—3 hours. Greek art from the time of Pericles to that of Alexander: Olympia, the Athenian Acropolis, Bassae, Epidaurus, Halicarnassus; Myron, Phidias, Polykleitos, the Achilles Painter, Praxiteles, and Scopas.
Mr. Howard

154C. Greek Art: The Hellenistic Age. (4) III.

Lecture—3 hours. Art in the Greek world from 322 B.C. until the time of Imperial Rome: Pergamum, Alexandria, Priene, and Delos: Lysippus, Polyeuctus, Boethus, Agesander, Philoxenus, and Nikeratus.
Mr. Howard

155. Roman Art. (4) I.

Lecture—3 hours. The art of Republican and Imperial Rome, its buildings, portraiture, historic reliefs, and murals: Pompeii, Nimes, Praeneste, Ostia, Baalbeck, Palmyra, Petra, Spoleto, Trier; Forum Romanum, Ara Pacis, Pont du Gard, Colosseum, Pantheon, Baths of Caracalla, and the Arch of Constantine.
Mr. Howard

***160. History of Minor Art. (4) I.**

Lecture—3 hours. Great periods, masters, and masterworks of minor art, such as Tutankhamen's throne, harp of Ur, Tanagra figurines, Portland vase, Bayeux tapestry, Suger's chalice, Majolica; Pisanello, Cellini, Chippendale, Adam, Wedgwood, Morris, Tiffany, Eames, and others.

***162. History of Graphic Art. (4) III.**

Lecture—3 hours. Printmaking from the Renaissance to modern times; such printmakers as the Master of the Nuremberg Chronicle, Durer, Van Dyck, Rembrandt, Goya, Daumier, Whistler, Picasso, and Hayter.

168. The History of Urban Form. (4) II.

Lecture—3 hours. An historical investigation of the evolution of great cities; physical forms of town planning in the past as a guide to modern urban developments. Consideration of Rome, Constantinople, Venice, Paris, London, and New York. The relation of European and American planning concepts. Field trips.
Mr. Baird

* Not to be given, 1967-68.

176A. Art of the Middle Ages: Early Christian to Romanesque. (4) I.

Lecture—3 hours. The art of Christian Europe from the founding of Constantinople to the tenth century; the early Christian, Byzantine, Carolingian, and Ottonian periods; the Basilica of St. Peter's, St. Mark's in Venice, Hagia Sophia, St. Gall, Sutton-Hoo, and the Lindisfarne Gospels.

176B. Art of the Middle Ages: Romanesque through Gothic. (4) II.

Lecture—3 hours. The arts in Christian Europe from the eleventh to the fifteenth centuries: St. Sernin, Gislebertus, Poitiers, Caen, St. Ambrose, St. Denis, Chartres, Rheims, Salisbury, Cologne, Santa Croce, Strasbourg, Naumburg, Claus Sluter, and Villard de Honnecourt.

177A. Northern Renaissance Art. (4) I.

Lecture—3 hours. Art of the Lowlands in the fifteenth and sixteenth centuries. The van Eycks, Master of Flemalle, Roger van der Weyden, Bouts, Geertgen, Bosch, and Bruegel.

Mrs. McKillop

***177B. Northern Renaissance Art. (4) II.**

Lecture—3 hours. Art between the Rhine and the Danube in the fifteenth and sixteenth centuries: Multscher, Riemenschneider, Witz, Schongauer, Durer, Grunwald, Cranach, Altendorfer, and Holbein.

Mrs. McKillop

178A. Italian Renaissance Art. (4) I.

Lecture—3 hours. Art of the Trecento: Nicola and Giovanni Pisano, Cimabue, Giotto, Duccio, the Lorenzetti, Simone Martini. Emphasis on Assisi, Florence, and Siena.

Mrs. McKillop

178B. Italian Renaissance Art. (4) II.

Lecture—3 hours. Art of the fifteenth century: Ghiberti, Brunelleschi, Masaccio, Donatello, Fra Angelico, Piero della Francesca, Botticelli, Mantegna, and Bellini. Emphasis on Florence, Northern Italy, and Venice.

Mrs. McKillop

178C. Italian Renaissance Art. (4) III.

Lecture—3 hours. Art of the sixteenth century: Leonardo, Michelangelo, Raphael, Bramante, Giorgione, Titian, Correggio, Pontormo, and Tintoretto. Emphasis on Rome, Florence, and Venice.

Mrs. McKillop

***179A. Baroque Art. (4) II.**

Lecture—3 hours. Architecture, sculpture, and art of the garden, from formative stages of the Baroque in the sixteenth century to creation of the Rococo. Emphasis on western Europe; prototypes and developments. Bernini, Mansart, and other major artistic personalities.

Mr. Baird

***179B. Baroque Art. (4) III.**

Lecture—3 hours. Painting from 1590 to 1720. Such Italian, Spanish, Flemish, French, and English masters as Caravaggio, Velasquez, Rubens, Van Dyck, Claude, and Poussin will receive particular attention. Some attention to painting and drawing for the theater and other spectacles.

Mr. Baird

180. Readings in Art Historical Methods. (4) III.

Lecture—3 hours. Works by major art chroniclers, historians, and theorists of the historic and recent past: Plutarch, Pliny, Lucian, Suger, Alberti, Vasari, Bellori, Winckelmann, Ruskin, Wölfflin, Berenson, Riegl, and Panofsky.

Mr. Howard

183A. Modern Painting: Neo-Classicism to Realism. (4) I.

Lecture—3 hours. European painting from the French Revolution through mid-nineteenth-century academicism. Goya, David, Ingres, Gericault, Delacroix, Daumier, Corot, Millet, Rousseau, Courbet, early Manet, Reynolds, Blake, Lawrence, Constable, Turner, Overbeck, Feuerbach.

183B. Modern Painting: Impressionism through Early Expressionism: (4) II.

Lecture—3 hours. European painting from 1865 to 1910: later Manet, Degas, Monet, Renoir, Cezanne, Seurat, Van Gogh, Lautrec, Gauguin, Bernard, Vuillard, Bonnard, Redon, Moreau, Matisse, Derain, Rouault, Rossetti, Sickert, Munch, Corinth, Kokoschka, Kirchner, Nolde, Soutine, and Modigliani.

183C. Modern Painting: Cubism to the Present. (4) III.

Lecture—3 hours. International painting styles from 1910 to the present: Picasso, Braque, Boccioni, Severini, Delaunay, Leger, Malevitch, Mondrian, Kandinsky, Klee, Beckmann, Grosz, Duchamp, Chirico, Chagall, Schwitters, Ernest, Arp, Miro, Masson, Gorky, de Kooning, Johns, Orozco, Bacon, Sutherland, Burri, Soulages, Appel, and Dubuffet.

184. Architecture in the Twentieth Century. (4) III.

Lecture—3 hours. The forms and substyles of modern architecture, with emphasis on the development of organicism in the works of Frank Lloyd Wright and of the international style in the work of Le Corbusier and Mies Van Der Rohe.

Mr. Cramer

***188A. The Art of Latin America. (4) I.**

Lecture—3 hours. Emphasis on architecture, sculpture, and paintings of Mexico from colonial times to the present; the American Southwest, colonial art in Peru, and eighteenth century to

* Not to be given, 1967-68.

modern architecture in Brazil, European backgrounds and creative originality in the New World.

Mr. Baird

188B. The Art of the United States. (4) II.

Lecture—3 hours. A survey of three centuries of American building arts, with emphasis on colonial, Georgian, nineteenth and twentieth century architecture. Particular attention to California (especially northern California). Field trips.

Mr. Baird

188C. The Art of the United States. (4) III.

Lecture—3 hours. Emphasis on painting and sculpture. The great eras from colonial to contemporary; notable masters and schools. Special attention to pictorial art since 1850; some attention to the leading figures in California of the later nineteenth and early twentieth centuries. Field trips.

Mr. Baird

189. Museum Methods and Connoisseurship. (4) III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: basic art history courses; or consent of instructor. The history of collecting; problems of media and connoisseurship, especially in painting, drawing, and graphic arts. Study of iconography, techniques of preservation and restoration, museum registration and storage. Preparation of an exhibition at Davis, with printed catalogue. Field trips.

Mr. Baird

***190. The Role of the Artist in Culture. (4) I.**

Lecture—3 hours. Prerequisite: nonmajors admitted only with consent of instructor. Comparative analysis of recruitment, training, function, roles, and evaluations of artists in various cultures. Written and oral reports.

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ASTRONOMY—See Physics

ATMOSPHERIC SCIENCE—See Soil, Water and Atmospheric Sciences

AVIAN MEDICINE—See Epidemiology and Preventive Medicine

BACTERIOLOGY

Allen G. Marr, Ph.D., *Chairman of the Department*

Department Office, 156 Hutchison Hall

Professors:

Robert E. Hungate, Ph.D.

John L. Ingraham, Ph.D.

Allen G. Marr, Ph.D.

Herman J. Phaff, Ph.D. (*Bacteriology and Food Science and Technology*)

Mortimer P. Starr, Ph.D.

Associate Professor:

Donald M. Reynolds, Ph.D.

Assistant Professor:

Clifton E. Dowell, Ph.D.



* Not to be given, 1967-68.

Associate Professor:

Martin W. Miller, Ph.D. (*Food Science and Technology*)

Assistant Professor:

Norma J. Lang, Ph.D. (*Botany*)

Associate:

Emily S. McDermott, M.A.T.

Major Advisers.—Mr. Hungate, Mr. Reynolds, Mr. Dowell.

The Major Program. The undergraduate major programs are designed to provide a proper balance of studies in the biology of bacteria and other microorganisms together with appropriate courses in mathematics and physical science. The Bachelor of Science program offers greater emphasis in mathematics and physical science. Both the Bachelor of Arts program and the Bachelor of Science program are suitable for students who plan to do graduate work in a biological science or who wish a professional career in bacteriology.

Either major is appropriate for students contemplating a career in Medical Technology. Such students are advised to take Veterinary Microbiology 127 and a year laboratory course in physics in addition to the courses required for a major in bacteriology.

Bachelor of Arts Major Program

Lower Division Courses.—Bacteriology 2; Biology 1; Botany 2, or Zoology 2; Chemistry 1A-1B-1C, 8; Mathematics 16A-16B and either 13, 16C, or 36A-36B; Physics 2A-2B-2C.

Upper Division Courses.—Bacteriology 110, 130 or 131, 140; Biochemistry and Biophysics 101A-101B-101L; Chemistry 5; Genetics 100; and one course from the following group: Bacteriology 150; Botany 118, 119A-119B; Zoology 110; and two additional units in bacteriology which may include Veterinary Science 127.

Bachelor of Science Major Program

Lower Division Courses.—Bacteriology 2; Biology 1; Chemistry 1A-1B-1C, 5; Mathematics 1A-1B-1C, 13; Physics 4A-4B-4C-4D. Recommended: elementary courses in French or German.

Upper Division Courses.—Bacteriology 110, 130 or 131, 140, 160 or 170; Biochemistry and Biophysics 101A-101B-101L; Chemistry 110A-110B-110C, 112A-112D-112E; Genetics 100; and one course from the following group: Bacteriology 150; Botany 118, 119A-119B; Zoology 110.

Honors and Honors Program (see page 107).

—The honors program consists of course 194H.

Graduate Study (see page 127).—The Graduate Group in Microbiology offers programs of study and research leading to the M.A. and Ph.D. degrees in general microbiology, includ-

ing bacteriology. The offerings of the Department of Bacteriology are augmented by courses and faculty of the Departments of Biochemistry and Biophysics, Botany, Food Science and Technology, Viticulture and Enology, and the School of Veterinary Medicine. For detailed information regarding graduate study in microbiology, address the Graduate Adviser in Microbiology, Department of Bacteriology.

Teaching Major.—Requirements for the Teaching major are the same as those for the departmental major.

Teaching Minor.—30 units selected from the B.A. or B.S. Bacteriology major programs, as approved by the Department Subject Representative.

Subject Representative: Mr. Reynolds

Lower Division Course**2. Introduction to Microbiology. (5) I, II, III.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biology 1; Chemistry 1A. A general introduction to the biology of bacteria and of other microorganisms.

The Staff

Upper Division Courses**110. Structure and Function of Bacteria. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 2. Analysis of the structure and ultrastructure of bacteria in relationship to physiological function; osmotic behavior of bacterial cells.

Mr. Marr

130. Bacterial Physiology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2; Biochemistry 101B; Mathematics 16A. Growth of bacteria; biochemical and genetic regulation of metabolism; effects of the physical and chemical environment.

Mr. Ingraham

131. Bacterial Metabolism. (3) I.

Lecture—3 hours. Prerequisite: course 2; Biochemistry 101A. Anaerobic and aerobic metabolism of organic and inorganic foods by bacteria, including pathways of synthesis.

Mr. Hungate

132. Bacterial Metabolism Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: course 2; Biochemistry 101B. Quantitative experiments in microbial metabolism, using selected methods of microchemical analysis, manometry liquid and gas phase chromatography, spectrophotometry, and isotopic tracers.

Mr. Hungate

140. Bacterial Diversity and Ecology. (5) III.

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 2; Chemistry 8. Principles of bacterial diversity and bacterial ecology. Survey of the major systematic groups of bacteria, with intensive study of selected microorganisms and habitats.

Mr. Starr

* Not to be given, 1967-68.

150. Protistology. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 2 and Botany 2; or Zoology 2. A survey of algae, protozoa and yeast, including selected physiological topics.

Mr. Phaff, Mr. Hungate, Miss Lang

160. Virology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 130; Biochemistry 101B. Structure of viruses; physiology and biochemistry of viral infections; genetics of viruses; lysogeny. Emphasis on bacteriophage.

Mr. Dowell

170. Bacterial Genetics. (4) II.

Lecture—4 hours. Prerequisite: course 2; Genetics 100B; Biochemistry 101B. Mutation and genetic recombination in bacteria and bacteriophages. Mechanisms of replication, recombination, and gene expression. The Staff

***171. Bacterial Genetics Laboratory. (1) II.**

Laboratory—3 hours. Prerequisite: course 170 (may be taken concurrently). Selection of mutants and analysis of genetic recombination in bacteria and bacteriophages. The Staff

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

Prerequisite: consent of instructor. The Staff

Graduate Courses**230. Bacterial Physiology. (4) III.**

Lecture—4 hours. Prerequisite: course 130;

BIOCHEMISTRY—See Also Animal Science**BIOCHEMISTRY AND BIOPHYSICS**

Paul K. Stumpf, Ph.D., *Chairman of the Department*

Department Office, 554 Hutchison Hall

Professors:

Eric E. Conn, Ph.D.
Lloyd L. Ingraham, Ph.D.
Paul K. Stumpf, Ph.D.

Associate Professors:

Sterling Chaykin, Ph.D.
Richard S. Criddle, Ph.D.
Roy H. Doi, Ph.D.
Jack Preiss, Ph.D.

Assistant Professors:

George E. Bruening, Ph.D.
Jerry L. Hedrick, Ph.D.
Irwin H. Segel, Ph.D.

¹ Absent on leave, 1967–68.

† Not to be given, fall quarter 1967.

‡ Not to be given, winter quarter 1968.

Biochemistry 101B. Recommended: course 170. Economics of bacterial growth; biochemical and genetic regulation of metabolism.

Mr. Ingraham, Mr. Marr

240. Bacterial Taxonomy. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 140. Recommended: a course in computer programming. Principles of classification; evolution and phylogeny of bacteria; determinative and taxonomic techniques. Laboratory includes numerical taxonomy. Mr. Starr

250. Yeasts and Related Organisms. (5) I.

Lecture—3 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.

Mr. Phaff, Mr. Miller

#290. Seminar in General Microbiology. (1) I, II, III.

Seminar—1 hour. The Staff

†#291. Seminar in Bacterial Physiology. (1) I, II, III.

Seminar—1 hour. The Staff

#292. Seminar in Bacterial Genetics. (1) I, II, III.

Seminar—1 hour. The Staff

299. Research. (1–6) I, II, III.

The Staff

**Professors:**

Robert E. Feeney, Ph.D. (*Food Science and Technology*)

Associate Professors:

Ray C. Huffaker, Ph.D. (*Agronomy*)
Tsune Kosuge, Ph.D. (*Plant Pathology*)

Departmental Major Advisers.—See *Schedule and Directory listing*.

Bachelor of Science Major Program and Graduate Study. See pages 53 and 127.

Upper Division Courses**101A. General Biochemistry. (3) I, II.**

Lecture—3 hours. Prerequisite: Chemistry 1B and 8 or 112B. Recommended: introductory course in bacteriology, botany, or zoology. Intro-

duction to the chemistry and metabolism of biologically important compounds; dynamic aspects of biochemistry with examples from animals, plants, and microorganisms.

Mr. Conn, Mr. Segel

101B. General Biochemistry. (3) II, III.

Lecture—3 hours. Prerequisite: course 101A. A continuation of 101A. Mr. Conn, Mr. Segel

101L. General Biochemistry Laboratory. (4) I, III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 101B (may be taken concurrently); Chemistry 5. Introduction to laboratory methods and procedures employed in studying biochemical processes. Designed for students who require limited experience in the use of biochemical techniques as laboratory tools.

Mr. Bruening, Mr. Doi

108. Biochemical Control Mechanisms. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101B. The mechanisms by which metabolism is regulated in living cells. The role of variations in the intracellular levels of intermediates, activators, and inhibitors; enzyme induction and repression; and multiple forms of enzymes.

Mr. Doi, Mr. Segel

122. Plant Biochemistry. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 101B. The chemistry of important plant constituents and processes such as photosynthesis and respiration; carbohydrate, fat, and nitrogen metabolism.

Mr. Conn, Mr. Stumpf

194H. Special Study for Honor Students. (1-5)

I, II, III.

Seminar—1-5 hours. Prerequisite: open only to majors of senior standing on honors list. Independent study of selected topics under the direction of a member of the staff. Completion will involve the writing of a senior thesis.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Seminar—1-5 hours. Prerequisite: consent of instructor. Discussion of the historical developments of modern biochemistry.

The Staff (Mr. Segel in charge)

Graduate Courses

201A-201B-201C. Advanced General Biochemistry.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 101B or consent of instructor; Chemistry 109B or 110C, 112C. Physical and chemical properties of amino acids, proteins, lipids, carbohydrates and nucleic acids; methods of isolating proteins; enzymes, including kinetics, cofactors, and type reactions; and the study of organized cell structures. The Staff (Mr. Chaykin in charge)

202A-202B. Advanced Biochemistry Laboratory.

(6-6) II-III.

Lecture—1 hour; laboratory—15 hours. Prerequisite: course 201A; Chemistry 5. Laboratory methods and procedures used in biochemical research. Critical evaluation of experimental design and data is stressed.

The Staff (Mr. Chaykin in charge)

203. Carbohydrates. (3) I.

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. The chemistry, metabolism, and biological functions of the various classes of carbohydrates and their polymers. Biosynthesis of simple and complex sugars and polysaccharides.

Mr. Preiss

204. Nucleic Acids. (3) III.

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. The physical and biological properties of nucleic acids; biosynthetic pathways; metabolism and structure of bases, nucleotides and their occurrence and distribution. The relation of structure and function of RNA and DNA to heredity, coding, and protein synthesis.

Mr. Bruening, Mr. Doi

205. Biochemical Mechanisms. (3) II.

Lecture—3 hours. Prerequisite: course 101B or consent of instructor; Chemistry 110C, 131. Bond structures of biochemical interest. Application of modern organic and inorganic chemical principles to a study of the mechanisms of biochemical reactions.

Mr. Ingraham

*206. Physical Biochemistry of Macromolecules.

(3) I.

Lecture—3 hours. Prerequisite: course 201C or consent of instructor; Chemistry 110C. Application of modern physical concepts and experimental methods to the problems of large molecules of biological interest.

Mr. Criddle

207. Lipids. (3) I.

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. A discussion of the chemistry, metabolism and experimental methodology unique to fatty acids, triglycerides, phospholipids, plasmalogens, sphingolipids, carotenoids, steroids.

Mr. Stumpf

220. Principles of Comparative Biochemistry. (3) I.

Lecture—3 hours. Prerequisite: Biochemistry 201C or permission of instructor. An advanced treatment of comparative biochemistry. Comparisons of living systems, their structures and functions on a molecular basis. Biochemical unity and diversity; protein structures and organized enzyme systems. Comparison of biochemical processes related to photobiology, metabolism and excretion.

Mr. Feeney, Mr. Hedrick

* Not to be given, 1967-68.

***240. Selected Topics in Biochemistry. (2) I.**

Lecture—2 hours. Prerequisite: course 201C or consent of instructor. The Staff

250. Biochemical Literature. (1) I, II, III.

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Critical reading and evaluation of the current biochemical literature. Selected papers will be presented and discussed in detail. Mr. Ingraham, Mr. Stumpf

270. Advanced Research Conference. (1) I, II, III.

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Presentation and critical

discussions of the research activities of various members of the local biochemical community; primarily designed for graduate students.

Mr. Ingraham

291. Current Progress in Biochemistry. (1) I, II, III.

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Seminars presented by guest lecturers on the subject of their own research activities.

Mr. Conn

299. Research. (1-9) I, II, III.

The Staff

BIOLOGICAL SCIENCES

_____, Chairman of the Committee

Committee Office, _____

Major Advisors.—See Schedule and Directory.

The Major Program. The major programs in biological sciences provide the opportunity to study a broader area of biology than is possible with most departmental programs. The programs prepare for a career in professions such as teacher, laboratory technician, medical technologist, etc. Both Plan I and Plan II serve as a basis for training in professional schools (Medicine, Dentistry, Pharmacy, etc.) and for graduate study leading to advanced degrees and careers in research. Plan II should be selected by those interested in the study of the chemical and molecular aspects of life. Students who follow plan I and are interested in a career as laboratory technician, admission to professional schools or graduate work in physiology or chemical biology should consider taking Chemistry 5 and a year laboratory course in physics. For those contemplating medical technology, veterinary microbiology 127 and courses such as medical microbiology and parasitology are recommended in addition to the above.

The Committee in Charge has issued a list of upper division courses acceptable in the major and a list of courses which can be used to satisfy the specific upper division area requirements for Plan I. Copies can be obtained from advisers and from the committee office.

Plan I

Bachelor of Arts Major Program

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Bacteriology 2; Chemistry 1A-1B, 8. Recommended: other introductory courses in natural sciences.

Upper Division Courses.—A total of 36 units in biological sciences, including at least one course in each of the following six categories: invertebrate zoology, vertebrate zoology, plant taxonomy, plant morphology, genetics and evolution, and physiology.

Bachelor of Science Major Program

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Bacteriology 2; Chemistry 1A-1B, 8; Physics 2A-2B-2C; Mathematics 13. Recommended: Chemistry 1C; Mathematics 16A, 16B, 16C; other introductory courses in natural sciences.

Upper Division Courses.—A total of 45 units in biological sciences, including at least one course in each of the following four categories: animal morphology and taxonomy, plant morphology and taxonomy, genetics and evolution, and physiology.

Not fewer than two courses in botany and two in zoology are required. To complete the 45-unit requirement, students may elect additional upper division courses in the above-mentioned groups or in other fields of biology.

Plan II

Bachelor of Arts Major Program

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Bacteriology 2; Chemistry 1A-1B-1C, 5 or 1A-7A-7B; Physics 2A-2B-2C or 4A-4B-4C; Mathematics 13; 16A-16B-16C or 1A-1B-1C.

Upper Division Courses.—Required: Chemistry 112A-112B-112C or 112A-112D-112E; Biochemistry 101A-101B; Genetics 100; 15 units in biological sciences.

Bachelor of Science Major Program

Lower Division Courses.—Required: same as for Bachelor of Arts under Plan II.

Upper Division Courses.—Required: A total of 45 units. Required and elective courses same as for Bachelor of Arts under Plan II and, in addition, Chemistry 110A-110B-110C; Biochemistry 101L. Recommended: an upper division course in physics.

Minor in Biological Sciences

A minimum of 30 units of biology, including

* Not to be given, 1967-68.

the undergraduate core: Biology 1, Botany 2, Zoology 2 and Bacteriology 2.

The Honors Program.—Students on the honor list may enroll in an Honors Program of courses leading to honors with the bachelor's degree (see page 96).

A special study course (194H) involving either independent research or reading on an appropriate topic, followed by preparation of an honors thesis (course 195H) based primarily on the work done in the prerequisite course, must be completed.

Teaching Major.—A degree in Biological Sciences satisfies the requirement for a teaching major in the life sciences for both elementary and secondary teaching credentials, except that for the elementary credential Entomology 1 or 10 must be included.

Teaching Minor.—A minimum of 30 units of biology, including the undergraduate core: Biology 1, Botany 2, Zoology 2, and Bacteriology 2.

Subject Representative: —————

BIOLOGY (Interdepartmental Courses)

Biology courses offered jointly by two or more departments or groups are listed below. Information concerning instructors is given under the individual departments.

Lower Division Courses

1. Principles of Biology. (6) I, II, III.

Lecture—4 hours; laboratory—6 hours. Prerequisite: Chemistry 1A; or a passing score in a qualifying examination in chemistry. An interdisciplinary course designed for majors in the biological sciences. Emphasis on the unity of basic biological principles as related to cell structure and function, reproduction, genetics,

Upper Division Courses

189. Integration of Biological Concepts. (2) III.

Lecture—2 hours. Prerequisite: twenty upper division units in biology. A detailed examination in depth of the coherence of biology through a study of several unifying themes, for example, evolution.

Mr. Stebbins

194H. Special Study for Honors Students. (3-6)

I, II, III.

Prerequisite: enrollment limited to honors students. Independent research and/or reading on selected topics.

The Staff (Committee Chairman in charge)

195H. Honors Thesis. (2) I, II, III.

Prerequisite: course 194H. Preparation of comprehensive thesis incorporating studies undertaken in course 194H.

The Staff (Committee Chairman in charge)

growth and differentiation, evolution, ecology, and taxonomy.

I. Mr. Ketellapper (Botany),

II. Mr. Wolfe (Zoology),

III. Mr. Reynolds (Bacteriology)

(Offered by Bacteriology, Botany, and Zoology)

10. General Biology. (4) I, III.

Lecture—3 hours; discussion—1 hour. Not open for credit to those who have had course 1. Consideration of the main features and principles of biology, with emphasis on biological processes and special reference to evolution, heredity, and the bearing of biology on human life. Designed for students not specializing in biology.

I. Mr. Spieth (Zoology),

III. Mr. Ketellapper (Botany)

(Offered by Botany and Zoology)

BOTANY

Ernest M. Gifford, Jr., Ph.D., *Chairman of the Department*

Department Office, 143 Robbins Hall

Professors:

Daniel I. Axelrod, Ph.D.

Alden S. Crafts, Ph.D. (*Emeritus*)

Herbert B. Currier, Ph.D.

Ernest M. Gifford, Jr., Ph.D.

C. Ralph Stocking, Ph.D.

John M. Tucker, Ph.D.

Grady L. Webster, Ph.D.

T. Elliot Weier, Ph.D.

Paul A. Castelfranco, Ph.D.

Elizabeth G. Cutter, Ph.D., D.Sc.

Hendrik J. Ketellapper, Ph.D.

Jack Major, Ph.D.

Kenneth Wells, Ph.D.

Assistant Professors:

Bruce A. Bonner, Ph.D.

Donald W. Kyhos, Ph.D.

Norma J. Lang, Ph.D.

Robert F. Norris, Ph.D.

Thomas E. Ragland, Ph.D.



Associate Professors:

Floyd M. Ashton, Ph.D.

Lecturers:

David E. Bayer, Ph.D.

Oliver A. Leonard, Ph.D.

Departmental Major Adviser.—Mr. Wells**The Major Programs**

The Bachelor of Science major program should be elected by those students who plan advanced study in botany, who wish to obtain general secondary teaching credentials, or who wish training for a position requiring a detailed knowledge of plants. Students who wish a less intensive program in botany, but one that acquaints the students with plant life and its importance, should elect the Bachelor of Arts major program.

Bachelor of Science Major Program

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Chemistry 1A, 1B, 8; Physics 2A, 2B, 2C; plus 8 additional units in related natural science subjects. German or French is the required language. Recommended: Bacteriology 2; Chemistry 1C; and Mathematics 13, 16A, 16B, 16C.

Upper Division Courses.—Required: Botany 105, 108, 111, 116, 118 or 119A and 119B; Genetics 100; 6 (3 if Botany 119A and 119B are selected) additional units in botany; plus 8 units in related natural science courses. Recommended: Biochemistry 101A and 101B.

Bachelor of Arts Major Program

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Chemistry 1A, 1B. Recommended: Chemistry 8.

Upper Division Courses.—Required: 36 units in botany and allied areas; 12 upper division units from the humanities or the social sciences, in addition to the college breadth requirements.

Honors and Honors Program (see page 107).—Students on the honors list may elect to substitute a maximum 5 units of 194H for 5 upper division units of the regular major; however, recommendations for high honors and highest honors at graduation are not dependent on the completion of 194H.

Teaching Major.—The requirements for the teaching major are the same as for the departmental major for degree (A.B. or B.S.).

Teaching Minor.—Botany 2; and a minimum of 23 units in botany or closely related subjects. Students must consult with subject representative.

Subject Representative: Mr. Wells

Graduate Study.—Graduate programs leading to M.A., M.S., and Ph.D. degrees are offered in cytology, plant physiology, anatomy, morphology, taxonomy, ecology, mycology, phycology, and allied areas. The resources of the department are augmented by appropriate courses in related departments.

Lower Division Courses**2. General Botany. (5) I, II, III.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biology 1. Structure, physiology, and taxonomy of plants, with special emphasis on seed plants.
The Staff

8. Poisonous Plants. (1) III.

Laboratory—3 hours. Identification of poisonous plants, their distribution, toxic principles, nature of injury and animals affected, and plant control measures.
Mr. Kyhos

Upper Division Courses**105. Plant Anatomy. (5) II.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Structure and growth of meristems; development and structure of cells, tissues, and tissue systems; comparative anatomy of stem, root, and leaf.
Miss Cutter

107. Weed Control. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2; Chemistry 8. Introduction to the physiological and chemical principles underlying control of weeds; principles of preventive, cultural, and biological weed control; identification of common weeds.
Mr. Ashton

108. Systematic Botany of Flowering Plants. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Laboratory and field studies of the characters and relationships of the principal families and orders of flowering plants. Principles of taxonomy. Practice in identification of species by means of keys.
Mr. Tucker

111. Introduction to Plant Physiology. (5) I.

Lecture—5 hours. Prerequisite: course 2; Chemistry 8 (may be taken concurrently). The fundamental activities of plants such as absorption, transpiration, synthesis of foods, respiration, growth, and reproduction.
Mr. Stocking

***115. Mosses and Liverworts. (3) II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 2. Morphology, taxonomy, and ecology of mosses and liverworts. Field trips.
Miss Lang

116. Organization and Phylogeny of Vascular Plants. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Structure, reproduction, and phylogeny of the major groups of living and extinct vascular plants; special emphasis given to seed plants.
Mr. Gifford

117. Plant Ecology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 111. Study of individual

* Not to be given, 1967-68.

plants, species, and vegetation in relation to environment and of modification of the environment by vegetation.

Mr. Major

118. Phycology. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Morphology, physiology, genetics, evolution, distribution, cultivation, and economic importance of freshwater and marine algae; field trips.

Miss Lang

119A. Mycology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2. Introduction to structure, relationships, ontogeny, and genetics of selected species of Ascomycetes, Myxomycetes, Plasmodiophoromycetes, Chytridiomycetes, Phycomycetes, and Ascomycetes.

Mr. Wells

119B. Mycology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 119A. Introduction to structure, relationships, ontogeny, and genetics of selected species of Basidiomycetes and Fungi Imperfetti; ultrastructure of fungi; genetics of mating systems; mycorrhizae.

Mr. Wells

120A. Plant Physiology. (3) I.

Lecture—3 hours. Prerequisite: course 111; Biochemistry 101A (may be taken concurrently). Cellular physiology, plant water relations, and translocation.

Mr. Currier

Mr. Ragland

120B. Plant Physiology. (3) II.

Lecture—3 hours. Prerequisite: course 111; Biochemistry 101A. Recommended: course 120A; Biochemistry 101B. Mineral nutrition; plant metabolism, including photosynthesis and respiration.

Mr. Ragland

120C. Plant Physiology. (3) III.

Lecture—3 hours. Prerequisite: course 111; Biochemistry 101A. Recommended: courses 120A and 120B; Biochemistry 101B. Internal and environmental regulation of plant growth and development.

Mr. Bonner

121A. Plant Physiology Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: course 120A (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 120A.

Mr. Currier

121B. Plant Physiology Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 120B (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 120B.

Mr. Ragland

121C. Plant Physiology Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 120C (may be taken concurrently). Laboratory

procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 120C.

Mr. Bonner

130A. General Cytology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2 or Zoology 2; Genetics 100B or Biochemistry 101A. An analysis of the structure and ultrastructure of cells; the relationship between structure and function at cellular and subcellular levels. Consideration of cell particulates, membranes, endoplasmic reticulum, mitochondria, plastids, the golgi zone and their relationship to the metabolic nucleus. Mr. Weier

130B. General Cytology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 130A. An analysis of the structure and function of cells during mitosis, meiosis, gametogenesis and fertilization at cellular and subcellular levels.

Mr. Weier

140. Paleobotany. (4) II.

Lecture—3 hours. Advanced standing in botany or consent of instructor. Vegetation of the earth during geologic time.

Mr. Axelrod

155. Plant Microtechnique. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 116 or course 105. Introduction to practical laboratory methods in preparing plant materials for microscopic examination; special emphasis on paraffin and chromosome smear techniques; introduction to techniques of tissue culture and photomicrography. The Staff

180. Biological Evaluation of Herbicides. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 107 and 111 (may be taken concurrently). Principles dealing with the physical, chemical, and physiological aspects of herbicides. Laboratory, greenhouse and field studies illustrating these principles in herbicide evaluation; emphasis upon biological assays and upon the interpretation of biological data. Mr. Bayer

194H. Special Study for Honors Students. (1-5)

I, II, III.

Prerequisite: open only to majors of senior standing on honors list. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

*210. Cell Physiology-Protoplastics. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Selected plant physiological topics treated on the cellular level: water relations, plasmolytic phenomena, cyto-

* Not to be given, 1967-68.

plasmic movements, transport mechanisms, vital staining, responses of cells to high and low temperatures, wound reactions, effects of poisons. Microscopic techniques are stressed.

Mr. Currier

211. Plant Cell Metabolism. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: consent of instructor. Plant cell physiology, dealing particularly with the roles of plastids, mitochondria, microsomes, and nuclei in cellular metabolism. Isolation and study of these particulates, using centrifugation, gasometric, chromatographic, and spectroscopic methods. Detailed consideration of photosynthesis and respiration.

Mr. Castelfranco, Mr. Stocking

212. Physiology of Herbicidal Action. (3) I.

Lecture—3 hours. Prerequisite: courses 107, 120A, 120B, 120C. A study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants and soils.

Mr. Ashton

214. Mechanisms of Toxic Action. (4) II.

Lecture—4 hours. Prerequisite: Biochemistry 101A, 101B and consent of instructor. Physiological and biochemical mechanisms underlying toxicity and detoxification reactions.

Mr. Castelfranco

***215. Light and Plant Growth. (3) I.**

Lecture—3 hours. Prerequisite: courses 120A, 120B, 120C; Physics 2B. Mechanisms and phenomena involved in the control of plant growth by light. Photoperiodism, photomorphogenesis, phototropism, and certain aspects of photosynthesis.

Mr. Bonner

216. Advanced Morphology of Vascular Plants. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 116. Evolution of form, structure, and reproduction of fossil and extant types through Cycadophytes.

Mr. Gifford

***218. Experimental Phycology. (3) II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 118. Special problems in development, physiology, and genetics using algae as experimental organisms. Topics to be investigated will be selected according to the interests of individual students.

Miss Lang

***220. Plant Morphogenesis. (2) III.**

Lecture—2 hours. Prerequisite: course 105 or 116. Recommended: course 155. A survey of recent advances in the study of growth and the development of form, with special reference to higher plants, and some emphasis on experimental approaches.

Miss Cutter

***220L. Plant Morphogenesis Laboratory. (2) III.**

Laboratory—6 hours. Prerequisite: course 220 (may be taken concurrently) and consent

of the instructor. Procedures, principally experimental, used to study the development of plant form.

Miss Cutter

221. Selected Topics in Plant Physiology. (2) I, II, III.

Lecture—2 hours. Evaluation of the most recent research in plant physiology. Coverage of the entire field in a three-year period. Lectures and discussions by specialists in the areas of their research interests. May be repeated for credit.

The Staff

231. Advanced Microtechnique. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: one of the following: course 105, 116, 130A; 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.

Mr. Weier

255. Principles of Plant Taxonomy. (5) I.

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: course 108; Genetics 103. Evaluation of different approaches to biological classifications; theory of evolutionary classification; examples of how various disciplines—anatomy, embryology, biochemistry, paleontology, ecology—contribute to the elucidation of problems of taxonomic relationships, mainly of genera and higher categories.

Mr. Tucker

256A. Experimental Plant Taxonomy. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 108. Recommended: course 117; Genetics 103. The application of experimental techniques to the elucidation of taxonomic problems and evolutionary relationships in higher plants.

Mr. Kyhos

256B. Experimental Plant Taxonomy. (2) III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 256A. A continuation of course 256A. The study of variation in natural populations in relation to taxonomy; the application of population sample analysis, cytogenetics, transplant studies, etc., to the solution of taxonomic problems and the clarification of relationships.

Mr. Kyhos

***257. Plant Autecology. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 108, 111, 117; Mathematics 13. Study of the ecological requirements of native plants of California as demonstrated by experiments under controlled conditions. Comparison of responses of related species, and analysis of responses in pure stands under changing competitive conditions. Field measurements; life histories.

Mr. Major

* Not to be given, 1967-68.

258. Plant Synecology. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 108, 117; Soil Science 120A recommended. Theories and techniques involved in the study of structure, composition, boundaries, ecology, and classification of vegetation, with particular emphasis on California plant communities.

Mr. Major

290. Seminar (1) I, II, III.

Seminar—1 hour.

The Staff

291. Seminar in Plant Morphology. (1) I, II, III.

Seminar—1 hour.

The Staff

292. Seminar in Plant Physiology. (1) I, II, III.

Seminar—1 hour.

The Staff

293. Seminar in Weed Science. (1) II.

Seminar—1 hour.

The Staff

294. Seminar in Cytology and Cytobiochemistry.

(1) III.

Seminar—1 hour. Survey of current research developments in the fields of cytology and biochemistry with special reference to plants. Discussion of the fine structure of cells in relation to biochemical function.

Mr. Castelfranco

299. Research. (1-9) I, II, III.

The Staff

CHEMISTRYRaymond M. Keefer, Ph.D., *Chairman of the Department*

Department Office, 108 Chemistry Building

Professors:

Thomas L. Allen, Ph.D.

¹ Lawrence J. Andrews, Ph.D.

Robert K. Brinton, Ph.D.

Raymond M. Keefer, Ph.D.

Richard E. Kepner, Ph.D.

Edgar P. Painter, Ph.D.

Harold G. Reiber, Ph.D.

Leo H. Sommer, Ph.D.

David H. Volman, Ph.D.

Associate Professors:

Albert T. Bottini, Ph.D.

Gary E. Maciel, Ph.D.

Charles P. Nash, Ph.D.

George S. Zweifel, Sc.D.

Assistant Professors:

Edwin C. Friedrich, Ph.D.

George A. Gerhold, Ph.D.

Rodney E. Harrington, Ph.D.

Hakon Hope, Cand. Real.

W. Kenneth Musker, Ph.D.

Peter A. Rock, Ph.D.

John W. Root, Ph.D.

William P. Schaefer, Ph.D.

James H. Swinehart, Ph.D.

William E. Thiessen, Ph.D.

James S. Vincent, Ph.D.

♦ ♦ ♦

Professor:A. B. Callear, Ph.D. (*Visiting*)

Major Subject Advisers.—Mr. Bottini, Mr. Harrington, Mr. Kepner, Mr. Maciel, Mr. Painter, Mr. Rock, Mr. Swinehart.

¹ Absent on leave, 1967-68.**The 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. 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

Lower Division Courses.—Required: Chemistry 1A, 1B, 1C, 5 or 1A, 7A, 7B; Physics 4A, 4B, 4C, 4D, 4E; Mathematics 1A, 1B, 1C, 2A, 2B; and a reading knowledge of German.

Upper Division Courses.—Required: Chemistry 105A, 105B, 110A, 110B, 110C, 111, 112A, 112B, 112C, and 8 units of any additional courses in chemistry (one of which must include laboratory work) except Chemistry 109A or 109B.

Bachelor of Arts Major Program.

Lower Division Courses.—Required: Chemistry 1A, 1B, 1C, 5 or 1A, 7A, 7B; Physics 2A, 2B, 2C, 3A, 3B, 3C; Mathematics 16A, 16B, 16C.

Upper Division Courses.—Required: 36 units in chemistry, biochemistry, or physics, including Chemistry 110A, 110B, 110C, 112A, 112B, and 112C or 112E.

Honors and Honors Program (see page 107).—The honors program comprises 6 units of course 194H.

Graduate Study.—The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in chemistry. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Chemistry.

Teaching Major.—The teaching major is satisfied by either the A.B. or B.S. major in chemistry.

Teaching Minor.—Chemistry 1A, 1B, 1C, 5, 8, 9, 109A, 109B. With the approval of the representative some substitution may be permitted.

Subject Representative: Mr. Nash

Lower Division Courses

1A. General Chemistry. (5) I, II.

Lecture—3 hours; 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-quarter standing. The Staff

(I. Mr. Keefer, Mr. Allen, and Mr. Vincent in charge; II. Mr. Maciel in charge)

1B. General Chemistry. (5) II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1A. The Staff

(II. Mr. Volman and Mr. Schaefer in charge; III. Mr. Brinton in charge)

1C. General Chemistry. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1B. The Staff
(Mr. Gerhold and Mr. Swinehart in charge)

5. Quantitative Analysis. (4) I, III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1C with grade of C or higher. Not open to students who have credit for Chemistry 7B. An introduction to the principles and methods of quantitative chemical analysis, with emphasis on the application of equilibrium theory to analytical problems.

I. Mr. Schaefer, III. Mr. Vincent

7A. General Chemistry. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1A, Mathematics 1A or 16A (may be taken concurrently). Enrollment to be limited. Admission based on performance in course 1A. The fundamental principles of chemistry with emphasis in the laboratory on quantitative work. Courses 1A–7A–7B are equivalent to the sequence Chemistry 1A–1B–1C–5 as a prerequisite for further courses in chemistry.

Mr. Nash

7B. General Chemistry. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 7A. Continuation of course 7A.

Mr. Hope

8. Organic Chemistry, Brief Course. (5) I, III.

Lecture—4 hours; laboratory—3 hours. Prerequisite: course 1B or 1C with a grade of C or higher. An introductory study of the compounds of carbon.

I. Mr. Reiber, III. Mr. Sommer

9. Methods of Organic Chemistry. (3) I, II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 1C with a grade of C or higher and course 8. An experimental study of the physical properties and chemical reactions of the common classes of organic compounds.

I. Mr. Thiessen, II. Mr. Zweifel

Upper Division Courses

105A–105B. Advanced Quantitative Analysis. (3–3)

II, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 109B or 110C (may be taken concurrently). Instrumental methods of analysis, emphasizing chromatographic, electrochemical, and spectrophotometric techniques.

II. Mr. Swinehart, III. Mr. Schaefer

109A. Physical Chemistry, Brief Course. (2) I.

Lecture—2 hours. Prerequisite: course 5 or 7B; Mathematics 16C; one year of college physics. Graduate students of high standing may, under exceptional circumstances, be admitted without the prerequisite in chemistry. Special topics in physical chemistry.

Mr. Harrington

109B. Physical Chemistry, Brief Course. (3) II.

Lecture—3 hours. Prerequisite: course 109A or 110A. Continuation of course 109A.

Mr. Hope

110A. Physical Chemistry. (3) I, III.

Lecture—3 hours. Prerequisite: course 5 or 7B; Mathematics 2B or 16C; one year of college physics. The general principles of physical chemistry and elementary thermodynamics.

I. Mr. Brinton, Mr. Rock; III. Mr. Volman

110B. Physical Chemistry. (3) I, II.

Lecture—3 hours. Prerequisite: course 110A. Continuation of course 110A.

I. Mr. Root, II. Mr. Gerhold, Mr. Harrington

110C. Physical Chemistry. (3) II, III.

Lecture—3 hours. Prerequisite: course 110B. Continuation of course 110B.

II. Mr. Vincent, III. Mr. Allen, Mr. Rock

111. Physical Chemistry. (4) I, III.

Lecture—1 hour; laboratory—9 hours. Prerequisite: course 109B or 110C (may be taken concurrently). Physicochemical measurements and laboratory experiments illustrating some of the important principles of physical chemistry.

I. Mr. Nash, III. —

112A. Organic Chemistry. (5) II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1C with a grade of C or higher. A course with emphasis on modern theoretical concepts designed primarily for majors in chemistry. II. Mr. Friedrich; III. Mr. Reiber

112B. Organic Chemistry. (5) I, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112A or 8 and 9. Continuation of course 112A.

I. Mr. Zweifel; III. Mr. Bottini

112C. Organic Chemistry. (5) I, II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112B. Continuation of course 112B. I. Mr. Kepner; II. Mr. Thiessen;

112D. Organic Chemistry. (3) I, III.

Lecture—3 hours. Prerequisite: course 112A or 8 and 9; and consent of instructor. Equivalent to the lecture part of 112B. Intended primarily for students in fields other than chemistry.

I. Mr. Zweifel; III. Mr. Bottini

112E. Organic Chemistry. (3) I, II.

Lecture—3 hours. Prerequisite: course 112B or 112D; and consent of instructor. Equivalent to the lecture part of 112C. Intended primarily for students in fields other than chemistry.

I. Mr. Kepner; II. Mr. Thiessen

121. Introduction to Molecular Structure and Spectra. (4) III.

Lecture—4 hours. Prerequisite: course 110C. Modern theoretical and experimental methods used to study problems of molecular structure and binding; emphasis on spectroscopic techniques.

Mr. Maciel

124. Advanced Inorganic Chemistry. (4) I.

Lecture—4 hours. Prerequisite: course 109B or 110C; 112C or 112E. Modern interpretations of bonding, structure, and reactivity of inorganic compounds; emphasis on the chemistry of the first- and second-row elements and transition metals.

Mr. Swinehart

124L. Advanced Inorganic Chemistry. (2) II.

Laboratory—6 hours. Prerequisite: course 124. Synthesis and characterization of inorganic compounds.

Mr. Musker

126A. Nuclear Chemistry. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110C (may be taken concurrently). General features of nuclear structure, nuclear radiations, and laws of radioactive decay. Laboratory experiments to illustrate the application of nuclear chemical techniques to nuclear and chemical problems.

Mr. Root

126B. Nuclear Chemistry. (3) III.

Lecture—3 hours. Prerequisite: course 126A.

Detailed discussion of selected examples of nuclear properties, nuclear models, radioactive decay processes, nuclear reactions, and fission.

Mr. Root

130. Qualitative Organic Analysis. (4) III.

Lecture—1 hour; laboratory—9 hours. Prerequisite: course 5 or 7B; 112C or 112E. The application of physical and chemical techniques to the qualitative identification of organic compounds.

Mr. Kepner

131. Advanced Organic Chemistry. (4) II.

Lecture—4 hours. Prerequisite: course 109B or 110B; 112C or 112E. Application of current knowledge of reaction mechanisms and molecular structure to problems of organic synthesis.

Mr. Sommer

150A. Chemistry of Natural Products. (3) I.

Lecture—3 hours. Prerequisite: courses 109B and 112C or 112E, or consent of the instructor. Chemistry of carbohydrates and lipids; structure proof, stereochemistry, conformation, substitutions, and rearrangements of model systems.

Mr. Painter

150B. Chemistry of Natural Products. (3) II.

Lecture—3 hours. Prerequisite: courses 109B and 112C or 112E, or consent of the instructor. Structure, reactions, and physical properties of proteins, amino acids, nucleic acids, and related nitrogen compounds.

Mr. Painter

194H. Undergraduate Research. (2–5) I, II, III.

Prerequisite: course 110C (may be taken concurrently) and honors status. Original research and a written report of the investigation. Unit value to be determined by instructor supervising the research.

The Staff

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

Prerequisite: consent of the instructor based upon adequate preparation in chemistry, mathematics, and physics.

The Staff

Graduate Courses***204. Chemical Kinetics. (3) I.**

Lecture—3 hours. Prerequisite: course 214. Basic theories describing rate processes, with special emphasis on the interpretation of activation parameters. An intensive study of the relationship between rate law and mechanism.

205. Quantum Chemistry I. (3) II.

Lecture—3 hours. Introduction to quantum chemistry, with emphasis on molecular electronic structure.

Mr. Allen

* Not to be given, 1967–68.

206. Quantum Chemistry II. (3) III.

Lecture—3 hours. Prerequisite: course 205. Selected topics in the application of quantum theory to systems of chemical interest. Offered in odd-numbered years. Mr. Gerhold

214. Chemical Thermodynamics. (4) I.

Lecture—4 hours. Development of thermodynamic relations; applications to chemical systems. Mr. Volman

215. Advanced Physical Chemistry—Statistical Methods. (3) III.

Lecture—3 hours. Prerequisite: course 214. Probability and statistical methods; introduction to partition functions and statistical thermodynamics; heat capacities; chemical equilibrium; statistical theory of reaction rates; liquids and solutions; matter in fields. Mr. Nash

216. Statistical Thermodynamics. (3) I.

Lecture—3 hours. Prerequisite: course 215. Development of the laws of molecular assemblies; ensemble theory; fluctuations; imperfect gases; quantum effects; cooperative phenomena. Offered in even-numbered years.

220. Organic Chemistry. (3) II.

Lecture—3 hours. Selected topics of current interest concerning the structure and synthesis of naturally-occurring organic compounds. Offered in odd-numbered years. Mr. Thiessen

221. Organic Chemistry. (3) III.

Lecture—3 hours. Selected topics of current interest concerning the synthesis and reactions of heterocyclic compounds. Offered in even-numbered years. Mr. Friedrich

222. Organic Chemistry. (3) II.

Lecture—3 hours. Selected topics of current interest concerning the synthesis and reactions

of small-ring compounds. Offered in even-numbered years. Mr. Bottini

223. Organometallic Compounds. (3) III.

Lecture—3 hours. Selected topics concerning the preparation and utilization of organometallic compounds in organic synthesis, including the application of metal hydrides as reducing agents. Offered in odd-numbered years. Mr. Zweifel

224. Inorganic Chemistry. (3) III.

Lecture—3 hours. Prerequisite: course 124. A development of the modern theories related to the structural, optical, and magnetic properties of inorganic compounds and complexes. Offered in odd-numbered years. Mr. Swinehart

225. Inorganic Chemistry. (3) III.

Lecture—3 hours. Prerequisite: course 124. Application of kinetic and thermodynamic principles to the interpretation of inorganic systems. Offered in even-numbered years. Mr. Musker

233A-233B. Physical Organic Chemistry. (2-2) I-II.

Lecture—2 hours. Modern concepts of substitution, elimination, and addition reactions, rearrangements, and stereochemistry.

290. Seminar. (1) I, II, III.

Seminar—1 hour. Prerequisite: consent of the instructor. Mr. Sommer and Mr. Maciel

298. Group Study. (1-5) I, II.

Mr. Callendar

299. Research. (1-12) I, II, III.

The laboratory is open to qualified graduate students who wish to pursue original investigation. Students wishing to enroll should communicate with the department well in advance of the semester in which the work is to be undertaken. The Staff

CHINESE—See Oriental Languages**CLASSICS**

Department Office, 622 Sproul Hall

Associate Professors:

Richard E. Grimm, Ph.D.

Wesley E. Thompson, Ph.D.

**Assistant Professor:**

H. Phelps Gates, Jr., M.A. (Acting)

Classics**Lower Division Courses*****10. Greek and Roman Mythology. (3) I.**

Lecture—3 hours. Origin and development of myths and legends, their place in the religion, literature, and art of Greece and Rome.

Upper Division Courses**139A. Greek Literature in Translation. (4) I.**

Lecture—3 hours. Prerequisite: English 1A. The Homeric epic and fifth-century drama.

* Not to be given, 1967-68.

Reading of the Iliad, Odyssey, and selected plays of Aeschylus, Sophocles, Euripides, and Aristophanes. Lectures on the early Greek epic and classical Athenian drama. Mr. Grimm

***139B. Greek Literature in Translation. (4) II.**

Lecture—3 hours. Prerequisite: English 1A. Readings in Pindar, Herodotus, Thucydides, Plato, Menander, and the Hellenistic writers. Lectures on literary trends from the fifth century to the end of the Hellenistic period. Offered in even-numbered years. Mr. Thompson

***140. Latin Literature in Translation. (4) II.**

Lecture—3 hours. Prerequisite: English 1A. Readings in Plautus, Terence, Lucretius, Roman lyric poets, Vergil, Livy, Seneca, Petronius, Tacitus, and Juvenal. Lectures on Roman literary history from Ennius to the late Empire. Offered in odd-numbered years.

Greek

The Major Program

Lower Division Courses.—Required: Greek 1, 2, and 3 or their equivalents. Recommended: Latin 1, 2, and 3.

Upper Division Courses.—Required: 36 units of upper division courses of which two may be chosen from department-approved courses in other fields. Students majoring in Greek must maintain at least a C average in upper division courses.

Lower Division Courses

1. Elementary Greek. (5) I.

Lecture—4 hours. Mr. Gates

2. Elementary Greek. (5) II.

Lecture—4 hours. Prerequisite: course 1. A continuation of course 1. Mr. Gates

3. Elementary Greek. (5) III.

Lecture—4 hours. Prerequisite: course 2. A continuation of course 2. Mr. Thompson

Upper Division Courses

101. Plato. (4) I.

Lecture—3 hours. Prerequisite: course 3. Mr. Thompson

102. Euripides. (4) II.

Lecture—3 hours. Prerequisite: course 101. Mr. Gates

103. Homer. (4) III.

Lecture—3 hours. Prerequisite: course 102. Mr. Gates

111. Sophocles. (4) III.

Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years. Mr. Grimm

***112. Aristophanes. (4) II.**

Lecture—3 hours. Prerequisite: course 103. Offered in even-numbered years. Mr. Grimm

113. Thucydides. (4) I.

Lecture—3 hours. Prerequisite: course 103. Offered in even-numbered years. Mr. Thompson

***114. Lyric Poetry. (4) I.**

Lecture—3 hours. Prerequisite: course 103.

***115. Aeschylus. (4) II.**

Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years. Mr. Thompson

***116. Herodotus. (4) III.**

Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years. Mr. Thompson

***120A-120B. Greek Composition. (2-2) II-III.**

Lecture—2 hours. Prerequisite: course 103. Mr. Gates

194H. Special Study for Honors Students. (5)

I, II, III.

Prerequisite: open only to honor students. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Latin

Departmental Major Adviser.—Mr. Thompson.

The Major Program

Lower Division Courses.—Required: Latin 1, 2, 3, 4, and 5, or their equivalents.

Upper Division Courses.—Required: at least 36 units of upper division courses, including 121A-121B-121C.

Honors and Honors Program (see page 107).

—The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Requirements for the teaching minor in Latin: Latin 1, 2, 3, 4, 5, or their equivalents; at least 18 units of upper division work, including Latin 121A-121B-121C. Recommended: History 111C.

Subject Representative: Mr. Grimm

Lower Division Courses

1. Elementary Latin. (4) I.

Lecture—4 hours. The Staff

2. Elementary Latin. (4) II.

Lecture—4 hours. Prerequisite: course 1. A continuation of course 1. The Staff

* Not to be given in 1967-68.

3. Elementary Latin. (4) III.

Lecture—4 hours. Prerequisite: course 2. A continuation of course 2. The Staff

4. Intermediate Latin. (3) I.

Lecture—3 hours. Prerequisite: course 3 or equivalent. The Staff

5. Intermediate Latin. (3) I, II.

Lecture—3 hours. Prerequisite: course 4 or equivalent. Continuation of course 4. The Staff

Upper Division Courses***101. Livy. (4) I.**

Lecture—3 hours. Prerequisite: course 5. Offered in odd-numbered years. Mr. Thompson

102. Roman Comedy. (4) II.

Lecture—3 hours. Prerequisite: course 5. Offered in even-numbered years. —

***103. Vergil: Aeneid. (4) III.**

Lecture—3 hours. Prerequisite: course 5. Offered in even-numbered years. Mr. Gates

***104. Sallust. (4) I.**

Lecture—3 hours. Prerequisite: course 5. Offered in even-numbered years. Mr. Thompson

***105. Catullus. (4) II.**

Lecture—3 hours. Prerequisite: course 5. Offered in odd-numbered years. Mr. Thompson

***106. Horace: Odes and Epodes. (4) III.**

Lecture—3 hours. Prerequisite: course 5. Offered in odd-numbered years. —

109. Roman Elegy. (4) III.

Lecture—3 hours. Prerequisite: course 5. Offered in even-numbered years. —

***111. Tacitus. (4) I.**

Lecture—3 hours. Prerequisite: course 5. Offered in even-numbered years. —

***112. Petronius. (4) II.**

Lecture—3 hours. Prerequisite: course 5. Offered in odd-numbered years. —

***113. Juvenal. (4) III.**

Lecture—3 hours. Prerequisite: course 5. Offered in odd-numbered years. —

114. Cicero: Philosophical Works. (4) I.

Lecture—3 hours. Prerequisite: course 5. Offered in odd-numbered years. —

115. Lucretius. (4) II.

Lecture—3 hours. Prerequisite: course 5. Offered in even-numbered years. Mr. Gates

116. Vergil: Eclogues and Georgics. (4) III.

Lecture—3 hours. Prerequisite: course 5. Offered in even-numbered years. —

121A-121B-121C. Latin Composition. (2) I, II, III.

Lecture—2 hours. Prerequisite: course 5. Survey of classical Latin syntax; extensive practice in prose composition. Offered in odd-numbered years. Mr. Grimm

194H. Special Study for Honors Students. (5)

I, II, III.

Prerequisite: open only to honors students. Guided research leading to an honors paper.

The Staff

199. Special Study for Advanced Undergraduates.

(2-5) I, II, III.

The Staff

Graduate Courses***201. Introduction to Classical Philology. (4) I.**

Seminar—3 hours.

Mr. Thompson

***202. Lucretius. (4) II.**

Seminar—3 hours.

Mr. Gates

***203. Vergil. (4) III.**

Seminar—3 hours.

Mr. Grimm

***299. Research. (2-5) I, II, III.**

The Staff

Sanskrit**Upper Division Courses*****191. Elementary Sanskrit. (4) I.**

Discussion—3 hours. Introduction to the study of the Sanskrit language; analysis of its structure and history. To be offered in even-numbered years. Mr. Gates

***192. Elementary Sanskrit. (4) II.**

Discussion—3 hours. Prerequisite: course 191. Continuation of course 191. To be offered in odd-numbered years. Mr. Gates

***193. Elementary Sanskrit. (4) III.**

Discussion—3 hours. Prerequisite: course 192. Continuation of course 192. To be offered in odd-numbered years. Mr. Gates

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Mr. Gates

^a Not to be given, 1967-68.

CLINICAL PATHOLOGY

Oscar W. Schalm, D.V.M., Ph.D., *Chairman of the Department*

Department Office, 1163 Haring Hall

Professors:

Donald E. Jasper, D.V.M., Ph.D.
Oscar W. Schalm, D.V.M., Ph.D.

Associate Professor:

*Jiro J. Kaneko, D.V.M., Ph.D.

Upper Division Course

199. Special Study for Undergraduates. (1-4)

I, II, III. The Staff

Graduate Courses

201. Clinical Hematology. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of the instructor. Hematological techniques and interpretation as applied to the study of disease in animals. Mr. Schalm, Mr. Kaneko

202. Clinical Biochemistry. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: third-year standing in 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. Mr. Kaneko, Mr. Jasper

*203. Biochemistry of Metabolic Diseases. (3) II.

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. Mr. Kaneko

204. Morphological Hematology. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of the instructor. Morphological and interpretive clinical hematology for graduate students. Mr. Schalm

250A-250B-250C. Clinical Pathology Laboratory.

(1) I, II, III.

Prerequisite: fourth-year standing in School of Veterinary Medicine. Application of laboratory methods to the diagnosis of animal disease.

The Staff

261. The Bovine Mammary Glands in Health and Disease. (2) II.

Lecture—2 hours; laboratory—2 hours. Prerequisite: consent of instructor. Ontogeny, embryology, anatomy and physiology of the mammary glands; relationship of mastitis and milk quality; infectious causes and the influence of environment, milking machines and management on mastitis; pathogenesis of mastitis; cellular and humoral defense mechanisms; mastitis diagnosis and control. Mr. Jasper, Mr. Schalm

290. Seminar in Clinical Pathology. (1) I, II, III.

Seminar—1 hour.

The Staff

298. Directed Group Study. (1-3) I, II, III. The Staff

299. Research in Clinical Pathology. (1-9) I, II, III. The Staff

CLINICAL SCIENCES

R. M. Cello, D.V.M., *Chairman of the Department*

Department Office, 1315 Haring Hall

Professors:

Robert M. Cello, D.V.M.
John F. Christensen, D.V.M., Ph.D.
John P. Hughes, D.V.M.
John W. Kendrick, D.V.M., Ph.D.
Blaine McGowan, Jr., D.V.M.
William R. Pritchard, D.V.M., Ph.D., J.D.
Edward A. Rhode, Jr., D.V.M. (*Clinical Sciences and Animal Physiology*)
John D. Wheat, D.V.M.

¹ Absent on leave, 1967-68.

* Not to be given, 1967-68.

Associate Professors:

Murray E. Fowler, D.V.M.
Jack A. Howarth, D.V.M., Ph.D.
Robert L. Leighton, D.V.M.
Gordon H. Theilen, D.V.M.

Assistant Professors:

John C. Bartley, D.V.M., Ph.D.
Jerry R. Gillespie, D.V.M., Ph.D.
Charles A. Hjerpe, D.V.M.
Terrell A. Holliday, D.V.M., Ph.D.
Bud C. Tenant, D.V.M.



Lecturers:

Alfred G. Edward, D.V.M. (*Laboratory—Animal Medicine*)
 Charles E. Grayson, M.D. (*Radiology*)
 Alida P. Wind, D.V.M.

Associates:

Gary O. Ewing, D.V.M.
 Ronald D. Schechter, D.V.M.

Lower Division Course**10. Introduction to Biomedical Terminology. (2) III.**

Lecture—1 hour; discussion—1 hour. An introduction to the basic terminology of animal biology and medicine, with practice in term analysis. Mr. Christensen

Upper Division Courses**103. Introductory Medicine. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Pathology 122B and Physiological Sciences 140B. Lectures on the principles of clinical diagnosis of animal diseases, with special emphasis on history taking and identification and interpretation of symptoms. The laboratory will provide practice in physical examination of normal and abnormal animals. Mr. Rhode, Mr. Cello

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

The Staff (Mr. Rhode in charge)

Graduate Courses**202. Laboratory Animal Hygiene. (2) I.**

Lecture—2 hours; discussion—1 hour. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Lectures and discussion of the principles of animal facility design, husbandry and legal aspects of laboratory animal care.

Mr. Edward, Mr. Rich, Mr. Kerber, Mr. Bustad

204A. Medicine (3) I.

Lecture—3 hours. Prerequisite: course 103. A study of the medical diseases of domestic animals. The Staff (Mr. Tennant in charge)

204B. Medicine. (4) II.

Lecture—4 hours. Prerequisite: course 204A. A study of the medical diseases of domestic animals. The Staff (Mr. Howarth in charge)

204C. Medicine. (3) III.

Lecture—3 hours. Prerequisite: course 204B. A study of the medical diseases of domestic animals. The Staff (Mr. Hughes in charge)

204D. Medicine. (5) I.

Lecture—5 hours. Prerequisite: course 204C. A study of the medical diseases of domestic animals. The Staff (Mr. Cello in charge)

204E. Medicine. (3) II.

Lecture—3 hours. Prerequisite: course 204D. A study of the medical diseases of domestic animals. The Staff (Mr. Rhode in charge)

204F. Medicine. (3) III.

Lecture—3 hours. Prerequisite: course 204E. A study of the medical diseases of domestic animals. The Staff (Mr. Hjerpe in charge)

210A. Medical Rounds. (1) I.

Discussion—2 hours. Prerequisite: course 103. Discussion of selected cases from the clinic. The Staff (Mr. Holliday in charge)

210B. Medical Rounds. (1) II.

Discussion—2 hours. Prerequisite: course 204A. Discussion of selected cases from the clinic. The Staff (Mr. Fowler in charge)

210C. Medical Rounds. (1) III.

Discussion—2 hours. Prerequisite: course 204B. Discussion of selected cases from the clinic. The Staff (Mr. Cello in charge)

211A. Medical Rounds in Laboratory Animal Medicine. (1) I.

Discussion—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Cases from the campus Experimental Animal Resource Facility as well as the Primate Center and Radiobiology Laboratory will be selected for discussion of history, interpretation of symptoms, treatment and disposition. The Staff (Mr. Edward in charge)

211B. Medical Rounds in Laboratory Animal Medicine. (1) II.

Discussion—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Cases from the campus Experimental Animal Resource Facility as well as the Primate Center and Radiobiology Laboratory will be selected for discussion of history, interpretation of symptoms, treatment and disposition. The Staff (Mr. Edward in charge)

211C. Medical Rounds in Laboratory Animal Medicine. (1) III.

Discussion—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Cases from the campus Experimental Animal Resource Facility as well as the Primate Center and Radiobiology Laboratory will be selected for discussion of history, interpretation of symptoms, treatment and disposition. The Staff (Mr. Edward in charge)

220. Introductory Surgery. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Pathology 122C, Physiological Sciences 140B. Principles of surgery and surgical technique. Mr. Leighton, Miss Wind

221. Large Animal Surgery. (5) II.

Lecture—5 hours. Prerequisite: course 220. Surgical diseases of large animals. Mr. Wheat

222. Small Animal Surgery. (5) III.

Lecture—5 hours. Prerequisite: course 220. Surgical diseases of small animals

Miss Wind, Mr. Leighton

230. Reproduction, Genital Diseases and Obstetrics. (6) I.

Lecture—5 hours; laboratory—3 hours. Prerequisite: Pathology 122C, Physiological Sciences 140B. A course in the diagnosis, treatment, and control of diseases affecting the reproductive organs; the normal and disturbed physiology of reproduction; and obstetrics.

Mr. Kendrick

249. Clinics. (Summer) (2-7).

Diagnosis and treatment of animal diseases. Students are responsible for case records, care of patients, physical examinations, and participation in surgery. Laboratory exercises in restraint, diagnostic and therapeutic procedures and surgical techniques. Completion of 7 units satisfies requirements of 250C.

The Staff (Mr. Cello in charge)

250A. Clinics. (8) I.

Laboratory—24 hours. Prerequisite: courses 204C, 220, 230, 260.

The Staff (Mr. Cello in charge)

COMPARATIVE BIOCHEMISTRY (A Graduate Group)

Jack Preiss, Ph.D., *Chairman of the Group*

Group Office, 578 Hutchison Hall

Graduate Courses

290. Seminar. (1) I, II, III.

Prerequisite: consent of instructor.

Seminar—1 hour.

The Staff

299. Research (1-9) I, II, III.

The Staff

CONSUMER ECONOMICS—See Family and Consumer Sciences

DESIGN—See Family and Consumer Sciences

DRAMATIC ART

Theodore J. Shank, Ph.D., *Chairman of the Department*

Department Office, 220 Dramatic Art

Professor:

Theodore J. Shank, Ph.D.

Associate Professors:

Everard d'Harnoncourt, Ph.D.

Daniel E. Snyder

¹ Alan A. Stambusky, Ph.D.

Assistant Professors:

Gene A. Chesley, M.A.

⁴ Douglas McDermott, Ph.D.

Alfred A. Rossi, Ph.D.

^{2,3} Robert K. Sarlos, Ph.D.

Major Adviser.—Mr. McDermott

¹ Absent on leave, 1967-68.

² Absent on leave, fall quarter 1967.

³ Absent on leave, winter quarter 1968.

⁴ Absent on leave, spring quarter 1968.

Lower Division Courses.—Twenty-four quarter units in Dramatic Art consisting of the following: 10A, 10B, 10C (Principles of Acting); 20 (Introduction to Dramatic Art); 24 (Visual Aspects of Dramatic Art); and 27 (Creative Principles of Dramatic Art).

Upper Division Courses.—Thirty-eight quarter units in Dramatic Art including the following: 124A, 124B, and 124C or 124D (Principles of Theatrical Design); 127A, 127B (Principles of Directing); 158A, 158B, 158C (World Drama); 159 (Contemporary Drama); and 160A, 160B (Principles of Playwriting).

In exceptional cases, with the adviser's consent, the student may petition to substitute up to 8 units from other Dramatic Art courses for any of the above courses.

To qualify for graduation, each major student will be required to pass a comprehensive examination in Dramatic Art, administered during the third quarter of the student's senior year. In some instances, with the adviser's consent, the student may petition to substitute a thesis for part or all of the comprehensive examination. The thesis may be based upon a research project or upon a creative project in acting, design, directing, or playwriting.

In addition each major student is required to participate in departmental dramatic productions.

Teaching Major.—The requirements for the teaching major are the same as for the undergraduate major.

Teaching Minor.—At least 30 quarter units, including Dramatic Art 10A, 20, and 24; and 127A–127B and two courses from the sequence 158A, 158B, 158C, 159. Participation in departmental dramatic productions is recommended.

Subject Representative: Mr. McDermott.

Master of Arts Degree

Graduate Adviser:—Mr. d'Harnoncourt

Candidates who meet the requirements of the Graduate Division and the Department of Dramatic Art will be admitted to graduate studies. After admission, students will be required to complete a background examination in Dramatic Art.

Candidates for the degree must complete the following requirements:

1. At least one graduate course in each of the following groups:

Group A: Dramatic Art 230, 232, 234, 235, 240, 242, 244.

Group B: Dramatic Art 228, 250, 259, 265.

Group C: Dramatic Art 210, 224A, 224B, 227, 260.

Group D: Dramatic Art 280, 299.

2. Graduate students who lack experience in some phase of dramatic production will be given assignments to make up their deficiencies. Beyond this, student participation, while highly encouraged, is voluntary.

3. A reading knowledge of French or German (or another language approved by the Department). Demonstration of the student's ability to apply his knowledge of that language in a graduate course will satisfy the foreign language requirement.

4. The requirements of one of the following plans must be fulfilled:

Plan I

Candidates must complete a minimum of 30 units of upper division and graduate courses in Dramatic Art and allied fields, take an oral examination lasting not less than two hours, and submit a thesis that has been approved by the faculty committee in charge. The thesis may be of either type described below:

The Creative Thesis records an artistic accomplishment involving research and public performance in one of the following areas: Acting, Design, Directing, or Playwriting.

The Research Thesis presents the results of a historical or critical investigation of an important aspect of Dramatic Art.

Plan II

Candidates must complete a minimum of 36 units in Dramatic Art and allied fields, of which at least 18 are in graduate courses, and take a written comprehensive examination not less than nine hours in length.

The University Theatre

Each year the Department of Dramatic Art presents a series of stage productions of outstanding dramas from various periods and countries. These productions are part of the academic program of the Department and serve an important purpose in the study of dramatic art. Participation is open to all students.

Lower Division Courses

10A. Principles of Acting. (4) I, II.

Lecture—2 hours; laboratory—4 hours. The physical and psychological resources for acting; fundamentals of creative mime, improvisation, stage speech and movement. Reading and analysis of selective plays to illustrate principles involved. Field trips included.

Mr. Stambusky, Mr. Rossi

10B. Principles of Acting. (4) II.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 10A. Methods of characterization in the realistic style. Reading and analysis of contemporary plays; theory and practice of acting with emphasis on realistic and naturalistic character analysis and interpretation. Field trips included.

Mr. Stambusky

10C. Principles of Acting. (4) III.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 10A. Methods of characterization in non-realistic styles. Reading and analysis of plays of different types and forms selected from various periods; theory and practice of acting with emphasis on period styles. Field trips included.

Mr. Rossi

15. The Art of the Cinema. (4) I, III.

Lecture—3 hours; laboratory—2 hours. The cinema as an art form; its relation to other arts; its evolution with emphasis on the significant modern contributions.

Mr. d'Harnoncourt

20. Introduction to Dramatic Art. (4) I, III.

Lecture—3 hours; discussion—1 hour. Understanding and appreciation of plays in their cultural contexts. The plays will be selected from the major periods of dramatic art.

Mr. McDermott, Mr. Stambusky

24. Visual Aspects of Dramatic Art. (4) III.

Lecture—3 hours; laboratory—2 hours. Understanding and appreciation of the visual aspects of dramatic art: theatre architecture, scenery, lighting, costume, and makeup.

Mr. Snyder

27. Creative Principles of Dramatic Art. (4) II.

Lecture—4 hours. Understanding and appreciation of both the distinctive and collaborative contributions of playwright, actor, director, and designer to the total work of dramatic art.

Mr. McDermott

30. Theatre Laboratory. (1–5) I, II, III.

Prerequisite: consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to a total of 8 units.

The Staff

Upper Division Courses**110. Advanced Acting. (4) I.**

Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 10B and 10C, and consent of instructor. Advanced theory and practice of acting with emphasis on special problems. Detailed study of the Stanislavski system of acting and other acting theories. Field trips included.

Mr. Rossi

115. Advanced Study of Major Film Makers. (4) II.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 15. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and their application to selected films.

Mr. d'Harnoncourt

124A. Principles of Theatrical Design. (3) I.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24; or consent of instructor. Scene design: drafting methods, working drawings, rendering techniques, scale models, methods and materials of scenery construction.

Mr. Chesley

124B. Principles of Theatrical Design. (4) II.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 124A. Analysis of plays in terms of scene design, elements of design, execution of designs for modern and period plays.

Mr. Snyder

124C. Principles of Theatrical Design. (3) III.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24; or consent of instructor. Theories of lighting the stage, equipment and control systems, execution of lighting plots.

Mr. Chesley

124D. Principles of Theatrical Design. (3) III.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24; or consent of instructor. Source materials for theatrical costuming, selecting fabrics, elements of design, analysis of plays in terms of costume design, execution of designs for modern and period plays.

***125. History of Scene Design and Staging Methods. (4) II.**

Lecture—4 hours. Study of scenic developments from the Renaissance to the present.

Mr. Sarlos

127A. Principles of Directing. (4) I.

Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 10A and 10B. The director's creative approach to the play and to its staging.

Mr. Rossi

127B. Principles of Directing. (2) II.

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 127A. The director's creative approach to the actor.

Mr. Stambusky

150. American Drama. (4) III.

Lecture—4 hours. Selected plays and the history of the theatre from Colonial times to the present.

Mr. McDermott

158A. World Drama. (4) I.

Lecture—4 hours. Selected plays and the history of the theatre from ancient Greece to the Renaissance.

Mr. Sarlos

158B. World Drama. (4) II.

Lecture—4 hours. Selected plays and the history of the theatre from the Renaissance to Romanticism.

Mr. Sarlos

* Not to be given, 1967–68.

158C. World Drama. (4) III.

Lecture—4 hours. Selected plays and the history of the theatre from Romanticism to the end of the nineteenth century. Mr. Sarlos

159. Contemporary Drama. (4) I.

Lecture—4 hours. Twentieth-century European, British, and American plays. Mr. McDermott

160A-160B. Principles of Playwriting. (4-2) I-II.

Lecture—Seminar—4-2 hours. Prerequisite: two courses in Dramatic Art or related courses in other departments. Analysis of dramatic structure; preparation of scenarios; the composition of plays. Mr. Shank

165. Dramatic Theory and Criticism. (4) III.

Lecture—Seminar—4 hours. Changing concepts of drama from Aristotle to the present. Mr. McDermott

180. Theatre Laboratory. (1-5) I, II, III.

Prerequisite: upper division standing and consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to a total of 8 units. The Staff

198. Directed Group Study. (1-4) I, II, III.

Lecture—1-4 hours. Prerequisite: consent of instructor. The Staff

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

Prerequisite: consent of instructor. The Staff

Graduate Courses**210. Special Problems in Advanced Acting. (4) II.**

Seminar—2 hours; laboratory—2 hours. Study of specialized advanced-acting problems arising from differences in the type and style of dramatic production as they relate to the history, theory, and practice of acting through the ages. Mr. Stambusky

224A. Advanced Principles and Theories of**Theatrical Design. (4) I.**

Seminar—3 hours. Selected problems in the visual and auditory aspects of theatrical production. Mr. Snyder

224B. Advanced Principles and Theories of**Theatrical Design. (4) II.**

Seminar—3 hours. Selected problems in the design of stage scenery and costumes; practice in design. Mr. Chesley

227. Advanced Directing. (4) III.

Seminar—2 hours; laboratory—2 hours. Advanced directing techniques; specialized pro-

cedures in styles of drama. Projects in directing scenes from dramas of different types and periods. Mr. Stambusky

228. Seminar in Directing. (4) II.

Seminar—3 hours. Prerequisite: course 227; or consent of instructor. Development of directorial conceptions for hypothetical contemporary productions of classical and modern plays. Mr. Rossi

230. Greek and Roman Theatre. (4) I.

Seminar—3 hours. The classical theatre, with emphasis on the relationship of the dramas of the period to the physical circumstances under which they were produced. Mr. Sarlos

***232. Medieval Theatre. (4) III.**

Seminar—3 hours. The theatre and drama of the Middle Ages; the significant liturgical and secular influences upon the evolution of dramatic art from the fall of the Roman Empire to the Renaissance. Offered in even-numbered years. Mr. Stambusky

***234. Theatre of the Italian Renaissance. (4) II.**

Seminar—3 hours. The Italian theatre after the rediscovery of classical antiquity, with emphasis on courtly spectacles and the emergence of a theatrical tradition characterized by proscenium arch, unified perspective setting, and changeable scenery. Offered in odd-numbered years. Mr. Sarlos

235. Elizabethan-Jacobean Theatre. (4) II.

Seminar—3 hours. The theatre under the Tudors and Stuarts, with emphasis on the dominant dramatic and theatrical traditions and the relationship between the plays and the physical circumstances under which they were performed. Mr. Sarlos

***240. French Seventeenth-Century Theatre. (4) I.**

Seminar—3 hours. The theatre under Louis XIII and Louis XIV. The manifestation of the classical ideal. Special study of the dramatic productions of plays by Corneille, Racine, and Molière. Offered in even-numbered years. Mr. d'Harnoncourt

242. English Restoration and Eighteenth Century**Theatre. (4) I.**

Seminar—3 hours. The history of the British theatre in its attempt to accommodate such changes as the rise of sentiment in the drama, the dominance of the middle-class in the audience, and the introduction of changeable scenery. Offered in odd-numbered years. Mr. McDermott

244. The European Theatre of the Eighteenth and Nineteenth Centuries. (4) III.

Seminar—3 hours. The development of such dramatic genres as domestic tragedy and melo-

* Not to be given, 1967-68.

drama, and the corresponding rise of scenic illusion, with the culmination of these trends in romanticism and realism. Mr. McDermott

*250. Realism in the Contemporary Theatre. (4) I.

Seminar—3 hours. The realistic drama in its theatrical context. Mr. Sarlos

259. Contemporary Nonrealistic Trends in the Theatre. (4) III.

Seminar—3 hours. Nonrealistic drama in the twentieth century and related movements in the theatre. Mr. d'Harnoncourt

260. Advanced Playwriting. (4) III.

Seminar—3 hours. Dramatic structure, character, and dialogue. Advanced projects in playwriting. Mr. Shank

265. Theory of Dramatic Art. (4) I.

Seminar—3 hours. Theory and aesthetic principles of dramatic art as a fine art.

Mr. McDermott

280. Theatre Laboratory. (1-12) I, II, III.

Advanced practice in acting, design, directing, playwriting, and technical theatre.

The Staff

298. Group Study. (1-4) I, II, III.

Seminar—1-3 hours. Prerequisite: consent of instructor.

The Staff

299. Individual Study. (1-12) I, II, III.

The Staff

ECONOMICS

¹Frank C. Child, Ph.D., *Chairman of the Department*

Department Office, 378 Voorhies Hall

Professors:

Frank C. Child, Ph.D.
Bruce Glassburner, Ph.D.
Thomas Mayer, Ph.D.

Associate Professors:

Andrzej Brzeski, Ph.D.
Tsung-yuen Shen, Ph.D.
Elias H. Tuma, Ph.D.
Henry Y. Wan, Jr., Ph.D.

Assistant Professors:

W. Eric Gustafson, Ph.D.
Hiromitsu Kaneda, Ph.D.
Martin P. Oettinger, Ph.D.
Norman Schneider, Ph.D.
Leon L. Wegge, Ph.D.

◇ ◇ ◇

Assistant Professor:

Charles Schotta, Jr., M.A. (Acting)

Departmental Major Advisers.—Mr. Brzeski, Mr. Kaneda, Mr. Shen, Mr. Schneider, Mr. Schotta, Mr. Tuma, Mr. Gustafson, Mr. Wan, Mr. Oettinger, Mr. Wegge.

Graduate Adviser.—Mr. Wan, Mr. Glassburner.

Economics

The Major Program

Lower Division Courses.—Required: Economics 1A, 1B, and 9 additional units in social sciences; Economics 12; at least a C average in these courses. Students planning to major in economics should complete these courses by the end of the sophomore year.

^o Not to be given, 1967-68.

¹ Absent on leave, 1967-68.

Students considering graduate study in economics or business are strongly urged to take Mathematics 15, 16A, and 16B.

Upper Division Courses.—Required: A total of 36 units of economics including (1) Economics 100A, 100B, 101A, 101B; (2) either Economics 110 or 111; and (3) one of the following sequences of courses: 110 or 111; 116, 117; 121A, 121B; 130A, 130B; 135A, 135B, 135C; 150A, 150B; 160, 161.

It is recommended that Economics 100A, 100B, 101A, and 101B be taken during the junior year; 101A and 101B may be taken before, concurrently with, or prior to 100A or 100B. Except under extraordinary circumstances, not more than three economics courses may be taken in any one quarter.

Graduate Study.—Students who meet the admission requirements of the Graduate Division and the Department of Economics may pursue studies leading to the M.A. and Ph.D. degrees. Fields of emphasis for graduate study include: Economic Theory, Monetary Economics, Economic Development, Economic History, International Economics, Labor Economics, Industrial Organization, Economic Systems, Public Finance, Mathematical Economics, and Quantitative Methods (Econometrics).

For information about admission to graduate study, degree requirements, and financial aid, students should consult the *Announcement of the Graduate Division* and contact the Department's Graduate Adviser.

Teaching Major and Minor.—Economics is acceptable for the secondary credential.

Teaching Major.—Same as for the undergraduate major for the A.B. degree.

Teaching Minor.—Thirty units in economics

including Economics 1A, 1B, and 12. The student should consult with the subject representative.

Subject Representative: Mr. Brzeski.

Lower Division Courses

1A. Principles of Economics. (5) I, II, III.

Lecture—3 hours; discussion—2 hours. Prerequisite: courses 1A and 1B may be taken in either order. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems.

The Staff

1B. Principles of Economics. (5) I, II, III.

Lecture—3 hours; discussion—2 hours. Prerequisite: courses 1A and 1B may be taken in either order. Analysis of the economy as a whole: determinants of the level of income, employment, and prices; money and banking, economic fluctuations, international trade, economic development; the role of public policy.

The Staff

11A. Elementary Accounting. (4) I.

Lecture—3 hours; laboratory—2 hours. The history and basic concepts of accounting; the ledger, journals, income statement, and the balance sheet; inventory valuation; depreciation; introduction to cost accounting; analysis of financial statements; social accounting.

Mr. Oettinger

11B. Elementary Accounting. (3) II.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 11A. Continuation of course 11A.

Mr. Oettinger

12. Introduction to Quantitative Methods in Economics. (5) I, III.

Lecture—4 hours; laboratory—2 hours. Prerequisite: two years of high school algebra. Not open to students having credit for Mathematics 13 or Psychology 3. Methods of analyzing quantitative economic data including descriptive statistics; sampling and statistical inference, index numbers, correlation, and time series. Emphasis on the logic of procedures, interpretation, and application.

Mr. Brzeski, Mr. Gustafson

Upper Division Courses

100A. Micro Theory: Welfare and Competition. (3)

I, II.

Lecture—3 hours. Prerequisite: courses 1A and 1B; or consent of instructor. Price and distribution theory; the firm and the industry under conditions of perfect competition; welfare economics.

The Staff

100B. Micro Theory: Imperfect Competition. (3)

II, III.

Lecture—3 hours. Prerequisite: course 100A. Price and distribution theory; the firm and the

industry under conditions of monopoly, imperfect competition, and bilateral monopoly; economic welfare considerations.

The Staff

101A. Macro Theory: Statics. (3) I, III.

Lecture—3 hours. Prerequisite: courses 1A and 1B; or consent of instructor. Theory of income, employment, and prices under static conditions.

The Staff

101B. Macro Theory: Dynamics. (4) I, II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 12 and 101A. Theory of income, employment, and prices under dynamic conditions; analysis of economic fluctuations and growth.

The Staff

102. Advanced Economic Theory. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A and one course in calculus. Mathematical analysis in economic theory; determinants of the aggregate level of output and employment and the allocation of resources. Includes advanced value and distribution theory and a brief examination of modern monetary theory.

105. History of Economic Thought. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. Historical survey of economic doctrine: the Classical School and its antecedents, Neoclassical thought, criticism of classical thought, emergence of modern economic thought.

Mr. Glassburner, Mr. Shen

110. Economic History. (4) I.

Lecture—4 hours. Prerequisite: courses 1A and 1B or consent of the instructor. Survey of economic change in Europe beginning with the middle ages; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development.

Mr. Tuma

111. Economic History. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B or consent of the instructor. Survey of economic change in the United States beginning with the Colonial Period; reference to other regions of the Western Hemisphere; implications for contemporary economic problems.

115. Economic Development. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. Theories of economic development and underdevelopment, economic policy for growth and development.

Mr. Glassburner, Mr. Shen

116. Economic Systems. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of

instructor. Critical examination of major economic systems, their goals and institutions; capitalism, fascism, and varieties of socialism; problems of economic planning in USSR, India, China, and other industrializing economies.

Mr. Brzeski

117. The Soviet Economy. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. Survey of Soviet economic development: economic organization, methods of planning, and performance.

Mr. Brzeski

121A. Industrial Organization. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. An appraisal of the role of competition and monopoly in the American economy; market structure, conduct, and economic performance of a variety of industries.

Mr. Schneider

121B. Industrial Organization. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Public policy in a private enterprise economy; antitrust and other policies toward industry; economies of regulated industries.

Mr. Schneider

125. Urban Economics. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B. The structure of the metropolitan economy. The process of urban economic growth. Major problems such as: urban poverty and decay, housing, transportation, land-use planning and financing public services.

Mr. Schneider

130A-130B. Economics of the Public Sector. (4-4)

II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. Impact of the public sector on income, employment, prices, allocation of resources, and distribution of income; related topics such as the budgetary process, public debt, revenue and expenditure problems, fiscal institutions.

Mr. Schotta

134. Corporation Finance. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A and 1B; or consent of instructor. The corporation as a form of business organization; promotion, organization, operation, expansion, consolidation, failure, and reorganization; the capital market, financial instruments, and institutions; security markets.

135A. Money, Income, and Monetary Policy. (3) I.

Lecture—3 hours. Prerequisite: courses 1A and 1B; or consent of instructor. Monetary insti-

tutions, the banking system, money creation, the Federal Reserve System, the tools of monetary policy.

Mr. Mayer

135B. Money, Income, and Monetary Policy. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 101A and 135A. Monetary theory; the impact of changes in the quantity of money and of liquid assets on money income.

Mr. Mayer

135C. Money, Income, and Monetary Policy. (3) III.

Lecture—3 hours. Prerequisite: course 135B. Evaluation of monetary policy, its impact on the economy and past performance, the problem of inflation.

Mr. Mayer

150A. Labor Economics. (5) II.

Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. Historical analysis of worker organization and of trade union philosophy and practice; theoretical exploration of basic influences affecting real wages and employment; examination of relevant statistical records; wage structure and wage level problems; union-management relations and the national economy.

Mr. Oettinger

150B. Labor Economics. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. Labor law and legislation and their economic impact; collective bargaining and economic conflict; economic impact of laws regulating minimum wages, hour of work, and other labor standards; government intervention in collective bargaining and dispute settlement.

Mr. Oettinger

160. International Trade. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. International trade theory: impact of trade on the domestic and the world economies; public policy toward external trade. Mr. Kaneda

161. International Finance. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. International money and capital markets and their impact on the domestic and world economies; international financial institutions and policies. Mr. Kaneda

190. Senior Seminar. (5) III.

Seminar—4 hours. Prerequisite: senior standing, open only to economics majors. Selected topics in economic analysis and public policy.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**200A. Economic Theory. (3) I.**

Lecture—3 hours. Price and value theory; behavior of firms and households under competitive conditions; price determination, resource allocation, and income distribution; fundamentals of welfare economics. Mr. Child

200B. Economic Theory. (3) II.

Lecture—3 hours. Prerequisite: course 200A. A continuation of course 200A with reference to noncompetitive conditions. Mr. Child

200C. Economic Theory. (3) III.

Lecture—3 hours. Macrostatic theory of income, employment, and prices. —

200D. Economic Theory. (3) I.

Lecture—3 hours. Prerequisite: course 200C. Macrodynamic theory of income, employment, and prices. —

201. History of Economic Thought. (4) III.

Lecture—3 hours; discussion—1 hour. Development of economic thought from classical Greece to modern times.

Mr. Glassburner, Mr. Shen

203A. Advanced Economic Theory. (4) II.

Seminar—4 hours. Prerequisite: course 200B. Advanced topics in the theory of the firm; distribution theory; welfare economics.

Mr. Wan

203B. Advanced Economic Theory. (4) III.

Prerequisite: courses 200B and 200C. General equilibrium theory; capital theory; growth theory. Mr. Wan

207. Special Topics in Mathematical Economics.

(4) II.

Seminar—3 hours. Prerequisite: courses 203A and 203B or consent of instructor. Advanced topics in mathematical economics. Contents may vary from one year to another. Mr. Wan

210A. Economic History. (4) I.

Seminar—3 hours. Method and theory of economic history. Critical analysis of the methodology of economic history and theories of economic change as illustrated by major economic phenomena drawn from the history of different countries. Mr. Tuma

210B. Economic History. (3) II.

Lecture-discussion—3 hours. Prerequisite: course 210A. Problems in economic history of the eastern hemisphere from the beginning of the Middle Ages up to the end of the eighteenth century; emphasis on Europe. Mr. Tuma

210C. Economic History. (3) II.

Lecture-discussion—3 hours. Prerequisite: course 210A. Problems in economic history of

the eastern hemisphere since the eighteenth century; emphasis on England, France, and Germany. Mr. Tuma

210D. Economic History. (3) III.

Lecture-discussion—3 hours. Prerequisite: course 210A. Problems in economic history of the western hemisphere since the eighteenth century; emphasis on United States. Mr. Tuma

215A—215B. Economic Development. (4—4) I, II.

Lecture—3 hours; discussion—1 hour. Theories of economic development, policies for growth, problems from selected areas.

Mr. Glassburner, Mr. Shen

216. Economic Systems. (4) I.

Lecture—4 hours. Comparative study of economic systems, with reference to their organization and institutions, their values and goals, and their economic performance. Mr. Brzeski

217. Economics of Planning. (4) III.

Lecture—4 hours. Theories and principles of economic planning under various economic systems.

Mr. Brzeski

218. Development Programming. (4) III.

Seminar—3 hours. Prerequisite: courses 215B and 217; Mathematics 15 and 16B. Analytical formulation of growth and development goals including the optimal growth models; problems and practices in implementing such development policies.

Mr. Shen

221A. Industrial Organization. (4) II.

Lecture—2 hours; seminar—2 hours. Analysis of market structure, business behavior, and economic performance under conditions of limited government interference. Mr. Schneider

221B. Industrial Organization. (4) III.

Lecture—2 hours; seminar—2 hours. Prerequisite: course 221A. Social standards and public policies toward the business sector of the economy.

Mr. Schneider

230. Public Finance. (4) II.

Lecture—2 hours; seminar—2 hours. Role of the public sector; tax and expenditure theories; related topics.

Mr. Schotta

231. Problems of the Public Sector. (4) III.

Lecture—2 hours; seminar—2 hours. Prerequisite: course 230. Public sector institutions, problems, and policies.

Mr. Schotta

235A—235B—235C. Monetary Economics. (3—3—3)

I, II, III.

Lecture—3 hours. Monetary theory, policy, and problems.

Mr. Mayer

240A. Econometrics: Principles. (4) III.

Lecture-discussion—4 hours. Prerequisites: Mathematics 15 and 131B. General linear model, auto-correlation, multicollinearity, heteroscedasticity. Simultaneous equation problems.

240B. Econometrics: Advanced Topics. (3) I.

Lecture-discussion—3 hours. Prerequisite: course 240A. Special problems in the theory and the applications of econometrics.

250A. Labor Economics. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 150A and 150B. Philosophy and theory of the labor movement; union structure and organization under changing labor market conditions; labor market issues.

Mr. Oettinger

EDUCATION*Chairman of the Department*

Department Office, 228 Voorhies Hall

Professor:

Hugh C. Black, Ph.D.

Associate Professor:

Julius M. Sassenrath, Ph.D.

Assistant Professors:

V. Kenneth Shrable, Ph.D.

Leroy F. Troutner, Ph.D.

George D. Yonge, Ph.D.

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Lecturers in and Supervisors of Teacher Education:

Dorothy S. Blackmore, Ed.D. (*Associate Head of Teacher Education*)

Julie Eghoian, M.A.

Larry D. Estes, M.A.

Robert E. Hapworth, M.A.

Ross Hempstead, M.A.

Burt Liebert, M.F.A.

Walter T. Mara, M.S.

Douglas L. Minnis, Ed.D. (*Head of Teacher Education*)

Shirley J. Skinner, M.A.

Credentials Counselors:

Elementary.—Mrs. Blackmore, Miss Eghoian, Mr. Hapworth, Mr. Hempstead, Mrs. Skinner.

Secondary.—Mr. Estes, Mr. Mara, Mr. Liebert.

Junior College.—Mr. Mara.

Curricula for Teacher Education.—See page 130. For a statement of complete requirements and appointments with credential counselors, apply to the departmental office. Applicants for the intern program should consult the depart-

250B. Labor Economics. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 150A and 150B. Theory of the labor market; analysis of wage-employment, wage-investment, and wage-price relationships.

Mr. Oettinger

260A. International Economics. (4) I.

Lecture—3 hours; discussion—1 hour. Economic structure and factors that underlie international trade; policies for regulating external trade.

Mr. Kaneda

260B. International Economics. (4) II.

Lecture—3 hours; discussion—1 hour. Significance of international transactions for the national income; international monetary mechanisms.

Mr. Kaneda

299. Individual Study. (1-6) I, II, III.

The Staff

ment early in the fall quarter of the senior year.

Required courses in the "Professional Preparation" part of the requirements:

For Secondary Teaching: courses 320A (for student teachers, as early as junior year; for interns, spring quarter of senior year), 110, 120, 320C, and 320E.

For Elementary Teaching: courses 330A, 110, 120, 300, 302, 303, 330C, and 330E.

Upper Division Courses**110. Introduction to Educational Psychology. (4) I, II, III.**

Lecture—4 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.

Mr. Sassenrath, Mr. Shrable, Mr. Yonge

***114. Quantitative Methods in Educational Research. (4) II.**

Lecture—2 hours; discussion—2 hours. Prerequisite: two years of high school algebra. Problems and methods in data analysis. Design of research projects. Emphasis will be on procedures suited to digital computers.

Mr. Mara

***119. Tests and Measurements. (4) II.**

Lecture—4 hours. Prerequisite: course 110 (may be taken concurrently). A critical survey of teacher-made and standardized tests; principles and functions of measurement in education, current practices in school marks; supervised work in test administration, scoring, and interpretation.

Mr. Yonge

* Not to be given, 1967-68.

120. Educational Sociology. (4) I, II, III.

Lecture—4 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. Mr. Black, Mr. Troutner

***163. Guidance and Counseling. (4) III.**

Lecture—4 hours. Prerequisite: course 110 (may be taken concurrently). Nature and scope of pupil personnel services; basic tools and techniques of guidance; theory and practice of counseling psychology, with emphasis on educational and vocational adjustment. Mr. Shrable

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Graduate Courses***201. History and Philosophy of Education—****Ancient Period. (4) I.**

Lecture—2 hours; seminar—2 hours. The scope, influence, and significance of the major educational ideas from selected ancient societies and cultures with emphasis upon the historical and philosophical contexts.

202. History and Philosophy of Education—*Middle Period. (4) II.**

Lecture—2 hours; seminar—2 hours. The scope, influence, and significance of the major educational ideas from selected societies and cultures of the middle period (through the 18th century) with emphasis upon the historical and philosophical contexts.

203. History and Philosophy of Education—*Modern Period. (4) III.**

Lecture—2 hours; discussion—2 hours. A critical analysis and study of the contemporary educational scene from the historical and philosophical perspectives. Mr. Troutner

***210. Learning and Instruction. (3) I.**

Seminar—3 hours. Prerequisite: course 110 or equivalent and consent of instructor. Critical readings and seminar reports of selected problems and procedures in the experimental study of learning and instruction. Mr. Sassenrath

***211. Thinking and Problem Solving. (3) II.**

Seminar—3 hours. Prerequisite: course 110 or equivalent and consent of instructor. Critical consideration of thinking with special reference to concept development, problem-solving, home, school, and personality influences. Mr. Yonge

***219. Advanced Educational Measurement. (3) III.**

Seminar—3 hours. Prerequisite: course 119 or equivalent and consent of instructor. Critical

study and evaluation of an advanced level of measurement procedures used in educational research, including such topics as test theory, item analysis, and factor analysis. Mr. Sassenrath

***290. Seminar. (3) I, II, III.**

Seminar—3 hours.

***299. Research. (1-6) I, II, III.**

The Staff

Professional Courses**300. Language Arts in the Elementary School. (3)**

I, II, III.

Lecture—3 hours. Prerequisite: consent of instructor. Principles, procedures, and curricular materials for developing oral and written language skills. Mrs. Blackmore, Mrs. Skinner

302. Elementary School Curriculum—Social Studies.

(2) II.

Lecture—2 hours. Current conceptions of the elementary school curriculum, with emphasis on the contributions from the social sciences and on effective teaching methods. Mr. Minnis

303. Elementary School Curriculum—Science. (2) III.

Lecture—2 hours. Current conceptions of the elementary school curriculum with emphasis on the role of science and on effective teaching methods.

Mr. Hapworth

***320A. Introduction to Teaching in Secondary Schools. (2) I, II, III.**

Lecture—1 hour; discussion—1 hour. Lectures, conferences, and field work in secondary teaching. Observations and participation in some form of public school work.

Mr. Estes, Mr. Mara, Mr. Minnis

***††320C. Supervised Teaching in Secondary Schools. (4-12) I, II, III.**

Prerequisite: course 320A; course 320E must be taken concurrently. Directed teaching for candidates for the secondary credential. May be repeated for credit up to a total of 12 units.

The Staff

††320E. Methods of Teaching in Secondary Schools. (2) I, II, III.

Lecture—2 hours. Prerequisite: course 320A; course 320C must be taken concurrently.

^a Not to be given, 1967-68.

^{††} Open only to interns and student teachers. These 300 series courses are scheduled as extra-session courses, to begin with the opening of the public schools and to end with the closing of the second semester in the public schools. Thus teaching assignments in the fall quarter, 1967, will begin on or about September 5. For the spring quarter, they will end on or about June 7. Students should make arrangements accordingly.

^b Students must make their own transportation arrangements for observations and student teaching.

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. May be repeated for credit up to a total of 4 units.

The Staff

***330A. Introduction to Teaching in Elementary Schools. (2) I, II, III.**

Lecture—1 hour; discussion—1 hour. Lectures, conferences, and field work; observation and participation in classroom activities in the public elementary schools. Mrs. Blackmore

***††330C. Supervised Teaching in Elementary Schools. (4-12) I, II, III.**

Prerequisite: course 330E must be taken concurrently. Directed teaching for candidates for the elementary credential.

The Staff

ENGINEERING

Roy Bainer, M.S., *Dean of the College*
College Office, 2132 Engineering I

Lower Division Courses

1. Plane Surveying. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: plane trigonometry. Not open to students in Engineering. Principles of measurement of horizontal distances, horizontal angles, elevations and leveling, including stadia methods. Field problems, including mapping with special reference to agricultural and landscaping applications.

Mr. Schertz

3A. Introduction to Engineering Measurements.

(2) I, III.

Lecture—1 hour; laboratory—3 hours. No credit given to students who have received credit for course 1. Introduction to and the analysis of systematic, random, probable, and maximum errors; the precision of measurements as applied to elementary plane surveying problems using the surveyor's steel tape, engineer's level, level rod, transit, and stadia board.

Mr. Goss

3B. Introduction to Engineering Measurements.

(2) I, II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Mathematics 1A (may be taken concurrently). Elementary problems in engineering measurement, instrumentation, and data analysis applied to temperature, fluid flow, micro-distance, electrical, and other physical quantities; engine power and concrete strength tests.

Mr. Goss

††330E. Methods of Teaching in Elementary Schools. (1-2) I, II, III.

Lecture—1-2 hours. Prerequisite: course 330C must be taken concurrently. Selection, organization, and evaluation of teaching materials including audio-visual aids. May be repeated for credit up to a total of 3 units.

The Staff

***††340. Supervised Teaching in Junior Colleges. (5) I, II, III.**

Discussion—1 hour. Prerequisite: consent of instructor. Directed teaching for candidates for the standard teaching credential with specialization in junior college teaching.

The Staff

341. Teaching in the Junior College. (3) II.

Lecture—3 hours. Prerequisite: consent of instructor. The junior college: organization and functions, role in higher education, characteristics of students, trends and issues in curricula, instructional procedures and materials.

Mr. Mara

4. Engineering Geometry. (3) I, II, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: mechanical drawing; Mathematics 1A (may be taken concurrently). Principles of descriptive geometry and of mechanical and free-hand drawing; their application in the representation, visualization and solution of engineering problems. Introduction to engineering design.

Mr. J. M. Henderson

5. Engineering Applications of Computers.

(2) I, II.

Laboratory—6 hours. Prerequisite: Mathematics 1B (may be taken concurrently). Operation of electronic analog computers and their application to the solution of simple engineering problems. Programming digital computers; the FORTRAN language; applications of the computer to both numerical and non-numerical problems.

Mr. Loomis

35. Statics. (3) I, II, III.

Lecture—3 hours. Prerequisite: Mathematics 1C; Physics 4A. Force systems and equilibrium conditions with emphasis on engineering problems.

The Staff (Mr. Herrmann in charge)

^o Students must make their own transportation arrangements for observations and student teaching.

^{††} Open only to interns and student teachers. These 300 series courses begin and end with the public schools. Teaching assignments in the fall quarter, 1967, will begin on or about September 5.

45. Properties of Materials. (4) I, II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: sophomore standing in engineering. An introductory course on the properties of engineering materials and their relation to the internal structure of the materials.

Mr. Mukherjee, Mr. Moon

Upper Division Courses**100. Electronics. (2) I, II, III.**

Lecture—2 hours. Prerequisite: course 107 (may be taken concurrently). Characteristics of vacuum and semiconductor devices; graphical analysis and the development of small signal equivalent circuits.

Mr. LaPatra, Mr. Hsia

101. Electrical Laboratory. (2) I, II, III.

Laboratory—6 hours. Prerequisite: course 107 (may be taken concurrently). Laboratory use of basic electronic devices and measuring instruments. Problem topics include passive and active circuits, electromechanical devices, signal analysis, and nonlinear components.

Mr. Owen

102A. Dynamics. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 35, Mathematics 2C. Kinematics and kinetics of particles, of systems of particles, and of rigid bodies applied to engineering problems.

Mr. J. M. Henderson

102B. Dynamics. (3) II, III.

Lecture—3 hours. Prerequisite: course 102A. Topics in rigid body dynamics; elementary dynamics of vibrating systems; introduction to energy methods.

Mr. J. M. Henderson

103A. Elementary Fluid Mechanics. (3) I, II.

Lecture—3 hours. Prerequisite: course 102A. Fluid properties; fluid statics; continuity and linear momentum equations for control volumes; flow of incompressible fluids in pipes; dimensional analysis; laminar, transition, and turbulent flow regimes.

103B. Elementary Fluid Mechanics. (3) II, III.

Lecture—3 hours. Prerequisite: course 103A. Potential flow; open channel flow; boundary layer flow; one dimensional compressible flow.

104A. Mechanics of Materials. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 35; Mathematics 2C (may be taken concurrently) or equivalent. Concepts of stress, strain, elasticity; stress and deformation analysis for axially loaded members, torsion of round shafts, bending and shear of beams; combined stresses.

The Staff (Mr. Herrmann in charge)

104B. Mechanics of Materials. (3) II, III.

Lecture—3 hours. Prerequisite: course 104A. Beams: unsymmetrical loading, shear center, in-

determinate problems, inelastic bending, buckling and lateral instability. Energy methods; failure theories; torsion of thin-walled sections.

The Staff (Mr. Herrmann in charge)

105A. Thermodynamics. (3) I, II, III.

Lecture—3 hours. Prerequisite: Mathematics 2C. Equations of state and thermodynamics of one-component systems; first and second laws.

Mr. Giedt

105B. Thermodynamics. (3) II, III.

Lecture—3 hours. Prerequisite: course 105A. Gas mixtures; work-producing and work-absorbing cycles (vapor and gas); measures of performance. Recent developments.

Mr. Giedt

106. Engineering Economics. (3) I, II.

Lecture—3 hours. Prerequisite: senior standing in engineering. The analysis of problems in engineering economy; the selection of alternatives; replacement decisions. Compounding, tax, origins and cost of capital, economic life, and risk and uncertainty are applied to methods of selecting most economic alternatives.

107. Circuits. (3) I, II, III.

Lecture—3 hours. Prerequisite: Mathematics 2C (may be taken concurrently), or equivalent; Physics 4C. Basic circuit analysis techniques; transient and steady-state solutions using differential equations.

Mr. Algazi, Mr. Loomis

122. Introduction to Mechanical Vibrations. (3) I.

Lecture—3 hours. Prerequisite: course 102B. Free and forced vibrations in lumped-parameter systems with and without damping; vibrations in coupled systems; electromechanical analogs; use of energy conservation principles.

Mr. Kemper

180. Engineering Analysis. (3) I.

Lecture—3 hours. Prerequisite: senior standing in engineering. The analysis of steady-state and nonsteady-state problems for discrete and continuous systems; analytic and approximate solutions. Typical engineering problems in heat transfer, fluid mechanics, electrical networks, mechanical vibrations, and elasticity.

Mr. McKillop

183. Intermediate Mechanics of Materials. (3) I, II.

Lecture—3 hours. Prerequisite: course 104B. Stresses and deformations of curved beams; beams on elastic foundations; torsion of non-circular bars; introduction to plates and shells; thick-walled cylinders.

Mr. Hutchinson

184. Experimental Stress Analysis. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 104B. Experimental methods for the analysis of stress and strain, including photoelasticity, brittle lacquers, mechanical and electrical strain gages and instrumentation.

Mr. Beadle

185. Heat Transfer. (3) I, III.

Lecture—3 hours. Prerequisite: course 103B and 105A. Fundamental concepts of heat transfer; conduction, radiation, and convection.

Mr. Whitaker

186. Intermediate Heat Transfer. (3) II.

Lecture—3 hours. Prerequisite: course 185. Transient and steady-state heat conduction. Intermediate problems in free and forced convection. Boiling and evaporative cooling.

Mr. McKillop

187. Introduction to Theory of Elasticity. (3) I, III.

Lecture—3 hours. Prerequisite: course 183. Fundamental equations in three dimensions; plane stress and plane strain; flexure and torsion of bars of various shapes.

Mr. Hutchinson

188. Physical Metallurgy Principles. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 4E, courses 45, 105 and

Mr. Mukherjee

senior standing in Engineering. The physical principles in metallurgy are outlined. The elementary theory of metals, rate of approach to equilibrium, thermal behavior of metals, structure and free energy of alloy phases, diffusion phenomenon and strengthening mechanisms in solids are discussed.

Mr. Mukherjee

ENGINEERING: AGRICULTURAL—See also Agricultural Engineering**ENGINEERING: AGRICULTURAL**

Coby Lorenzen, M.S., *Chairman of the Department*

Department Office, 2030 Engineering I

Professors:

John R. Goss, M.S.
Samuel A. Hart, Ph.D.
S. Milton Henderson, M.S.
Robert A. Kepner, B.S.
Coby Lorenzen, M.S.
Loren W. Neubauer, Ph.D.

Associate Professors:

William J. Chancellor, Ph.D.
Robert B. Fridley, M.S.

Assistant Professors:

Stanton R. Morrison, Ph.D.
Errol D. Rodda, Ph.D.
Cletus E. Schertz, Ph.D.

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Lecturers:

Roger E. Garrett, M.S.
Joe P. Gentry, M.S.

Upper Division Courses**114. Principles of Farm Machinery. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 102B. Functional requirements, basic principles, and performance characteristics of field machines; cost analysis; general design considerations; laboratory studies and tests with specific machines.

Mr. Kepner

116. Agricultural Power. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 105B. Sources and systems for supplying energy to agricultural operations: internal combustion engines; fuels; electric power; solar energy; power transmission systems; muscle physiology; traction and vehicle mechanics; implement control systems.

Mr. Chancellor

117. Developing and Evaluating Farm Machines.

(3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 114; Mechanical Engineering 118. Design procedures; effects of biological factors, labor requirements, crop values, and annual use upon the design approach; designing a production unit; hydraulic controls and power transmission in farm machines; testing and evaluating machine performance and durability.

Mr. Gentry

118. Development Engineering. (2) III.

Lecture—2 hours. Prerequisite: Mechanical Engineering 118 (may be taken concurrently). Failure modes; determination of the causes of systems malfunction by analysis of interactions and variations in effects; experiment design; development procedures.

Mr. Garrett

125. Agricultural Structures and Sanitation. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 35 and 104A. Functional and material requirements of storage and pro-

duction structures; lighting, heating, insulating, and ventilating; water supply and sanitation for the farm home and for animal structures; methods and economics of farm waste disposal.

Mr. Neubauer

126. Design of Agricultural Structures. (3) III.

Lecture—3 hours. Prerequisite: course 125; Civil Engineering 131A. Agricultural building loads and codes; design with steel, concrete, and timber; glued-laminated and plywood box beams; pole buildings and connections; lumber rigid frames; arches.

Mr. Rodda

132. Unit Operations in Agricultural Processing. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103B and 105B. Thermodynamic and mass transfer principles applied to such processes as drying, dehydration, refrigeration, size reduction, separation, and materials handling.

Mr. Henderson

141. Engineering Properties of Agricultural Materials. (3) I.

Lecture—2 hours; laboratory—3 hours. Selected topics, with emphasis on mechanical and rheological properties and design applications. Techniques for measuring and recording static and dynamic properties.

Mr. Fridley

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of the instructor.

The Staff

199. Special Study for Advanced Undergraduates. (1–5) I, II, III.

The Staff

Graduate Courses

215. Soil-Machine Relations in Tillage and Traction. (2) II.

Lecture—2 hours. Prerequisite: courses 114 and 116 (may be taken concurrently); Civil Engineering 133A. Recommended: Soil and Water Science 101. Mechanics of interactions between agricultural soils and tillage and traction devices; determination of relevant physical properties of soil; analyses of stresses and strains in soil due to machine-applied loads; experimental and analytical methods for synthesizing characteristics of overall systems.

Mr. Chancellor

ENGINEERING: APPLIED SCIENCE

Albert J. Kirschbaum, Ph.D., *Chairman of the Department*

Wilson K. Talley, Ph.D., *Vice-Chairman of the Department*

Department Office, 228 Walker

Professors:

Stewart D. Bloom, Ph.D.

Edward Teller, Ph.D.

225. Advanced Agricultural Structures Design. (3) II.

Lecture—3 hours. Prerequisite: course 126. Recommended: Civil Engineering 132B and 132C. Critical evaluation of codes as applied to agricultural structures; safe design criteria, load sharing, and statistical reliability concepts; computer analysis of indeterminate wood structures; stressed skin construction; ultimate strength design in reinforced concrete; applications of new materials and methods.

Mr. Rodda

235. Advanced Unit Operations in Agricultural Processing. (2) II.

Lecture—2 hours. Prerequisite: course 132 or equivalent. Basic engineering procedures applicable to agricultural processing; e.g., size reduction, fluidization of granular particles, heat and mass transfer applications to drying and freezing, respiration of bio-materials.

Mr. Henderson

245. Agricultural Waste Management. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 125, Civil Engineering 148. The wastes problem peculiar to agriculture; types of rural and agricultural wastes, quantities and characteristics; practices and procedures for wastes management; coordination of agricultural wastes handling activities with that of all the community.

Mr. Hart

255. Environmental Engineering in Agriculture. (3) II.

Lecture—3 hours. Prerequisite: Engineering 186. The description, methods of measurement and effect on man, animals and plants of physical environmental factors, and the design of systems for their control.

Mr. Morrison

290. Seminar. (1) III.

Seminar—1 hour. Discussion of current graduate research with particular attention to validity of experimental procedures; includes oral and written presentation of a term paper.

The Staff

298. Group Study. (1–5) I, II, III.

The Staff (Mr. Henderson in charge)

299. Research. (1–12) I, II, III.

The Staff

Associate Professors:

Richard J. Borg, Ph.D.

Albert J. Kirschbaum, Ph.D.

Assistant Professors:

Carl A. Jensen, Ph.D.
 George D. Sauter, Ph.D.
 Wilson K. Talley, Ph.D.
 Lowell W. Wood, Ph.D.

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Professor:Richard F. Post, Ph.D. (*In Residence*)**Lecturers:**

Berni J. Alder, Ph.D.
 Stephen E. Bodner, Ph.D.
 Sidney S. Fernbach, Ph.D.
 Joseph Fleck, Ph.D.
 John G. Fletcher, Ph.D.
 Harold P. Furth, Ph.D.
 Michael N. Guinan, Ph.D.
 Montgomery H. Johnson, Ph.D.
 Ray E. Kidder, Ph.D.
 John Killeen, Ph.D.
 Cecil E. Leith, Ph.D.
 Kenneth Moses, Ph.D.
 David N. Pipkorn, Ph.D.
 Jacques B. Read, Ph.D.
 Harry L. Sahlin, Ph.D.
 Fred W. Weingarten, Ph.D.
 Frederick O. Wooten, Ph.D.

Davis**Upper Division Courses****115. Introduction to the Use of Computers. (3) I, III.**

Lecture—3 hours. Prerequisite: Mathematics 2C, Engineering 5. Lectures and laboratory work on electronic computers and their application to engineering problems. Mr. Talley

135A. Introductory Nuclear Science and Technology. (3) I.

Lecture—3 hours. Prerequisite: Physics 121 or equivalent. Interaction of gamma rays, electrons, and heavy particles with matter; energy loss and multiple scattering formulae and their application in various media. Introductory aspects of nuclear phenomena: nuclear masses, size, energies, and decay modes. Mr. Sauter

144. Introduction to Nuclear Technology. (3) II.

Lecture—3 hours. Prerequisite: course 135A. Nuclear reactions and their applications: nuclear energy sources, radiation detection; nuclear instrumentation. Nuclear particle accelerators. High vacuum technology. Mr. Sauter

Graduate Courses**230A–230B–230C. Structure of Matter.**

(3–3–3) III, I, II.

Lecture—3 hours. Prerequisite: course 110C. Classical properties of matter; introduction of

quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules and solids; quantum theory of cooperative effects. Mr. Jensen

240A–240B–240C. Nuclear Reactor Analysis.

(3–3–3) Year.

Lecture—3 hours. Prerequisite: course 110C. The physical concepts and mathematical techniques used in the analysis of nuclear reactors. Mr. Talley

244. Nuclear Reactor Applications. (3) III.

Lecture—3 hours. Prerequisite: course 135A, Mathematics 220C. Application of nuclear reactors: power; research; isotope production; terrestrial; marine; space. Direct energy conversion. Use of radioisotopes. Mr. Sauter

245A–245B. Nuclear Reactor Systems. (3–3) II, III.

Lecture—3 hours. Prerequisite: course 240A. Those aspects of fluid dynamics, thermodynamics, heat transfer, and thermal stress analysis that apply to the engineering design of nuclear reactors. Radiation shielding, fuel cycles, and isotope separation. Mr. Sauter

246. Nuclear Explosives: Phenomenology. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 220A. The phenomenology of nuclear explosives; the theoretical and empirical laws for such effects; the scientific uses of such phenomena. Offered in odd-numbered years. Mr. Talley

260A–260B. Statistical Theory of Equilibrium and Transport Phenomena. (3–3) I, II.

Lecture—3 hours. Prerequisite: courses 110A and 120B. Statistical mechanical formulation of thermodynamics with application to the various states of matter. Statistical foundation of irreversible phenomena; evaluation of the transport coefficients in fluids and metals. Mr. Jensen

271. Electrodynamics of Continuous Media. (3) II.

Lecture—3 hours. Prerequisite: course 230A, Electrical Engineering 210A, Chemistry 110A. Solutions of Maxwell's equations in continuous media. Stresses and mechanical potentials of matter in constant and time varying fields. Thermodynamically based phenomenological description of electromagnetic fields in matter. Quantum mechanical interpretation of the properties of conductive and dispersive media. Mr. Wood

290. Seminar. (1–2) I, II, III.

The Staff

Seminar—2 hours.

298. Group Study. (1–3) I, II, III.

Lecture—1–3 hours. Such topics as neutron physics, nuclear technology, advanced hydrodynamics, plasma physics, or advanced mathematics. The Staff

299. Research. (1–12) I, II, III.

The Staff

Livermore**Upper Division Courses****105. Special Topics in Applied Science. (2) I.**

Lecture—2 hours. Use of laws and concepts covered in undergraduate curricula in applied science. The variety of subjects covered will include problems of space physics, a discussion of gravity and capillary waves, and some problems in optics such as lasers. Mr. Teller

110A. Vectors and Tensors. (4) I.

Lecture—4 hours. Prerequisite: ordinary differential equations. Algebra and calculus of finite and infinite dimensional vectors; orthonormal functions; introduction to linear equations. Mr. Fletcher

110B. Complex Variables and Calculus of Variations. (4) II.

Lecture—4 hours. Prerequisite: course 110A. Analytic functions; contour integrals; power series, conformal mapping; Laplace transform; calculus of variations. Mr. Fletcher

110C. Linear Equations. (4) III.

Lecture—4 hours. Prerequisite: course 110B. Solution of linear algebraic, differential, and integral equations by orthonormal expansion and Green's functions; approximation methods. Mr. Fletcher

115. Introduction to the Use of Computers. (3) I.

Lecture—3 hours. Prerequisite: Mathematics 2C, Engineering 5. Lectures and laboratory work on electronic computers and their application to engineering problems. Mr. Wood

120A-120B. Chemistry for Physicists and Engineers. (3-3) I, II.

Lecture—3 hours. Prerequisite: Chemistry 1C; Mathematics 2C. Concepts of chemistry and physical chemistry, including atomic and molecular structure and the properties of liquids and solids. Mr. Borg

123A-123B-123C. Structural Chemistry. (1) I, II, III.

Lecture—1 hour. Prerequisite: freshman chemistry and modern physics. A factual descriptive course relating chemical and physical properties of substances to their molecular or crystal structure. Selected examples of organic compounds, minerals, refractory oxides and carbides and complex ions. Generalizing correlations between structure, chemical reactivity, solubility, melting temperatures, etc. Mr. Borg

135A. Introductory Nuclear Science and Technology. (3) I.

Lecture—3 hours. Prerequisite: Physics 121 or equivalent. Interaction of gamma rays, electrons, and heavy particles with matter; energy

loss and multiple scattering formulae and their application in various media. Introductory aspects of nuclear phenomena: nuclear masses, size, energies, and decay modes. Mr. Bloom

135B-135C. Introductory Nuclear Science and Technology. (2) II, III.

Lecture—2 hours: Prerequisite: course 135A. Radiation detection, charged particle technology, radiation chemistry, neutron technology, magnetic moment and spin measurement, vacuum technology. Mr. Bloom

Graduate Courses**210A-210B. Advanced Mathematical Methods. (3) II, III.**

Lecture—3 hours. Prerequisite: course 110C. Classification of partial differential equations, elliptic equations, hyperbolic equations in two independent variables, difference methods for initial-value problems in two independent variables, initial value problems in more than two independent variables, difference methods for elliptic equations, Monte Carlo methods. Mr. Killeen

211. Computer Mathematics. (3) I.

Lecture—3 hours. Prerequisite: course 110C. (course 115 concurrently). Review and survey of mathematical fields fundamental to computer science. Theory of sets, Boolean algebra and propositional calculus, predicate calculus, probability and statistics, mathematical programming, general number systems. Mr. Weingarten

212A-212B. Computer Languages. (3) II, III.

Lecture—3 hours. Prerequisite: course 211. The basic tools in the use of computers for processing data are covered. These include common subroutines such as notations and construction of algorithms. Considerations evolving from special hardware are discussed. Mr. Weingarten

213A. Switching Theory. (3) II.

Lecture—3 hours. Prerequisite: course 211. This course will cover minimization techniques, switching function realization with electronic circuits, trees, storage devices, and elementary sequential machines.

213B. Computing Machines. (3) III.

Lecture—3 hours. Prerequisite: course 212A. This course will cover computing machine organization, memory systems, arithmetic units and input-output systems.

214. Computing with Symbolic Expressions. (3) I.

Lecture—3 hours. Prerequisite: course 211. Theory and practice of computing with symbolic expressions. The LISP programming language, function composition, conditional expressions, recursive functions. Writing programs to manipulate symbolic expressions. Interpreters, com-

pilers, proving the equivalence of algorithms. Survey of symbol manipulation languages.

215. Artificial Intelligence. (3) II.

Lecture—3 hours. Prerequisite: course 211. An organized description of attempts to get computers to behave intelligently. Programs play games, solve problems, prove theorems, and deduce answers to questions from given facts. Programs that learn to make evaluations and to recognize patterns.

216. Automata Theory. (3) III.

Lecture—3 hours. Prerequisite: course 212A. This course will cover the elements of finite automata including models, graphical and table representation, equivalence, minimization, identification. Time permitting, infinite automata will be introduced and computability discussed.

220. Physical Chemistry of Solids. (3) III.

Lecture—3 hours. Prerequisite: courses 120A–120B, 260A–260B. Equations of state—heterogeneous equilibria—phase diagrams—two-body potential functions, the Debye model statistical thermodynamics of solid solutions, phase transformations and order—disorder phenomena—surface thermodynamics. Mr. Borg

221A–221B–221C. Materials Science. (3) I, II, III.

Lecture—3 hours. Prerequisite: courses 120A–120B, 260A–260B. The facts and theories of crystal defect physics and their application to such problems as the mechanical properties of solids, radiation damage, phase transformations, etc. Covers thermodynamics of point defects, diffusion, elasticity dislocation theory.

Mr. Borg, Mr. Guinan

230A–230B–230C. Structure of Matter.

(3–3–3) Year.

Lecture—3 hours. Prerequisite: course 110C. Classical properties of matter; introduction of quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules and solids; quantum theory of cooperative effects. Mr. Sahlin

231A–231B–231C. Theory of the Solid State.

(3–3–3) I, II, III.

Lecture—3 hours. Prerequisite: courses 230A–230B–230C. Structure binding and mechanical properties of crystals; dielectrics, electrons in metals, metals and alloys; magnetism, superconductivity, and semiconductors. Mr. Johnson

232. Solid State Electronics. (3) I.

Lecture—3 hours. Prerequisite: course 231C. Theory of semiconductors and semiconductor devices (transport properties, optical properties, p-n junctions, transistor devices, and surface

states). An introduction to microwave magnetic devices and superconducting memory devices.

Mr. Wooten

235A–235B. Nuclear Physics. (3–3) II, III.

Lecture—3 hours. Prerequisite: course 230C. Basic properties of nuclei; radioactive decay; nuclear models; low energy nuclear reactions; neutron physics. Interaction of particles and radiation with matter. Mr. Bloom

237A–237B. Neutron Physics. (3) II, III.

Lecture—3 hours. Prerequisite: course 135A. Properties of neutrons, cross-sections and nuclear structure, fast neutrons, neutron resonances, fission process, thermal neutrons, neutron optics, diffraction, applications of neutron diffraction and optics to studies of the structure of matter. Mr. Kirschbaum

239A–239B. Nuclear Chemistry. (3) II, III.

Lecture—3 hours. Prerequisite: course 135A. Radiochemistry as an analytical technique in the study of chemical and nuclear processes: activation analysis, fission, properties of the actinides, current theories of the properties of the transactinides, radiolysis, "hot atom" chemistry, and mechanisms of biological radiation damage.

Mr. Read

243A–243B. Nuclear Technology. (3) II, III.

Lecture—3 hours. Prerequisite: courses 135A and 110C. Physics of chain reacting systems, neutron diffusion theory, neutron moderation, transport theory, homogeneous reactors statics and dynamics, instrumentation and control, critical assemblies, pulsed neutron techniques, prompt burst reactors.

250A–250B. Continuum Mechanics. (3–3) I, II.

Lecture—3 hours. Prerequisite: course 110C. Tensor notation, algebra, and analysis. Theory of elasticity, stress-strain relation, strain energy, reciprocity laws, elastic waves. Hydrodynamics of incompressible and compressible flows in two and three dimensions. Mr. Leith

251. Geophysical and Stellar Hydrodynamics. (3) III.

Lecture—3 hours. Prerequisite: course 250A–250B. Hydrodynamics and thermodynamics of fluids in gravitational fields with applications to the atmosphere, the ocean, and stellar models. The role of convection and radiation transport. The use of numerical models. Mr. Leith

252. Turbulence. (3) III.

Lecture—3 hours. Prerequisite: course 250A–250B. Definition, kinematics, and dynamics of turbulent flows. Hydrodynamic instability. Equilibrium theory for isotropic turbulence. Convection, diffusion, and Reynolds stress, magneto-hydrodynamic turbulence of plasmas. Two-dimensional turbulence with geophysical applications. Mr. Leith

260A-260B. Statistical Theory of Equilibrium and Transport Phenomena. (3-3) III, I.

Lecture—3 hours. Prerequisite: courses 110A and 120B. Statistical mechanical formulation of thermodynamics with application to the various states of matter. Statistical foundation of irreversible phenomena; evaluation of the transport coefficients in fluids and metals. Mr. Fleck

261A. Advanced Statistical Mechanics. (1) I.

Lecture—1½ hours. Prerequisite: course 260A-260B. The application of high speed computers to the study of equilibrium and non-equilibrium systems by the Monte Carlo and molecular dynamic techniques. Mr. Alder

261B. Advanced Statistical Mechanics. (1) II.

Lecture—1½ hours. Prerequisite: course 260A-260B. A discussion of the experimental study of the properties of matter at high temperatures and pressures with high explosive techniques. Mr. Alder

261C. Advanced Statistical Mechanics. (1) III.

Lecture—1½ hours. Prerequisite: course 260A-260B. A theoretical approach to the properties of matter with emphasis on astrophysical and geophysical application. Mr. Alder

270A-270B-270C. Electromagnetic Theory.

(3-3-3) II, III, I.

Lecture—3 hours. Prerequisite: Electrical Engineering 171B and Mathematics 2C. Electromagnetic field theory; physical properties of dielectrics and conductors; magnetic properties of materials, steady and quasi-steady currents; propagation of electromagnetic waves in vacuum and through matter. Mr. Kidder

ENGINEERING: CHEMICAL

J. M. Smith, Sc.D., *Chairman of the Department*

Department Office, 3094 Engineering I

Professor:

J. M. Smith, Sc.D.

Associate Professor:

Stephen Whitaker, Ph.D.

Assistant Professors:

Richard L. Bell, Ph.D.

Neil A. Dougherty, Ph.D.

Upper Division Courses**151. Material and Energy Balances. (3) I.**

Lecture—3 hours. Prerequisite: Chemistry 110A (may be taken concurrently). Use of principles of conservation of mass and energy in chemical process calculations, with emphasis on problem solving. Mr. Bell

275A-275B-275C. Plasma Physics. (3-3-3) II, III, I.

Lecture—3 hours. Prerequisite: course 270C. The basic equations governing the behavior of a fully ionized plasma in a magnetic field; simple plasma configurations in controlled fusion research and space applications. Theory of plasma waves and instabilities. Transport coefficients and radiation phenomena. Mr. Moses

277. Plasma Kinetic Theory. (3) I.

Lecture—3 hours. Prerequisite: course 275A-275B. The derivation of plasma kinetic equations; turbulence; fluctuations; advanced radiation and transport phenomena. Mr. Bodner

278. Waves and Radiation in Plasmas. (3) III.

Lecture—3 hours. Prerequisite: course 275A-275B. Theory of propagation of waves in hot and cold magneto-plasmas; relation of wave theory to plasma instabilities; radiation processes, including collective effects, bremsstrahlung, synchrotron radiation and radiation from partially ionized atoms.

279. High-Temperature Plasmas. (3) I.

Lecture—3 hours. Prerequisite: course 275A-275B. Confinement and stability of high temperature plasmas in open and closed magnetic-field structures. Application to controlled-fusion research and space plasmas.

290. Seminar. (1-2) I, II, III.

The Staff

Seminar—2 hours.

298. Group Study. (1-3) I, II, III.

The Staff

Lecture—1-3 hours. Such topics as neutron physics, nuclear technology, advanced hydrodynamics, plasma physics, or advanced mathematics.

299. Research. (1-12) I, II, III

The Staff

152. Chemical Engineering Thermodynamics. (3) III.

Lecture—3 hours. Prerequisite: Engineering 105A and Chemistry 110A. Application of the laws of thermodynamics, with particular emphasis on the behavior of fluids, phase equilibria, and chemical reaction equilibria. Mr. Smith

154A. Mass Transfer. (3) I.

Lecture—3 hours. Prerequisite: course 185 (may be taken concurrently); Chemistry 110A. Fundamental concepts of mass transfer in fluids. Problems in pure diffusion and convective mass transfer. Mr. Whitaker

154B. Applications of Mass Transfer. (3) II.

Lecture—3 hours. Prerequisite: course 154A. Application of the principles of mass transfer

and thermodynamic equilibrium to absorption, extraction, distillation and other separation processes.
Mr. Bell

155A. Chemical Engineering Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 154A; course 154B (may be taken concurrently). Laboratory experiments in heat, mass, and momentum transfer and in chemical kinetics.
The Staff

155B. Chemical Engineering Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 155A. Continuation of course 155A. The Staff

156A. Chemical Engineering Kinetics. (3) II.

Lecture—3 hours. Prerequisite: courses 152; 154A; and Chemistry 110C (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reactor design.
Mr. Smith

156B. Chemical Engineering Kinetics. (3) III.

Lecture—3 hours. Prerequisite: course 156A. Continuation of course 156A. Mr. Dougherty

158. Chemical Engineering Process Design. (3) III.

Lecture—3 hours. Prerequisite: courses 154B and 156B. Chemical Engineering process design; optimization and process dynamics.
Mr. Bell

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: senior standing in engineering with at least a B average. Student groups may be organized in instrumentation and design problems. Students may enroll in one or more separate subjects.
The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor. The Staff

Graduate Courses

252A. Advanced Thermodynamics. (3) I.

Lecture—3 hours. Prerequisite: course 152 or Engineering 105B. A general treatment of the first and second laws; applications of thermodynamic relationships to phase and chemical reaction equilibria; introduction to statistical thermodynamics.
Mr. Smith

252B. Advanced Thermodynamics. (3) II.

Lecture—3 hours. Prerequisite: course 252A. Continuation of 252A with an emphasis on statistical thermodynamics.
Mr. Dougherty

253A. Advanced Transport Phenomena. (3) I.

Lecture—3 hours. Prerequisite: course 185. Tensor and vector methods in the formulation of the equations of mass, momentum, energy, and entropy in continuous media with particular emphasis on fluids. Applications to the formulation of rheological equations of state for viscoelastic fluids and fluid interfaces.
Mr. Whitaker

253B. Advanced Transport Phenomena. (3) II.

Lecture—3 hours. Prerequisite: course 253A. Continuation of 253A, with application to both differential and integral mass, momentum, and energy balances.
Mr. Whitaker

253C. Advanced Transport Phenomena. (3) III.

Lecture—3 hours. Prerequisite: course 253B. Continuation of 253B with special emphasis on multicomponent systems. The laws of molecular diffusion and energy transport, including the effects of concentration, temperature, electric and pressure fields. Convective mass transfer and chemically reacting flows.
Mr. Bell

255A. Equilibrium Stage Processing. (3) I.

Lecture—3 hours. Prerequisite: course 154B; course 252 (may be taken concurrently). The concept of equilibrium stage processing; applications to the design of distillation, absorption, and extraction processes.
Mr. Dougherty

255B. Equilibrium Stage Processing. (3) II.

Lecture—3 hours. Prerequisite: course 255A. Continuation of course 255A.
Mr. Bell

256A. Applied Kinetics and Reactor Design. (3) II.

Lecture—3 hours. Prerequisite: courses 156B and 252. Application of kinetics and molecular transport rates to the design of chemical reactors, with emphasis on homogeneous systems.
Mr. Dougherty

256B. Applied Kinetics and Reactor Design. (3) III.

Lecture—3 hours. Prerequisite: course 256A. Continuation of 256A, with emphasis on convective transport and heterogeneous catalytic systems.
Mr. Smith

257. Rheology of Fluids. (3) III.

Lecture—3 hours. Prerequisite: course 253A. Non-Newtonian and viscoelastic behavior of polymer materials, suspensions and emulsions. Continuum theories of stress equations for materials with and without memory. Solution of simple boundary value problems and the evaluation of rheological experiments.
Mr. Whitaker

258. Chemical Process Dynamics. (3) I.

Lecture—3 hours. Prerequisite: courses 154B; 156B. Unsteady state process analysis, examples of first and second order process systems, coupling of mixed order processes including chemical reaction kinetics, mass and heat transfer and fluid mechanics, simulation of chemical processes.
Mr. Bell

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

ENGINEERING: CIVIL

Don O. Brush, Ph.D., *Chairman of the Department*
Department Office, 2092 Engineering I

Professors:

Jaime Amorocho, Ph.D. (*Civil Engineering and Water Science and Engineering*)

Don O. Brush, Ph.D.

Robert H. Burgy, M.S. (*Civil Engineering and Water Science and Engineering*)

James N. Luthin, Ph.D. (*Civil Engineering and Water Science and Engineering*)

Verne H. Scott, Ph.D. (*Civil Engineering and Water Science and Engineering*)

Associate Professors:

James A. Cheney, Ph.D.

Leonard R. Herrmann, Ph.D.

Ray B. Krone, Ph.D.

Assistant Professors:

Kandiah Arulanandan, Ph.D.

John C. Badoux, Ph.D.

James R. Hutchinson, Ph.D.

Bruce E. Larock, Ph.D.

Edward D. Schroeder, Ph.D.

Theodor S. Strelkoff, Ph.D. (*Civil Engineering and Water Science and Engineering*)



Upper Division Courses

131A. Structural Analysis. (3) I, III.

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Structural analysis of determinate and indeterminate beams, trusses and frames; influence lines, moving loads, deflection analysis.

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131B. Structural Analysis. (2) I, II.

Lecture—2 hours. Prerequisite: course 131A. General force and displacement methods of analysis of structures; matrix notation, limit analysis.

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132A. Structural Design: Metallic Elements. (3)

II, III.

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Metallic beams, columns, other members; analysis and design of riveted, bolted, and welded joints; design of simple beam connections, moment resistant connections, and column base plates.

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132B. Structural Design: Concrete Elements.

(3) I, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 132A (may be taken concur-

rently). Reinforced concrete beams, columns, slabs, and footings; elastic theory and ultimate design. Introduction to prestressed concrete and plastics.

Mr. Badoux

132C. Structural Design: Timber Elements. (2) III.

Lecture—2 hours. Prerequisite: course 132A. Elements of timber structures and laminated structures, including connection design.

Mr. Rodda

134. Analysis and Design of Buildings. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 131A, 132B, 132C. Vertical dead and live loading; earthquake and wind forces. Building code and structural requirements for the use of timber, steel frame, reinforced concrete, and brick. Supervised classroom design.

135. Advanced Structural Analysis. (4) III.

Lecture—4 hours. Prerequisite: course 131B. Analysis of stiffened and unstiffened shell structures; limit analysis of frame structures; analysis of statically indeterminate box beams, rings, and arches. Buckling of flat plates and shells. Introduction to matrix analysis of space frames.

Mr. Cheney

137. Construction Principles. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: senior standing in engineering. A study of the construction industry; its form, evolution, and methods of operation; fundamental principles underlying construction practices; economic factors in planning, organizing, and operating a construction force. Field trips and analysis of local construction projects.

Mr. Cheney

138. Dynamic Loads on Stationary Structures. (3) II.

Lecture—3 hours. Prerequisite: course 131B, Engineering 102B, 103B. Determination of loads on structures due to base movements (earthquakes), steady and non-steady aerodynamic forces (wind and blast), and impact and vibration forces; comparison of dynamic loads with stationary loads and determination of equivalent load factors.

Mr. Hutchinson

141. Engineering Hydromechanics. (3) I.

Lecture—3 hours. Prerequisite: Engineering 103B. Application of principles of mechanics to flows of heavy, incompressible fluids. Flow visualization, configuration of free surfaces, streamlines, flow nets, separation, cavitation; pressure distribution in non-uniform, unsteady flow; turbulence; surface and form drag; conduit flow. Engineering approximations.

Mr. Strelkoff

142. Water Supply. (4) I.

Lecture—4 hours. Prerequisite: Engineering 103B or consent of instructor. Study of surface and ground water supplies; analysis for prediction of surface and ground water yields; water requirements; water supply and distribution systems including dams, reservoirs, wells, pumping plants, open channels, and pipe lines; water treatment methods and processes. Mr. Burgy

143. Water Resources Engineering. (3) II.

Lecture—3 hours. Prerequisite: course 142. Basic concepts of water resources planning; water inventories, use, and control; water conservation measures and legislation; multiple-purpose project planning, domestic and foreign water development projects; simulation optimization and dynamic programming studies.

Mr. Scott

144. Drainage Engineering. (3) III.

Lecture—3 hours. Prerequisite: Engineering 103B. Elements of seepage through porous media; theory of drainage; depth and spacing of drains; methods of drainage investigation; project planning for drainage; engineering analysis of surface drainage.

Mr. Luthin

145. Hydraulic System Design. (3) III.

Lecture—3 hours. Prerequisite: course 141. Principles of project planning; methods of analysis and hydraulic design of storage systems, diversion structures, conveyance and regulation systems, and structures for irrigation, power and flood control projects.

Mr. Amorocho

146. Hydraulic Engineering Design Laboratory.

(3) III.

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 145 (may be taken concurrently). Design and experimental analysis of hydraulic systems including storage, conveyance and energy dissipation structures; hydrologic considerations; irrigation and drainage systems; measurements and instrumentation.

Mr. Larock

147. Solid and Radioactive Waste Management.

(3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103B. Characteristics and amounts of solid wastes; collection systems; introduction to waste treatment processes and return of treated wastes to the environment. Origin, nature, and management of radioactive wastes.

Mr. Hart

148. Waterborne Waste Management. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 142. Introduction to industrial and domestic waterborne waste collection and treatment systems; methods of treated waste release.

Mr. Schroeder

149. Air Pollution Control. (3) III.

Lecture—3 hours. Prerequisite: course 147. Origins, characteristics, and amounts of air pollutants; atmospheric reactions and behavior of airborne wastes; methods of control. Mr. Krone

160. Highway Engineering. (3) II.

Lecture—3 hours. Prerequisite: senior standing in engineering. Highway planning, economy, surveys and plans; highway design to include highway capacity, cross section, vertical and horizontal alignment, intersections and drainage. Highway construction, grading and pavements.

Mr. Arulanandan

171. Soil Mechanics. (3) I, III.

Lecture—3 hours. Prerequisite: Engineering 104A (may be taken concurrently). Soil formations, mass-volume relationships, principle of effective stress, soil characteristics (classification and identification) compaction, capillarity and permeability, compressibility and consolidation, strength—state of stress and failure criteria.

Mr. Arulanandan

172. Soil Properties, Soil Behavior and Engineering. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 171. Detailed study of the physical and mechanical properties of soils, including experimental determination of these properties and their engineering applications. Introduction to physicochemical principles and influence of physicochemical factors on soil behavior.

Mr. Arulanandan

173. Soil Mechanics and Foundation Design. (3) II.

Lecture—3 hours. Prerequisite: course 172. Site exploration, bearing capacity, footing design, lateral earth pressures, retaining walls, slope stability, theory of consolidation and application of foundation design, methods of minimizing settlements and effect of settlement on structures.

181. Plastic Analysis of Structures. (3) III.

Lecture—3 hours. Prerequisite: course 131B, course 132A. Structural behavior in the plastic range; methods of predicting strength and deformation in the inelastic range; analysis and design of continuous beams and frames; rules of practice for plastic design of structures.

Mr. Badoux

182. Prestressed Concrete. (3) II.

Lecture—3 hours. Prerequisite: course 132B. Analysis and design of prestressed concrete structures; statically determinate and indeterminate structures; principles and applications of ultimate strength; applications to buildings, bridges and tanks.

Mr. Badoux

198. Directed Group Study. (1-5) I, II, III.

Lecture—1-5 hours. Prerequisite: consent of the instructor. Selected topics. Students may enroll in one or more separate sections. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Lecture—1-5 hours. Prerequisite: senior standing in engineering and at least a B average. The Staff

Graduate Courses**225. Theory of Elasticity. (3) II.**

Lecture—3 hours. Prerequisite: Engineering 187. Tensor formulation of the elastic field equations. Variational principles. Introduction to nonlinear elasticity. Approximate and exact solutions for plane stress and plane strain problems. Introduction to three-dimensional problems. Mr. Herrmann

226A. Theory of Elastic Stability. (2) II.

Lecture—2 hours. Prerequisite: Engineering 187. Basic concepts of the stability of elastic systems. Derivation of the differential equations of stability by summation of forces and moments and by the variational method. Applications to bars, frames, and rings. Mr. Brush

226B. Theory of Elastic Stability. (2) III.

Lecture—2 hours. Prerequisite: course 226A. Continuation of course 226A. Application to plates and shells. Mr. Brush

227. Theory of Plates. (3) II.

Lecture—3 hours. Prerequisite: Engineering 187. Stress and deformation analysis of plates bent by transverse loads; applications to circular, rectangular, and other shapes. Mr. Hermann

228. Theory of Shells. (3) III.

Lecture—3 hours. Prerequisite: Engineering 187. Direct stresses in shells with axial symmetry. Applications to shell roofs, tanks, cylindrical shells, pipelines; bending stresses in shells. Mr. Cheney

229. Theory of Plasticity. (3) III.

Lecture—3 hours. Prerequisite: course 225. Fundamentals of plasticity, the concept of yield and the associated constitutive equations in the theory of elastic-plastic solids. Variational theorems, the piecewise linear loading functions and related minimum principles. Application to earth structures, torsion and plane problems of plasticity. To be offered in odd-numbered years. Mr. Hutchinson

230. Theory of Viscoelasticity. (3) III.

Lecture—3 hours. Prerequisite: course 225. Fundamentals of viscoelasticity, representation of linear viscoelastic material behavior in integral and differential operator forms. Application to earth structure, buckling, plane and

axisymmetric problems. Introduction to nonlinear viscoelasticity. To be offered in even-numbered years. Mr. Herrmann

231. Advanced Analysis Procedures in Solid Mechanics. (3) I.

Lecture—3 hours. Prerequisite: course 131B and Engineering 187. Fundamentals of the finite element and related procedures. Application to torsion, plane stress, plane strain, axisymmetric, plate and shell bending, thermal stress and soil mechanics problems. Consideration of inelastic and nonlinear problems. Mr. Herrmann

240. Water Quality. (3) I.

Lecture—3 hours. Prerequisite: Bacteriology 2 and Mechanical Engineering 185B or equivalent; Chemistry 110A (may be taken concurrently). Water quality requirements for domestic, industrial, agricultural, and recreational and wildlife water uses; properties of natural surface and ground waters; transport and fates of water-borne pollutants; methods of analysis; and transfer of pollutants in the aquatic food chain. Mr. Krone

***241. Land Quality. (2) II.**

Lecture—2 hours. Prerequisite: Bacteriology 2; Chemistry 110B (may be taken concurrently) and consent of the instructor. Factors determining land quality for use in man's activities; origins of soil pollutants; uptake of pollutants by plants; interrelations of land and vegetation and qualities of air and water. Mr. Krone

242. Air Quality. (3) III.

Lecture—3 hours. Prerequisite: Engineering 105A; Engineering 185; Chemistry 110B. Properties of the air and the atmosphere; atmospheric phenomena; factors determining air quality; origins, transport and degradation of atmospheric pollutants; effects of pollutants on men, plants, soil, and water. Mr. Krone

243A. Water and Waste Treatment. (3) I.

Lecture—3 hours. Prerequisite: courses 148, 149; Mechanical Engineering 185B. Characteristics of water- and airborne-wastes; treatment processes and process kinetics; treatment system design. Mr. Schroeder

243B. Water and Waste Treatment. (3) II.

Lecture—3 hours. Prerequisite: course 243A. Continuation of course 243A. Mr. Schroeder

243C. Water and Waste Treatment Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 243B. Operation of model treatment units; measurements of waste and process effluent characteristics; evaluation of process parameters. Mr. Schroeder

* Not to be given, 1967-68.

244. Environment Quality Management. (2) III.

Lecture—2 hours. Prerequisite: course 242 (may be taken concurrently), 240, 241. Fates of pollutants in the overall environment; requirements for environment quality; monitoring methods; environment quality control methods.

The Staff

247. Nuclear Civil Engineering. (3) III.

Lecture—3 hours. Prerequisite: Applied Science 246. The engineering uses of nuclear explosives; earthmoving for canals, harbors, highways and water resource development; mining; petroleum; desalination. To be offered in odd-numbered years.

Mr. Cheney

251. Advanced Topics in Structural Engineering.

(3) I.

Lecture—3 hours. Prerequisite: course 131B; course 138 or Mechanical Engineering 122. Analysis of indeterminate structures by force (flexibility) methods and by displacement (stiffness) methods; application to multistory buildings and aerospace structures; consideration of dynamic and inelastic effects; emphasis on methods suited for digital computer solution. To be offered in odd-numbered years.

Mr. Badoux

252. Advanced Topics in Metal Structures. (3) I.

Lecture—3 hours. Prerequisite: consent of instructor. Residual stresses, recent developments in welded structures and high-strength bolt connections, light gage and alloy steels, aluminum and other metals; aerospace structures, three dimensional space frames. To be offered in even-numbered years.

Mr. Badoux

253. Advanced Topics in Concrete Structures.

(3) I.

Lecture—3 hours. Prerequisite: consent of instructor. Advanced analysis and design of concrete folded plates, thin shells and gravity dams; yield line theory; lift slabs; effects of shrinkage and creep upon stress and deflection. To be offered in odd-numbered years.

Mr. Badoux

257. Analysis of Structures under Dynamic Loading. (3) I.

Lecture—3 hours. Prerequisite: course 138. Analysis of earthquake and blast resistant structures; method of lateral forces; current research about earthquake and blast loading and structural effects. To be offered in even-numbered years.

Mr. Hutchinson

271. Advanced Topics in Surface Water Hydrology.

(2) III.

Lecture—2 hours. Prerequisite: course 142, Water Science 141 and consent of instructor. Analysis of hydrologic processes and procedures in water supply investigations including topics in atmospheric relationships, research methods,

water balances, and water yield prediction methods.

Mr. Burgy

272. Groundwater Flow and Seepage. (3) II.

Lecture—3 hours. Prerequisite: Engineering 103B. Flow of fluids through porous media. Anisotropy. Solution of steady state problems by: mathematical analysis, models, analogs, graphical methods. Dupuit-Forchheimer assumptions. Method of images. Boussinesq's equation for transient problems, solution by Laplace transform. Seepage under dams.

Mr. Luthin

273. Groundwater Hydrology. (3) III.

Lecture—3 hours. Prerequisite: course 272. Analyses and methods of groundwater development; geophysical exploration and analysis; artificial recharge concepts; hydraulics of wells, including analytical treatment of transient flow problems; and problems of well design. Numerical and experimental methods of groundwater flow.

Mr. Scott

276. Hydrologic and Hydraulic System Analysis.

(3) II.

Lecture—3 hours. Prerequisite: courses 142, 145, Water Science 141, and Mathematics 2C. Theory and application of the methods and techniques of modern system analysis to hydrologic and hydraulic systems; emphasis on current developments in parametric hydrology and on application of control theory to water supply and distribution projects.

Mr. Amoroch

277. Mechanics of Open Channel Flow. (3) II.

Lecture—3 hours. Prerequisite: course 141 and Mathematics 2C. Recommended: a short course in FORTRAN programming (may be taken concurrently). Free surface flow; resistance in uniform flows; gradually and rapidly varied flows; critical depth; unsteady flows; supercritical flows; shock waves. Graphical and digital-computer solutions. To be offered in odd-numbered years.

Mr. Strelkoff

278. Hydromechanics. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 2C, 185; Mechanical Engineering 185B. Recommended: a short course in FORTRAN programming (may be taken concurrently). General equations of continuity, momentum, and energy. Stream functions; velocity potential; conformal mapping. Direct solutions for irrotational flow around bodies and in conduits; gravitational effects. To be offered in even-numbered years.

Mr. Strelkoff

279. Advanced Mechanics of Fluids. (4) I.

Lecture—4 hours. Prerequisite: Mathematics 2C and Mechanical Engineering 185B. Rotational flows. Navier-Stokes equations and solutions for laminar, viscous flows; turbulent flow and Reynolds equations, isotropy simplification, diffusion, phenomenological theories; the boundary layer approximation.

Mr. Larock

281A. Advanced Soil Mechanics. (3) I.

Lecture—3 hours. Prerequisite: course 173. Theories of consolidation, secondary compression, stress distribution, bearing capacity, lateral earth pressures, shear strength, yielding of soils, creep, effect of type of compaction on the behavior of compacted clays. Mr. Arulanandan

281B. Advanced Soil Mechanics. (3) III.

Lecture—3 hours. Prerequisite: courses 281A, 231. Theories of slope stability, pile foundation, anchored bulkheads; advanced procedures for use in the analysis of soil mechanics problems including the finite element method; problems in nuclear civil engineering. To be offered in even-numbered years.

Mr. Arulanandan

282. Advanced Soil Laboratory. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 281A. Subsurface exploration,

ENGINEERING: ELECTRICAL

Ronald F. Soohoo, Ph.D., *Chairman of the Department*

Department Office, 3004 Engineering I

Professors:

John B. Powers, Ph.D.
Ronald F. Soohoo, Ph.D.

Associate Professors:

Jack W. LaPatra, Ph.D.
Sanjit K. Mitra, Ph.D.

Assistant Professors:

Vidal R. Algazi, Ph.D.
Verne R. Brown, Ph.D.
Robert B. Green, Ph.D.
Tien C. Hsia, Ph.D.
Victor R. Latorre, Ph.D.
Herschel H. Loomis, Jr., Ph.D.
Earle W. Owen, Ph.D.

Upper Division Courses**160A. Electronics. (3) II, III.**

Lecture—3 hours. Prerequisite: Engineering 100. Analysis of linear amplifiers; single stage and multistage amplifiers, tuned amplifiers, oscillators. Mr. Latorre

160B. Electronics. (3) I, III.

Lecture—3 hours. Prerequisite: course 160A. Nonlinear electronic circuits; large signal amplifiers, oscillators, and switching circuits.

Mr. Powers

161A. Electronics Laboratory. (2) II, III.

Laboratory—6 hours. Prerequisite: course 160A (may be taken concurrently), 101. Prop-

advanced laboratory techniques including consolidation, shear strength, pore water pressure measurement, electrical properties measurement, pavement design tests, field strength and load bearing tests. To be offered in odd-numbered years.

Mr. Arulanandan

290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study.

Mr. Herrmann

298. Group Study. (1-5) I, II, III.

Lecture—1-5 hours.

The Staff (Mr. Brush in charge)

299. Research. (1-12) I, II, III.

The Staff

erties of transistors and vacuum tubes. Small signal single stage and multistage resistance coupled and transformer coupled class A amplifier.

Mr. Latorre

161B. Electronics Laboratory. (2) I, III.

Laboratory—6 hours. Prerequisite: course 161A, course 160B (may be taken concurrently). Tuned amplifiers and oscillators. Switching circuits and large signal amplifiers. Mr. Hsia

162. Network Analysis. (3) II.

Lecture—3 hours. Prerequisite: course 182. Topics in modern network analysis, including two-port networks, matrix methods, graph theory, nonlinear circuits, and computer solutions.

Mr. LaPatra

163. Data Systems. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 107. Theoretical and practical aspects of data systems; Boolean algebra; switching circuits; sequential machines; computer systems organization; laboratory investigation of switching circuits and sequential machines including design and construction of computer functional parts.

Mr. Loomis

164. Random Signals and Noise. (4) III.

Lecture—4 hours. Prerequisite: course 182, Mathematics 131A. Signal analysis, including the mathematical representation of nonrandom and random signals; probability correlation applications to digital and analog communications systems.

Mr. Algazi

165A. Solid State Electronics. (3) I.

Lecture—3 hours. Prerequisite: Physics 121. Electric and magnetic properties of solids. Topics discussed include electrical conductivity, dielectric constant, and various types of magnetism in solids.

Mr. Brown

165B. Solid State Electronics. (3) II.

Lecture—3 hours. Prerequisite: course 165A. Electrical characteristics of dielectric and semiconducting materials, with application to such solid state electronics devices as transistors, tunnel diodes, parametric amplifiers, and their associated circuits.

Mr. Brown

165C. Solid State Electronics. (3) III.

Lecture—3 hours. Prerequisite: course 165A. Characteristics of magnetic materials, with application to such magnetic devices as ferrite cores, thin films, and their associated computer memory and logic circuits.

Mr. Brown

166. Physical Electronics. (3) I, II.

Lecture—3 hours. Prerequisite: Physics 121. Motion of charges through vacuum, gases and solids. Topics include discussion of vacuum tubes, gaseous electronic and semiconductor devices, and magnetic materials.

Mr. Soohoo

167. Network Synthesis. (3) III.

Lecture—3 hours. Prerequisite: course 182. An introduction to modern network synthesis techniques. Topics include one- and two-port networks, approximation problems, realization procedures, and filter theory.

Mr. LaPatra

169. High Frequency Laboratory. (2) I, II.

Laboratory—6 hours. Prerequisite: course 181B. Steady-state and transient transmission line behavior; wave propagation in linear and nonlinear artificial lines; rudimentary experiments with reflex klystrons and wave guides.

Mr. Green

170. Communications Systems. (3) I, III.

Lecture—3 hours. Prerequisite: course 182. Introduction to information transmission systems; response of networks and systems to signals; modulation and demodulation; sampling and pulse modulation.

Mr. Latorre

171A. Electromagnetic Fields and Waves. (3) I.

Lecture—3 hours. Prerequisite: course 181B. Maxwell's equations and the derivation of high frequency circuit concepts from these field equations; the skin effect.

Mr. Brown

171B. Electromagnetic Fields and Waves. (3) II.

Lecture—3 hours. Prerequisite: course 171A. Propagation and reflection of electromagnetic waves and their application to transmission lines and wave guides.

Mr. Brown

171C. Electromagnetic Fields and Waves. (3) III.

Lecture—3 hours. Prerequisite: course 171B. The behavior of resonant cavities, microwave networks, radiation, and antennas. Mr. Brown

180. Instrumentation Systems. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 107. Analytical and design methods common to all instrumentation systems; dynamic response; transducers; signal conditioning.

Mr. Owen

181A. Introduction to Field Theory. (3) I, II.

Lecture—3 hours. Prerequisite: Mathematics 2C. Use of vector calculus in the description of steady potential and solenoidal fields with illustration in gravitational, electrostatic, thermal, thermodynamic, elastic and fluid domains.

Mr. Powers

181B. Introduction to Field Theory. (3) II, III.

Lecture—3 hours. Prerequisite: course 181A. Oscillations and wave propagation on transmission lines, static electric and magnetic fields, potential concepts and solution of Laplace's equation, solution of wave equation and application to elementary wave guide problems.

Mr. Green

182. Linear Systems Analysis. (3) II, III.

Lecture—3 hours. Prerequisite: Engineering 107. The use of operational mathematics in the analysis of lumped parameter systems. Topics include the Laplace transform, Fourier methods, singularity functions, and the convolution integral.

Mr. Algazi

187A. Control Systems. (3) II.

Lecture—3 hours. Prerequisite: course 182. Design and analysis of closed loop automatic control systems. Examples are drawn from all engineering fields. The mathematical representation of systems; frequency, s-plane and state space methods; stability criteria.

Mr. Hsia, Mr. Owen

187B. Control Systems. (3) III.

Lecture—2 hours; laboratory—1 hour. Prerequisite: course 187A. Introduction to nonlinear and sampled data systems. Applications of digital and analog computers.

Mr. Hsia, Mr. Owen

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: senior standing in engineering with at least a B average. Group study of selected topics. Students may enroll in one or more separate subjects.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**210A. Advanced Electromagnetic Theory. (3) I.**

Lecture—3 hours. Prerequisite: course 171C or equivalent. The exact formulation of electromagnetic problems by using vector potentials and Green's functions. Applications of these techniques to radiation and transmission problems.

Mr. Green

210B. Advanced Electromagnetic Theory. (3) II.

Lecture—3 hours. Prerequisite: course 210A. Advanced topics in propagation such as propagation through anisotropic media, duct theory of propagation over the earth, ray tracing through the ionosphere.

Mr. Latorre

210C. Advanced Electromagnetic Theory. (3) III.

Lecture—3 hours. Prerequisite: course 210A. Advanced topics in radiation and scattering such as reception of statistically varying signals, diffracted ray theory, and quasi static solutions.

Mr. Green

260A. System Analysis. (3) I.

Lecture—3 hours. Prerequisite: course 182. Properties of systems and their mathematical characteristics; state space concepts, matrix methods; multivariable systems, time-invariant systems, time varying systems, discrete time systems; real time analysis, frequency methods, the identification problem, adaptive systems.

Mr. Hsia

260B. System Analysis (3) II.

Lecture—3 hours. Prerequisite: course 260A. Continuation of course 260A.

Mr. Owen

***261. Nonlinear Control Systems. (3) III.**

Lecture—3 hours. Prerequisite: course 187B and 260B. Techniques for solving nonlinear control problems; state space methods, stability theorems; Lyapunov's methods; sinusoidal describing function and on-off systems.

Mr. Owen

262. Control System Optimization. (3) III.

Lecture—3 hours. Prerequisite: course 187B and 260B. Optimization of systems by the adjustment of parameters; deterministic inputs, stochastic inputs. Optimization of systems by the calculus of variations: Pontryagin's maximum principle, Bellman's principle of optimality.

Mr. Hsia

263A-263B. Theory of Automata. (3-3) II-III.

Lecture—3 hours. Prerequisite: course 163 or equivalent. Theory of finite and infinite automata including advanced topics in computer design; finite-state machines, the state assignment problem, questions of synchronization, delay and relay of operation. Turing machines and computability; reliability.

Mr. Loomis

* Not to be given, 1967-68.

264A. Noise, Communication and Information Theory. (3) I.

Lecture—3 hours. Prerequisite: course 164 or equivalent. Fundamentals of the theory of random processes pertinent to communications, control and other physical applications. Review of probability theory. Characterization of random processes. Correlation functions and power spectra. Linear and nonlinear operations on random processes.

Mr. Algazi

264B. Noise, Communication and Information Theory. (3) II.

Lecture—3 hours. Prerequisite: course 264A. Application of statistical techniques to the areas of detection, estimation, and modulation theory. Detection problem and application to radar and digital communication. Estimation theory for signals described by finite parameter sets. Linear and nonlinear modulation and efficient demodulators.

Mr. Algazi

264C. Noise, Communication and Information Theory. (3) III.

Lecture—3 hours. Prerequisite: course 264A. Information theory and coding. Definition of a measure of information and study of its properties. Introduction to channel capacity and error free communications over noisy channels. Encoding and decoding of data for transmission over noisy channels.

Mr. Algazi

265A. Applied Solid State Physics. (3) I.

Lecture—3 hours. Prerequisite: course 165C or equivalent. The physics of solids relevant to solid state applications. Topics include classical statistics, band theory of solids, electric polarization, conductivity, and magnetism in solids.

Mr. Soohoo

265B. Applied Solid State Physics. (3) II.

Lecture—3 hours. Prerequisite: course 265A. The theory of semiconductors with application to transistors. Topics include electrons, holes, mobility, and transistor circuitry. Brief discussion of superconductivity and superconducting solenoids.

Mr. Soohoo

265C. Applied Solid State Physics. (3) III.

Lecture—3 hours. Prerequisite: course 265A. The theory of magnetism in solids, with application to ferromagnetic devices and circuits. Topics include paramagnetism, ferromagnetism, magnetic resonance, and switching properties of individual magnetic elements and magnetic arrays.

Mr. Soohoo

266A. Microwave and Quantum Electronics. (3) I.

Lecture—3 hours. Prerequisite: courses 169 and 171C. Interaction between electromagnetic fields and the electron charge and spin. Topics include Lorentz force law, energy levels in

matter, Zeeman splitting, magnetic resonance and relaxation, and the absorption and radiation of electromagnetic energy. Mr. Soohoo

266B. Microwave and Quantum Electronics. (3) II.

Lecture—3 hours. Prerequisite: course 266A. Theory of interaction between electromagnetic fields and the electronic charge, with applications to microwave tubes and plasmas. Beam formation, velocity, and density modulation, plasma oscillation, space charge wave propagation in klystrons. Mr. Soohoo

266C. Microwave and Quantum Electronics. (3) III.

Lecture—3 hours. Prerequisite: course 266A. Theory of interaction between electromagnetic fields and the electron-spin, with applications to quantum oscillators and amplifiers such as masers and lasers. Mr. Soohoo

267A. Network Theory. (3) I.

Lecture—3 hours. Prerequisite: course 167 or equivalent. Advanced topics in network

analysis such as time-varying parameters, distributed circuits, matrix methods, nonlinear circuits, and computer methods. Mr. LaPatra

267B. Network Theory. (3) II.

Lecture—3 hours. Prerequisite: course 267A. The graph theory approach to networks. Graphic theoretic concepts as applied to analysis and synthesis problems. Mr. LaPatra

267C. Network Theory. (3) III.

Lecture—3 hours. Prerequisite: course 267A. Advanced topics in network synthesis such as approximation techniques, n-port realizations, driving point and transfer function realizations, and active synthesis. Mr. LaPatra

290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion of current research. Written and oral reports will be given. The Staff

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

ENGINEERING: MECHANICAL

Warren H. Giedt, Ph.D., *Chairman of the Department*

Department Office, 2018 Engineering I

Professors:

Clyne F. Garland, M.S.

Warren H. Giedt, Ph.D.

John D. Kemper, M.S.

kinematic elements and mechanisms; graphical and analytical determination of displacements, velocities, and accelerations within planar mechanisms involving turning, sliding, and higher pairs. Kinematic design of cams, gears, and gear trains; intermittent-motion mechanisms.

Mr. Yang

Associate Professors:

Charles W. Beadle, Ph.D.

Harry Brandt, Ph.D.

Allan A. McKillop, Ph.D.

An Tzu Yang, Ph.D.

Assistant Professors:

John W. Brewer, Ph. D.

Jerald M. Henderson, D.Eng.

Paul S. Moller, Ph.D.

Donald W. Moon, Ph.D.

Amiya K. Mukherjee, Ph.D.

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Lecturer:

Arthur S. Leonard, M.S.

Upper Division Courses

111. Engineering Principles Laboratory. (4) III.

Discussion—2 hours; laboratory—4 hours.

Prerequisite: Engineering 103A, 104A, 105B. Experimental investigation of the steady state and transient behavior of thermal, mechanical, structural, and fluid systems. Mr. Brandt

115. Dynamics of Machinery. (3) II.

Lecture—3 hours. Prerequisite: course 114. Analysis of dynamic response of machine elements such as cams, springs, gears, and links, with emphasis on high speed operation; gyroscopic forces in machines; balancing of machinery; introduction to dynamics of feedback control systems. Mr. Yang

118. Mechanical Design. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104B; course 121 recommended. Application of the principles of engineering mechanics in the design of mechanical components, with special emphasis on stress concentration, theories of failure, fatigue, and fluctuating stresses. Mr. Kemper

120. Advanced Mechanical Design. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 118. Continuation of course 118, with special emphasis on advanced design analysis; application of two-dimensional theory of elasticity to stress analysis; contact stresses; thermal stresses; elastic impact; creep; hydrodynamic lubrication and bearing design. Mr. Yang

114. Kinematics of Mechanisms. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102B. Classification of

121. Manufacturing Methods. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104A. Introduction to the methods employed in modern manufacturing, with particular emphasis on the interrelationships between engineering design and manufacturing methods. Introduction to the theoretical basis of metal forming. Mr. Kemper

123A. Experimental Engineering. (2) I, II.

Laboratory—6 hours. Prerequisite: senior standing in engineering. Projects chosen to acquaint students with experimental methods in fluid mechanics, heat transfer, thermodynamics, and energy conversion. Mr. Henderson

123B. Experimental Engineering. (2) I, III.

Laboratory—6 hours. Prerequisite: senior standing in engineering. Projects chosen to acquaint students with experimental methods in mechanical design, stress analysis, vibrations, elasticity and plasticity. Mr. Henderson

124. Engineering Systems Design. (3) III.

Lecture—3 hours. Prerequisite: senior standing in engineering. Synthesis of the several fields of engineering, with applications in the design of systems. Mr. McKillop

125. Mechanics of Compressible Fluids. (3) II.

Lecture—3 hours. Prerequisite: Engineering 103B. Introductory concepts of compressible flow. Isentropic flow; normal shock waves; frictional and diabatic flow; generalized one-dimensional continuous flow. Mr. Moller

127. Aerodynamics. (3) I.

Lecture—3 hours. Prerequisite: Engineering 103B. Lift and drag; aerodynamic load distributions; thin aerofoil and slender body theory; boundary layer control; compressibility effects; mutual interference; static and elementary dynamic stability; propulsion. Mr. Moller

128. Aerospace Design. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 127; Engineering 104B. Design of aircraft and missile systems; influence of aerodynamic and inertial loading on structural integrity; guidance and control. Mr. Moller

129B. Analysis and Design of Dynamic Systems. (3) III.

Lecture—3 hours. Prerequisite: course 129A. Phenomenological models for dynamic systems. Control system design using frequency domain methods. Stability of nonlinear control systems. Introduction to the theory of state space models for multivariable systems. Mr. Brewer

130A. Intermediate Thermodynamics. (3) I.

Lecture—3 hours. Prerequisite: Engineering 105B. Real gases. General equations of equilibrium; thermodynamic properties of fluids; vaporization and condensation. Mr. Giedt

130B. Intermediate Thermodynamics. (3) III.

Lecture—3 hours. Prerequisite: course 130A. Introduction to kinetic theory of gases. High temperature effects; dissociation and combustion. Nonsteady state processes. Mr. Giedt

135. Aircraft and Rocket Propulsion. (4) III.

Lecture—4 hours. Prerequisite: Engineering 103B, 105B. Principles of fluid propulsion and propulsive efficiency of air-breathing systems. Principles of rocket propulsion. Dynamics of launch in gravitational field and with air drag; thrust programming; and multistaging. Satellite orbital mechanics and interplanetary flight. Mr. Leonard

140. Engineering Physical Metallurgy. (3) II.

Lecture—3 hours. Prerequisite: senior standing in engineering, or consent of instructor. Principles of treatment of metals to alter their properties for specific applications in engineering. Ferrous and nonferrous metals and alloys will be considered. Mr. Moon

142. Crystal Structure and X-Ray Diffraction. (3) I.

Lecture—3 hours. Prerequisite: Engineering 45. Crystallography, including crystal structure and symmetry operations. Stereographic projection. Reciprocal lattice. Physics of X-rays. Theory of diffraction for X-rays, electrons and neutrons. Mr. Moon

185A. Intermediate Fluid Mechanics. (3) I, III.

Lecture—3 hours. Prerequisite: Engineering 103B. Formulation of continuity, momentum, and energy equations; applications to control volumes; two-dimensional and axially symmetric potential flows.

185B. Intermediate Fluid Mechanics. (3) I, II.

Lecture—3 hours. Prerequisite: course 185A. Incompressible flows of real fluids; Navier-Stokes equations; unsteady flows in conduits and open channels; flow around immersed bodies; one-dimensional compressible flow.

***188. Engineering Materials. (3) III.**

Lecture—3 hours. Prerequisite: Engineering 45; Mathematics 2C. Characteristics of engineering materials including metals and natural and synthetic organic materials. Illustrations for engineering design. Mr. Mukherjee

198. Directed Group Study. (1-5) I, II, III.

Lecture—1-5 hours. Prerequisite: senior standing in engineering with at least a B average. Group study of selected topics.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of the instructor.

The Staff

* Not to be given, 1967-68.

Graduate Courses**203A-203B. Convective Heat Transfer. (3-3) II-III.**

Lecture—3 hours. Prerequisite: course 210A; Engineering 186; or Chemical Engineering 253A. Analysis of heat and momentum transfer by forced and natural convection during laminar and turbulent flow; discussion of allied topics such as boiling and condensation; current topics in heat transfer.

Mr. McKillop

204. Heat Conduction. (3) I.

Lecture—3 hours. Prerequisite: Engineering 180, 186. Steady-state and transient problems in heat conduction, using both mathematical and numerical methods of solution. Mr. Giedt

205. Thermal Radiation. (3) I.

Lecture—3 hours. Prerequisite: Engineering 186, or consent of the instructor. The transfer of radiant energy. Geometrical and spectral characteristics of systems involving thermal radiation. Gaseous radiation.

Mr. Brandt

210A. Boundary Layer Theory. (3) I.

Lecture—3 hours. Prerequisite: course 185B or consent of the instructor; Mathematics 2C. Introduction to boundary layer theory. Boundary layers for two-dimensional flow. Similarity solutions of boundary layer equations. Axially symmetrical and three-dimensional boundary layers.

Mr. Brandt

210B. Boundary Layer Theory. (3) II.

Lecture—3 hours. Prerequisite: course 210A, or consent of the instructor. Nonsteady state boundary layers. Approximate methods for solution of boundary layer equations. Boundary layers in compressible flow. Turbulent boundary layers along a flat plate. Turbulent boundary layers with positive and negative pressure gradients.

Mr. Brandt

211. Turbulence. (3) III.

Lecture—3 hours. Prerequisite: course 210B. Methods of description and basic equations of turbulent flow; isotropic and homogeneous turbulence; phenomenological theories; wall turbulence; boundary layer calculations; transition; jets and wakes.

212. Gas Dynamics. (3) II.

Lecture—3 hours. Prerequisite: courses 125 and 185B. Unsteady motion in one dimension; supersonic flow of real gases with viscosity and heat conductivity; mixed flow; small perturbation theory; method of characteristics; oblique shocks; similarity rules; experimental methods.

Mr. Moller

220A-220B. Mechanical Vibrations. (3-3) II-III.

Lecture—3 hours. Prerequisite: course 122. Applications of vibration theory to systems with many degrees of freedom and continuous sys-

tems. Oscillations in systems having nonlinear characteristics. Self-excited oscillations. Response curves and stability considerations.

Mr. Kemper

221. Introduction to Random Vibration. (3) II.

Lecture—3 hours. Prerequisite: course 122. Nature and statistical analysis of random vibrations. Response of physical systems to random excitation. Data processing.

Mr. Beadle

222. Advanced Dynamics. (3) I.

Lecture—3 hours. Prerequisite: Engineering 102B. Dynamics of particles and of rigid bodies with advanced engineering applications; generalized coordinates; Hamilton's Principles; Lagrange's Equations; Hamilton-Jacobi theory.

Mr. Beadle

223. Advanced Kinematic Analysis. (3) I.

Lecture—3 hours. Prerequisite: course 115. Advanced kinematic analysis of planar mechanism, poles and centrodes, Euler-Savary equation, inflection circle, curvative theory, Bobillier's construction, Hartmann's construction. Four-bar coupler-point curves.

Mr. Yang

224. Kinematic Synthesis of Mechanisms. (3) II.

Lecture—3 hours. Prerequisite: course 115. Introduction to curve and function synthesis. Chebychev's theorem. Structure errors. Complex number methods. Geometrical synthesis using poles, pole paths, and center point curves. Burmester's theorem.

Mr. Yang

225. Spatial Mechanisms. (3) III.

Lecture—3 hours. Prerequisite: courses 115 and 223. Constraints and pairing in spatial mechanisms. Analysis of spatial mechanisms; application of vector, dual number, dual vector, matrix, quaternions, and associated computer methods. Synthesis of spatial mechanisms for path and function generation.

Mr. Yang

240. Theory of Crystal Dislocations. (3) II.

Lecture—3 hours. Prerequisite: course 142, Engineering 187, or consent of instructor. Edge, screw and mixed dislocation concepts. The stress field and energy of dislocations. Force on a dislocation. Motion of dislocations and its relation to plastic deformation. Dislocation multiplication and interaction with point, line, and surface defects.

Mr. Moon

290. Seminar. (1) II, III.

Seminar—1 hour. Discussion of current graduate research with particular attention to validity of experimental procedures, and including oral and written presentation of a term paper.

Mr. Giedt

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

ENGLISH

Robert A. Wiggins, Ph.D., *Chairman of the Department*
 Brom Weber, Ph.D., *Vice-Chairman of the Department*
 Department Office, 109 Sproul Hall

Professors:

Everett Carter, Ph.D.
 Solomon Fishman, Ph.D.
 Thomas A. Hanzo, Ph.D.
 Gwendolyn B. Needham, Ph.D.
 Linda Van Norden, Ph.D.
 Brom Weber, Ph.D.
 Robert A. Wiggins, Ph.D.
 James L. Woodress, Ph.D.
 Celeste T. Wright, Ph.D.

Associate Professors:

Jay L. Halio, Ph.D.
 Wayne C. Harsh, Ph.D. (*English and Linguistics*)
 Robert Hogan, Ph.D.
 Elizabeth R. Homann, Ph.D.

Assistant Professors:

Elliot L. Gilbert, Ph.D.
 John O. Hayden, Ph.D.
 Peter L. Hays, Ph.D.
 Michael J. Hoffman, Ph.D.
 Robert H. Hopkins, Ph.D.
 John L. Magnus, Ph.D.
 Lindsay A. Mann, Ph.D.
 Arthur E. McGuinness, Ph.D.
 Alan W. Rudrum, Ph.D.
 Daniel S. Silvia, Jr., Ph.D.

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Assistant Professors:

Leonard Michaels, M.A. (*Acting*)
 Sarita G. Schotta, B.A., B.M. (*Acting; English and Linguistics*)

Lecturer:

Mary A. O'Connor, M.A.

Departmental Major Advisers.—Mr. Gilbert, Mr. Halio, Mr. Hayden, Mr. Hays, Mr. Hogan, Mrs. Homann, Mr. Magnus, Mr. Mann, Mr. McGuinness, Mrs. Needham, Mrs. Schotta, Mr. Silvia, Miss Van Norden.

The Major Program

Lower Division Courses.—Required: first year, courses 1A and 1B; second year, course 45; courses 46A, 46B, and 46C (these courses should be taken in order). Recommended: courses 30A, 30B, 30C; a course in philosophy; and a course in classics.

Upper Division Courses.—Thirty-six units of upper division courses, 32 of which must be in literature, including either course 117A or 117B,

12 units of courses in literature prior to 1800, and 12 units of literature after 1800. The remaining 4 units may be either in literature or in one of the following language and creative writing courses: 100A, 100B, 105. Recommended: a course in English history.

Teaching Major.—The English teaching major in the teacher-training curriculum requires not only the departmental major but also courses 103, 105A, 105B, and 300 (which counts as 3 units of credit in education). Although these courses may be postponed to the fifth year, course 105A should be taken before course 300.

Teaching Minor.—The teaching minor consists of 32 units, including courses 45, 46A, 46B, 46C, either 30B or 30C, and at least 12 units of upper-division work including English 103, 117A or 117B, and 155B or 155C. Course 300 (which counts as 3 units of credit in education) must be taken in the senior or postgraduate year. Recommended in addition to the required 32 units, especially in preparation for course 300: course 105A. *Subject Representative:* Mr. Harsh.

Foreign Languages.—Students who contemplate advanced study in English at Davis should keep in mind the foreign-language requirements for higher degrees. Consultation with the graduate adviser is suggested.

Honors and Honors Program.—See page 107.

Graduate Study.—The Department of English offers programs of study and research leading to the M.A. and Ph.D. degrees. Detailed information may be obtained from the Chairman of the Department.

Lower Division Courses

1A-1B. First-Year Reading and Composition.

(4-4) I, II, III.

Lecture—2 hours; discussion—2 hours. Principles of expository writing. Analysis and evaluation of various kinds of written discourse.

The Staff

1F. Freshman Seminar in English Composition.

(4) I, II, III.

Seminar—3 hours. Prerequisite: limited to a selected group of students meeting standards set by the department. Principles of expository writing. Analysis and evaluation of various kinds of written discourse. Students completing this course successfully will be considered to have fulfilled the College of Letters and Science English Reading and Composition requirement.

The Staff (Mr. Harsh in charge)

20. Intermediate Composition. (4) I, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1B. Designed primarily for non-majors who wish to improve their skills in expository writing; the content of the course includes basic principles of rhetoric and rules of usage in present-day English.

Mr. Hays, Mr. Hopkins

25. English for Foreign Students. (5) I, II.

Lecture, 2 hours; discussion—2 hours; laboratory—1 hour. For foreign students only. Required of those who do not pass the examination in English.

Mr. Harsh, Mrs. Schotta

26. English for Foreign Students. (5) I, II, III.

Lecture—2 hours; discussion—2 hours; laboratory—2 hours. Continuation of course 25; required of those who have taken course 25.

Mr. Harsh, Mrs. Schotta

30A. Survey of American Literature. (4) I.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1A. American literature from its seventeenth-century beginnings to 1830.

Mr. Wiggins

30B. Survey of American Literature. (4) II.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1A. Nineteenth-century American literature from 1830 to 1900.

Mr. Wiggins

30C. Survey of American Literature. (4) III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1A. American literature in the twentieth century.

Mr. Wiggins

45. Critical Reading of Poetry. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1B. Close reading of selections from English and American poetry. Frequent written exercises.

The Staff

46A. Masterpieces of English Literature. (4)

I, II.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1A. Selected works of principal writers to 1640. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

Mrs. O'Connor

46B. Masterpieces of English Literature. (4) II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1A. Selected works of principal writers from 1640 to 1800. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

Mrs. O'Connor

46C. Masterpieces of English Literature. (4) III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1A. Selected works of principal

writers from 1800 to the present. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

Mrs. O'Connor

47. Introduction to Modern Literature. (4) II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1A. Chief twentieth-century writers of England and America.

Mr. Gilbert, Mr. Carter

Upper Division Courses**100A. Creative Writing. (4) I.**

Lecture—3 hours. Prerequisite: course 1B; sophomores may enroll with consent of instructor.

Mr. Michaels

100B. Creative Writing. (4) II.

Lecture—3 hours. Prerequisite: course 1B; course 100A recommended. Sophomores may enroll with consent of instructor.

Mr. Michaels

100C. Creative Writing. (4) III.

Lecture—3 hours. Prerequisite: course 1B; sophomores may enroll with consent of instructor.

Mr. Michaels

103. Advanced Composition. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 1B; required of prospective high school English teachers. Survey of prose styles, the principles of prose rhetoric, and the usage patterns of present-day English grammar. Frequent written composition stressing the principles studied.

The Staff

105A. Language. (4) I, II.

Lecture—3 hours. Prerequisite: course 1B. Present-day English grammar and pronunciation according to the perspectives of traditional grammar and contemporary linguistics. Preparation for stylistic analysis and historical study of English language and literature. Required of prospective English teachers.

Mrs. Schotta

105B. Language. (4) II, III.

Lecture—3 hours. Prerequisite: course 1B. History of the English language. Examination of the language as recorded in literary texts from Old English to present-day English. Relationship of English to other languages; development of vocabulary, phonology, and grammatical patterns. Required of prospective English teachers.

Mr. Harsh, Mrs. Schotta

110A. Introduction to Principles of Criticism. (4) I.

Lecture—3 hours. Prerequisite: course 45 or equivalent. Methods and assumptions of critical theory from Aristotle to the present. Emphasis on major contributions to the history of literary criticism.

Mr. Hayden

110B. Introduction to Principles of Criticism. (4) II.

Lecture—3 hours. Prerequisite: course 45.
Continuation of 110A. Mr. Hayden

111. Old English and Early Medieval Literature. (4) I.

Lecture—3 hours. Prerequisite: course 1A.
Major types, traditions, and conventions of literature in England from the time of *Beowulf* to the late medieval romances, with special emphasis on the heroic strain, courtly love and its impact, and the development of Arthurian literature. Mostly in translation. Mr. Silvia

112. The Age of Chaucer. (4) II.

Lecture—3 hours. Prerequisite: course 1A.
The literary, religious, and social movements of the later fourteenth century in England as they are reflected in the writings of Chaucer, Langland, the *Gawain* poet, and their contemporaries; the fifteenth-century Chaucerians. Mr. Silvia

113. Chaucer. (4) I.

Lecture—3 hours. Prerequisite: course 1A.
Troilus and Criseyde, selected *Canterbury Tales*; central ideas in the fourteenth century. Mr. Silvia

***115. The English Renaissance. (4) III.**

Lecture—3 hours. Prerequisite: course 1A.
Selected poetry and prose: More, Spenser, Hooker, Bacon, and others. The New Learning; the Reformation; psychological and moral concepts of the age. Mr. Rudrum

116. The Age of Elizabeth. (4) II.

Lecture—3 hours. Prerequisite: course 1A.
Poetry of Marlowe, Shakespeare, Sidney and others; fiction of Gascoigne, Lyly, Lodge; representative plays. Mr. Rudrum

117A. Shakespeare. (4) I, II.

Lecture—3 hours. Prerequisite: course 1A.
Selected major works. The Staff

117B. Shakespeare. (4) II, III.

Lecture—3 hours. Prerequisite: course 1A.
Selected major works not included in 117A. The Staff

***120. Earlier Seventeenth-Century Prose. (4) I.**

Lecture—3 hours. Prerequisite: course 1A.
Bacon, Browne, and Hobbes. Sermon literature, religious and philosophical prose, and the development of prose style; the art and theory of translation, evolution of literary criticism and critical theory, emergence of the essay. Mr. Mann

121. Earlier Seventeenth-Century Poetry. (4) II.

Lecture—3 hours. Prerequisite: course 1A.
Donne, Jonson, Herbert, and Marvell. The metaphysical style, its influence and history; religious poetry; the cavalier poets; the early neoclassicists. Mr. Mann

122. Milton. (4) III.

Lecture—3 hours. Prerequisite: course 1A.
Selected major works, including *Paradise Lost*. Mr. Mann

123. Dryden and His Contemporaries. (4) III.

Lecture—3 hours. Prerequisite: course 1A.
The Restoration in English Literature; Neoclassicism, Ancients versus Moderns, Pyrrhonism, the New Philosophy. Drama, criticism, and satire. Emphasis on the work of John Dryden. Mr. Rudrum

***125A. The Age of Swift and Pope: Prose and Drama. (4) I.**

Lecture—3 hours. Prerequisite: course 1A.
The Augustan Age: the nature of man and society—reason, satire, sentiment, and reform. Readings in Swift, Defoe, Addison, Steele, and others. Mr. Hopkins

125B. The Age of Swift and Pope: Poetry and Criticism. (4) II.

Lecture—3 hours. Prerequisite: course 1A.
The Augustan Age: neoclassical rules and forms, judgment and imagination, satire and song in poetry and criticism. Readings in Pope, Gay, Addison, Prior, Thomson, and others. Mr. McGuinness

127. Johnson and His Contemporaries. (4) III.

Lecture—3 hours. Prerequisite: course 1A.
Sense and Sensibility in poetry, biography, journals, fiction, comedy, and criticism. Readings in Johnson, Boswell, Goldsmith, Fielding, and others. Mr. McGuinness

***128. Prose and Poetry of the Later Eighteenth Century. (4) I.**

Lecture—3 hours. Prerequisite: course 1A.
Sense and Sensibility in criticism, history, philosophy and the novel. Readings in Hume, Burke, Gibbon, Sterne, Cowper, and others. The mysticism of Blake. Mr. McGuinness

130. Early Romantic Literature. (4) I.

Lecture—3 hours. Prerequisite: course 1A.
Blake, Burns, Wordsworth, Coleridge, Scott; the eighteenth-century background and the development of Romantic concepts of the imagination. Mr. Hayden

132. Later Romantic Literature. (4) II.

Lecture—3 hours. Prerequisite: course 1A.
Byron, Shelly, Keats. Individualism and revolt. Mr. Michaels

133. Early Victorian Literature. (4) I.

Lecture—3 hours. Prerequisite: course 1A.
Tennyson, Browning, Arnold, and selected prose writers. The Victorian temper; the individual and society; the search for faith. The impact of scientific thought upon creative thinkers. Mr. Gilbert

* Not to be given, 1967-68.

134. Later Victorian Literature. (4) III.

Lecture—3 hours. Prerequisite: course 1A. Ruskin, Hardy, Hopkins, and others. The Oxford movement; the Pre-Raphaelites; art and sociology; aestheticism and decadence; pessimism. Tendencies continuing into the Edwardian period.

Mr. Gilbert

136. British Literature from 1880 to 1918. (4) I.

Lecture—3 hours. Prerequisite: course 1A. Yeats, Conrad, Joyce. Aestheticism, naturalism, symbolism, and impressionism. The transition from Victorian to twentieth-century styles and attitudes.

Mr. Gilbert

137. British Literature from 1918 to 1940. (4) II.

Lecture—3 hours. Prerequisite: course 1A. Lawrence, Eliot, Forster, and others. Post-war attitudes. Modern psychology and the awareness of myth.

Mr. Hoffman

***138. British Literature from 1940 to the Present. (4) III.**

Lecture—3 hours. Prerequisite: course 1A. Literature of England and Ireland from World War II to the present. Major themes in the novel, poetry, and short story.

140. Origins of American Literature. (4) I.

Lecture—3 hours. Prerequisite: course 1A. Seventeenth-century American literature; special attention to European literary-intellectual traditions, dominant American forms (poem, sermon, history), and major writers (Ann Bradstreet, Edward Taylor, and others).

Mr. Weber

141. The American Enlightenment and Its Reaction. (4) II.

Lecture—3 hours. Prerequisite: course 1A. Eighteenth-century American literature; rise of neoclassicism, liberal religion, popular literature, scientific thought, satiric temper; decline of Puritan traditions; major writers, including Franklin, Edwards, Freneau, and Brackenridge.

Mr. Woodress

142. Early Nineteenth-Century American Literature. (4) III.

Lecture—3 hours. Prerequisite: course 1A. Beginnings of American romanticism; sentimentalism. Gothic vogue, cultural nationalism, Southwestern humor; prose and poetry of Brown, Bryant, Irving, Cooper, Poe, and Longstreet.

Mr. Magnus

143. Transcendentalism and Its Reaction. (4) I.

Lecture—3 hours. Prerequisite: course 1A. Flowering of American romanticism; the metaphysical tradition, Oriental and European antecedents, philosophical idealism, and literary

* Not to be given, 1967-68.

achievement of Transcendentalism (Emerson, Thoreau, Whitman); the critical tempers of Hawthorne and Melville; Emily Dickinson.

Mr. Magnus

144. American Literature from 1865 to 1914. (4) II.

Lecture—3 hours. Prerequisite: course 1A. Religion, local color, social criticism, naturalism, *fin de siècle* aestheticism; Twain, James, Crane, Dreiser, Wharton.

Mr. Carter

146. Modern American Literature: 1914 to 1940. (4) III.

Lecture—3 hours. Prerequisite: course 1A. The Modernist movement, disillusionment, artistic experimentalism, classical revival, New Criticism, proletarian literature, romantic nationalism, European currents, Pound, Eliot, Frost, Hemingway, Fitzgerald, Crane, Faulkner, and Stevens.

Mr. Hays

***147. Modern American Literature: 1940 to the Present. (4) I.**

Lecture—3 hours. Prerequisite: course 1A. Contemporary fiction, poetry, and drama. The impact of World War II on the younger writers; experimentation and formalism in poetry and the drama.

Mr. Weber

150A. English Drama to Marlowe. (4) I.

Lecture—3 hours. Prerequisite: course 1A. The development of the drama from its beginnings to the Renaissance. Miracle and mystery plays; the morality tradition. Early comedy, tragedy, and chronicle plays.

Mrs. Homann

***150B. English Drama from Marlowe to 1642. (4) II.**

Lecture—3 hours. Prerequisite: course 1A. Shakespeare's contemporaries in the drama, including Webster, Jonson, Beaumont and Fletcher, and others. The revenge play and tragicomedy; post-Shakespearean development of dramatic action and blank verse.

Mrs. Wright

150C. English Drama from 1642 to 1890. (4) II.

Lecture—3 hours. Prerequisite: course 1A. Restoration comedy, eighteenth-century sentimental comedy, and nineteenth-century melodrama, with particular attention to plays of Congreve, Sheridan, and Boucicault.

Mr. Hays

***150D. British Drama from 1890 to the Present. (4) I.**

Lecture—3 hours. Prerequisite: course 1A. The rise of dramatic realism; the chief reactions against it; emphasis on Shaw, O'Casey, and Osborne.

Mr. Hogan

***152. American Drama from its Beginnings to the Present. (4) II.**

Lecture—3 hours. Prerequisite: course 1A. Critical and historical survey of drama in Amer-

ica from its eighteenth-century origins with emphasis on Boucicault, Rice, O'Neill, Williams, and Miller. Mr. Hogan

155A. The English Novel: 1700-1770. (4) I.

Lecture—3 hours. Prerequisite: course 1A. Realism and the rise of the modern novel. Defoe, Richardson, Fielding, Sterne, and Smollett. Mr. Hopkins

155B. The English Novel: 1770-1850. (4) II.

Lecture—3 hours. Prerequisite: course 1A. Sense and Sensibility in the novel. Walpole, Radcliffe, Austen, Scott, Dickens, Bronte sisters. Mrs. Needham

***155C. The English Novel: 1850-1900. (4) III.**

Lecture—3 hours. Prerequisite: course 1A. Major Victorian novelists: their theory and practice. Dickens, Thackeray, Trollope, Eliot, Meredith, and Hardy. Mr. Gilbert

155D. The English Novel: 1900 to the Present. (4) I.

Lecture—3 hours. Prerequisite: course 1A. Major figures including Conrad, Joyce, and Lawrence. Impressionism, the revolt against naturalism; the experimental novel; the anti-modernist reaction. Mr. Hoffman

158A. The American Novel to 1900. (4) II.

Lecture—3 hours. Prerequisite: course 1A. The rise and development of the American novel from its eighteenth-century beginnings; Cooper, Hawthorne, Melville, Howells, Twain, James, Crane. Mr. Hoffman

***158B. The American Novel from 1900 to Present. (4) III.**

Lecture—3 hours. Prerequisite: course 1A. Major American novelists of the twentieth century. Wharton, Dreiser, Faulkner, Hemingway, Fitzgerald, Bellow. Mr. Hays

160. The English Lyric. (4) III.

Lecture—3 hours. Prerequisite: course 1A. The history of poetic style from the sixteenth to the twentieth centuries. Major examples of the short poem in relation to intellectual history, to foreign influences, and to the development of poetic forms. Mr. Rudrum

***170A. The Epic. (4) II.**

Lecture—3 hours. Prerequisite: course 1A. Studies in the development of the epic. Miss Van Norden

***170B. European Influences on the English and American Novel. (4) III.**

Lecture—3 hours. Prerequisite: course 1A. Studies in the English and American novel, with special reference to continental influences. Mr. Carter

171. English Bible as Literature. (4) III.

Lecture—3 hours. Prerequisite: course 1A. Old Testament poetry and prophecy; the Gospels and certain Epistles. Miss Van Norden

***175. American Literary Humor. (4) I.**

Lecture—3 hours. Prerequisite: course 1A. The American humorous vision as expressed in such modes as comedy, satire, irony, and their combinations from the seventeenth century to the present, with attention given to such matters as the nature of humor and the cultural influences affecting its development. Mr. Weber

189. Study of a Major Writer. (4) I, III.

Lecture—3 hours. Prerequisite: course 1A. The artistic development of one major writer and his intellectual and literary milieu. May be repeated for credit when a different writer is studied. Mr. Carter, Mr. Hoffman

194H. Special Study for Honors Students.

(2) I, II, III.

Prerequisite: honors status. Individual directed study leading to preparation of a long paper. May be repeated once for credit.

The Staff

198. Directed Group Study. (4) I, II, III.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

200. Techniques of Literary Scholarship. (4) II.

Lecture—3 hours. The elements of bibliography with special attention to literature and discussion of the principal modes of literary investigation—critical, historical, textual, and others. Mr. Hopkins

201. Literary Criticism. (4) II.

Lecture—3 hours. Survey of the major critics from Aristotle to the present, with emphasis on the relationship of critical theory to the history of literature. Mr. Hayden

205. Introduction to Old English. (4) I.

Lecture—3 hours. The language of Anglo-Saxon England; readings in Old English prose and poetry. Mr. Harsh

206. Beowulf. (4) II.

Lecture—3 hours. A study of the poem and the Heroic Age of Germanic literature. Mr. Silvia

***207. Middle and Early Modern English. (4) III.**

Lecture—3 hours. Earlier dialects; the new vocabulary; the later sound shifts and changes to the seventeenth century. Readings in illustrative documents. Mr. Harsh

* Not to be given, 1967-68.

210. Readings in English and American Literature.

(4) I, II, III.

Discussion—3 hours. This course will be divided into various sections according to the topics selected.

The Staff

***215. Arthurian Romance. (4) I.**

Lecture—3 hours. The sources of Arthurian Romantic literature; Continental and English literary treatment; Malory's synthesis; significant changes of attitudes in post-Malory literature.

Mrs. Homann

***225. Modern Anglo-Irish Writers. (4) I.**

Lecture—3 hours. Mr. Hogan

***230A. Studies in Major Writers: Chaucer. (4) III.**

Seminar—3 hours. Mrs. Homann

230B. Studies in Major Writers: Milton. (4) II.

Seminar—3 hours. Mr. Rudrum

***231. American-European Literary Relations. (4) I.**

Lecture—3 hours. The interchange of ideas and forms between America and Europe.

Mr. Carter

***232A. Problems of English Romantic Literature.**

(4) III.

Seminar—3 hours. Selected issues in the current study and critical assessment of Romantic literature.

Mr. Hayden

***232B. Problems of English Victorian Literature.**

(4) II.

Seminar—3 hours. Selected issues in the current study and critical assessment of Victorian literature.

Mr. Gilbert

***233. Problems in American Literature. (4) II.**

Seminar—3 hours. Selected topics for intensive investigation.

Mr. Carter

***234. Dramatic Literature. (4) III.**

Seminar—3 hours. An historical introduction to dramatic theory; the genres of tragedy, comedy, and tragicomedy.

Mr. Hogan

***235. Fiction. (4) I.**

Seminar—3 hours. Theories of fiction as reflected in the practice of writers from the eighteenth century to the present.

Mrs. Needham

***236. Poetics. (4) II.**

Seminar—3 hours. Metaphor, style, and structure in English poetry from the sixteenth century to the present.

Mr. Weber

237. Modern Critical Theory. (4) III.

Seminar—3 hours. Examination of problems in the theory underlying the practice of literary criticism from I. A. Richards and T. S. Eliot to the present.

Mr. Fishman

240A-240B-240C. Medieval Literature.

(4-4-4) I-II-III.

Seminar—3 hours.

Mrs. Homann

***242A-242B-242C. Sixteenth-Century Literature.**

(4-4-4) I-II-III.

Seminar—3 hours.

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244A-244B-244C. Shakespeare. (4-4-4) I-II-III.

Seminar—3 hours.

Mr. Halio

246A-246B-246C. Seventeenth-Century Literature.

(4-4-4) I-II-III.

Seminar—3 hours.

Miss Van Norden

248A-248B-248C. Eighteenth-Century Literature.

(4-4-4) I-II-III.

Seminar—3 hours.

Mrs. Needham

***250A-250B-250C. Romantic Literature.**

(4-4-4) I-II-III.

Seminar—3 hours.

Mr. Fishman

252A-252B-252C. Victorian Literature.

(4-4-4) I-II-III.

Seminar—3 hours.

Mr. Fishman

***254A-254B-254C. Twentieth-Century British Literature. (4-4-4) I-II-III.**

Seminar—3 hours.

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***256A-256B-256C. Early American Literature.**

(4-4-4) I-II-III.

Seminar—3 hours.

Mr. Weber

***258A-258B-258C. American Literature: 1800 to the Civil War. (4-4-4) I-II-III.**

Seminar—3 hours.

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260A-260B-260C. American Literature: Civil War to 1914. (4-4-4) I-II-III.

Seminar—3 hours.

Mr. Woodress

262A-262B-262C. American Literature after 1914.

(4-4-4) I-II-III.

Seminar—3 hours.

Mr. Weber

***264A-264B-264C. Studies in Modern British and American Literature. (4-4-4) I-II-III.**

Seminar—3 hours.

Mr. Hanzo

299. Individual Study. (1-4) I, II, III.

The Staff

299D. Special Study for the Doctoral Dissertation.

(1-8) I, II, III.

The Staff

* Not to be given, 1967-68.

Professional Courses

300. Problems in Teaching English Language Literature and Composition in Secondary Schools. (3) I, II.

Lecture—2 hours. Prerequisite: senior or graduate standing; an English teaching major or minor. This course should be completed before practice teaching. The course is accepted in

partial satisfaction of the requirement in education for the general secondary credential.

Mr. Harsh

301. The Teaching of English as a Foreign Language. (4) III.

Lecture—3 hours. Methods for the use of applied linguistics in the teaching of English to nonnative speakers.

Mrs. Schotta

ENTOMOLOGY

Richard M. Bohart, Ph.D., *Chairman of the Department*

Department Office, 124 Robbins Hall

Professors:

Oscar G. Bacon, Ph.D.
 Stanley F. Bailey, Ph.D.
 Richard M. Bohart, Ph.D.
 John E. Eckert, Ph.D. (*Emeritus*)
 Harry H. Laidlaw, Jr., Ph.D.
 William H. Lange, Jr., Ph.D.
 Leslie M. Smith, Ph.D. (*Emeritus*)
 Eugene M. Stafford, Ph.D.
 Francis M. Summers, Ph.D.

Associate Professors:

Albert A. Grigarick, Jr., Ph.D.
 Frank E. Strong, Ph.D.

Assistant Professors:

Norman E. Gary, Ph.D.
 Charles L. Judson, Ph.D.
 C. A. H. McClelland, Ph.D.

*Professors:*

Merlin W. Allen, Ph.D. (*Nematology*)
 James R. Douglas, Ph.D. (*Veterinary Microbiology*)
 Paul D. Hurd, Jr., Ph.D. (*Berkeley Campus*)

Lecturers:

Herman F. Beckman, Ph.D.
 Donald L. McLean, Ph.D.
 Jerry A. Powell, Ph.D. (*Berkeley Campus*)

Departmental Major Advisers.—See Schedule and Directory Listing.

Bachelor of Science Major Program and Graduate Study. See pages 53 and 127.

Lower Division Courses**1. An Introduction to Entomology. (5) III.**

Lecture—3 hours; laboratory—6 hours. A basic study of insects: their biology, anatomy, classification, and relation to human welfare.

Mr. Strong

10. Natural History of Insects. (3) I.

Lecture—3 hours. Designed for students not specializing in entomology. Not open for credit to students who have had course 1 but students who have taken course 10 may take course 1 for credit. Biology, taxonomy and behavior of insects. A cultural and technical course providing an introduction to the insects.

Mr. Bacon

Upper Division Courses**101. Introduction to Structure and Function in Insects. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1. General principles of insect morphology with emphasis on the functional approach. Comparative anatomy of selected insect types.

Mr. Summers

102. Insect Physiology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1 or equivalent; Chemistry 8. Recommended: course 101. Vital functions of insects and related organisms.

Mr. Judson

103. Systematic Entomology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory course in zoology or entomology. The principles of taxonomy in animals; speciation; introduction to classification and nomenclature.

Mr. Bohart

104. Insect Ecology. (4) III.

Lecture—4 hours. Prerequisite: upper division standing in one of the biological sciences. Principles of ecology with examples from the insects; analysis of the insect environment; population dynamics.

Mr. Bailey

109. Field Taxonomy and Ecology. (5) Summer.

Lecture—2 hours; laboratory—24 hours. Prerequisite: an introductory course in Entomology or consent of instructor. The study of insects in their natural habitats; their identification and ecology.

Mr. Bohart, Mr. Hurd, Mr. Powell

110. Economic Entomology. (4) III.

Lecture—2 hours; laboratory—6 hours. An introductory course dealing with the identifica-

tion, biology, and control of economic insects, with emphasis on those attacking agricultural crops.

Mr. Grigarick

112. Principles of Agricultural Entomology. (4) II.

Lecture—4 hours. Prerequisite: an introductory course in entomology or consent of instructor. Principles and problems in the control of insects and mites; integrated control, residues, considerations of application equipment, philosophy of sampling.

Mr. Lange

116. Biology of Aquatic Insects. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: an introductory course in entomology or consent of instructor. A study of the life histories, ecology, and identification of insects associated with streams, ponds, and lakes. Offered in even-numbered years.

Mr. Grigarick

117. Chemistry of Insecticides. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8, or consent of instructor. Chemical composition and reactions of insecticides; their physiological effects on plant and animal tissues.

Mr. Stafford

119. Apiculture. (3) II.

Lecture—3 hours. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities.

Mr. Laidlaw, Mr. Gary

119L. Apiculture Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 119 (may be taken concurrently). Biology and behavior of honeybees (especially communicative behavior); fundamentals of colony management necessary for efficient agricultural use; utilization of bees in research and teaching.

Mr. Gary, Mr. Laidlaw

121. Insect Behavior. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences. Evolution of behavior, sense organs, specific types and patterns of behavior, comparative behavior, learning, and applied aspects of behavioral phenomena. Analysis of movies on behavior.

Mr. Gary

123. Classification of Immature Insects. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory course in entomology. Criteria used to identify the immature forms of the principal orders and families of insects; primary emphasis on economic groups. Offered in even-numbered years.

Mr. Lange

125. Insect Vectors of Plant Pathogens. (3) III.

Lecture—3 hours. Prerequisite: an introductory course in entomology. Recommended: Plant Pathology 120. The role of insects and mites in

the transmission of plant pathogens with emphasis on the vector-pathogen relationships. Approaches to control.

Mr. McLean

125L. Insect Vectors of Plant Pathogens Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 125 (may be taken concurrently). Practical experience in specialized techniques used in the study of relationships of plant viruses to their insect vectors.

Mr. McLean

127. Acarology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 103 or 110. The morphology, taxonomy, and ecology of mites, with emphasis on plant and animal parasites. Offered in odd-numbered years.

Mr. Summers

130. Biological Control of Insect and Weed Pests. (4) I.

Lecture—4 hours. Prerequisite: introductory course in entomology or consent of instructor. Theories and practices of biological control; population phenomena, and the biology of entomophagous insects. Offered in odd-numbered years.

Mr. Bacon

153. Medical Entomology. (3) III.

Lecture—3 hours. Prerequisite: one course in entomology or consent of instructor. The worldwide relationships of insects and other arthropods to human health. The biology and basic classification of medically important arthropods with special emphasis on the ecology of arthropod-borne diseases of man and principles of their control.

Mr. McClelland

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honor students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff

198. Directed Group Study. (1-5) I, II, III, S.

Prerequisite: consent of instructor.

The Staff (Mr. Bacon in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III, S.

The Staff (Mr. Grigarick in charge)

Graduate Courses

202. Advanced Insect Physiology. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 102 or Zoology 112, or consent of instructor. Recommended: Biochemistry 101A or 101B. Selected topics of insect physiology. Intensive study of topics of current in-

terest, which will vary from year to year. The course may be repeated for credit. Offered in odd-numbered years. Mr. Judson

203. Principles of Systematic Entomology. (3) II.

Lecture—3 hours. Prerequisite: course 103. Theory and philosophy of taxonomy with emphasis on phylogeny, zoogeography, and nomenclature of insects. Offered in even-numbered years. Mr. Bohart

219. Advanced Apiculture. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 119, or consent of instructor. Advanced topics in bee biology with special consideration of morphology, genetics, caste differentiation, and artificial insemination. Offered in even-numbered years. Mr. Laidlaw

253. Advanced Medical Entomology. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: one upper division course in entomology other than 153 and one course in microbiology; course 153 is recommended. A

study in depth of one or more selected arthropod-born diseases of man with emphasis on the relationship of the physiology, behavior and population dynamics of the vector to the ecology of the disease. Emphasis in the laboratory on epidemiologic techniques relating to vectors and taxonomy of a selected group.

Mr. McClelland, Mr. Lavoipierre

275. Principles and Methods of Entomological Research. (4) II.

Lecture—2 hours; laboratory—6 hours. Techniques and purposes of the scientific method as related to the field of entomological research with emphasis on problem selection, methods of attack, and the accompanying collection, evaluation, and presentation of data. Offered in odd-numbered years. Mr. Strong

290. Seminar. (2) I, II, III.

Seminar—2 hours.

The Staff (Mr. Strong in charge)

299. Research. (1-12) I, II, III, S.

The Staff (Mr. Summers in charge)

EPIDEMIOLOGY AND PREVENTIVE MEDICINE

Calvin W. Schwabe, D.V.M., M.P.H., Sc.D., *Chairman of the Department*

Department Office, 2079 Haring Hall

Professors:

Henry E. Adler, D.V.M., Ph.D.
Raymond A. Bankowski, D.V.M., Ph.D.
⁵John B. Enright, Ph.D.
Livio G. Raggi, D.V.M., Ph.D.
Walter W. Sadler, D.V.M., M.P.H.
Calvin W. Schwabe, D.V.M., M.P.H.,
Sc.D.

Associate Professor:

Hans P. Riemann, D.V.M., Ph.D.

Assistant Professors:

Charles E. Franti, Ph.D.
Joyce E. Goggin, D.V.M., M.P.H.

◇ ◇ ◇

Professors:

Ralph J. Audy, M.B., Ph.D. (*San Francisco Campus*)
Nicholas L. Petrakis, M.D. (*San Francisco Campus*)

Senior Lecturer:

Dale R. Lindsay, Ph.D.

Lecturers:

Robert B. Bushnell, D.V.M.
Fred N. Cooper, B.S.
George L. Crenshaw, D.V.M.
Benjamin H. Dean, D.V.M., M.P.H.

Richard C. Dorn, D.V.M., M.P.H.

Bryan Mayeda, D.V.M.

Arnold S. Rosenwald, D.V.M., Ph.D.

Herold G. Wixom, D.V.M.

James H. Wommack, D.V.M.

Richard Yamamoto, Ph.D.

Upper Division Courses

101. Perspectives in Veterinary Medicine. (2) I.

Lecture—2 hours. Consideration of the present-day scope of veterinary medicine and of the role of the veterinary profession in modern society. Mr. Schwabe

102. Biomedical Information Retrieval. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of the instructor. The use of bibliographic tools in the biomedical sciences; the use and availability of demographic data; the application of manual and machine systems for storage and retrieval of data; and consideration of computerized systems in literature retrieval and clinical data processing.

Miss Goggin, Mr. Merala, Mr. Franti

103A-103B-103C. Medical Statistics. (3-3-3)

I, II, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: two years of high school algebra and upper division or graduate student status in School of Veterinary Medicine or School of

⁵ Sabbatical leave in residence, 1967-68.

Medicine or permission of the instructor. Use of statistics in clinical, laboratory and population medicine; probability; normal, binomial, student-t and chi-square distributions; hypothesis testing; introduction to regression, correlation, analysis of variance; simple nonparametric tests; analysis of time-dependent variation; bioassay; statistical problems in follow-up studies.

Mr. Franti

111. Animal Hygiene (3) III.

Lecture—3 hours. Prerequisite: Biology 1 or consent of the instructor. The causes, prevention and control of animal diseases important in economic agriculture and in public health, with emphasis upon animal management factors in disease.

The Staff (Mr. Adler in charge)

140. Principles of Epidemiology. (2) II.

Lecture—1 hour; case study—2 hours. Prerequisite: sophomore standing in the School of Veterinary Medicine or permission of instructor. Introduction to medical ecology with special consideration given to modes of disease transmission and to interrelationships between those host, agent and environmental factors which are responsible for the distributional patterns of diseases in space and time.

Mr. Schwabe

150. Food-borne Infections and Intoxications. (4) II.

Lecture—4 hours. Prerequisite: Bacteriology 2. Prevalence and characteristics of those diseases of man which are derived from food or food sources; access of disease agents to and distribution in food and food sources; exposure of man to those agents; prevention of food-borne diseases.

Mr. Riemann, Mr. York

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

201. Diseases of Laboratory Animals. (3) II.

Prerequisite: Senior standing in veterinary medicine or consent of instructor. A study of infectious and noninfectious diseases of laboratory animals, including diagnostic procedures and treatment.

Mr. Edward, Mr. Adler, Mr. Bustad, Mr. Sadler, Mr. Yamamoto, Miss Kilejian, Mr. Theilen

208. Avian Medicine. (3) II.

Lecture—3 hours. Prerequisite: junior standing in the School of Veterinary Medicine or consent of the instructor. Etiology, diagnosis, epidemiology, prevention and control of diseases of poultry, including those important to the public health.

Mr. Raggi (in charge), Mr. Adler,
Mr. Bankowski

209. Avian Medicine Laboratory. (2) I.

Lecture—1 hour; laboratory—2 hours. Prerequisite: senior standing in the School of

Veterinary Medicine. Diagnosis of avian diseases by necropsy and laboratory procedures. Selected diseases, including some of bacterial, viral and chemical etiology, are experimentally induced for study.

Mr. Yamamoto (in charge), Mr. Adler,
Mr. Raggi, Mr. Bankowski

210. Advanced Epidemiology. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: A doctoral degree (or equivalent) in veterinary medicine, human medicine or dental medicine, or permission of instructor. Methods for the study of diseases in populations both of lower animals and of man, with critical discussions of illustrative case examples of "classical" and contemporary epidemiological research.

Mr. Schwabe, Miss Goggan

212. Epidemiology of the Zoonoses. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 210 or permission of instructor. The epidemiological features of infections and infestations shared by man and other vertebrate animals, with particular attention to those perpetuated in nature by wildlife and those which are of greater public health than economic significance.

Mr. Enright

214. Comparative Epidemiology of Noninfectious Diseases. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 210 or permission of instructor. Study of the environmental and host factors which are associated with the occurrence of diseases of noninfectious or unknown etiology. Emphasis will be placed on the comparison of the epidemiologic features of these diseases in man and lower animals.

Miss Goggan

216. Mass Screening for Diseases in Populations.

(2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 210 or permission of instructor. Recommended: Veterinary Microbiology 270. Consideration of immunodiagnostic, biochemical and other techniques for mass screening of human and animal populations for abnormalities and disease; evaluation of their usefulness to study incidence and/or prevalence of such conditions and for application in programs of prevention and control. Mr. Yamamoto, Mr. Adler

218. Disease Control and Eradication. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 216 or permission of instructor. Studies of various approaches used to control diseases in lower animals and man. Discussions will be concerned with past successes and failures and emphasis placed on future prospects and limitations of these methods. Mr. Bankowski

240. Public Health. (3) III.

Lecture—3 hours. Prerequisite: junior standing in the School of Veterinary Medicine or permission of the instructor. Introduction to public health and to the responsibilities of the veterinarian; consideration of the roles of lower animals in the causation and perpetuation of human diseases; consideration of occupational health hazards associated with the practice of veterinary medicine.

Mr. Schwabe

ing in the School of Veterinary Medicine or permission of the instructor. Principles and practice of inspection and sanitary control of meat of mammalian and avian origin and of milk.

Mr. Sadler, Mr. Riemann

250. Sanitary Control of Meat and Milk. (2) III.

Lecture—2 hours. Prerequisite: junior stand-

290. Seminar in Epidemiology and Preventive Medicine. (1) I, II, III.

Seminar—2 hours.

The Staff

298. Group Study. (1-9) I, II, III.

The Staff

299. Research. (1-9) I, II, III.

The Staff

FAMILY AND CONSUMER SCIENCES

Glenn R. Hawkes, Ph.D. Associate Dean, Family and Consumer Sciences Committee

Committee Office, 228 Administration Building

Committee in Charge:

Glenn R. Hawkes, Ph.D., (*Child Development*)

Fredric W. Hill, Ph.D. (*Nutrition*)

Mary Ann Morris, Ph.D. (*Consumer Sciences*)

J. Herbert Snyder, Ph.D., (*Agricultural Economics*)

O. E. Thompson, Ph.D. (*Agricultural Education*)

Teaching Faculty in Design:

Professor:

Richard D. Cramer, M.F.A.

Lecturers:

Helen A. Giambruni, M.A.

Helge B. Olsen

Rosana Pistolese, Classica

Katherine W. Rossbach, M.A.

Participating Departments:

AGRICULTURAL ECONOMICS

J. Herbert Snyder, Ph.D., *Chairman of the Department*

Department Office, 118 Voorhies Hall

AGRICULTURAL EDUCATION

Orville E. Thompson, Ph.D., *Chairman of the Department*

Department Office, T.B.—10

Associate Professor:

Emmy E. Werner, Ph.D.

◇ ◇ ◇

Lecturers:

Arline Johnson, M.S.

Jane N. Welker, M.A.

CONSUMER SCIENCES

Mary Ann Morris, Ph.D., *Chairman of the Department*

Department Office, 148 Home Economics Building

Professor:

Mary Ann Morris, Ph.D.

Assistant Professor:

Duane E. Heinz, Ph.D.

◇ ◇ ◇

Lecturers:

Kenneth C. Laughlin, Ph.D.

Anita M. Lear, M.S.

Harold P. Lundgren, Ph.D.

Agnes McClelland, M.A.

NUTRITION

Fredric W. Hill, Ph.D., *Chairman of the Department*
Department Office, 231 Home Economics Building

Professors:

Gladys J. Everson, Ph.D.
Fredric W. Hill, Ph.D.
Lucille S. Hurley, Ph.D.

Assistant Professors:

Betty E. Haskell, Ph.D.
Frances J. Zeman, Ph.D.

Departmental Major Advisers.—See *Schedule and Directory Listing*.

Bachelor of Science Major Program and Graduate Study. See pages 53 and 127.

Consumer Economics

Upper Division Courses

141. Consumers and the Market. (4) II.

Lecture—4 hours. Prerequisite: Economics 1A; Mathematics 13. Social and economic factors affecting consumer expenditures. The structure of the retail market and the effects of its performance on consumers. Agencies aiding and protecting consumers, sources of information available to consumers.

142. Social and Economic Problems of Families. (4) III.

Lecture—4 hours. Prerequisite: Economics 1A; Mathematics 13. The management of income and expenditures by the family. The use of consumer credit, savings, investments, and insurance by families.

198. Directed Group Study. (1-5) I, II, III. The Staff

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

The Staff

Graduate Courses

247. Consumption and Standards of Living. (4) III.

Lecture—4 hours. Prerequisite: course 141. An analytical treatment of household consumption behavior. The effects of income, prices, and household characteristics on expenditures. Standards of income and consumption adequacy.

290. Seminar. (1) I, II, III.

Seminar—1 hour.

299. Research. (1-12) I, II, III.

The Staff

Design

Upper Division Courses

130. Interior Design. (3) III.

Lecture—3 hours. Prerequisite: Art 2. Introduction to the principles of design. Analysis, organization, and solution of problems in interior design in reference to functional and aesthetic aspects.

Mr. Olsen

130L. Interior Design. (2) I, III.

Laboratory—6 hours. Prerequisite: course 130 (may be taken concurrently). Introduction to the principles of design. Analysis, organization, and solution of problems in interior design with reference to functional and aesthetic aspects.

Mr. Olsen

150. The House. (4) II.

Lecture—3 hours. Prerequisite: Art 2. The tenets of modern architecture as illustrated in the contemporary house.

Mr. Cramer

160A-160B-160C. Textile Design. (2-2-2) I-II-III.

Laboratory—6 hours. Prerequisite: Art 2 or consent of instructor. Studio projects in textile printing.

Mrs. Rossbach

191. History of Design. (3) I.

Lecture—3 hours. Prerequisite: 2 quarters of history of art. From ancient to modern times.

Mrs. Giambruni

192A-192B. Costume Design. (3-3) II-III.

Laboratory—9 hours. Prerequisite: Art 2 and Art 16, or consent of instructor. Studio projects in contemporary costume design.

Mrs. Pistolese

193. History of Costume. (3) II.

Lecture—3 hours. Prerequisite: 2 quarters of history of art. From ancient to modern times.

Mrs. Pistolese

195. History of Interior Design. (3) I.

Lecture—3 hours. Prerequisite: 2 quarters of history of art. From ancient to modern times.

Mrs. Giambruni

196A-196B. Advanced Interior Design. (3-3) I-II.

Laboratory—9 hours. Prerequisite: course 130L and Art 16, or consent of instructor. Studio projects in interior design.

Mr. Olsen

197. Individual Problems in Design. (3) II, III.

Laboratory—9 hours. Prerequisite: one year upper division work in design or consent of in-

structor. Senior thesis: a comprehensive design problem independently pursued under the direction of a member of the faculty. The Staff

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: upper division standing and consent of instructor. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III. The Staff

Foods

Upper Division Courses

100A. Experimental Food Study. (3) II.

Lecture—3 hours. Prerequisite: Bacteriology 2 (may be taken concurrently); Chemistry 8. Chemical and microbiological aspects of food, and their relation to physical and chemical changes in foods; regulatory agencies and laws.

100B. Experimental Food Study. (3) III.

Lecture—3 hours. Prerequisite: course 100A. Chemical and microbiological aspects of food, and their relation to physical and chemical changes in foods; factors influencing food combinations and service.

101A. Experimental Food Study Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 100A should be taken concurrently. Chemical and microbiological aspects of food and their relation to physical and chemical changes in foods.

101B. Experimental Food Study Laboratory. (2) III.

Laboratory—3 hours, discussion—1 hour. Prerequisite: course 101A; course 100B should be taken concurrently. Chemical and microbiological aspects of food and their relation to physical and chemical changes in foods; food combinations and service.

104A-104B. Advanced Food Studies. (4-4) I-II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100B and Physics 2C; or consent of instructor. Chemical and physical properties influencing characteristics of food materials. Mr. Heinz

104C. Introduction to Research in Foods. (4) III.

Lecture—1 hour; laboratory—9 hours. Prerequisite: course 104B. Senior thesis on independent problems. Mr. Heinz

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. The Staff

198. Directed Group Study. (1-5) I, II, III. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

Home Economics Education

Professional Course

300. Teaching Home Economics in Secondary Schools. (3) I, III.

Lecture—3 hours. Prerequisite: senior or graduate standing; a teaching major or minor in home economics. Instructional procedures and materials used in teaching home economics in secondary schools. This course should be completed before student teaching and is accepted as a part of the professional education requirements for the teaching credential.

Miss Johnson

Human Development

Upper Division Courses

131. Development in Infancy and Early Childhood. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Psychology 1A. Psychological and cultural factors in the development of infants and preschool children.

133. Laboratory in Child Development. (2) I, II, III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 131 (may be taken concurrently). Laboratory conducted at the nursery school.

Mrs. Welker

136. Development in Middle Childhood and Adolescence. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Psychology 1C. Psychological and cultural factors in the development of school-age children and adolescents.

Miss Werner

137. The Contemporary American Family. (4) III.

Lecture—4 hours. Sociological and psychological factors influencing marriage and the family in present-day society.

Mr. Hawkes

138A. Exceptional Children. (3) II.

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 131 and 136, or Psychology

112. Discussion of psychosis, neurosis, behavior disorders, and learning difficulties in children.

138B. Exceptional Children. (3) I.

Lecture—3 hours. Prerequisite: courses 131 and 136, or Psychology 112. General consideration of physically handicapped, retarded and gifted children.

Miss Werner

139. Diagnostic Techniques with Children. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 131 and 136, or Psychology 112. Evaluation of intelligence, personality, and special abilities of children. Class demonstration of individual tests for infants, preschool, and school-age children. Concepts of environment. Relevant research findings. Miss Werner

198. Directed Group Study. (1-5) I, II, III. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

290. Seminar. (1) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

Home Management

Upper Division Courses

140. Home Management. (4) I.

Lecture—4 hours. Prerequisite: Psychology 1A. Management principles in relation to family resources, goals, and values.

140L. Laboratory in Home Management. (3) II, III.

Prerequisite: course 140 and senior or graduate standing. Integrated experiences in the various phases of home management.

Institution Management

Upper Division Courses

121. Institution Food Study. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Foods 100B. The principles and problems involved in the preparation and service of food in institutions.

Miss Zeman

122A. Organization and Management of Institutions. (3) II.

Lecture—3 hours. Prerequisite: Foods 100B. Recommended: course 121. Organization and administration of institutional food services; management and training of personnel; work simplification, sanitation.

Miss Zeman

122B. Food Service Planning and Control. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 122A. Design of food service facilities; selection of equipment and furnishings. Procedures employed in financial control.

Miss Zeman

Nutrition

Lower Division Course

10. Discoveries and Concepts in Nutrition. (3) III.

Lecture—3 hours. Nutrition as a science; its historical development; the properties of foods.

Upper Division Courses

110. Principles of Nutrition. (5) II.

Lecture—4 hours; discussion—1 hour. Prerequisite: Biochemistry 101B (may be taken concurrently); a course in physiology or zoology. The fundamental principles of the nutrition of man and other animals. The nutrients in relation to physiological processes of growth, maintenance, and reproduction. Nutritional disorders.

112A-112B. Nutrition and Dietetics. (3-4) I-II.

Lecture—3-4 hours. Prerequisite: Chemistry 8; Physiology 2 or 101. 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. Miss Everson

113A-113B. Nutrition and Dietetics Laboratory. (1-1) I-II.

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.

Miss Everson

114. Physiological Processes in Child Development. (4) I.

Lecture—4 hours. Prerequisite: course 110 or 112B; Biochemistry 101B or consent of instructor. Physical development, physiological changes, and nutritional needs during the embryological period, infancy, childhood, and youth.

Mrs. Hurley

116. Nutrition and Diet Therapy. (5) I.

Lecture—5 hours. Prerequisite: course 112B; Biochemistry 101B. Physiological basis for the use of special diets. Problems in the planning and computation of dietaries for normal and pathological conditions.

Mrs. Haskell

117. Problems in Human Nutrition. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112B; Biochemistry 101B; Chemistry 5. Evaluation of methods of assessing nutritional status in humans. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in human nutrition. Mrs. Haskell

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to honors students of senior standing. Independent study of selected topics under the direction of a staff member or the writing of a senior thesis.

The Staff (Mr. Hill in charge)

198. Directed Group Study. (1-5) I, II, III. The Staff**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff

Graduate Courses**201A. Advanced General Nutrition. (3) I.**

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of protein and amino acid metabolism; animal energetics and energy metabolism. Comparative aspects.

The Staff (Mr. Hill in charge)

201B. Advanced General Nutrition. (3) II.

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of problems in nutrition with emphasis on minerals; water balance. Comparative aspects.

The Staff (Mr. Kratzer in charge)

201C. Advanced General Nutrition. (3) III.

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of metabolic function and nutritional importance of vitamins; essential fatty acids; deficiency and degenerative diseases. Comparative aspects.

The Staff (Mrs. Hurley in charge)

250. Concepts of Animal Nutrition. (3) II.

Lecture—3 hours. Prerequisite: courses 201A 201B, 201C. Dynamic interrelationships between food, animal, and environment, including concepts in food intake, digestion, absorption, and utilization of nutrients.

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff (Mr. Hill in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Hill in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Hill in charge)

Textiles and Clothing**Lower Division Course****7. Clothing Study. (2) I, III.**

Lecture—2 hours. Prerequisite: Art 2, Psychology 1A. Social, psychological, and artistic aspects of clothing as related to the selection and design for individuals.

Mrs. Lear

Upper Division Courses**160. Introduction to Textiles. (3) II.**

Lecture—3 hours. Prerequisite: Chemistry 8. Study of plant, animal, and synthetic fibers used in textiles and of the finished textile fabrics.

Miss Morris

160L. Introduction to Textiles Laboratory. (2) II, III.

Laboratory—6 hours. Prerequisite: course 160 (may be taken concurrently). Study of plant, animal, and synthetic fibers used in textiles and of the finished textile fabrics.

Miss Morris

161. Textile Fibers. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 160. The chemical and physical structure of textile fibers, and its relation to fiber and fabric properties.

Mr. Laughlin

162. Textile Fabrics. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 160. The properties of fabrics as related to serviceability, comfort, and appearance.

Mr. Laughlin

172. Socio-Economic Factors of Clothing and Textiles. (3) II.

Lecture—3 hours. Prerequisite: Economics 1A, sociology or cultural anthropology; Psychology 1A. Clothing and textiles as related to social, economic, and psychological aspects of families and cultures.

Mrs. Lear

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to honors students of senior standing. Independent study of selected topics under the direction of a staff member, or members of the staff. Completion will involve the writing of a senior thesis.

The Staff

198. Directed Group Study. (1-5) I, II, III. The Staff**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff

Graduate Courses**292. Seminar in Textiles. (2) I, II, III.**

Seminar—3 hours.

The Staff

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

Professional Courses**370. Clothing Study Laboratory. (2) I, II, III.**

Laboratory—6 hours. Prerequisite: course 7 (may be taken concurrently). Application of selection, design, and construction principles in different textile fabrics. Miss McClelland

375. Clothing Design Laboratory. (2) I, II, III.

Laboratory—6 hours. Prerequisite: course

370. A knowledge of the principles of fitting and basic dress design through the medium of flat pattern designing, drafting and draping.

Miss McClelland

376. Advanced Clothing Laboratory. (3) I, III.

Laboratory—9 hours. Prerequisite: course 370. Advanced problems and tailoring techniques in clothing construction.

Miss McClelland

FOOD SCIENCE

Martin W. Miller, Ph.D., *Chairman of the Committee*

Committee Office, 258 Cruess Hall

Committee in Charge:

Harold W. Berg, M.S. (*Viticulture and Enology*)
Clinton O. Chichester, Ph.D. (*Food Science and Technology*)

Participating Departments:**FOOD SCIENCE AND TECHNOLOGY**

Clinton O. Chichester, Ph.D., *Chairman of the Department*

Department Office, 126A Cruess Hall

Professors:

Clinton O. Chichester, Ph.D.
Edwin B. Collins, Ph.D.
Walter L. Dunkley, Ph.D.
Robert E. Feeney, Ph.D.
Eugene L. Jack, Ph.D. (*Emeritus*)
Walter G. Jennings, Ph.D.
George L. Marsh, M.S.
Emil M. Mrak, Ph.D.
Thomas A. Nickerson, Ph.D.
Herman J. Phaff, Ph.D. (*Food Science and Technology and Bacteriology*)
Chester L. Roadhouse, D.V.M. (*Emeritus*)
Lloyd M. Smith, Ph.D.
Clarence Sterling, Ph.D.
George F. Stewart, Ph.D.
Aloys L. Tappel, Ph.D. (*Food Science and Technology and Nutrition*)
Nikita P. Tarassuk, Ph.D.
Reese H. Vaughn, Ph.D.
John R. Whitaker, Ph.D.

Associate Professors:

Richard A. Bernhard, Ph.D.
Mendel Mazelis, Ph.D.
Martin W. Miller, Ph.D.

Edwin B. Collins, Ph.D. (*Food Science and Technology*)

Duane E. Heinz, Ph.D. (*Consumer Science*)

Martin W. Miller, Ph.D. (*Food Science and Technology*)

Assistant Professors:

Ralph E. Kunkee, Ph.D. (*Viticulture and Enology*)
Michael J. Lewis, Ph.D.
Morris H. Woskow, Ph.D. (*Food Science and Technology and Psychology*)
◇ ◇ ◇

Professors:

Maynard A. Amerine, Ph.D. (*Viticulture and Enology*)
Harold W. Berg, M.S. (*Viticulture and Enology*)
James F. Guymon, Ph.D. (*Viticulture and Enology*)
Samuel B. Lepkovsky, Ph.D. (*Poultry Husbandry; Berkeley Campus*)
Edward B. Roessler, Ph.D. (*Mathematics*)
Joseph M. Smith, Sc.D. (*Chemical Engineering*)
A. Dinsmoor Webb, Ph.D. (*Viticulture and Enology*)

Associate Professors:

John C. Harper, D.Sc. (*Agricultural Engineering*)
Daniel W. Peterson, Ph.D. (*Poultry Husbandry*)

Lecturers:

A. Wade Brant, Ph.D.
 Donald G. Crosby, Ph.D.
 Dieter W. Gruenwedel, Ph.D.

Wendell W. Kilgore, Ph.D.
 Bor S. Luh, Ph.D.
 Rose Marie Pangborn, M.S.
 Vernon L. Singleton, Ph.D. (*Viticulture and Enology*)

VITICULTURE AND ENOLOGY

Harold W. Berg, M.S., *Chairman of the Department*
 Department Office, 1023 Wickson Hall

Professors:

Maynard A. Amerine, Ph.D.
 Harold W. Berg, M.S.
 James A. Cook, Ph.D.
 James F. Guymon, Ph.D.
 Klayton E. Nelson, Ph.D.
 Harold P. Olmo, Ph.D.
 Robert J. Weaver, Ph.D.
 A. Dinsmoor Webb, Ph.D.
 Albert J. Winkler, Ph.D., LL.D. (*Emeritus*)

foods, feeds, and fibers to provide desirable qualities, such as convenience, economy and utility. Principles used in raw product selection, conversion, preservation, and quality control.

Mr. Miller, Mr. Dunkley

101. Chemistry and Biochemistry of Food Processing. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101B. Chemical and biochemical principles in relation to food processing problems: hydrophilic polymers, enzymes, lipids, proteins, and vitamins.

Mr. Sterling, Mr. Tappel

102. Biochemistry and Technology of Malting and Brewing. (2) III.

Lecture—2 hours. Prerequisite: Biochemistry 101B. Special attention is paid to the complex biochemistry of raw materials, malting, brewing, and fermentation as it affects industrial practice. Field trips and pilot brewing by arrangement.

Mr. Lewis

103. Physical and Chemical Methods for Food Analysis. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biochemistry 101B; Chemistry 5; Chemistry 8 (may be taken concurrently). Theory and application of physical and chemical methods for analyzing foods.

Mr. Whitaker, Mr. Bernhard

104A. Food and Industrial Microbiology. (2) II.

Lecture—2 hours. Prerequisite: Bacteriology 2; Chemistry 8. Taxonomy, physiology, ecology, and control of microorganisms important in manufacturing and ripening foods, producing defects, and spoilage; disposing of wastes and protecting public health; bacteriophage action and control.

Mr. Collins and Mr. Vaughn

104B. Food and Industrial Microbiology. (2) III.

Lecture—2 hours. Prerequisite: course 104A. Continuation of course 104A with emphasis on destruction of microorganisms, and food-borne infections and intoxications.

Mr. Collins and Mr. Vaughn

Food Science and Technology**Lower Division Course****1. Introduction to Food Science. (3) I.**

Lecture—3 hours. 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.

Mr. Amerine, Mr. Stewart, Mr. Vaughn

Upper Division Courses**100. Processing Agricultural Products. (5) I.**

Lecture—4 hours; laboratory—3 hours. Prerequisite: Biology 1; Chemistry 8. Processing of

105A-105B. Food and Industrial Microbiology**Laboratory. (2-2) II-III.**

Laboratory—6 hours. Prerequisite: courses 104A-104B (should be taken concurrently);

Bacteriology 2; Chemistry 8. Laboratory procedures selected to follow subject matter sequence of course 104A-104B.

Mr. Collins and Mr. Vaughn

*106. Industrial Fermentations. (3) I.

Lecture—3 hours. Prerequisite: Bacteriology 2. Microorganisms and their activity in relation to industrial processes such as baking, brewing, and the production of industrial solvents, vitamins, enzymes, and drugs. For laboratory experience in this field, students may register in Food Science and Technology 106L.

Mr. Lewis, Mr. Phaff, Mr. Kunkee

106L. Food and Industrial Microbiology Summer

Laboratory. (3)

Laboratory—90 hours total. Prerequisite: A course in Industrial Fermentation. Microorganisms and their activities in relation to industrial processes such as baking; brewing; production of industrial alcohol, yeasts, solvents, vitamins, enzymes, antibiotics, and other drugs.

Mr. Lewis

107. Principles of Sensory Evaluation of Foods.

(4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 13 and ability to use the analysis of variance. Nature of sensory response with emphasis on taste and smell as related to foods; design and methodology of small panel and consumer panel testing; and application of appropriate mathematical procedures.

Mr. Amerine, Mrs. Pangborn, Mr. Woskow

*108A. Food Plant Sanitation. (2) I.

Lecture—2 hours. Prerequisite: Chemistry 1A. Principles of water conditioning and water treatment, chemical sanitizing agents, metallic corrosion, fundamental concepts in the disposal of wastes, and discussion of other factors relating to food plant sanitation.

Mr. Jennings

*108B. Food Plant Sanitation. (2) II.

Lecture—2 hours. Prerequisite: Chemistry 8. Principles of hard-surface detergency; detergent classification and formulations, soil and substrate considerations, energy relationships in detergency, and theories and mechanisms of detergency.

Mr. Jennings

109. Quality Control for Food Processing

Operations. (3) III.

Lecture—3 hours. Prerequisite: course 103, and Mathematics 13. Objectives of quality control; measurement of quality attributes; development of grades and standards of quality; sampling and inspection techniques; statistical procedures; application of analyzed data to control of quality.

Mr. Bernhard and Mr. Smith

* Not to be given, 1967-68.

110A. Engineering Principles of Food Processing.

(4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 109B; Mathematics 16C; Physics 2B, 3B. Application of the conservation of mass and energy to food processing. Elements of fluid mechanics and heat transfer and introduction to process principles, including countercurrent operation and equilibrium stage processing. Field trips to food processing operations in the area.

Mr. Dunkley, Mr. Guymon, Mr. Harper

110B. Engineering Principles of Food Processing.

(4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110A. Continuation of course 110A, with emphasis on evaporation, psychrometry, dehydration, sterilization, freezing, process control, and process evaluation.

Mr. Dunkley, Mr. Harper, Mr. Guymon

113. Structure of Food Materials. (3) I.

Lecture—2 hours; laboratory—1 hour. Anatomical features and structural properties of foods; histochemical tests of food tissues; rheological characteristics; food texture.

Mr. Sterling

114. Principles of Processing Fruit and Vegetable Products. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Bacteriology 2; Chemistry 8. Technical principles relating to processing operations used in the commercial preservation of fruit and vegetable products; theory and practical applications; field trips.

Mr. Marsh

118. Principles of Dairy Processing. (3) I.

Lecture—3 hours. Prerequisite: Bacteriology 2; Chemistry 8. Principles of selected processes, including pasteurization, sterilization, homogenization, separation and condensing, and their application in the processing of fluid dairy foods.

Mr. Dunkley

119. Principles of Dairy Processing. (3) III.

Lecture—3 hours. Prerequisite: Bacteriology 2; Chemistry 8. Principles of freezing, drying, crystallization, emulsification, stabilization, and fermentation and their application in the manufacture of frozen, dried and cultured dairy products, cheese, and butter.

Mr. Nickerson

122. An Introduction to Enzymology. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biochemistry 101B. Principles of purification, physicochemical and enzymatic properties, and utilization with emphasis on enzymes which are used, or have potential use, in the food and beverage industries.

Mr. Whitaker

130. Chemistry of Milk and Dairy Products. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101A. The chemistry of milk constituents;

physical and chemical properties of milk; and the changes that occur during the processing and storage of dairy products, with emphasis on quality. Offered in even-numbered years.

Mr. Tarassuk

190. Recent Advances in Food Technology. (1) I.

Lecture—1 hour. Prerequisite: two courses in Food Science and Technology. Assigned topics, reports, and discussions concerning recent advances in food technology.

Mr. Chichester

194H. Special Study for Honors Students.

(1–5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the Staff. Completion will involve the writing of a senior thesis.

The Staff

*198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Chichester in charge)

199. Special Study for Advanced Undergraduates.

(1–6) I, II, III.

The Staff (Mr. Chichester in charge)

Graduate Courses

210A. Proteins: Functional Activities and Interactions. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 101B. The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products.

Mr. Feeney

210B. Proteins: Functional Activities and Interactions. (2) III.

Lecture—2 hours. Prerequisite: course 210A or Biochemistry 201A. The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products.

Mr. Feeney

211. Chemistry of the Food Lipids. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 101A. Chemical constitution, molecular structure, and stereo chemistry of the fats, phospholipids, and related compounds. Methods of isolation, characterization, and synthesis. Relation of molecular structure to physical properties.

Mr. Smith

213. Macromolecular Gels. (2) II.

Lecture—2 hours. Prerequisite: Biochemistry 101A. Structural interrelationship of water with typical biological polymers in gels; zergels; gel properties and methods of study.

Mr. Sterling

215A–215B. Chemistry of Metal Ions in Biological Systems. (3–2) I, II.

Lecture—3–2 hours. Prerequisite: Biochemistry 101B, Chemistry 109B or 110B or consent of instructor. Structure, reactions, and physical properties of metal complexes of biological interest. The biochemistry of transition metal chelates, metal-biopolymer interactions, and the chemistry of metallo-enzymes.

220. The Natural Coloring Matters. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: 3 units of biochemistry or plant biochemistry; 3 units of upper division organic chemistry. Chemistry of natural pigments and related compounds; spectrophotometric and chromatographic techniques; special emphasis on pigments in relation to foods.

Mr. Chichester

*250A–250B. Isolation and Characterization of Trace Volatiles. (2) I, II.

Lecture—2 hours. Prerequisite: consent of the instructor. Preparation of volatile concentrates suitable for gas chromatographic separations; influence of the design and type of chromatograph on the efficiency of separation; techniques of trapping and reinjecting chromatographic fractions; and spectrometric characterization of the separated compounds.

Mr. Jennings

290. Seminar. (1) I, II, III.

Seminar—1 hour.

Mr. Mazelis

298. Group Study. (1–5) I, II, III.

Director study on food chemistry, food microbiology, food processing or sensory evaluation.

The Staff (Mr. Chichester in charge)

299. Research. (1–12) I, II, III.

Prerequisite: graduate standing.

The Staff (Mr. Chichester in charge)

Viticulture and Enology

Lower Division Course

3. Introduction to Wine Making. (3) II.

Lecture—3 hours. An introduction to wine technology, including history, fermentation, production practices, wine types, and the wine industry of California and other wine producing areas.

Mr. Singleton, Mr. Amerine

Upper Division Courses

124. Enology: Wine Production. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2; Chemistry 5, 8. Rec-

^a Not to be given, 1967–68.

^b In fall quarter only, Mr. Roessler, Mrs. Pangborn, and Mr. Woskow will offer one unit of "Statistical Analysis of Sensory Data" in order to prepare students for course 107.

ommended: Chemistry 9, 109B; Food Science and Technology 107; Plant Science 2; and course 3. The principles and practice of making the various standard types of wines, with special reference to the grape varieties used and the methods of vinification required for each.

Mr. Webb

125. Principles of Sensory and Chemical Analysis of Wines; Wine Types. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2; Chemistry 5, 8. Recommended: Chemistry 9, 109B; Food Science and Technology 107; Plant Science 2; and courses 3, 124. Principles of sensory and chemical examination of wines; wine regions of the world; principles of production of sparkling wines and vermouth.

Mr. Amerine

126. Enology: Wine Processing. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2; Chemistry 5, 8. Recommended: Chemistry 9, 109B; Food Science and Technology 107; Plant Science 2; and courses 3, 124, 125. Principles and theory of nonbacterial disorders: metal, tartrate, protein, color, oxidative and their control by clarification, filtration and ion-exchange.

Mr. Berg

140. Distillation Principles and Brandy Technology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 5, 8. Recommended: Chemistry 109B; Food Science and Technology

110A. Principles of distillation including engineering aspects and problems with emphasis upon the alcohol-water system and distillation of wines; brandy types, sensory and chemical analysis and production factors. Offered in odd-numbered years.

Mr. Guymon

191. Proseminar in Enology. (1) II.

Lecture—1 hour. Prerequisite: consent of instructor. Reports and discussion of recent advances in enology. Mr. Amerine, Mr. Webb

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Berg in charge)

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

The Staff (Mr. Berg in charge)

Graduate Courses

217. Microbiology of Wine Production. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2, and an upper division course in Bacteriology or Food Science 104B; Chemistry 5, 8. Recommended: course 3 or 124, 125, 126. Open to properly qualified undergraduates with consent of instructor. Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging, and spoilage of wines. Mr. Kunkee

290. Seminar. (1) II.

Seminar—1 hour. Prerequisite: consent of instructor.

Mr. Webb

299. Research. (1-6) I, II, III.

The Staff (Mr. Berg in charge)

FOODS—See Family and Consumer Sciences

FOREIGN LITERATURE IN TRANSLATION

The following courses are open to students throughout the campus. The readings are in English. Refer to departmental listing for descriptions of courses.

Classics

139A and 139B. Greek Literature in Translation.

140. Latin Literature in Translation.

Dramatic Art

20. Introduction to Dramatic Art.

158A, 158B, and 158C. World Drama.

159. Contemporary Drama.

English

170A. The Epic.

170B. European Influences on the English and American Novel.

171. English Bible as Literature.

French

134. French Novel from Malraux to the Nouveau Roman.

141. Gide and Proust.

150. Masterpieces of French Literature.

German

110. Masterpieces of German Prose from Goethe to Kafka.

111. Masterpieces of German Drama from Lessing to Brecht.

112. Masterpieces of German Poetry from Walther von der Vogelweide to Rilke.

114. Goethe's Faust.

115. German Literature of the Twentieth Century

Russian

39. Great Russian Writers.
 110. Survey of Russian Literature to 1800.
 111. Survey of Russian Literature: Nineteenth Century.
 112. Survey of Russian Literature: Twentieth Century.

FRENCH AND ITALIAN

—, *Chairman of the Department.*

Department Office, 522 Sproul Hall

Professors:

- Max Bach, Ph.D.
 * Colin R. Duckworth, Ph.D.

Associate Professor:

- Marshall Lindsay, Ph.D.

Assistant Professors:

- Edward M. Bloomberg, Ph.D.
 Alfredo A. Bonadeo, Ph.D.
 Gerald Herman, Ph.D.
 George H. Keith, Ph.D.
 David S. Wilson, Ph.D.
 Ruth B. York, Ph.D.
 Emily Zants, Ph.D.

♦ ♦ ♦

Professor:

- Jean Hytier, DèsL. (*Visiting*)

Lecturers:

- Jonathan Butler, M.A.
 William P. Galvin, M.A.
 Teresa de Lauretis Mead, Ph.D.

Associates:

- Bernadette Barrio de Mendoza, M.A.
 Marlene Bloomberg, L.èsL.

French

Departmental Major Advisers.—Mr. Bloomberg, Mr. Herman, Mr. Keith, Mr. Lindsay, Miss York.

Graduate Adviser.—Mr. Lindsay.

The Major Program

Lower Division Courses.—Required: French 1, 2, 3, 4, 5, and 6 or their equivalents, French 30A, 30B, and 30C. Recommended: French 46A, 46B, and 46C; one year of college Latin or the equivalent.

Upper Division Courses.—Required: at least 36 units including 3 quarters of course 110, one

² Absent on leave, fall quarter 1967.

121. The Russian Novel: Pushkin to Turgenev.
 122. The Russian Novel: Tolstoy and Dostoevsky.
 123. The Russian Novel: Saltykov to Pasternak.

Spanish

150. Masterpieces of Spanish Literature.

of the following: 130, 131, 132, and a separate course in each of the following periods: sixteenth century, seventeenth century, eighteenth century, nineteenth century. (Course 46A will satisfy the requirement for the sixteenth century.) Recommended: Classics 139A, 139B, 140.

Course 107A, 107B and either course 104 or 105 are required for the General Secondary Teaching Credential in French.

Honors and Honors Program (see page 107). The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

Graduate Study.—The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in French. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of French and Italian.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—A minimum of 30 units in French. Normally these will consist of courses 1, 2, 3, 4, 5, 6, or their equivalents, 30A, 30B, 30C, 104, 105, and 107A, 107B. Recommended: courses 46A, 46B, 46C.

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. (4) I, II, III.**

Laboratory—1 hour; recitation—5 hours.
 The Staff

16. **French for Graduate Students. No Credit. III.**

Recitation—3 hours. A course designed to prepare students for the graduate reading examination.

Mr. Herman

2. Elementary French. (4) I, II, III.

Recitation—5 hours; 1 hour laboratory optional. Prerequisite: course 1 or equivalent. A continuation of course 1. The Staff

3. Elementary French. (4) I, II, III.

Recitation—5 hours; 1 hour laboratory optional. Prerequisite: course 2. A continuation of course 2. The Staff

4. Intermediate French. (3) I, II, III.

Laboratory—1 hour; recitation—3 hours. Prerequisite: course 3 or equivalent. The Staff

5. Intermediate French. (3) I, II, III.

Laboratory—1 hour; recitation—3 hours. Prerequisite: course 4 or equivalent. Continuation of course 4. The Staff

6. Reading and Conversation. (4) I, II, III.

Recitation—4 hours. Prerequisite: course 5 or equivalent. Class discussion; reading of selected works; oral reports; explications de textes. The Staff

30A. Grammar, Composition, and Conversation.

(3) I, II, III.

Lecture—3 hours. Prerequisite: course 6. The Staff

30B. Grammar, Composition, and Conversation.

(3) I, II, III.

Lecture—3 hours. Prerequisite: course 30A. The Staff

30C. Grammar, Composition, and Conversation.

(3) I, II, III.

Lecture—3 hours. Prerequisite: course 30B. The Staff

46A. Survey of French Literature: Middle Ages and Renaissance. (3) I.

Lecture—3 hours. Prerequisite: course 6. Readings from major works; discussion of literary history and theory. The Staff

46B. Survey of French Literature from 1600 to 1800. (3) II.

Lecture—3 hours. Prerequisite: course 6. Readings from major works; discussion of literary history and theory. The Staff

46C. Survey of French Literature from 1800 to the Present. (3) III.

Lecture—3 hours. Prerequisite: course 6. Readings from major works; discussion of literary history and criticism. The Staff

Upper Division Courses**104. Advanced Grammar and Composition. (3) I.**

Lecture—3 hours. Prerequisite: course 30C. Offered in even-numbered years. Mr. Bach

105. Advanced Grammar and Composition. (3) II.

Lecture—3 hours. Prerequisite: course 104. Offered in odd-numbered years. Mr. Bach

107A-107B. Survey of French Culture and Institutions. (3-3) II, III.

Lecture—3 hours. Prerequisite: course 6. Offered in odd-numbered years. Mr. Galvin

110. Advanced Composition and Translation.

(2) I, II, III.

Lecture—2 hours. Prerequisite: course 30C. This course may be repeated for credit. The Staff

116. Literature of the Sixteenth Century. (4) I.

Lecture—3 hours. Prerequisite: course 6. Readings in Rabelais and Montaigne. Offered in odd-numbered years. Mr. Wilson

117A. Theater of the Seventeenth Century. (4) I.

Lecture—3 hours. Prerequisite: course 6. Offered in even-numbered years. Mr. Bloomberg

117B. Novelists and Moralists of the Seventeenth Century. (4) II.

Lecture—3 hours. Prerequisite: course 6. Offered in even-numbered years. Mr. Bloomberg

117C. Classicism and Baroque. (4) III.

Lecture—3 hours. Prerequisite: course 6. Offered in even-numbered years. Mr. Wilson

118A. The Enlightenment. (4) I.

Lecture—3 hours. Prerequisite: course 6. Readings from Bayle, Fontenelle, Montesquieu, Voltaire, Diderot, Rousseau, and others. Offered in odd-numbered years. The Staff

118B. Drama and Novel in the Eighteenth Century.

(4) II.

Lecture—3 hours. Prerequisite: course 6. Plays of Marivaux and Beaumarchais; novels of Lesage, Prevost, Diderot, Voltaire, Rousseau. Offered in odd-numbered years. The Staff

118C. Diderot and the Encyclopédie. (4) III.

Lecture—3 hours. Prerequisite: course 6. Offered in even-numbered years. The Staff

119A. The Nineteenth Century. (4) I.

Lecture—3 hours. Prerequisite: course 6. Romanticism in the drama and novel: Hugo, Stendhal, Vigny, Musset, etc. Offered in even-numbered years. Mr. Bach

119B. The Nineteenth Century. (4) II.

Lecture—3 hours. Prerequisite: course 6. Realism: Balzac and Flaubert. Offered in even-numbered years. Mr. Bach

119C. The Nineteenth Century. (4) III.

Lecture—3 hours. Prerequisite: course 6. Naturalism and Symbolism: Zola, Maupassant, Mallarmé. Offered in odd-numbered years.

The Staff

120A. Twentieth Century Drama. (4) I.

Lecture—3 hours. Prerequisite: course 6. Representative plays from Jarry to Giraudoux. Offered in even-numbered years.

Miss York

120B. Twentieth Century Drama. (4) II.

Lecture—3 hours. Prerequisite: course 6. Representative plays from Anouilh to Ionesco. Offered in odd-numbered years.

Miss York

130. Critical Reading of Poetry. (4) I.

Lecture—3 hours. Prerequisite: course 6 or its equivalent. Analysis and evaluation of works representing main types of French poetry. Study of poetic conventions and versification.

Mr. Lindsay

131. Critical Reading of Fiction. (4) II.

Lecture—3 hours. Prerequisite: course 6 or its equivalent. Analysis and evaluation of short stories and novels representing the main types of French fiction, with emphasis on narrative structure and techniques.

Miss Zants

132. Critical Reading of Drama. (4) III.

Lecture—3 hours. Prerequisite: course 6 or its equivalent. Analysis and evaluation of plays representing main types of French drama, with emphasis on dramatic structure and techniques.

Miss York

134. French Novel from Malraux to the Nouveau**Roman. (4) III.**

Lecture—3 hours. Lectures and discussion in English; reading in French or English.

Mr. Lindsay

140. Study of a Major Writer. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 6. With the consent of the instructor, this course may be repeated for credit.

The Staff

141. Gide and Proust. (4) II.

Lecture—3 hours. Lectures and discussion in English; reading in French and English.

Mr. Lindsay

150. Masterpieces of French Literature. (4) I.

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 even-numbered years.

The Staff

160. Structure of the French Language. (4) II.

Lecture—3 hours. Prerequisite: course 6 or consent of instructor. Linguistic analysis of modern French. Offered in odd-numbered years.

Mr. Keith

194H. Special Study for Honors Students.

(5) I, II, III.

Prerequisite: open only to honors students. Guided research leading to an honors paper.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**201A. History of the French Language. (4) I.**

Seminar—3 hours.

Mr. Keith

201B. History of the French Language. (4) II.

Seminar—3 hours. Prerequisite: course 201A.

Mr. Keith

202. Medieval French Literature. (4) I.

Seminar—3 hours.

Mr. Herman

203. Reading of Old French Texts. (4) III.

Seminar—3 hours. Prerequisite: course 201A-201B or equivalent.

Mr. Keith

204. Sixteenth-Century French Literature. (4) II.

Seminar—3 hours. May be repeated for credit with consent of the instructor.

Mr. Wilson

206. Seventeenth-Century French Literature. (4) II.

Seminar—3 hours. May be repeated for credit with consent of the instructor.

Mr. Bloomberg, Mr. Hytier

208. Eighteenth-Century French Literature. (4) III.

Seminar—3 hours. May be repeated for credit with consent of the instructor.

The Staff

215. Nineteenth-Century French Literature. (4) I.

Seminar—3 hours. May be repeated for credit with consent of the instructor.

Mr. Bach

220. Twentieth-Century French Literature. (4) I.

Seminar—3 hours. May be repeated for credit with consent of the instructor.

Mr. Hytier

230. Old Provençal. (4) III.

Seminar—3 hours. Prerequisite: course 201A, 201B or equivalent. An introduction to Old Provençal phonology and morphology, with reading and interpretation of texts.

Mr. Keith

298. Group Study. (1-4) I, II, III.

Seminar—1-3 hours. May be repeated for credit with consent of the instructor.

The Staff

299. Research. (2-5) I, II, III.

The Staff

Italian**Lower Division Courses**

A course may not ordinarily be taken for credit if it is a prerequisite to a course already

completed. Students offering high school language preparation as a prerequisite must take a placement test.

1. Elementary Italian. (4) I.

Laboratory—2 hours; recitation—3 hours.
The Staff

2. Elementary Italian. (4) II.

Laboratory—2 hours; recitation—3 hours.
Prerequisite: course 1. Continuation of course 1.
The Staff

3. Elementary Italian. (4) III.

Laboratory—2 hours; recitation—3 hours.
Prerequisite: course 2. Continuation of course 2.
The Staff

4. Intermediate Italian. (3) I

Laboratory—1 hour; recitation—3 hours. Pre-
requisite: course 3 or equivalent. The Staff

5. Intermediate Italian. (3) II.

Laboratory—1 hour; recitation—3 hours. Pre-
requisite: course 4 or equivalent. Continuation
of course 4. The Staff

6. Reading and Conversation. (4) III.

Recitation—4 hours. Prerequisite: course 5 or
equivalent. Class discussion; reading of selected
works; oral reports. The Staff

Upper Division Courses

**101. Advanced Conversation, Composition, and
Grammar. (3) I.**

Lecture—3 hours. Prerequisite: course 6 or
equivalent. Mr. Bonadeo

**102. Advanced Conversation, Composition, and
Grammar. (3) II.**

Lecture—3 hours. Prerequisite: course 101.
Mr. Bonadeo

**103. Advanced Conversation, Composition, and
Grammar. (3) III.**

Lecture—3 hours. Prerequisite: course 102.
Mr. Bonadeo

Professional Course

**300. The Teaching of a Modern Foreign Language.
(3) III.**

Lecture—3 hours. Prerequisite: senior or
graduate standing; a major or minor in a modern
foreign language. The Staff

GENETICS—See also Animal Science

GENETICS

Sidney R. Snow, Ph.D., *Acting Chairman of the Department*

Department Office, 201 Hutchison Hall

Professors:

Robert W. Allard, Ph.D. (*Genetics and
Agronomy*)

Melvin M. Green, Ph.D.

G. Ledyard Stebbins, Ph.D.

Associate Professor:

Sidney R. Snow, Ph.D.

Assistant Professors:

Harris Bernstein, Ph.D.

Paul Hansche, Ph.D. (*Genetics and
Pomology*)

◇ ◇ ◇

Professor:

Alex S. Fraser, Ph.D. (*Animal Husbandry*)

Lower Division Course

10. Heredity and Evolution. (3) II.

Lecture—3 hours. The general principles of
the laws of heredity and evolution for students

not specializing in biology. No credit to stu-
dents who have had or are taking upper divi-
sion genetics courses. Mr. Fraser

Upper Division Courses

100A. Principles of Genetics. (3) I, II.

Lecture—3 hours. Prerequisite: introductory
course in zoology, botany or biology; upper di-
vision standing. Not open for credit to students
who have received credit in course 115. Intro-
duction to genetics with some consideration of
its applications in agriculture and biology.
The Staff

100L. Principles of Genetics Laboratory. (1) II, III.

Laboratory—3 hours. Prerequisite: Genetics
100A. Laboratory work in basic genetics to sup-
plement course 100A, 100B, and 115.
Mr. Bernstein

101. Cytogenetics. (3) I.

Lecture—3 hours. Prerequisite: course 100B
or 115. Chromosome morphology and behavior
as related to genetics and evolution. Mr. Snow

101L. Cytogenetics Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: course 101 (may be taken concurrently). Laboratory study of chromosome morphology and behavior.
Mr. Snow

102. Molecular and Biochemical Genetics. (3) I.

Lecture—3 hours. Prerequisite: course 100B, Biochemistry 101B. Study of gene structure, mutation and the biochemical basis of gene function. Offered in odd-numbered years.

Mr. Bernstein, Mr. Green

103. Organic Evolution. (3) III.

Lecture—3 hours. Prerequisite: course 100B or 115. Evolutionary processes in higher organisms.

Mr. Stebbins

104. Developmental Genetics. (3) II.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 100B or 115; Biochemistry 101B. The action of genes in development at the levels of the enzyme molecule, cellular organelle, tissue and organ, with examples from microorganisms, plants, and animals.

Mr. Stebbins

105. Population Genetics. (3) I.

Lecture—2 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: course 100B or 115; recommended Mathematics 13, 16A. An introductory course in the analysis and interpretation of quantitative genetic systems. Laboratory plus discussion, ten hours.

Mr. Allard

115. Human Genetics. (5) III.

Lecture—4 hours; discussion—1 hour. Prerequisite: introductory course in zoology, botany, or biology; upper division standing. Recommended: Mathematics 13 or equivalent. Not open for credit to students who have received credit in course 100. Introduction to genetics with special emphasis on man. This course will fulfill the needs of preprofessional students and those in other areas of human biology.

Mr. Green

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

Prerequisite: Consent of instructor based on adequate preparation of the student in allied fields.

The Staff

GEOGRAPHY

Kenneth Thompson, Ph.D., *Chairman of the Department*

Department Office, 330 Voorhies Hall

Associate Professors:

Howard F. Gregor, Ph.D.

Kenneth Thompson, Ph.D.

Philip L. Wagner, Ph.D.

Graduate Courses

205. Advanced Population Genetics. (3) II.

Lecture—3 hours. Prerequisite: course 105, Mathematics 131A. Analysis of the genetic structure and evolution of populations.

Mr. Hansche

206. Current Topics in Genetics. (3) I, II, III.

Lecture—2 hours; laboratory or discussion—2 hours. Prerequisite: course 100B or 115, consent of the instructor. Selected topics of current interest in advanced genetics. May be repeated for credit.

291. Seminar in History of Genetics. (2) II.

Seminar—2 hours. Prerequisite: course 100B or 115. The development of modern genetic theories beginning with Mendel.

Mr. Stebbins

292. Seminar in Gene Structure and Action. (1–3) I.

Seminar—1 hour. Prerequisite: course 102, or 206, Bacteriology 170. Topics of current interest related to the structure of genes, mutation, and the mechanism of gene action. Offered in even-numbered years.

Mr. Bernstein

293. Seminar in Cytogenetics and Evolution.

(1–3) II.

Seminar—1 hour. Prerequisite: course 291 (may be taken concurrently). Topics of current interest related to chromosomal changes, mutation and other genetic changes in natural populations, and the application of genetics to study of organic evolution.

294. Seminar in Breeding Systems. (1–3) III.

Seminar—1 hour. Prerequisite: course 291. Topics of current interest relating genetics to problems of animal and plant breeding.

298. Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor. Directed group study of special topics in genetics.

The Staff

299. Research. (1–12) I, II, III.

The Staff

Assistant Professors:

Stephen C. Jett, Ph.D.

Paul D. Marr, Ph.D.

Roy J. Shlemon, Ph.D.



Assistant Professor:

David R. Lee, M.A. (Acting)

Lecturer:Herbert B. Schultz, Ph.D. (*Geography; Professor of Agricultural Engineering*)**Departmental Major Advisers.**—Mr. Marr, Mr. Shlemon.**Graduate Advisers.**—Mr. Jett, Mr. Thompson.**Teaching Major.**—Requirements for the teaching major are the same as for the undergraduate major for degree, with the addition of Geography 300.**Teaching Minor.**—A minimum of 30 quarter units in Geography, including course 300.**Subject Representative:** Mr. Lee.**The Major Program****Lower Division Courses.**—Required: Geography 1, 2, 3, 5; Anthropology 2.**Upper Division Courses.**—Required: 36 upper division units in geography. Each program should normally include Geography 101 (Methods of Geographic Research), 105 (Cartography), and 151 (History of Geographic Thought).

Students who wish to prepare for further training or employment in the field of Urban and Regional Planning may do so by completing certain additional courses, while fulfilling the requirements for the major, in consultation with the departmental adviser.

Lower Division Courses**1. Physical Geography. (4) I, III.**

Lecture—4 hours. Basic physical elements of the human habitat, especially climate, landforms, soils, and natural vegetation.

Mr. Shlemon

2. Cultural Geography. (4) III.

Lecture—4 hours. Distribution and cultural differentiation of human groups. Population, technology, economy, and relation to habitat.

Mr. Jett

3. Climate and Weather. (3) II.

Lecture—3 hours. Composition and structure of atmosphere, weather elements, pressure, wind, temperature, moisture, fog, and clouds; weather maps; regional climates and world climate classification; instruments for obtaining climatological data; installation and maintenance of weather stations; evaluation of recordings.

Mr. Schultz

4. Introduction to Maps. (3) I.

Lecture—3 hours. History and principles of cartography; great map-makers; national surveys; modern trends in mapping.

Mr. Lee

5. Economic Geography. (4) I.

Lecture—3 hours; discussion—1 hour. Geographic aspects of the production, exchange, and consumption of goods. Mr. Thompson

Upper Division Courses**101. Methods of Geographic Research. (4) III.**

Lecture and Field Trip one day per week. Prerequisite: courses 1 and 2 and consent of instructor. Research methodology and field study. Systematic mapping and analysis of elements of the natural and cultural landscape.

Mr. Lee

105. Cartography. (4) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 4; or consent of instructor. Theory and construction of map projections; interpretation of maps; compilation and generalization of base-map data; symbolization and processing of map data; cartographic designing and lettering techniques; map reproduction.

Mr. Lee

106. Interpretation of Aerial Photographs. (4) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 1; or consent of instructor. Analysis of landscape from aerial photographs: land forms; vegetation; land use; settlement; transport and communications. Preparation of contour and planimetric maps, and construction of aerial photo mosaics.

Mr. Marr

108. Analysis of Landforms. (4) II.

Lecture—3 hours. Prerequisite: course 1; or consent of instructor. Origin of land forms. Review of varied interpretations of processes involved, with emphasis on recent views.

Mr. Shlemon

119. Arid Lands. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; or consent of instructor. Physical characteristics and human utilization of rainfall deficiency regions.

Mr. Jett

***121A. Eastern North America. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Natural and economic regions of eastern United States and Canada.

Mr. Gregor

121B. Western North America. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Natural and economic regions of western United States and Canada.

Mr. Gregor

122A. Middle America. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Environment, culture, and economy from Mexico to Panama and in the Caribbean.

Mr. Wagner

* Not to be given, 1967-68.

122B. South America. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Environment, culture, and economy in the South American countries. Mr. Wagner

123A. Western Europe. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Geographic conditions and their relation to the economic, social and political problems of the countries of Western Europe.

Mr. Thompson

***123B. Eastern Europe. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Geographic conditions and their relation to the economic, social and political problems of the countries of Eastern Europe.

***124. The Soviet Union. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Physical landscapes and cultural regions of the U.S.S.R.

125A. North Africa and the Near East. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Physical, cultural, and historical geography of the Arab World and its neighbors.

Mr. Lee

125B. Sub-Saharan Africa. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Physical, cultural, and historical geography of Africa south of the Sahara. Mr. Lee

131. California. (4) I, III.

Lecture—3 hours; discussion—1 hour. Regions of California: landforms, climate, and other physical characteristics; agricultural, mineral, and other resources; and patterns of settlement, population, transportation, and economy.

Mr. Shlemon, Mr. Gregor

141A. Economic Geography. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5; or consent of instructor. Factors in economic regionalism. Analysis of major agricultural regions of the earth.

Mr. Gregor

141B. Economic Geography. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5; or consent of instructor. Factors in economic regionalism. Analysis of major industrial regions of the earth.

Mr. Gregor

143. Political Geography. (4) III.

Lecture—3 hours; discussion—1 hour. Areal differentiation of major natural and cultural

* Not to be given, 1967-68.-

phenomena affecting the world's political organization.

Mr. Thompson

151. History of Geographic Thought. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: three upper division courses in geography. The literature of geography: objectives, subdivisions, and development of the subject.

Mr. Thompson

155. Urban Geography. (4) I.

Lecture—3 hours; discussion—1 hour. Origin, development, distribution, and regional variation of the world's cities, with emphasis on an analysis of the functions and patterns of American cities.

Mr. Marr

156. Regional Structure. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2. Concepts of regional structure and their application to geographic problems; nodes, linkages, circulation, and regions. Quantitative and cartographic methods of regional research.

Mr. Marr

161. Conservation of Natural Resources. (4) III.

Lecture—3 hours; discussion—1 hour. Principles of the conservation of renewable and non-renewable resources: the conservation movement. Land-use conflicts between forestry, agricultural, mining, and recreational interests, especially in the United States.

Mr. Jett

162. Geography of Water Resources. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; or consent of instructor. Geographical survey of water on the land; needs and opportunities for water-resource development and conservation. Historical solutions to water needs of specific areas, and geographical problems associated with current and future water requirements.

Mr. Marr

170. Cultural Ecology. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2; or Anthropology 2. Theories of environment-man relations. Ecologic relations of gatherers, fishermen, hunters, swidden cultivators, peasants; their impact on environment; their domestic plants and animals. Mr. Wagner

199. Special Study for Advanced Undergraduates.

(2-4) I, II, III.

The Staff

Graduate Courses**250. Theory and Method in Geography. (4) I.**

Lecture—2 hours; discussion—1 hour.

Mr. Wagner

291. Seminar in Cultural Geography. (4) II.

Seminar—3 hours.

Mr. Jett

292. Seminar in Physical Geography. (4) III.

Seminar—3 hours.

Mr. Shlemon

293. Seminar in Economic Geography. (4) I.	
Seminar—3 hours.	Mr. Gregor
294. Seminar in Climatology. (4) II.	
Seminar—3 hours.	Mr. Schultz
295. Seminar in Urban Geography. (4) III.	
Seminar—3 hours.	Mr. Marr
299. Research (2-9) I, II, III.	The Staff

Professional Course**300. Problems in Teaching Geography.** (2) II.

Lecture—2 hours. Prerequisite: course 1 or 2. Establishing, organizing, and conducting courses in geography and regional study. Designed primarily for prospective elementary and secondary school teachers of the social sciences.

Mr. Thompson

GEOLOGYCordell Durrell, Ph.D., *Chairman of the Department*

Department Office, 306A Young Hall

Professors:

Daniel I. Axelrod, Ph.D.

^{3,4}Cordell Durrell, Ph.D.

Charles G. Higgins, Ph.D.

Associate Professors:

Donald O. Emerson, Ph.D.

James W. Valentine, Ph.D.

Assistant Professors:

Charles V. Guidotti, Ph.D.

Jere H. Lipps, Ph.D.

Eldridge M. Moores, Ph.D.

Thomas W. Todd, Ph.D.

Departmental Major Advisers.—Mr. Todd, Mr. Moores.*The Major Programs*

High school students should note that the preparation for either degree is simplified if their high school programs include foreign language, chemistry, and four years of mathematics.

Bachelor of Science Major Program

The major program consists of 90 units of mathematical and natural science courses including:

Lower Division Courses.—Required: Chemistry 1A–1B–1C or preferably 7A–7B; Geology 1, 2, 3, 4, 5; Mathematics 1A–1B–1C; Physics 4A–4B–4C; Biology 1. Recommended: Mathematics 13; Chemistry 5; Physics 4D–4E.

Upper Division Courses.—Required: 36 units of upper division courses in geology including Geology 102A–102B, 103A–103B, 111A or 111B, 112, 115, 116, and a summer field course as offered at the University of California, Berkeley and Los Angeles, or, with departmental approval, its equivalent at another institution.

Bachelor of Arts Major Program

Lower Division Courses.—Required: Chemistry 1A–1B, or 7A; Geology 1, 2, 3, 4, 5; Physics 2A–2B; Biology 1; and one of the following courses: Chemistry 1C; Mathematics 13; Physics 2C; Zoology 2.

Upper Division Courses.—Required: Geology 102A, 103A–103B, 111A or 111B, 115, 116

and other upper division courses in geology and related fields to total not less than 36 units selected in accordance with a plan approved by the major adviser.

Honors and Honors Program (see page 107).—The honors program in geological sciences consists of course 194H and an honors thesis incorporating studies undertaken in course 194H.

Graduate Study.—The Department of Geology offers a program of study and research leading to the M.S. and Ph.D. degrees. For information regarding graduate study in geology, address the Graduate Adviser, Department of Geology.

Teaching Major.—Requirements for the teaching major are the same as for undergraduate major for degree (B.A. or B.S.).

Teaching Minor.—Thirty units (quarter units) to be selected with the advice of the subject representative. Eighteen of the 30 units must be at the upper division or graduate level.

Subject Representative: Mr. Todd**Lower Division Courses****1. General Geology.** (3) I.

Lecture—3 hours. Prerequisite: recommended—high school chemistry. Rocks, minerals, geologic structures and internal processes of the earth.

Mr. Todd

***1L. General Geology Laboratory.** (1) I.

Laboratory—3 hours. Prerequisite: course 1, preferably taken concurrently. ~~Not open to students who have not had course 1 or its equivalent.~~ Identification of common minerals and rocks, and introduction to geologic maps.

2. General Geology. (3) II.

Lecture—3 hours. Prerequisite: course 1. Forms and processes of the earth's surface.

^o Not to be given, 1967–68.¹ Absent on leave, 1967–68.³ Absent on leave winter quarter, 1968.⁴ Absent on leave spring quarter, 1968.

***2L. General Geology Laboratory. (1) II.**

Laboratory—3 hours. Prerequisite: courses 1, 2 (may be taken concurrently). Interpretation of geomorphic features, topographic maps and aerial photographs. Mr. Higgins

3. General Geology. (3) III.

Lecture—3 hours. Prerequisite: course 1. Stratigraphy, paleontology and earth history. Mr. Lipps

***3L. General Geology Laboratory. (1) III.**

Laboratory—3 hours. Prerequisite: courses 1, 3 (may be taken concurrently). Identification of important fossils; problems in stratigraphy.

4. Crystallography. (4) II.

Lecture—2 hours; laboratory—6 hours. An introduction to morphological and x-ray crystallography. Mr. Guidotti

5. Crystal Chemistry. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4, Chemistry 1A. Chemistry and structure of minerals. Mr. Guidotti

Upper Division Courses**102A. Field Geology. (3) I.**

Laboratory—3 hours; field—1 day per week. Prerequisite: courses 1, 103A (may be taken concurrently). Principles and methods of geologic mapping. Preparation of geologic reports. The Staff

102B. Field Geology. (3) III.

Laboratory—3 hours; field—1 day per week. Prerequisite: courses 102A, 103B and 116. Continuation of course 102A. The Staff

103A-103B. Petrology and Physical Mineralogy.**(4-4) I, II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 1 and 4. Physical properties of rock-forming minerals. Origins and characteristics of rocks. Laboratory study of hand specimens of rocks and minerals.

Mr. Durrell, Mr. Emerson

108. Optical Mineralogy. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 4. Principles of optical crystallography; microscopic study of mineral fragments and thin sections. Mr. Emerson

109A. Petrology and Petrography: Igneous Rocks. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 5, 108. Characteristics and origins of igneous rocks; laboratory study by advanced methods. Mr. Emerson

109B. Petrology and Petrography: Metamorphic Rocks. (4) III.

Lecture—2 hours; laboratory—6 hours. Pre-

requisite: courses 5, 108. Characteristics and origins of metamorphic rocks, laboratory study by advanced methods. Mr. Guidotti

Mr. Todd

109C. Petrology and Petrography: Sedimentary Rocks. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 109A or 109B. Characteristics and origin of sedimentary rocks; laboratory study by advanced methods. Mr. Todd

111A. Paleontology of Larger Fossil Invertebrates. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 115 or Biology 1; or consent of instructor. Morphology, systematics, paleoecology, and evolution of the larger invertebrates, with emphasis on the megafossil groups such as the Porifera, Coelenterata, Brachiopoda, Mollusca, Arthropoda, and Echinodermata.

111B. Paleontology of Smaller Fossil Invertebrates. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 115 or Biology 1; or consent of instructor. Morphology, systematic paleoecology, and phylogeny of smaller invertebrates, with emphasis on the Foraminifera, Radiolaria, Ostracoda, and Bryozoa. Mr. Lipps

112. Stratigraphy. (4) I.

Lecture—4 hours. Prerequisite: course 1. The principles of stratigraphy, sedimentation, and sedimentary tectonics. Mr. Todd

***113. Paleoecology. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 111A or 111B or a course in invertebrate zoology or invertebrate morphology. Interpretation of relations of fossil organisms among themselves and with their ancient environments, and of their patterns of association and distribution in space and time; emphasis on the marine environment. Field trips.

115. Principles of Paleobiology. (2) I.

Lecture—2 hours. Prerequisite: course 1 and Biology 1, or consent of instructor. Origin and diversification of the major phyla, with emphasis on principles of evolution, ecology, and systematics and their interrelation in producing the biotic history reflected in the fossil record.

116. Structural Geology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1. Deformation of the earth; causes, mechanics, and effects of crustal deformation. Mr. Moores

* Not to be given, 1967-68.

117. Geomorphology. (4) III.

Lecture—3 hours; laboratory—3 hours.
Sculpture of the earth's surface by natural processes.

Mr. Higgins

152. Photogeology. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 102A or consent of instructor. Introduction to the use of aerial photographs in interpretation of regional geologic structure, rock types and geologic history through analysis of land forms, drainage patterns, vegetation, and outcrop patterns. Offered in odd-numbered years.

Mr. Higgins

194H. Special Study for Honor Students. (3) I, II, III.

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.

The Staff

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: senior standing in geology.

The Staff

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

The Staff

Graduate Courses**213. Geomorphology. (3) I.**

Seminar—3 hours. Prerequisite: course 117. Surficial processes and the evolution of land forms. Offered in even-numbered years.

Mr. Higgins

***216. Regional Structural Geology. (3) I.**

Seminar—3 hours. Prerequisite: course 116. Tectonics of mountain systems, continents and ocean basins.

Mr. Moores

218. Advanced Structural Analysis. (3) II.

Lecture—1 hour; seminar—2 hours. Prerequisite: course 116. Internal constitution of the

GERMANClifford A. Bernd, Dr. phil., *Chairman of the Department*

Department Office, 416 Sproul Hall

Associate Professors:

Clifford A. Bernd, Dr. phil.

Roland W. Hoermann, Ph.D.

H. Guenther Nerjes, Ph.D.

Assistant Professors:

Wolfgang Bender, Dr. phil.

William M. Estabrook, Ph.D.

John F. Fetzer, Ph.D.

¹ A. Cornelius Sommer, Dr. phil.**Professors:**Ernest Rose, Dr. phil. (*Visiting*)Benno von Wiese, Dr. phil. (*Visiting*)**Lecturer:**

Anthony S. Kawczynski, Mag. phil.

• Not to be given, 1967-68.

1 Absent on leave, 1967-68.

Associates:

Clair Allen, M.A.
 Albert DeNeve, M.A.
 William McNabb, M.A.
 Rolf Dieter Mauch, M.A.
 Margit Nance, M.A.
 Lola Polhamus, M.A.
 Dieter Schefke, M.A.
 Bruno Schwemann, M.A.
 Heintraut Taylor, M.A.
 Marie-Luise Wenderoth, M.A.

Departmental Major Advisers.—Mr. Bender,
 Mr. Estabrook.

Graduate Advisers.—Mr. Nerjes, Mr. Fetzer.

The Major Program

Lower Division Courses.—German 1, 2, 3, 11, 12, 48A, 48B, 49 or their equivalents.

Upper Division Courses.—Forty units in upper division courses, including German 101, 102, 103, 119, 190, and one course from each of the following groups:

- (a) Course 120, 121, 122
- (b) Course 123, 124, 125, 126
- (c) Course 127, 128, 129, 130
- (d) Course 131, 132, 133, 134

Four of the 40 units may be related work in other departments subject to the approval of the major adviser.

Honors and Honors Program (see page 107).—The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

The Master of Arts Degree

The Department offers programs of study leading to the M.A. degree. A minimum of 36 units is required. In addition, candidates for the M.A. will be expected to acquire a reading knowledge of French. Further information may be obtained by writing to the Graduate Adviser.

The Degree of Doctor of Philosophy

The Department offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Graduate Adviser.

Teaching Major.—Lower division requirements are the same as for the departmental major. A total of 36 upper division units is required, including courses 101, 102, 103, 119, 190, and 300.

Teaching Minor.—Six quarter courses in the lower division. Usually these will consist of German 1, 2, 3, 11, 12, and 49. A total of 18 upper division units is required, including German 101, 102, and 103.

Subject Representative: Mr. Fetzer

Lower Division Courses**1. Elementary German. (4) I, II, III.**

Recitation—3 hours; laboratory—2 hours.
 Mr. Estabrook

1G. German for Graduate Students. No Credit. I, II.

Lecture—3 hours. A course designed to prepare students for the graduate reading examination.
 Mr. Kawczynski

2. Elementary German. (4) I, II, III.

Recitation—3 hours; laboratory—2 hours.
 Prerequisite: course 1 or equivalent. Continuation of course 1.
 Mr. Kawczynski

3. Elementary German. (4) I, II, III.

Recitation—3 hours; laboratory—2 hours.
 Prerequisite: course 2 or equivalent. Continuation of course 2.

11. Intermediate German. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 3. Spoken German stressed; class discussion of modern short stories, with inductive review of grammar.
 Mr. Fetzer

12. Intermediate German. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 11. Spoken German stressed through class discussion of a variety of selected readings. A continuation of course 11.
 Mr. Nerjes

12R. Intermediate German—Reading. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 11. Intensive emphasis on reading and translation of materials from the natural and social sciences. A continuation of course 11.
 Mr. Estabrook

48A. Spoken German. (2) I, II, III.

Discussion—2 hours. Prerequisite: course 12. May be taken concurrently with 48B and/or 49. Intensive conversational practice based on the everyday vocabulary of reading assignments in German newspapers and contemporary literature.
 Miss Wenderoth

48B. Spoken German. (2) I, II, III.

Discussion—2 hours. Prerequisite: course 12; may be taken concurrently with 48A and/or 49. Intensive conversational practice and discussions based on selected literary texts; oral interpretation of dramatic roles in representative dramas and one-act plays.
 Miss Wenderoth

49. Advanced German. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 12; may be taken concurrently with 48A and/or 48B. Review of grammatical and stylistic principles by means of written exercises; expanding of comprehension vocabulary through rapid and extensive readings of modern prose, dramatic and verse texts.
 Mr. Nerjes

Upper Division Courses**101. Composition and Conversation. (4) I, II, III.**

Lecture—3 hours. Prerequisite: course 49 or courses 48A and 48B. Mr. Bender

102. Composition and Conversation. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Intermediate essay-writing; analysis of literary and journalistic styles; extension of active writing and speaking vocabulary. Mr. Rose

103. Advanced Composition. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 102 or consent of instructor. Advanced prose style and original composition. Mr. Bender

104. Advanced German Grammar. (4) I.

Lecture—3 hours. Prerequisite: course 103 or consent of instructor. The morphology, syntax, and stylistics of modern written usage as demonstrated in contemporary texts. Mr. Bender

105. History of the German Language. (4) II.

Lecture—3 hours. Prerequisite: course 102. Survey of the linguistic development from the Germanic and Old High German sound shifts; Middle High diphthongization and monophthongization; Ablaut and Umlaut phenomena; "Kanzleisprache" and Luther; origins of modern comparative philology with the Grimms; elementary phonetics. Offered in odd-numbered years.

Mr. Estabrook

106. Linguistic Structure of German (4) I.

Lecture—3 hours; participation in the form of assignment submitted for evaluation—1 hour. A linguistic analysis of modern standard German including phonetics, phonemics, morphology and Syntax. Offered in even-numbered years.

Mr. Estabrook

108. Contrastive Structures of English and German. (4) II.

Lecture—3 hours; other—1 hour. Prerequisite: course 106. A contrastive study of the linguistic structures of English and German. Offered in even-numbered years. Mr. Estabrook

110. Masterpieces of German Prose from Goethe to Kafka. (4) I.

Lecture—3 hours. Study in translation of works which have helped shape the European tradition in the novel and short story or were crucial in the development of German literature. Knowledge of German not required; may not be counted as part of the major in German. Offered in even-numbered years.

Mr. Hoermann

111. Masterpieces of German Drama from Lessing to Brecht. (4) III.

Lecture—3 hours. Study in translation of works which have helped shape the European drama or were crucial in the development of

German literature. Knowledge of German not required; may not be counted as part of the major in German. Offered in odd-numbered years.

Mr. Fetzer

112. Masterpieces of German Poetry from Walther von der Vogelweide to Rilke. (4) III.

Lecture—3 hours. Study in translation of the German Lyric genius from medieval love poetry through the classicism of Goethe and Hölderlin to the mysticism of Rilke. Knowledge of German not required; may not be counted as part of the major in German. Offered in odd-numbered years.

Mr. Hoermann

114. Goethe's Faust. (4) II.

Lecture—3 hours. A detailed analysis and aesthetic critique in English of both "Parts," together with the first-draft *Urfaust*. Knowledge of German not required; German majors fulfill readings in German. Offered in even-numbered years.

Mr. Nerjes

115. German Literature of the Twentieth Century. (4) II.

Lecture—3 hours. Representative readings in translation from Rilke, Kafka, Hesse, Thomas Mann, and others. Knowledge of German not required; may not be counted as part of the major in German. Offered in odd-numbered years.

Mr. Hoermann

119. Survey of German Literary Periods. (4) I, III.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. An integrated view of the philosophical, historical, and stylistic components in the development of the German literary tradition.

Mr. Nerjes

120. The Medieval Period in German Literature. (4) III.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. The literary-philosophical profile of the "Mittelhochdeutsche Blütezeit" in terms of the significant courtly and folk epics and the "Minnesang." Readings in modern German translation. Offered in odd-numbered years.

Mr. Estabrook

121. The Renaissance and Reformation Period in German Literature. (4) II.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. The distinctive thought and literary values of the period from *Der Ackermann aus Böhmen* through the "Meistersgesang" and "Fastnachtspiel" of Hans Sachs. Offered in even-numbered years.

Mr. Bender

122. The Baroque Period. (4) II.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. The stylistic and philosophical predicament of the Thirty-Years War era as documented in the works of Opitz and the Silesian Schools to Grimmelshausen and Gryphius. Offered in odd-numbered years.

Mr. Bender

123. The Period of Enlightenment and Rococo in German Literature. (4) II.

Lecture—3 hour. Prerequisite: course 49 or the equivalent. The era of eighteenth-century rationalism, from the imitative classicism of Gottsched, through the Anacreontic idylls. Wieland's epic art, and the aesthetics of Winckelmann, to the new humanism of Lessing. Offered in even-numbered years. Mr. Bender

124. Sentimentality and "Sturm und Drang." (4) III.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. The styles of "Empfindsamkeit," pietistic nature mysticism, and Storm and Stress from the "Rührstück" of Gellert and Lessing, through Klopstock's dithyrambic verse forms, to the youthful naturalism of the "Geniezeit" in Herder, Goethe, and Schiller. Offered in even-numbered years. Mr. Fetzer

125. The Classicism of Goethe. (4) III.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. Goethe's mature development beginning with the removal to Weimar: the great ballads, Roman Elegies, *Hermann und Dorothea*, and the *West-östlicher Diwan*, in his *Iphigenie* and *Tasso* dramas, and in prose selections from *Wilhelm Meister's Lehrjahre*, *Die Wahlverwandtschaften* and *Dichtung und Wahrheit*. Offered in odd-numbered years. Mr. Nerjes

126. The Classicism of Schiller. (4) II.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. Schiller's historical idealism, beginning with the Dresden phase of his *Don Carlos*, proceeding through the aesthetic tracts and great ballads, to the master dramas of the Wallenstein trilogy, *Maria Stuart*, *Jungfrau von Orleans*, *Braut von Messina*, and *Wilhelm Tell*. Offered in even-numbered years. Mr. Nerjes.

127. The Romantic Age. (4) III.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. The Napoleonic era from the Jena school of the Schlegels, Novalis, and Schelling, through the Arnim-Brentano group in Heidelberg, to the Berlin circle including Tieck, Eichendorff, and Hoffmann; contrasting delineation through special treatment of Jean Paul, Hölderlin, and Kleist. Offered in even-numbered years. Mr. Hoermann

128. Nineteenth-Century German Realism. (4) II.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. Response to the Restoration era; irony and cynicism in Grabbe's and Büchner's dramas; Heine's "Jungdeutschland" protest; Biedermeier, withdrawal in Grillparzer Mörike, and Drosté-Hülshoff; poetic realism in Hebbel's and Ludwig's dramas and in novelistic art of Stifter, Keller, Storm, and Meyer. Offered in odd-numbered years. Mr. Bernd

129. Naturalism to Neo-Classicism in German Literature. (4) II.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. From Hauptmann and the social protest of north-German naturalism, through the Viennese psychological impressionism of Schnitzler and the neo-romanticism of Hofmannsthal and Hesse, to Rilke and the collective mysticism of the "George-Kreis." Offered in even-numbered years. Mr. Fetzer

130. The Modern Period from Expressionism to the Present. (4) I.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. The moral and existential quandary from Nietzsche, Wedekind, and the wartime generation of dramatists, through the poetry of Trakl, Loerke, and Benn; novelistic mastery in Thomas Mann and Kafka, and the new theater of Brecht, Frisch, and Dürrenmatt. Offered in odd-numbered years. Mr. Hoermann

131. The German Novel. (4) III.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. Comparative stylistic study of the genre by means of representative cross-sections of such masterworks as *Parzival*, *Simplicissimus*, *Wilhelm Meister*, Keller's *Der grüne Heinrich*, Mann's *Zauberberg*, Kafka's *Schloss*, Hesse's *Glasperlenspiel*, and Frisch's *Stiller*. Offered in odd-numbered years. Mr. Nerjes

132. The German Novelle. (4) II.

Lecture—3 hours. Prerequisite: course 49 or the equivalent. Stylistic analysis of the genre from Goethe and Kleist, through the master "Novelle" of the second half of the nineteenth century, to Thomas Mann, Kafka, and the post-war generation. Offered in even-numbered years. Mr. Bernd

133. The German Drama. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 49 or the equivalent. A generic, comparative study based on representative works from the Renaissance beginnings and Gryphius, through Lessing, Kleist, Schiller, and Hebbel, to the drama of Naturalism, Expressionism, and the "Epic Theater" of Brecht. Offered in even-numbered years. Mr. Hoermann

134. German Poetry. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 49 or the equivalent. Analysis and study of representative lyric modes as deduced from the master specimens of verse throughout German literature. Offered in even-numbered years. Mr. Bernd

190. Proseminar in a Major Writer. (4) I.

Lecture—3 hours. Prerequisite: senior standing; or consent of instructor. Introduction to techniques of independent research and seminar

reporting and rebuttal, by means of term projects, joint analyses, and stylistic critique.

Mr. Bernd

194H. Special Study for Honors Students.

(5) I, II, III.

Prerequisite: open only to honors students. Guided research leading to an honors paper.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

200. Gothic. (4) I.

Seminar—3 hours. Phonology, grammar and reading of Gothic texts. Special topics including the relationship of Gothic to Indo-European and to the other Germanic languages. Knowledge of Modern German not required. Offered in even-numbered years.

Mr. Estabrook

201. Old High German. (4) II.

Seminar—3 hours. A study of the beginnings of German as a written language through the reading of selected texts from the eighth through the eleventh centuries. A linguistic analysis of the dialects. Offered in even-numbered years.

Mr. Estabrook

202. Middle High German. (4) III.

Seminar—3 hours. Outline of grammar; selections from Middle High German epic and lyric poetry. Offered in odd-numbered years.

Mr. Estabrook

203. Old Saxon. (4) III.

Seminar—3 hours. A study of the linguistic structure and the literary significance of the language of the Old Saxon *Heliand*. Knowledge of Modern German not required. Offered in even-numbered years.

Mr. Estabrook

210. Techniques of Literary Scholarship. (4) I.

Seminar—3 hours. The bibliographic, organizational, and methodological tools and resources for advanced, independent research.

Mr. Hoermann

211. The Rise of German Literary Criticism. (4) I.

Seminar—3 hours. The history of criticism in Germany, with some attention to classical sources. The course proceeds chronologically until the modern period, then by a study of special topics broadens to a consideration of recent approaches to German literature.

Mr. Bernd

250. Walther von der Vogelweide and the "Minnesang." (4) II.

Seminar—3 hours. Offered in even-numbered years.

Mr. Estabrook

251. Studies in the Works of Andreas Gryphius. (4) II.

Seminar—3 hours. Offered in even-numbered years.

Mr. Bender

252. The Writings of Lessing. (4) I.

Seminar—3 hours. Offered in odd-numbered years.

Mr. Nerjes

253. Goethe. (4) III.

Seminar—3 hours. Offered in even-numbered years.

Mr. Rose

254. Schiller. (4) II.

Seminar—3 hours. Offered in odd-numbered years.

Mr. Nerjes

255. Hölderlin. (4) III.

Seminar—3 hours. Offered in odd-numbered years.

Mr. Bernd

256. Studies in the Prose of Jean Paul. (4) I.

Seminar—3 hours. Offered in even-numbered years.

Mr. Fetzer

257. Heinrich von Kleist. (4) III.

Seminar—3 hours. Offered in even-numbered years.

Mr. Bernd

258. The Novels of Thomas Mann. (4) II.

Seminar—3 hours. Offered in odd-numbered years.

Mr. Bernd

259. Studies in Kafka. (4) I.

Seminar—3 hours. Offered in odd-numbered years.

Mr. Bernd

260. The Poetry of Rilke. (4) I.

Seminar—3 hours. Offered in even-numbered years.

Mr. Hoermann

261. Brecht and the Epic Theater. (4) III.

Seminar—3 hours. Offered in odd-numbered years.

Mr. Hoermann

291. Seminar in Middle High German Literature. (4) II.

Seminar—3 hours. Offered in odd-numbered years.

Mr. Estabrook

292. Seminar in the Renaissance and Baroque Periods. (4) I.

Seminar—3 hours. Offered in odd-numbered years.

Mr. Bernd

293. Seminar in the Classical Age. (4) I.

Seminar—3 hours. Offered in even-numbered years.

Mr. Nerjes

294. Seminar in the Romantic Period. (4) II.

Seminar—3 hours. Offered in even-numbered years.

Mr. Fetzer

295. Seminar in Nineteenth-Century Literature. (4) III.

Seminar—3 hours. Offered in odd-numbered years.

Mr. von Wiese

296. Seminar in Twentieth-Century**Literature.** (4) III.Seminar—3 hours. Offered in even-numbered years.
Mr. Hoermann**298. Group Study.** (1–9) I, II, III.

The Staff

299. Research. (1–12) I, II, III.

The Staff

Professional Course**300. The Teaching of a Modern Foreign****Language.** (3) III.Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.
Mr. Kawczynski**GREEK—See Classics****HEBREW—See Oriental Languages****HISTORY***Chairman of the Department*

Department Office, 167 Voorhies Hall

Professors:

William M. Bowsky, Ph.D.
 W. Turrentine Jackson, Ph.D.
 Kwang-Ching Liu, Ph.D.
 C. Bickford O'Brien, Ph.D.
 Peter Paret, Ph.D.
¹ Rollie E. Poppino, Ph.D.
 James H. Shideler, Ph.D.
 F. Wilson Smith, Ph.D.
 F. Roy Willis, Ph.D.
¹Walter L. Woodfill, Ph.D.

Associate Professors:

Daniel Calhoun, Ph.D.
 Paul Goodman, Ph.D.
 David L. Jacobson, Ph.D.
 Jung-Pang Lo, Ph.D.
 Richard N. Schwab, Ph.D.
 Donald C. Swain, Ph.D.

Assistant Professors:

Arthur F. Corwin, Ph.D.
 Craig B. Fisher, Ph.D.
¹ Manfred P. Fleischer, Ph.D.
 C. Roland Marchand, Ph.D.
 Richard Millman, Ph.D.
 Morgan B. Sherwood, Ph.D.

◊ ◊ ◊

Assistant Professor:Daniel M. Mulholland, M.A. (*Acting*)**Lecturer:**

Gordon R. Mork, Ph.D.

Departmental Advisers.—Mr. Corwin, Mr. Goodman, Mr. Fisher, Mr. Fleischer, Mr. Jacobson, Mr. Liu, Mr. Lo, Mr. Marchand, Mr. Millman, Mr. Mulholland, Mr. Paret, Mr. Poppino, Mr. Schwab, Mr. Sherwood, Mr. Swain, Mr. Willis.

Graduate Advisers.—Mr. Liu, Mr. O'Brien, Mr. Shideler, Mr. Smith.

Introductory Courses.—Courses 4A, 4B, 4C, 17A, and 17B are open to all students.

The American History and Institutions requirement may be satisfied by any two of the following courses: History 17A, 17B, 170A, 170B, 170C, 171A, 171B, 171C, 174A, 174B, 175A, 175B, 176A, 176B, 178A, 178B, 179A, 179B, 180, 183A, 183B. See also page 34.

The Major Program

Lower Division Courses.—Required: Courses 4A, 4B, 4C, 17A, 17B. It is recommended that students, in consultation with their advisers, also take at least 6 or 8 units (normally a two-quarter sequence of courses) in one of the following fields: cultural anthropology, cultural geography, principles of economics, English literature, literature of the United States, philosophy, political science, psychology, or sociology.

Upper Division Courses.—Required: Students majoring in history must complete at least 36 upper division units in history, including:

(a) A minimum of 12 units (including a two-quarter sequence of courses) in a field of concentration (for "field" see below).

(b) A minimum of 8 units each in two other fields of history. (The fields referred to are Great Britain, Europe, Russia, East Asia, Latin America, and the United States).

Honors and Honors Program (see page 107).

—A student may become eligible for graduation with honors in history by enrolling in the department's honors program, and will be invited by the department to do so. This program comprises course 101A, normally taken during the junior year, and the writing of a research paper in History 101B, 199, or other approved course during the senior year. Before being admitted to the honors program, a student must complete 20 units of history, including both United States and European history (normally courses 4 and 17) with an average grade of B.

¹ Absent on leave, 1967–68.

Graduate Study.—The Department of History offers programs of study and research leading to the M.A. and Ph.D. degrees in history. Detailed information may be obtained by writing to the Graduate Adviser, Department of History.

Teaching Major.—Requirements are the same as for the departmental major plus course 300.

Teaching Minor.—Thirty-two units of history, including 4A—4B—4C, 17A—17B, and 12 units of upper division course work. The 12-units of upper division work should include a two-quarter sequence.

Subject Representative: Mr. Jacobson

Lower Division Courses

4A. History of Western Civilization. (4) I.

Lecture—3 hours; discussion—1 hour. The growth of western civilization from ancient times through the middle ages. The Staff

4B. History of Western Civilization. (4) II.

Lecture—3 hours; discussion—1 hour. The development of western civilization from the Renaissance through 1815. The Staff

4C. History of Western Civilization. (4) III.

Lecture—3 hours; discussion—1 hour. The development of western civilization in the nineteenth and twentieth centuries. The Staff

17A. History of the United States. (4) I, II.

Lecture—3 hours; discussion—1 hour. The growth of the American people from colonial times through the Civil War. The Staff

17B. History of the United States. (4) II, III.

Lecture—3 hours; discussion—1 hour. The American people from Reconstruction to the present. The Staff

Upper Division Courses

101A. Introduction to Historical Thought and Writing. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Study of the history of historical thought and writing; analysis of critical and speculative philosophies of history, and evaluation of modes of organization, interpretation, and style in historical writing. Mr. Marchand

101B. Introduction to Historical Method. (4) I, II.

Discussion—4 hours. Prerequisite: consent of instructor. The development of skills in historical research and composition through individual, guided research. An extensive paper is required. The Staff

111A. Ancient History. (4) I.

Lecture—4 hours. History of the ancient empires of the Near East and of the Greek city-states to the fifth century B.C. Mr. Fisher

111B. Ancient History. (4) II.

Lecture—4 hours. History of Greece, the Hellenistic kingdoms, and Rome from the fifth century B.C. to the Punic Wars. Mr. Fisher

111C. Ancient History. (4) III.

Lecture—4 hours. History of Rome and its empire from the Punic Wars to Constantine. Mr. Fisher

121A. Medieval History. (4) I.

Lecture—4 hours. European history from Constantine to the eighth century. Mr. Bowsky

121B. Medieval History. (4) II.

Lecture—4 hours. European history from Charlemagne to the eleventh century. Mr. Bowsky

121C. Medieval History. (4) III.

Lecture—4 hours. European history from the Crusades to the Renaissance. Mr. Bowsky

*131A. Early Modern European History. (4) I.

Lecture—3 hours. Recommended: courses 4A and 4B. Western European history from about 1350 to about 1500. Mr. Fleischer

*131B. Early Modern European History. (4) II.

Lecture—3 hours. Recommended: courses 4A, 4B, 131A. Western European history from about 1500 to about 1650. Mr. Fleischer

*131C. Early Modern European History. (4) III.

Lecture—3 hours. Recommended: courses 4A, 4B, 131B. Western European history from about 1650 to about 1789. Mr. Fleischer

133A. Age of Reason. (4) I.

Lecture—3 hours, discussion—1 hour. Topics in the intellectual history of the seventeenth and early eighteenth centuries. From Bacon to Newton and Locke. Mr. Schwab

133B. Age of Reason. (4) II.

Lecture—3 hours, discussion—1 hour. The Enlightenment of the eighteenth century. An intellectual and social history. Mr. Schwab

134. The French Revolution and the Napoleonic Era. (4) III.

Lecture—3 hours, discussion—1 hour. Ideas and institutions in Europe during the French Revolution and the Napoleonic era. Mr. Schwab

137A. Russian History: Kievan and Muscovite Russia. (4) I.

Lecture—3 hours. Russian civilization from earliest times to the reign of Peter the Great. Mr. O'Brien

137B. Russian History: The Empire to 1856. (4) II.

Lecture—3 hours. Russian civilization from the Age of Peter the Great through the Crimean War. Mr. O'Brien

* Not to be given, 1967-68.

137C. Russian History: The Empire, 1856-1914. (4) I.

Lecture—3 hours. Russian civilization from the Crimean War to the outbreak of the First World War. Mr. Mulholland

137D. Russian History: Soviet Russia. (4) II.

Lecture—3 hours. Russia from the Revolution of 1917 to the Age of Stalin. Mr. Mulholland

139. Studies in Modern Russian History. (4) III.

Lectures and discussion—3 hours. Prerequisite: course in Russian history before 1917; or consent of instructor. Reading in sources and monographs on the history of Russia from the time of Troubles to the Crimean War; lectures, discussions, and reports. Mr. O'Brien

141. France since 1815. (4) I.

Lecture—3 hours. Mr. Willis

144A. History of Germany to 1815. (4) II.

Lecture—3 hours. Prerequisite: courses 4A and 4B. A history of the Germanies through the Congress of Vienna. Mr. Mork

144B. History of Germany since 1815. (4) III.

Lecture—3 hours. Prerequisite: courses 4C and 144A. The German national unification, the age of Bismarck and William II, and the wars and revolutions of the twentieth century. Mr. Mork

145A. Europe in the Nineteenth Century. (4) I.

Lecture—3 hours. A survey of the history of Europe from 1815 to 1870. Mr. Millman

145B. Europe in the Nineteenth Century. (4) II.

Lecture—3 hours. A survey of the history of Europe from 1870 to 1918. Mr. Millman

146A. Europe in the Twentieth Century. (4) I, II.

Lecture—3 hours. A survey of the history of Europe from 1919 to 1939. Mr. Willis

146B. Europe in the Twentieth Century. (4) III.

Lecture—3 hours. A survey of the history of Europe since 1939. Mr. Willis

***147. Ideas and Politics in Twentieth-Century Europe. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 4A, 4B, and 4C; or consent of instructor. Political, military, and intellectual history of Europe from the turn of the century to the present. Extensive source readings. Mr. Paret

***148A. Diplomatic History of Modern Europe. (4) I.**

Lecture—3 hours. A survey of the diplomatic relations of the European powers from the eighteenth century to the middle of the nineteenth century. Mr. Millman

148B. Diplomatic History of Modern Europe. (4) II.

Lecture—3 hours. A survey of the diplomatic relations of the European powers from the Crimean War to 1890. Mr. Millman

148C. Diplomatic History of Modern Europe. (4) III.

Lecture—3 hours. A survey of the diplomatic relations of the European powers from 1890 to the 1930's. Mr. Millman

149. History of Military Thought and Policy from Machiavelli to the Present. (4) I.

Lecture—3 hours. Prerequisite: courses 4A, 4B, 4C. Recommended: additional background in history, political theory, or sociology. An analysis of military affairs and of their interaction with intellectual, social, economic, and political history since the Renaissance. Mr. Paret

151A. History of England. (4) I.

Lecture—3 hours. Recommended: course 4A. A survey of English history to the latter part of the fifteenth century.

151B. History of England. (4) II.

Lecture—3 hours. Recommended: courses 4A, 4B, and 151A. A survey of English history from the latter part of the fifteenth century to the latter part of the eighteenth century.

151C. History of England. (4) III.

Lecture—3 hours. Recommended: courses 4B, 4C, 151A, and 151B. A survey of English history from the latter part of the eighteenth century to the present.

***152A. English Constitutional History. (4) II.**

Lecture—2 hours; discussion—2 hours. Recommended: course 151A. From Anglo-Saxon times to the reign of Edward IV.

***152B. English Constitutional History. (4) III.**

Lecture—2 hours; discussion—2 hours. Recommended: courses 151B or 154, 151C, and 152A. From the reign of Edward IV to the present.

154. Tudor and Stuart England. (4) III.

Lecture and discussion—3 hours. Prerequisite: consent of instructor. Recommended: courses 151A and 151B.

161A. Latin American History. (4) I.

Lecture—3 hours. Colonial history of Latin America. Mr. Corwin

161B. Latin American History. (4) II.

Lecture—3 hours. The national period of Latin American history. Mr. Corwin

* Not to be given, 1967-68.

162. History of Cuba and the Spanish Caribbean. (4) III.

Lecture—3 hours. The history of Cuba and the Spanish Caribbean since 1492, including discovery and settlement, slavery and the plantation economy, independence movements, and United States relations with the island republics. Emphasis on the period since 1898. Offered in odd-numbered years.

Mr. Corwin

***163. History of Brazil. (4) I.**

Lecture—3 hours. The history of Brazil since 1500, dealing with the colonial origins and subsequent development of political, economic, and social institutions. Emphasis on the period since independence.

Mr. Poppino

164. History of Argentina. (4) III.

Lecture—3 hours. The history of Argentina from about 1800 to the present, stressing the contributions of the colonial heritage and nineteenth-century political, economic, and social developments to the rise of Argentine nationalism. Offered in even-numbered years.

Mr. Corwin

***165. Latin American Social Revolutions. (4) II.**

Lecture—3 hours. Prerequisite: a reading knowledge of Spanish is recommended. Major social upheavals since 1900 in Mexico, Argentina, Brazil, Bolivia, Guatemala, and Cuba, examined as to similarities and differences in causes, course, and consequences. Mr. Poppino

166. History of Mexico. (4) III.

Lecture—3 hours. The colonial origin and development of the Mexican nation; its political, economic, and social institutions. Emphasis on the period since 1910.

Mr. Corwin

***167. Proseminar in Latin American History.**

(4) I, III.

Discussion—4 hours. Prerequisite: courses 161A or 161B, or the equivalent; consent of instructor. Recommended: reading knowledge of Spanish or Portuguese. Research and writing on selected topics in Latin American history.

Mr. Corwin, Mr. Poppino

***168. History of Inter-American Relations. (4) III.**

Lecture—3 hours. Prerequisite: a reading knowledge of Spanish or Portuguese is recommended. Diplomatic history of Latin America since independence, intra-Latin American relations, relations with the U.S., participation in international organizations, and communism in Latin America.

Mr. Poppino

***169. Anglo-American Relations in the Nineteenth Century. (4) I.**

Lecture—3 hours. The interaction of economic, political, and strategic factors in the re-

* Not to be given, 1967–68.

lations between Great Britain and the Americas during the nineteenth century.

170A. Colonial America. (4) I.

Lecture—3 hours; discussion—1 hour. Colonial society from 1607 to the American Revolution, with emphasis on European expansion, political, social, and economic foundations, colonial thought and culture, and imperial rivalry.

Mr. Jacobson

170B. The American Revolution. (4) II.

Lecture—3 hours. An analysis of the Revolutionary epoch with emphasis on the structure of British colonial policy, the rise of revolutionary movements, the War for Independence and its consequences, and the Confederation period.

Mr. Jacobson, Mr. Goodman

***170C. The Early National Period. 1789–1815.**

(4) III.

Lecture—3 hours. The political and social history of the American republic from the adoption of the Constitution through the War of 1812 and its consequences.

Mr. Goodman

171A. The Jacksonian Era. (4) III.

Lecture—3 hours. The political and social history of the American Republic from the end of the War of 1812 to the Compromise of 1850.

Mr. Smith

***171B. American Civil War. (4) I.**

Lecture—3 hours. Major developments in American history from 1848 to 1865: slavery and antislavery, immigration, sectional conflict, emergence of the Republican party, the Civil War.

171C. The Emergence of Modern America. (4) III.

Lecture—3 hours. From Reconstruction to the twentieth century, including political and intellectual change, the advent of big business, the rise of organized labor, ethnic adjustments, urbanization, and movements of social unrest.

Mr. Goodman

174A. Recent History of the United States. (4) I.

Lecture—3 hours; discussion—1 hour. Study of political, economic, and cultural aspects of American democracy from 1900 to 1930's.

Mr. Swain

174B. Recent History of the United States. (4) II.

Lecture—3 hours; discussion—1 hour. Study of political, economic, and cultural aspects of American democracy from the 1930's to the present.

Mr. Swain

175A. Intellectual History of the United States. (4) I.

Lecture—3 hours. Prerequisite: courses 17A and 17B; or a course in American philosophy, American political theory, American literature, or sociological theory. American social thought from colonial times to the 1860's. Emphasis

upon Puritanism, the American Enlightenment, Transcendentalism, Jacksonian democracy, in the context of ideas about the nature of man and his freedom and the idea of progress.

Mr. Smith

175B. Intellectual History of the United States. (4) II.

Lecture—3 hours. Prerequisite: courses 17A and 17B; or a course in American philosophy, American political theory, American literature, or sociological theory. American social thought from the 1860's to the present. Emphasis upon the social relevance of philosophical and religious idealism, naturalism, and pragmatism.

Mr. Smith

176A. Social and Cultural History of the United States. (4) III.

Lecture—3 hours. A study of social and cultural forces in American society from colonial times through reconstruction and the post-Civil War industrial expansion, with emphasis on class structure, religious movements, labor systems, racial and national groups, social reform movements, changes in social values. Offered in odd-numbered years.

Mr. Marchand

***176B. Social and Cultural History of the United States. (4) III.**

Lecture—3 hours. A study of social and cultural forces in American society from 1880 to the present with emphasis on class structure, religious movements, labor systems, racial and national groups, social reform movements, and changes in social values. Offered in even-numbered years.

Mr. Marchand

***178A. Great Issues in United States History: Ideas and Interpretations. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior standing; or consent of instructor. Selected topics in the political, economic, social and intellectual history of the United States. A study in historical thought and interpretation concerning the main currents of national development to 1865.

Mr. Jackson

***178B. Great Issues in United States History: Ideas and Interpretations. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior standing; or consent of instructor. Selected topics in the political, economic, social and intellectual history of the United States. A study in historical thought and interpretation concerning the main currents of national development since 1865.

Mr. Jackson

***179A. Economic Growth of the United States. (4) II.**

Lecture—3 hours. Development of the American economy from colonial agriculture and mercantilism to the emergence of industrial capitalism.

***179B. Economic Growth of the United States.**

(4) III.

Lecture—3 hours. The changing nature of industrial capitalism and its effects on agriculture, labor, business, and government in the late nineteenth and twentieth centuries.

***180. The Westward Movement to 1850. (4) III.**

Lecture—3 hours. The political, economic, and social significance of the westward movement from colonial times to 1850.

Mr. Sherwood

***183A. The Frontier Experience: Trans-Mississippi West. (4) I.**

Lecture—3 hours; discussion—1 hour. The fur trade, western exploration and transportation, the Oregon Country, the Greater Southwest and the Mexican War, the Mormons, mining discovery, and the West during the Civil War.

Mr. Jackson

183B. The Frontier Experience: Trans-Mississippi West. (4) II.

Lecture—3 hours; discussion—1 hour. Spread of the mining kingdom, the range cattle industry, Indian-military affairs, settlement of the Great Plains and Rocky Mountain Regions and political organization of the West.

Mr. Jackson

185A. History of Science and Technology in America. (4) II.

Lecture—3 hours. A study of science and technology in America, emphasizing the development of scientific ideas and institutions, to 1890.

Mr. Sherwood, Mr. Swain

185B. History of Science and Technology in America. (4) III.

Lecture—3 hours. A study of science and technology in America, emphasizing the development of scientific ideas and institutions, since 1890.

Mr. Sherwood, Mr. Swain

188A. History of Agriculture in the United States. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: junior or senior standing. History of agricultural development to 1900 with emphasis on social and economic institutions.

Mr. Shideler

188B. History of Agriculture in the United States. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: junior or senior standing. History of agricultural changes from 1900 to the present with emphasis on the background and evolution of government policy.

Mr. Shideler

* Not to be given, 1967-68.

189A. History of California. (4) III.

Lecture—3 hours; discussion—1 hour. History of California to 1865. Offered in odd-numbered years.
Mr. Jackson

189B. History of California. (4) III.

Lecture—3 hours; discussion—1 hour. History of California since 1865. Offered in even-numbered years.
Mr. Jackson

190A. East Asian Civilization. (4) I.

Lecture—3 hours. The culture and history of East Asia to 1600. Emphasis on China and Japan; attention also to Southeast Asia. Offered in odd-numbered years.
Mr. Liu

190B. East Asian Civilization. (4) II.

Lecture—3 hours. The culture, history, and problems of East Asia since 1600. Emphasis on China and Japan; attention also to Southeast Asia. Offered in even-numbered years. Mr. Liu

191A. Early Imperial China. (4) I.

Lecture—3 hours, discussion—1 hour. Chinese history to 960 with emphasis on the basic ideas and institutions which have molded the culture and society of China. Offered in odd-numbered years.
Mr. Lo

191B. Late Imperial China. (4) II.

Lecture—3 hours, discussion—1 hour. China, 960 to 1800, with attention to the growth of autocracy, economic and intellectual development, and problems of foreign relations. Offered in even-numbered years.
Mr. Lo

191C. Modern China. (4) III.

Lecture—3 hours, discussion—1 hour. The revolutionary transformation of China from the nineteenth century to the present. Mr. Lo

192. Modern China and the West. (4) III.

Lecture—1½ hours; discussion—1½ hours. Prerequisite: course 190B or 191C; or consent of instructor. Readings and reports on selected topics.
Mr. Liu

193. China's Relations with Southeast Asia. (4) I.

Lecture—3 hours; discussion—1 hour. China's historical relations with Southeast Asia—military, political, cultural, and economic. Offered in even-numbered years.
Mr. Lo

194. Japan. (4) II.

Lecture—3 hours. The society, culture, and foreign relations of Japan to the present. Offered in odd-numbered years.
Mr. Lo

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

Prerequisite: consent of instructor. The Staff

Graduate Courses**201. Sources and General Literature of History.**

(4) I, II, III.

Seminar—3 hours. Advanced studies in bibli-

ography and historiography in the several fields of history, for students preparing for higher degrees in history. May be repeated for credit.

The Staff

237. Russian History. (4) I, II.

Seminar—3 hours. Prerequisite: a reading knowledge of Russian. Topics relating to the history of Muscovite and Imperial Russia before 1856.
Mr. O'Brien

242. History of the Enlightenment. (4) II, III.

Seminar—3 hours. Prerequisite: a reading knowledge of French. Intellectual and social history of Europe during the Enlightenment. May be repeated for credit.
Mr. Schwab

245. History of the Napoleonic Era. (4) I, II.

Seminar—3 hours. Prerequisite: reading knowledge of French or German and consent of instructor. Political, intellectual, social, and military history of Europe from the Consulate to the Congress of Vienna.
Mr. Paret

246. Europe in the Twentieth Century. (4) II, III.

Seminar—3 hours. Political history of Europe since 1919, with particular emphasis on the post-1939 period.
Mr. Willis

***248A–248B. Modern European Diplomatic History.**
(4–4) II–III.

Seminar—3 hours. Prerequisite: reading knowledge of French or German; courses 148B and 148C; or consent of instructor. Bibliography and topics in the diplomatic history of Europe from the French Revolution to the 1930's, with emphasis on the nineteenth century.
Mr. Millman

249. Military Theory, Institutions, and Policy since the Renaissance. (4) II, III.

Seminar—3 hours.
Mr. Paret

***251. English History. (4) I, II, III.**

Seminar—3 hours. Recommended: courses 151A, 151B, and 151C; 152A and 152B; 154.
Mr. Woodfill

261. Latin American History. (4) I.

Seminar—3 hours. Prerequisite: two courses in Latin American history; reading knowledge of Spanish or Portuguese.
Mr. Corwin

270. Early American History. (4) I, II.

Seminar—3 hours.
Mr. Jacobson

271. History of the United States, 1760–1815.

(4) I, II.

Seminar—3 hours.
Mr. Goodman

***272. History of the United States, 1815–1848.**

(4) I, II.

Seminar—3 hours.
Mr. Calhoun

* Not to be given, 1967–68.

***273. History of the United States, 1848-1900.**

(4) I, II.

Seminar—3 hours.

274. Recent History of the United States. (4) II.

Seminar—3 hours. Topics in twentieth century American history. Mr. Swain

275. American Social and Intellectual History.

(4) I, III.

Seminar—3 hours. Prerequisite: graduate standing. Studies in the recent historiography of American social and intellectual history. Mr. Smith

277. Nineteenth Century American Institutions.

(4) II.

Seminar—3 hours. Churches, schools, professions, urban growth, and social mobility in nineteenth century America. Mr. Smith

283. History of the United States: The Frontier. (4) I.

Seminar—3 hours.

Mr. Jackson

288. History of the United States. (4) II, III.

Seminar—3 hours. Prerequisite: graduate standing. Emphasis on agricultural history and closely related topics such as exports, transportation and politics. Mr. Shideler

291. Chinese History. (4) I, II.

Seminar—3 hours.

Mr. Liu, Mr. Lo

299. Research. (1-6) I, II, III.

The Staff

299D. Individual Study. (1-6) I, II, III.

The Staff

Professional Course**300. The Teaching of History in the Secondary School and the Junior College. (3) III.**

Lecture—3 hours. Prerequisite: junior or senior standing with a teaching major or minor in social studies. Methods for the presentation of history at the secondary and junior college level.

HOME ECONOMICS EDUCATION—See Family and Consumer Sciences**HOME MANAGEMENT—See Family and Consumer Sciences****HUMAN DEVELOPMENT—See Family and Consumer Sciences****INSTITUTION MANAGEMENT—See Family and Consumer Sciences****INTERNATIONAL AGRICULTURAL DEVELOPMENT****William A. Williams, Ph.D., Chairman of the Committee**

Committee Office, 265 Hunt Hall

Committee in Charge:**William J. Chancellor, Ph.D. (Agricultural Engineering)****Robert M. Hagan, Ph.D. (Irrigation)****Klayton E. Nelson, Ph.D. (Viticulture and Enology)****Magnar Ronning, Ph.D. (Animal Husbandry)****William A. Williams, Ph.D. (Agronomy)****Departmental Major Adviser.—See Schedule and Directory Listing.****Bachelor of Science major program and Graduate.** See pages 53 and 127.**Upper Division Courses****101. Crop Production under Tropical Conditions. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Science 2 or Botany 2. Climatic and soil adaptation; varieties and varietal im-

provement in annual and perennial crops; pests, diseases, and their control; fertilization and other management practices. Mr. Williams

102. Livestock and Poultry Production in Developing Areas. (4) I.

Lecture—4 hours. Prerequisite: Animal Science 10, Nutrition 103. Kinds of livestock and poultry suited to developing areas; feed-stuff resources and their utilization; ecological problems including pests, diseases and their control; management practices.

Mr. Carroll, Mr. Kratzer, Mr. Wilson

190. Proseminar in International Agriculture Development. (2) III.

Lecture—1 hour; discussion—1 hour. Prerequisite: consent of instructor. Problems of coordinating principles and information from technical agriculture and the social sciences in the context of economic development. Mr. Smith

* Not to be given, 1967-68.

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Akesson in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Hedges in charge)

Graduate Courses**280. Social, Technological, and Other Factors in Agricultural Development. (3) II.**

Seminar—3 hours. Problem identification and analysis in agricultural development; cultural forces; political, social, and economic organization; human factors in relation to resource use and technology, function and use of the change agent; program development, planning and execution.
Mr. Hedges

299. Research. (1-9) I, II, III.

The Staff (Mr. Whittig in charge)

INTERNATIONAL RELATIONSPaul E. Zinner, Ph.D., *Chairman of the Committee*

Committee Office, 257 Voorhies Hall

Committee in Charge:**Professors:**

- Max Bach, Ph.D. (*French and Italian*)
 Bennett M. Berger, Ph.D. (*Sociology*)
 Bruce Glassburner, Ph.D. (*Economics*)
 Kwang-Ching Liu, Ph.D. (*History*)
 James H. Shideler, Ph.D. (*History*)
 Paul E. Zinner, Ph.D. (*Political Science*)

Associate Professor:

- Elias H. Tuma, Ph.D. (*Economics*)

Major Adviser: See Schedule and Directory.

International relations embraces those social relationships which transcend the boundaries of national states. The major in international relations is devised to meet the needs of students interested in acquiring an understanding of the forces and influences conditioning present-day world politics and world economics, as well as the main problems and policies of organized states in their relations with one another in the twentieth century. Because these problems and policies must be dealt with and determined by governments, the major is built around courses dealing with intergovernmental 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

Depth required in one modern foreign language, approximately 28 quarter units.

Lower Division Courses.—Required: Economics 1A, 1B; History 4A or 4B, 4C, 17A, 17B; Political Science 1A, 1B, 2, 3; approximately 28 quarter units in one modern foreign language; Economics 116 or 160, 161; Political Science 124, 128A-128B; 8 quarter units of history exclusive of United States history; 8 additional quarter units in related courses selected in consultation with the adviser.

of history exclusive of United States history; 8 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 (Economic Systems); Geography 123A (Geography of Western Europe); Geography 123B (Geography of Eastern Europe); Geography 143 (Political Geography); History 146A, 146B (Europe in the Twentieth Century); History 190B (East Asian Civilization); Political Science 149 (International Communism).

The student should also acquaint himself with history of the arts, literature, and philosophy.

Teaching Major.—Required: Economics 1A-1B; History 4A or 4B, 4C, 17A-17B; Political Science 1A-1B, 2, 3; approximately 28 quarter units in one modern foreign language; Economics 116 or 160, 161; Political Science 124, 128A-128B; 8 quarter units of history exclusive of United States history; 8 additional quarter units in related courses selected in consultation with the adviser.

For the secondary credential: a combined total of 36 quarter units of upper division work in the fields of political science, history, including economics and at least 20 quarter units of upper division or graduate course work in either political science or history.

For the elementary credential: Since the interdepartmental major for the A.B. degree requires a combined total of 36 quarter units of upper division work in the fields of political science, history, and economics, this meets the minimum state requirement of 24 semester hours of upper division or graduate course work in two or more subjects normally taught in the public schools in the social sciences.

Subject Representative: Mr. Zinner

ITALIAN—See French and Italian

JAPANESE—See Oriental Languages

LANDSCAPE HORTICULTURE—See Plant Science

LATIN—See Classics

LAW

Edward L. Barrett, Jr., LL.B., *Dean of the School and Chairman of the Department*
Department Office, TB-98

Professors:

Edward L. Barrett, Jr., LL.B.

Edgar Bodenheimer, J.D., LL.B.

Daniel J. Dykstra, LL.B., S.J.D.

James E. Hogan, LL.B.

Edward H. Rabin, LL.B. (*Acting*)

Mortimer D. Schwartz, LL.B., LL.M., M.S.
(*Law Librarian*)

John W. Whelan, LL.B.

Associate Professor:

Frank B. Baldwin III, LL.B., LL.M.
(*Acting*) ◇ ◇ ◇

Professor:

Paul N. Savoy, LL.B. (*Acting*)

Admission Requirements and Curriculum: for
details consult the *Announcement of the
School of Law*.

Professional Curriculum

First Year

**200A–200B–200C. Introduction to the Anglo-
American Legal Systems. (2–2–2) I–II–III.**

Lecture—2 hours. Basic concepts of the law, the precedent system, reasoning in law, the historical roots of common law and equity, the forms of action, equitable remedies, fundamentals of statutory interpretation.

Mr. Bodenheimer

201A–201B–201C. Property. (3–3–3) I–II–III.

Lecture—3 hours. The development of the law of property, including estates and other interests in land, real property marketing and conveyancing, land-use control, and landlord-tenant problems.

Mr. Baldwin, Mr. Rabin

202A–202B–202C. Contracts. (4–2–2) I–II–III.

Lecture—4–2–2 hours. The law of contracts, including problems of formation interpretation, performance, enforcement, and termination.

Mr. Whelan

**203A–203B–203C. Pleading and Procedure in Civil
Cases. (2–2–4) I–II–III.**

The principles of pleading under the code system and the federal rules; jurisdiction of state

and federal courts; modern pretrial, trial, and appellate procedure.

Mr. Hogan

204A–204B. Torts. (4–4) I–II.

Lecture—4 hours. Intentional and unintentional invasions of interests of personality and property.

Mr. Dykstra

206. Constitutional Law I. (4) III.

Lecture—4 hours. An introductory analysis of the judicial process in constitutional cases; division of powers between the national government and the states.

Mr. Barrett

207. Legal Research and Writing. (2) II.

Lecture—2 hours. Small group instruction in the techniques of legal research and writing.

Mr. Schwartz

Second Year—Required Courses

215A–215B–215C. Business Associations.

(2–2–4) I–II–III.

Lecture—2–2–4 hours. Principles of agency and partnership, the process of incorporation, corporate control and management, and problems related to corporate finance and regulation.

Mr. Dykstra

216. Commercial Law. (3) I.

Lecture—3 hours. Legal problems stemming from the distribution of goods.

Mr. Savoy

217. Constitutional Law II. (3) I.

Lecture—3 hours. Constitutional limitations on governmental power.

Mr. Barrett

218A–218B. Criminal Law and Procedure.

(3–2) I–II.

Lecture—3–2 hours. A study of the elements and policies of selected criminal offenses; principles of evidence and procedure in criminal cases.

Mr. Baldwin, Mr. Savoy

219A–219B. Evidence. (3–2) II–III.

Lecture—3–2 hours. An examination and evaluation of the basic rules governing the presentation of material in court by means of documents and the examination of witnesses.

Mr. Hogan

220A-220B. Federal Taxation. (2-3) II-III.

Lecture—2-3 hours. A study of the statutory, judicial, and administrative material concerning primarily federal taxes.

221A-221B. Introduction to Estate Planning. (3-3) I-II.

Lecture—3 hours. The basic estate planning devices, including wills, trusts, and future interests. Mr. Rabin

222A-222B. Writing Seminar. (2-2) II-III.

Seminar—2 hours. Each student is required to complete this seminar during his second year. No section of the course will enroll more than 12 students and a research paper will be required. Enrollment in Section 6 will be limited to students invited by the faculty to participate in the initiation of a legal periodical. Subject matter emphasis of the sections will vary from year to year. During 1967-68 the sections will be the following.

- Section 1. Criminal Procedure. Mr. Savoy
- 2. Government Contracts. Mr. Whelan
- 3. International Law. Mr. Bodenheimer
- 4. Land Use Planning. Mr. Rabin
- 5. Natural Resources. Mr. Baldwin
- 6. Methods of Law Review
Research, Writing, and Editing. Mr. Baldwin

Second-Year—Elective Courses**230. Family Law. (3) III.**

Lecture—3 hours. Legal aspects of the problems of family organization and disorganization, and the domestic relations of husband and wife, parent and child. Mr. Savoy

231. Legislation. (3) III.

Lecture—3 hours. An examination of the legislative process and the factors affecting it. Mr. Whelan

232. Land Financing. (3) III.

Lecture—3 hours. A study of the history and principles of real estate mortgages and deeds of trust as security devices for financing land and other transactions. Mr. Schwartz

233. Philosophy of Responsibility and Punishment. (3) III.

Lecture—3 hours. Freedom of will and responsibility in the light of recent developments in philosophy and psychology; the significance of the concept of responsibility in the administration of criminal justice; modern approaches to the problems of punishment and rehabilitation. Enrollment by permission of instructor.

Mr. Bodenheimer

234. Agricultural Law Seminar. (No credit) I.

A series of discussions on problems of agricultural industries which have legal significance. Discussions will be led by invited faculty members from the College of Agriculture and other related departments.

The Staff

LINGUISTICS

Benjamin E. Wallacker, Ph.D., *Chairman of the Committee*

Committee Office, 331 Voorhies Hall

Committee in Charge:**Professor:**

David L. Olmsted, Ph.D. (*Anthropology*)

Associate Professors:

Jarvis R. Bastian, Ph.D. (*Psychology*)

Martin A. Baumhoff, Ph.D. (*Anthropology*)

Wayne C. Harsh, Ph.D. (*English*)

Philip L. Wagner, Ph.D. (*Geography*)

Benjamin E. Wallacker, Ph.D. (*Oriental Languages*)

Assistant Professors:

Ronald A. Arbini, Ph.D. (*Philosophy*)

Jerry R. Craddock, A.B. (*Acting; Spanish and Classics*)

H. Phelps Gates, Jr., A.B. (*Acting; Spanish and Classics*)

George H. Keith, Ph.D. (*French and Italian*)

J. Rolf Kjolseth, M.A. (*Acting; Sociology*)

Eric S. Liu, Ph.D. (*Oriental Languages*)

Sarita G. Schotta, B.A., B.M. (*Acting; English and Linguistics*)

Edward J. Tully, Jr., Ph.D. (*Mathematics*)

Stephen A. Tyler, Ph.D. (*Anthropology*)

Graduate Adviser.—Mr. Wallacker

35. Introduction to Linguistics. (4) III.

Lecture—3 hours; laboratory—2 hours. Introduction to the study of language, its nature, diversity, and structure. Mr. Craddock

Upper Division Courses**140. Grammatical Analysis. (3) III.**

Lecture—3 hours. Prerequisite: Anthropology 110B. Introduction to the theory of grammatical analysis; practice in solving exercise problems.

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**202. Principles of Historical Linguistics. (3) II.**

Lecture—3 hours. Prerequisite: Anthropology 110C. Advanced treatment of the theory and method of historical linguistics, with special emphasis on Indo-European languages. Mr. Tyler

210. Historical Germanic Linguistics. (4) II.

Seminar—3 hours. The principles and techniques of historical linguistics will be used to study the development of the Germanic languages from Proto-Indo-European through Proto-Germanic and into early Germanic dialects such as Old Norse, Gothic, Old Saxon, and Old English. Mrs. Schotta

215. Computational Linguistics. (2) III.

Lecture—2 hours. Prerequisite: consent of instructor. The use of electronic computers and other computational devices in linguistic analysis, mechanical translation, and lexicography. Mr. Liu

220. Romance Linguistics. (4) II.

Seminar—3 hours. Prerequisite: consent of instructor. Phonology, morphology, and lexicography of the major Romance languages. Mr. Keith

225. Modern Linguistic Theory. (3) II.

Lecture—3 hours. Prerequisite: course 140 and Anthropology 110B. Survey of leading contributions to linguistic theory from de Saussure to the present.

299. Research. (1-12) I, II, III.

The Staff

MATHEMATICSEdward B. Roessler, *Chairman of the Department*

Department Office, 824 Sproul Hall

Professors:

- Henry L. Alder, Ph.D.
- George A. Baker, Ph.D.
- Curtis M. Fulton, Ph.D.
- Charles A. Hayes, Jr., Ph.D.
- Peter W. M. John, Ph.D.
- Archibald J. Macintyre, Ph.D.
- Edward B. Roessler, Ph.D.
- Sherman K. Stein, Ph.D.
- Takayuki Tamura, D.Sc.

Associate Professors:

- Hubert A. Arnold, Ph.D.
- Dallas O. Banks, Ph.D.
- Donald C. Benson, Ph.D.
- Albert C. Burdette, Ph.D.
- Gulbank D. Chakerian, Ph.D.
- Kurt Kreith, Ph.D.
- Gary J. Kurowski, Ph.D.
- David G. Mead, Ph.D.
- Donald A. Norton, Ph.D.

Assistant Professors:

- Carlos Borges, Ph.D.
 - Doyle O. Cutler, Ph.D.
 - Melven R. Krom, Ph.D.
 - Washek F. Pfeffer, Ph.D.
 - George T. Sallee, Ph.D.
 - Robert W. Stringall, Ph.D.
 - Edward J. Tully, Jr., Ph.D.
 - Howard J. Weiner, Ph.D.
- ◊ ◊ ◊

Assistant Professors:

- Edward H. Theil, M.S. (*Acting*)
- Charles E. Franti, M.S. (*Acting; Biostatistics*)

Lecturers:

- Shirley A. Goldman, M.S.
- Fred Krakowski, Ph.D.

Major Subject Advisers.—Mr. Alder, Mr. Baker, Mr. Borges, Mr. Chakerian, Mr. Cutler, Mr. Krakowski, Mr. Kreith, Mr. Krom, Mr. Norton, Mr. Stein, Mr. Tully and Mr. Weiner.

Bachelor of Arts Major Program

Lower Division Courses.—Required: course 1A, 1B, 1C (or 11A-11B), 2A, 2B, 2C.

Upper Division Courses.—Required: 36 units including courses 108A, 108B, 127A, and 150A and a course in geometry. Courses 108A-108B, although upper division courses, should be taken in the sophomore year. Students specializing in statistics may substitute course 132A for the geometry course; students specializing in numerical analysis or computer science may substitute course 128A for the geometry course.

Bachelor of Science Major Program

The major program consists of 90 units of mathematics and/or natural science courses including:

Lower Division Courses.—Required: courses 1A, 1B, 1C (or 11A-11B), 2A, 2B, 2C.

Upper Division Courses. Forty-four units including courses 108A, 108B, 127A, 127B, 127C, 150A, 150B, 151A, and a course in geometry. Courses 108A-108B, although upper division courses, should be taken in the sophomore year. Students specializing in statistics may substitute course 132A for the geometry course; students specializing in numerical analysis or computer science may substitute course 128A for the geometry course.

Courses offered by other departments.—Required: at least one science course requiring a background in mathematics, from a list to be prepared by the Department of Mathematics. (Examples: Physics 4A, Agricultural Economics 106, Zoology 116.)

A lower division course in mathematics is not acceptable as a prerequisite for another course in mathematics unless a grade of C or higher has been attained in it.

Graduate Study.—The Department of Mathematics offers programs of study and research leading to the M.A. and Ph.D. degrees in mathematics. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Mathematics.

Qualifying Examinations.—A student entering from high school who believes that he has had the equivalent of a course offered by the Department of Mathematics (e.g., analytic geometry and calculus) may demonstrate his proficiency in this course by examination. If, in the opinion of the department, his level of achievement is sufficiently high, he will be permitted to enter the next course in the sequence. No University credit is earned by passing such an examination. Arrangements for an examination must be made with the department secretary in 822 Sproul Hall on or before the Monday of registration week.

Teaching Major.—Requirements for the teaching major are the same as for the B.S. or B.A. major.

Teaching Minor.—Thirty units of mathematics which must include: 4 units of fundamentals of mathematics (course 36A); 8 units of calculus (courses 1A-1B or 16A-16B-16C); 3 units of probability and/or statistics (courses 13, 15, or 131A); 3 units of geometry (course 37 especially recommended, 112, 113, 114, or 116).

The remainder of the 30 units are elective, except that students with a non-academic major must include 18 units in mathematics at the upper division or graduate level.

Subject Representative: Mr. Burdette.

Lower Division Courses

1A. Analytic Geometry and Calculus, First Course.

(4) I, II, III.

Lecture—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry. Only 2 units of credit will be allowed students who have received credit for course 16A. Introduction to analytic geometry and calculus. The sequence 1A, 1B, 1C, 2A, 2B includes plane and solid analytic geometry, differentiation and integration of elementary functions, infinite series, functions of several variables, partial differentiation, multiple integration, determinants, matrices and Fourier series.

The Staff

1B. Analytic Geometry and Calculus, Second Course.

(4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A or 16A. Only 2 units will be allowed students who have received credit for course 9A or 16B. Continuation of course 1A. The Staff

1C. Analytic Geometry and Calculus, Third Course.

(4) I, II, III.

Lecture—4 hours. Prerequisite: course 1B. Continuation of course 1B. The Staff

2A. Analytic Geometry and Calculus, Fourth Course.

(4) I, II, III.

Lecture—4 hours. Prerequisite: course 1C or 11B. Continuation of course 1C. The Staff

2B. Analytic Geometry and Calculus, Fifth Course.

(4) I, II, III.

Lecture—4 hours. Prerequisite: course 2A. Only 2 units of credit for students who have credit in 9C. Continuation of course 2A. The Staff

2C. Vector Analysis and Differential Equations.

(4) II, III.

Lecture—4 hours. Prerequisite: course 2B. Vector analysis, solutions of differential equations. The Staff

7. Topics in Algebra. (4) I, II.

Lecture—4 hours. Prerequisite: two years of high school algebra, plane trigonometry. Natural numbers; integers; rational, real, and complex numbers; permutations; combinations; theory of equations; matrices; determinants.

Mr. Tully, Mr. Arnold

11A. Calculus. (4) I, III.

Lecture—4 hours. Prerequisite: plane analytic geometry in addition to the prerequisites for 1A. This course together with 11B covers the material of 1A-1B-1C for students who have studied plane analytic geometry. The Staff

11B. Calculus. (4) I, II.

Lecture—4 hours. Prerequisite: course 11A. Continuation of course 11A. The Staff

13. Elementary Statistics. (4) I, II, III.

Lecture—4 hours. Prerequisite: two years of high school algebra. Measures of central tendency and dispersion; binomial, normal, Student-t, and chi-square distributions; testing hypotheses; non-parametric statistics; regression and correlation theory.

The Staff

15. Discrete Mathematics. (3) I, II.

Lecture—3 hours. Courses 15, 16A, and 16B constitute a year sequence recommended for students in the biological, management, and

social sciences. Introduction to probability, vectors, and matrices. Applications to elementary Markov chains. Mr. Arnold, Mr. Mead

16A. Analytic Geometry and Calculus. (3) I, II.

Lecture—3 hours. Prerequisite: one and one-half years of high school algebra, or course 15, plane geometry, plane trigonometry. Not open for credit to students who have received credit in course 1A or 9A. A short course in analytic geometry and differential and integral calculus. Not recommended for students who may wish to major in the mathematical sciences. Courses 15, 16A, and 16B constitute a year sequence recommended for students in the biological, management, and social sciences. The Staff

16B. Analytic Geometry and Calculus. (3) II, III.

Lecture—3 hours. Prerequisite: course 16A or 1A. Only two units of credit will be allowed to students who have credit in course 1A. Not open for credit to students who have received credit in course 1B or course 9A. Continuation of course 16A. The Staff

16C. Analytic Geometry and Calculus. (3) III.

Lecture—3 hours. Prerequisite: course 16B or 1B. Only one unit of credit will be allowed to students who have credit in course 1B. Continuation of course 16B with special emphasis on the calculus of three dimensions including partial differentiation and total differentials; designed for students desiring to take physical chemistry. The Staff

30. Introduction to Computer Science. (3) I, II.

Lecture—2 hours; laboratory—2 hours. Prerequisite: two years of high school algebra. Introduction to the digital computer and its organization, coding and programming, use of compilers, flow charts, solutions of typical problems, code checking. Mr. Kurowski

***31. Algorithms for Computer Mathematics. (2) II.**

Lecture—2 hours. Prerequisite: course 30. Introduction to assembly languages. The development and description of mathematical algorithms in computer dependent languages. Mr. Norton

36A. Fundamentals of Mathematics. (4) I, II, III.

Lecture—4 hours. Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorem of arithmetic, properties of the rationals and irrationals, binary and other number systems. Mr. Alder, Mr. Chakerian

36B. Fundamentals of Mathematics. (2) III.

Lecture—2 hours. Prerequisite: course 36A. The content will be selected from the following

* Not to be given, 1967-68.

topics: number systems, set theory, number theory, the axiomatic method, topology, and combinatorics. Mr. Mead

37. Topics in Geometry. (4) III.

Lecture—4 hours. Topics in Euclidian geometry selected from the theory of geometric transformations, the area and dissection of plane figures, convex polyhedra, foundations of geometry. Mr. Sallee

Upper Division Courses

105A. Applied Statistical Methods: Analysis of Variance. (4) II, III.

Lecture—4 hours. Prerequisite: course 13. Design of experiments including randomized complete block designs, Latin squares, split-plot designs, factorial designs, and incomplete block designs. Mr. Weiner

105B. Applied Statistical Methods: Multiple Regression. (3) III.

Lecture—3 hours. Prerequisite: course 105A. Continuation of course 105A. Multiple regression and analysis of covariance. Mr. Weiner

108A-108B. Introduction to Abstract Algebra and Analysis. (3-3) I, III; I, II.

Lecture—3 hours. Prerequisite: course 1C or 11B. Introduction to abstract mathematics, including the real number system, sets, mappings, mathematical induction, and algebraic structures. Mr. Tully

***112. Higher Geometry. (3) I.**

Lecture—3 hours. Prerequisite: course 108B; or consent of instructor. Homogeneous point and line coordinates, cross ratio, one- and two-dimensional projective geometry, point and line conics. Offered in even-numbered years. Mr. Fulton

113. Synthetic Projective Geometry. (4) II.

Lecture—4 hours. Prerequisite: course 108B; or consent of instructor. Duality, perspectivity, harmonic sets, projectivity, definition of conics, theorems on conics, pole and polar. Offered in even-numbered years. Mr. Fulton

114. The Theory of Convex Sets. (3) I.

Lecture—3 hours. Prerequisite: courses 2B and 108B; or consent of instructor. Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Offered in odd-numbered years. Mr. Sallee

115A. The Theory of Numbers. (3) I.

Lecture—3 hours: Prerequisite: course 108A. Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers. Offered in odd-numbered years. Mr. Alder

115B. The Theory of Numbers. (3) II.

Lecture—3 hours. Prerequisite: course 108A. Euler-function, Moebius function, congruences, primitive roots, quadratic reciprocity law. Offered in even-numbered years. Mr. Alder

115C. The Theory of Numbers. (3) III.

Lecture—3 hours. Prerequisite: course 108A. Continued fractions, partitions. Offered in even-numbered years.

***116. Metric Differential Geometry. (4) III.**

Lecture—4 hours. Prerequisite: course 2C or consent of instructor. Vector analysis, curves and surfaces in three dimensions. Offered in odd-numbered years. Mr. Fulton

118A-118B. Introduction to Partial Differential Equations. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 2C. Solutions of partial differential equations of mathematical physics by separation of variables, series of orthogonal functions. Applications to boundary value problems. Mr. Banks

119. Theory of Ordinary Differential Equations.

(3) III.

Lecture—3 hours. Prerequisite: course 2C. Existence and uniqueness theorems, theory of linear equations of the second and higher orders, regular singular points, Sturm-Liouville systems, Laplace transforms. Mr. Borges

125. Introduction to Mathematical Logic. (3) I.

Lecture—3 hours. Prerequisite: course 108B, or consent of instructor. Propositional calculus, predicate calculus, normal forms, completeness. Mr. Krom

126. Introduction to the Theory of Sets. (3) I.

Lecture—3 hours. Prerequisite: 1C; or consent of instructor. Fundamental concepts including cardinal numbers, order types, ordinal numbers. Mr. Stringall

127A. Advanced Calculus. (4) I, II.

Lecture—4 hours. Prerequisite: course 2C. The real number system, continuity, differentiation and integration on the real line, vector calculus and functions of several variables, theory of convergence. Mr. Chakerian, Mr. Stein

127B. Advanced Calculus. (4) II, III.

Lecture—4 hours. Prerequisite: course 127A. Continuation of course 127A.

Mr. Chakerian, Mr. Stein

127C. Advanced Calculus. (4) III.

Lecture—4 hours. Prerequisite: course 127B. Continuation of course 127B. Mr. Chakerian

128A-128B-128C. Numerical Analysis.

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 2C and 30 or a knowledge of Fortran. Finite differences, interpolation, polynomial approximation, numerical integration and differentiation, non-linear equations, systems of linear equations, matrices and eigenvalue problems, solution of ordinary and partial differential equations. Mr. Kurowski

129. Theory of Compilers. (4) III.

Lecture—4 hours. Prerequisite: course 30. Theory of compilers; structure of computer languages, their limitations and ambiguities; study of a particular language. Mr. Norton

131A-131B-131C. Introduction to Mathematical Statistics. (4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 1C or 16C. An introduction to the mathematical theory of probability and statistics.

132A-132B. Introduction to Stochastic Processes.

(3-3) II-III.

Lecture—3 hours. Prerequisite: course 131A. Random walks, recurrent events, Markov chains, birth-and-death processes. Mr. Weiner

150A-150B. Linear Algebra. (4-4) I-II.

Lecture—4 hours. Prerequisite: course 1C or consent of instructor. Introduction to vector spaces, linear transformations, and matrices. Mr. Stein

151A. Algebra. (4) III.

Lecture—4 hours. Prerequisite: course 150A, or consent of instructor. Introduction to algebraic systems including groups, rings, and fields. Mr. Cutler

151B. Algebra. (4) I.

Lecture—4 hours. Prerequisite: course 151A. Continuation of course 151A. Mr. Mead

***168. Linear Programming and Game Theory. (3) I.**

Lecture—3 hours. Prerequisite: course 1C, 7 or 15. Introduction to zero-sum, two-person games; the fundamental theory for matrix games; basic concepts of linear inequalities; the duality theorem; the simplex method. Offered in even-numbered years. Mr. Sallee

185A. Geometry of Functions of a Complex Variable.

(2) I, III.

Lecture—2 hours. Prerequisite: course 2C. Complex number system, Cauchy-Riemann equations, elementary functions, conformal mapping. Mr. Burdette

* Not to be given, 1967-68.

185B. Analysis of Functions of a Complex Variable.
(3) II.

Lecture—3 hours. Prerequisite: course 185A. Cauchy's integral theorem, power series, Laurent series, residue theorem, special topics.

Mr. Burdette

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Roessler in charge)

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

The Staff (Mr. Roessler in charge)

Graduate Courses**201A–201B–201C. Real Analysis. (3–3–3) I–II–III.**

Lecture—3 hours. Prerequisite: course 127C. Point set topology; Lebesgue measure and integration on the real line; abstract spaces; general measure and integration.

Mr. Hayes

202A–202B–202C. Functional Analysis.

(3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: course 127C and 150B. Hilbert spaces, spectral theorem, Banach spaces, commutative Banach algebras.

Mr. Kreith

205A–205B–205C. Functions of a Complex Variable.
(3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: course 127C. Theory of analytic functions, Cauchy integral theorem, power series, analytic continuation, conformal mapping, special functions.

Mr. Banks

215A–215B–215C. Algebraic Topology.
(3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: familiarity with point-set topology. Topics selected from homology and homotopy theory.

Mr. Pfeffer

***216. Integral Equations. (3) III.**

Lecture—3 hours. Prerequisite: courses 150B and 127C. Volterra equations, Fredholm equations, symmetric kernels. Offered in odd-numbered years.

Mr. Banks

***218A–218B. Partial Differential Equations.**
(3–3) I–II.

Lecture—3 hours. Prerequisite: courses 150B and 127C. Topics from the theory of first order, hyperbolic and elliptic partial differential equations. Offered in even-numbered years.

Mr. Kreith

219. Ordinary Differential Equations. (3) I.

Lecture—3 hours. Prerequisite: courses 127C and 185. Ordinary differential equations in the real and complex domains; existence and uniqueness theorems; linear systems; analysis of singu-

lar points; Sturm-Liouville theory; asymptotic expansions. Offered in odd-numbered years.

Mr. Benson

220A–220B–220C. Mathematics for the Physical Sciences. (3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: course 185 (may be taken concurrently). Topics in ordinary and partial differential equations, boundary value problems, functions of a complex variable, matrices, and calculus of variations.

Mr. Theil

***225A–225B. Metamathematics. (3–3) II–III.**

Lecture—3 hours. Prerequisite: courses 151B and either 125 or Philosophy 12; or consent of instructor. Axiomatizability, consistency, and completeness of the formalized mathematical theories; definability in formal languages; topics from the theory of models. Offered in odd-numbered years.

Mr. Krom

***228. Advanced Numerical Analysis of Ordinary Differential Equations. (3) I.**

Lecture—3 hours. Prerequisite: course 128C. Numerical solutions of initial and boundary value problems for systems of ordinary differential equations; error analysis and stability. Offered in even-numbered years.

Mr. Kurowski

231A–231B–231C. Mathematical Statistics.

(3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: courses 2C and 131C; or consent of instructor. A first year graduate course in theoretical statistics.

Mr. Baker

232. Analysis of Variance. (3) I.

Lecture—3 hours. Prerequisite: course 131C. Estimation and testing for the general linear hypothesis, components of variance, multiple comparisons.

Mr. John

233A–233B. Design of Experiments. (3–3) II–III.

Lecture—3 hours. Prerequisite: course 232. Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces.

Mr. John

235A–235B–235C. Analytic Probability Theory.

(3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: course 127C. Measure-theoretic foundations of probability, distribution functions and characteristic functions, law of large numbers and central limit theorems, conditional probabilities, martingales.

Mr. Weiner

236A–236B–236C. Advanced Mathematical Statistics. (3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: courses 127C and 131C. Distribution theory, parametric and

* Not to be given, 1967–68.

nonparametric estimation, principles of statistical tests, sequential analysis, statistical decision functions.

***237A-237B. Nonparametric Inference. (3-3) II-III.**

Lecture—3 hours. Prerequisite: course 131C. A survey of non-parametric methods in estimation and hypothesis testing.

***238A-238B-238C. Analysis of Stochastic Processes. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: course 132B. The analytical theory of second-order stochastic processes, Poisson processes, birth-and-death processes, and Markov processes, including a study of statistical inference for these processes. Offered in even-numbered years. Mr. Weiner

240A-240B-240C. Differential Geometry.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 116. Transformation of coordinates, tensor analysis, intrinsic geometry of surfaces, parallel displacement, Riemannian manifolds, the geometry of subspaces, subspaces of a flat space, application of tensor analysis to the theory of relativity. Offered in odd-numbered years. Mr. Chakerian

250A-250B-250C. Algebra. (3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: graduate standing in mathematics; or consent of instructor. The theory of groups, rings, and fields.

Mr. Stringall

251A-251B. Theory of Groups. (3-3) I-II.

Lecture—3 hours. Prerequisite: graduate standing in mathematics; or consent of instructor. Normal subgroups, composition series,

Sylow subgroups, nilpotent groups, solvable groups, group representations, groups with operators, group extensions, free groups, ordered groups.

Mr. Tamura

***252. Linear Algebra. (3) I.**

Lecture—3 hours. Prerequisite: graduate standing in mathematics; or consent of instructor. Vector spaces. Offered in even-numbered years.

Mr. Tully

253. Theory of Binary Systems. (3) III.

Lecture—3 hours. Prerequisite: graduate standing in mathematics; or consent of instructor. Elements of semigroups, quasigroups, and groupoids.

Mr. Tamura

290. Seminar. (1-6) I, II, III.

Advanced study in various fields of mathematics as follows: (a) algebra; (b) analysis; (c) geometry; (d) mathematical logic; (e) number theory; (f) topology; (g) theoretical statistics; (h) applied statistics; (i) applied mathematics.

The Staff

299. Research. (2-6) I, II, III.

The Staff

Professional Courses

300A. The Teaching of Mathematics. (3) I.

Lecture—3 hours. Prerequisite: senior or graduate standing. Methods of teaching mathematics in grades K-6.

Mrs. Goldman

300B. The Teaching of Mathematics. (3) II.

Lecture—3 hours. Prerequisite: senior or graduate standing. Methods of teaching mathematics in grades 7-12.

Mrs. Goldman

MEDICINE

C. John Tupper, M.D., *Dean of the School*
 Earl F. Wolfman, Jr., M.D., *Associate Dean*
 Loren D. Carlson, Ph.D., *Assistant Dean*

Office of the Dean, Medical School

Professors:

- Robert J. Bolt, M.D. (*Internal Medicine*)
- Loren D. Carlson, Ph.D. (*Physiology*)
- Hamilton S. Davis, M.D. (*Anesthesiology*)
- Robert L. Hunter, Ph.D. (*Anatomy*)
- Calvin W. Schwabe, D.V.M., Sc.D.
 (*Epidemiology*)
- Makepeace Tsao, Ph.D. (*Biochemistry—Surgery*)
- C. John Tupper, M.D. (*Internal Medicine*)

* Not to be given, 1967-1968.

Earl F. Wolfman, Jr., M.D. (*General Surgery*)

Julian R. Youmans, M.D., Ph.D.
 (*Neurosurgery*)

Assistant Professor:

John R. Beljan, M.D. (*General Surgery*)

Admission Requirements and Curriculum.—The curriculum is currently being completed for the opening class in the fall quarter of 1968. For a general description, see page 115. Details will be available subsequently through the *Announcement of the School of Medicine*.

MICROBIOLOGY—See Also Veterinary Microbiology**MICROBIOLOGY****(A Graduate Group)**Herman J. Phaff, Ph.D., *Chairman of the Group*

Group Office, 134 Crues Hall

Graduate Courses**290. Seminar (1) I, II.**

Seminar—1 hour. One seminar is offered during the fall and winter quarters. One weekly meeting is held.

The Staff

299. Research. (1-6) I, II, III.

Laboratory—variable. Research under the guidance of dissertation committee. The Staff

MILITARY SCIENCE_____; *Chairman of the Department*

Department Office, 125 Gymnasium

Assistant Professors:

Richard W. Pfeiffer, Major, Infantry

Donald H. Conrad, Captain, Infantry

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 Physical Education 10 (Physical Conditioning Activities). The remaining five dual-credit units may be completed in any of the general areas of natural science, psychology, effective communication, or political science. Elected subjects must be taken while enrolled in the advanced course. In the event that a subject was required in the student's normal academic curriculum during his freshman and sophomore years, electives must be selected either from another general area or from advanced subjects in the same area. Conversely, for subjects not required in the student's academic curriculum during his freshman and sophomore years, complete freedom of selection from the four academic areas is permissible.

Lower division Military Science requires the completion of two units outside the department during the freshman year. The subject elected for ROTC credit may be one that is required in the student's normal academic curriculum during his freshman year; but it must be from one of the general subject areas mentioned above.

The chairman of the department will evaluate and approve the elective subjects selected. Consideration will be given to the value of the subjects in furthering the professional qualifications of the student as a prospective commissioned officer in the United States Army.

College of Letters and Science.—The Bachelor of Arts degree requires the completion of

180 units, of which 160 units must be in courses chosen from the Letters and Science List of Courses. The 9 units of lower division military science courses are included in the list. Upper division military science courses are considered off the Letters and Science List of Courses. They must be counted in the 20-unit allowance as indicated above. 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 180 units. All units of upper and lower division military science courses combined may be accredited toward this requirement. The dual-credit units in general areas may be selected from upper division courses required by the College of Agriculture.

College of Engineering.—Six units of military science may be accredited toward the requirement of the College of Engineering for the Bachelor of Science degree. 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 number of Military Science units acceptable toward the Bachelor of Science degree in Veterinary Medicine is on an individual program basis approved by the Dean of the School. 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 commission in the United States Army Veterinary Corps.

General Military Science

For the general regulations concerning enrollment and the program in Military Science, see above.

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 United States Government furnishes arms, equipment, uniforms, and textbooks for the use of all students enrolled in courses of the department.

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 23 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.

Upper Division

Application for admission to the upper division (advanced) course may be made by students who have successfully completed the basic course or who are eligible for equivalent credit and who can complete the course prior to their 28th birthday. It is also open to veterans having over one year of military service who meet the age and physical requirements.

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

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

During their senior year, outstanding students may be designated by the Chancellor and the Professor of Military Science as Distinguished Military Students. If their high records are maintained, they may be designated, upon graduation from the University, Distinguished Military Graduates. These cadets may then apply for direct commission in the Regular Army as Second Lieutenants.

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

Lower Division Courses

1A. Basic General Military Science (First Year). (1) I.

Lecture—1 hour; drill—1 hour. Prerequisite: meet enrollment criteria in General Regu-

lations of the General Catalog. Individual weapons and marksmanship; assembly, disassembly, and functioning of the standard United States Army rifle; preliminary training in marksmanship and good shooting habits. Leadership laboratory.

The Staff

1B. Basic General Military Science

(First Year). (1) II.

Lecture—1 hour; drill—1 hour. Prerequisite: course 1A or the equivalent. The theory of organization of the Army; history and organization of the ROTC. United States Army and national security: organization for national defense. Leadership laboratory.

The Staff

1C. Basic General Military Science

(First Year). (1) III.

Lecture—1 hour; drill—1 hour. Prerequisite: course 1B or the equivalent. United States Army and national security (continued): missions and responsibilities of the Army as a part of the National Defense Team. Leadership laboratory.

The Staff

20A. Basic General Military Science

(Second Year). (2) I.

Lecture—2 hours; drill—1 hour. Prerequisite: course 1C. American military history: survey from origins of American Army to World War II; emphasis on factors which led to organizational, logistical, operational, and other patterns in our present Army; analysis based on the principles of war. Leadership laboratory.

The Staff

20B. Basic General Military Science

(Second Year). (2) II.

Lecture—2 hours; drill—1 hour. Prerequisite: course 20A. American military history (continued): World War II until the present. Counterinsurgency operations: orientation. Map and aerial photograph reading: basic principles to include terrain evaluation, marginal information, map symbols, methods of orientation, and grid references. Leadership laboratory. The Staff

20C. Basic General Military Science

(Second Year). (2) III.

Lecture—2 hours; drill—1 hour. Prerequisite: course 20B, or the equivalent. Map and aerial photograph reading (continued): review of military maps; elementary aerial photograph reading. Introduction to operations and basic tactics: basic military team; combat formations and patrolling; field fortifications; concealment and cover; techniques of fire; principles of combat. Leadership laboratory.

The Staff

Upper Division Courses

130A. Advanced General Military Science

(First Year). (2) I.

Lecture—2 hours; drill—1 hour. Prerequisite: acceptance into upper division ROTC pro-

gram; completion of lower division courses, or the equivalent. Leadership: responsibilities and basic qualities of a leader; leadership objectives, traits, technique, principles; special problems of military leadership. Counterinsurgency operations: analysis of nature of the insurgency problem; role of the United States Government agencies. Leadership laboratory. The Staff

**130B. Advanced General Military Science
(First Year). (3) II.**

Lecture—3 hours; drill—1 hour. Prerequisite: course 130A. Military teaching principles: techniques used in planning and presenting instruction; use of training aids; methods of instruction; student presentations. Branches of the Army: familiarization with their missions, functions, and career patterns. Leadership laboratory. The Staff

**130C. Advanced General Military Science
(First Year). (3) III.**

Lecture—3 hours; drill—1 hour. Prerequisite: course 130B. Communications: means and principles of signal communications; characteristics, operation, and maintenance of communications equipment. Small unit tactics: infantry organization; fundamentals of offensive and defensive combat and their application. Summer camp orientation. Leadership laboratory. The Staff

**140A. Advanced General Military Science
(Second Year). (3) I.**

Lecture—3 hours; drill—1 hour. Prerequisite: course 130C. Operations: command and staff, military intelligence, and training manage-

ment. Logistics: supply and evacuation, troop movements, and motor transportation. Leadership laboratory. The Staff

**140B. Advanced General Military Science
(Second Year). (3) II.**

Lecture—3 hours; drill—1 hour. Prerequisite: course 140A. Army administration: personnel records; correspondence; unit funds; duties of administrative personnel; and mess management. Military justice: basic concepts of military justice under the Uniform Code of Military Justice and the Manual for Court-Martial, United States, 1951. Leadership laboratory. The Staff

**140C. Advanced General Military Science
(Second Year). (2) III.**

Lecture—2 hours; drill—1 hour. Prerequisite: course 140B. Role of the United States in world affairs: evaluation of the principal political subdivisions of the world. Service orientation: customs of the service; responsibilities and obligations of an officer. Map review: principles and techniques of map reading. Leadership laboratory. The Staff

ROTC Summer Training for Advanced Military Students. (5).

Prerequisite: course 130C. 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; development of military leadership. Successful completion is a requisite for the commission.

MUSIC

Richard G. Swift, M.A., *Chairman of the Department*
Department Office, Music Building

Professors:

Jerome W. Rosen, M.A.
Richard G. Swift, M.A.

Associate Professors:

Larry D. Austin, M.M.
¹ Theodore C. Karp, Ph.D.

Assistant Professors:

Robert S. Bloch, M.A.
Sydney R. Charles, Ph.D.
Marvin H. Tartak, M.A.

◇ ◇ ◇

Lecturers:

Charles W. Rosen, Ph.D. (*Visiting*)
Arthur N. Woodbury, M.M.

Associate:

John W. Baker

Major Subject Advisers. Mr. Bloch, Mr. Tartak.

The Major Program

Preparation for the major—required: first year, Music 1A–1B, Music 4A–4B–4C; second year, 5A–5B–5C and 21A–21B–21C. Beginning and transfer students must take an examination in piano playing. Those showing deficiencies will be required to take Music 405. Sufficient pianistic ability to perform four-part chorales and compositions comparable in difficulty with *The Little Preludes* of Bach is prerequisite to upper division courses in the major. Students transferring from other colleges should consult with departmental major advisers before enrolling in any music course.

¹ Absent on leave, 1967–68.

The major—required: Music 104A–104B–104C and at least twenty units selected from the following courses: 105A–105B, 106, 114, 115, 116, 117, 118, 119, 198, and 199. In addition, a total of at least 18 units in performance courses is required of all music majors. These courses include Music 30 (which may be satisfied by examination), 41, 42, 43, 44, 46, 108, 111, 112, 130, 141, 142, 143, 144, 146.

Attention is called to the requirements in foreign languages for higher degrees in music: a reading knowledge of French or German for the M.A. degree in both composition and musicology. Undergraduates contemplating advanced study in music should prepare to satisfy these requirements as they proceed to the bachelor's degree.

Individual Group Major.—Individual group majors may be established by combining the work offered in this department with courses in allied fields. The major subject adviser should be consulted for details.

Graduate Study.—The Department of Music offers programs of study and research leading to the M.A. degree in composition or musicology. Detailed information regarding graduate study may be obtained from the Graduate Adviser for Music, Mrs. Charles.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major. In addition, teaching methods courses (Music 321, 322, 323) are required.

Teaching Minor.—Required: Music 1A–1B (or 27A–27B), Music 4A–4B–4C; Music 5A–5B; Music 108; and either Music 111 or 112. In addition, students are advised to enroll in at least two quarters of performance courses. Students must consult with the subject representative.

Subject Representative: Mrs. Charles.

Lower Division Courses

1A–1B. Masterworks of Musical Literature.

(2–2) I–II.

Lecture—3 hours. Prerequisite: ability to read music; non-majors must obtain consent of the instructor. Introduction to styles and forms of music with guided listening to individual works.
Mr. Tartak

4A–4B–4C. Elementary Theory. (4–4–4) I–II–III.

Lecture—4 hours. Fundamentals of music; ear-training; beginning tonal counterpoint and harmony.
Mr. Swift, Mr. Tartak

5A–5B–5C. Intermediate Theory. (4–4–4) I–II–III.

Lecture—4 hours. Prerequisite: course 4C. Intermediate tonal counterpoint and harmony.
Mr. J. Rosen

10. Basic Musicianship. (2) I, II, III.

Lecture—3 hours. Fundamentals of music, singing, ear-training, and conducting for the general student with emphasis upon classroom procedures for the primary grades.

The Staff (Mr. Woodbury in charge)

21A–21B–21C. History and Literature of Music.

(4–4–4) I–II–III.

Lecture—4 hours; laboratory—1 hour. Prerequisite: course 1B. The history of music from antiquity to the present.
Mrs. Charles

27A. Introduction to Musical Literature. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Lectures, guided listening and readings designed to furnish the student with an understanding of basic music concepts. Intended primarily for non-majors.

Mr. Woodbury, Mr. Bloch, Mr. Austin

27B. Introduction to Musical Literature. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 27A, or consent of the instructor. A survey of the history of musical styles from antiquity to the present. Lectures, guided listening and readings. Intended primarily for non-majors.
Mr. Woodbury

30A–30B–30C. Applied Study of Music Literature: Intermediate. (1–1–2) I, II, III.

Class instruction in performance—2 hours. Prerequisite: consent of the instructor; student must demonstrate ability to perform scales and small compositions. Class instruction in individual wind, brass, string or keyboard instruments. Required for music majors; recommended for music minor. May be repeated once for credit. Non-majors and auditors not accepted.

The Staff (Mr. Austin in charge)

41. University Symphony. (1–2) I, II, III.

Rehearsal—3 hours. Prerequisite: open to any student in the University whose technical proficiency meets the requirements of concert performance. Rehearsal and performance of music from the orchestra repertory. Students wishing to take this course for two units must be enrolled for one unit in two quarters immediately preceding. Admission subject to audition before first meeting of class.
Mr. Bloch

42. Repertory Band. (1) I, II.

Rehearsal—3 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 music for wind ensembles. May be repeated twice for credit.
Mr. Austin

43. University Concert Band. (1-2) II, III.

Rehearsals—4 hours. Prerequisite: (open to any student in the University whose technical proficiency meets the requirements of concert performance.) Rehearsal and performance of music for band. Students wishing to take this course for two units must be enrolled for one unit in two quarters immediately preceding. Admission subject to audition before first meeting of class.

Mr. Austin, Mr. Woodbury

44. University Chorus. (1-2) I, II, III.

Rehearsal—4 hours. Rehearsal and performance of choral music. Students wishing to take this course for two units must be enrolled for one unit in two quarters immediately preceding. Admission subject to audition before first meeting of class.

Mr. J. Rosen

46. Chamber Music Ensemble. (1-2) I, II, III.

Rehearsal—2 hours. Prerequisite: (open to any student in the University with sufficient technical ability to take part in ensemble music. Rehearsal, study and performance of ensemble music for strings, winds, piano, harpsichord and organ. Students wishing to take this course for two units must be enrolled for one unit in two quarters immediately preceding. Admission subject to audition before first meeting of class.

The Staff (Mr. Bloch in charge)

Upper Division Courses**104A-104B-104C. Advanced Theory.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 5C. Strict composition: exercises in phrase and period structure.

105A-105B. Principles of Composition. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 104C. Elementary assignments in free composition.

Mr. Austin

***106. Fugue. (3) III.**

Lecture—3 hours. Prerequisite: course 104C.

Mr. Karp

108. Instrumentation. (2) I.

Lecture—2 hours. Prerequisite: course 5C. A study of instruments of the orchestra, analysis of scores, and scoring for various instrumental combinations.

Mr. Woodbury

110. Advanced Musicianship. (2) II, III.

Lecture—3 hours. Prerequisite: course 10. Harmonization of simple melodies at the keyboard, ear-training, conducting, introduction to instruments, and musical literature for the general student with emphasis upon classroom teaching in the primary grades.

Mr. Woodbury, Mr. Bloch

***111. Choral Conducting. (2) III.**

Lecture—2 hours. Prerequisite: course 5C. A study of the principles and techniques of conducting choral ensembles.

Mr. J. Rosen

112. Instrumental Conducting. (2) II.

Lecture—2 hours. Prerequisite: course 108. A study of the principles and techniques of conducting instrumental ensembles.

Mr. Woodbury

***114. Music of the Middle Ages. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the middle ages.

Mr. Karp

115. Music of the Renaissance. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the period from 1430-1600.

Mrs. Charles

116. Music of the Baroque Period. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the period from Monteverdi to Handel and J. S. Bach.

Mr. Tartak

117. Music of the Classic Period. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the eighteenth century.

Mr. C. Rosen

***118. Music of the Romantic Period. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the nineteenth century.

Mr. Tartak

119. Music of the Twentieth Century. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the twentieth century.

Mr. Austin

127A. Musical Literature: The Opera. (3) I.

Lecture—3 hours. Prerequisite: course 27B, or consent of the instructor. A study of selected operas such as Monteverdi's *Orfeo*, Mozart's *Don Giovanni*, Wagner's *Tristan und Isolde*, Verdi's *Otello*, Debussy's *Pélleas et Mélisande*, and Berg's *Wozzeck*. Intended primarily for non-majors.

Mr. Tartak

127B. Musical Literature: The Symphony. (3) III.

Lecture—3 hours. Prerequisite: course 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 non-majors.

Mr. Woodbury

* Not to be given, 1967-68.

130A-130B-130C. Applied Study of Music**Literature: Advanced.** (1-1-2) I, II, III.

Class instruction in performance—2 hours. Prerequisite: Music 30. Consent of instructor. Advanced class instruction in individual wind, brass, string or keyboard instruments. To complete the course students must perform in public concert or before faculty examination board. Non-majors and auditors not accepted. May be repeated for credit.

The Staff (Mr. Austin in charge)

141. University Symphony. (1-2) I, II, III.

Rehearsal—3 hours. Prerequisite: Music 41 or equivalent. Rehearsal and performance of music from the orchestra repertory. Students wishing to take this course for two units must be enrolled for one unit in two quarters immediately preceding. Admission subject to audition before first meeting of class. Mr. Bloch

142. Repertory Band. (1) I, II.

Rehearsal—3 hours. Prerequisite: Music 42 or equivalent and consent of the instructor. Rehearsal and performance of music for small wind ensembles. May be repeated twice for credit.

Mr. Austin

143. University Concert Band. (1-2) I, II, III.

Rehearsal—4 hours. Prerequisite: Music 43 or equivalent. Rehearsal and performance of music for band. Students wishing to take this course for two units must be enrolled for one unit in two quarters immediately preceding. Admission subject to audition before first meeting of class. I. Mr. Austin; II. Mr. Woodbury

144. University Chorus. (1-2) I, II, III.

Rehearsal—4 hours. Prerequisite: Music 44 or the equivalent. Rehearsal and performance of choral music. Students wishing to take this course for two units must be enrolled for one unit in two quarters immediately preceding. Admission subject to audition before first meeting of class. Mr. J. Rosen

146. Chamber Music Ensemble. (1-2) I, II, III.

Rehearsal—2 hours. Prerequisite: Music 46 or the equivalent. Rehearsal, study and performance of ensemble music for strings, winds, piano, harpsichord and organ. Students wishing to take this course for two units must be enrolled for one unit in two quarters immediately preceding. Admission subject to audition before first meeting of class. The Staff (Mr. Bloch in charge)

198. Directed Group Study. (1-5) II.

Prerequisite: consent of the instructor.
The Staff (Mr. Swift in charge)

199. Special Study for Advanced Undergraduates.

(2-4) I, II, III.

The Staff (Mr. Swift in charge)

Graduate Courses**200A-200B-200C. Introduction to Musicology.**

(3-3-3) I, II, III.

Seminar—3 hours. Bibliography, individual research problems, and a class problem.

Mrs. Charles

203A-203B-203C. Composition. (3-3-3) I, II, III.

Seminar—3 hours. Prerequisite: course 105B. Technical projects and free composition.

Mr. Swift

***210A-210B-210C. History of Notation.**

(3-3-3) I, II, III.

Seminar—3 hours.

Mr. Karp

***240A-240B-240C. Techniques of Analysis.**

(3-3-3) I, II, III.

Seminar—3 hours. Analysis and analytical techniques as applied to music of all historical style periods.

Mr. Karp, Mr. Tartak

291A-291B-291C. Seminar: Topics in Music History.

(3-3-3) I, II, III.

Seminar—3 hours. Studies in selected areas of music history and theory.

299. Individual Study. (2-5) I, II, III.

Special studies and projects in musical composition or music history.

The Staff (Mr. Swift in charge)

Teaching Methods Courses**Instrumental Methods**

The courses in this series consider methods of teaching orchestra and band instruments, and include repertoire and program planning for secondary schools. Each course may be repeated once for credit.

321. Stringed Instruments. (2) I.

Discussion—2 hours. Prerequisite: course 4C.

322. Brass Instruments. (2) II.

Discussion—2 hours. Prerequisite: course 4C.

Mr. Woodbury

323. Woodwind Instruments. (2) III.

Discussion—2 hours. Prerequisite: course 4C.

Mr. Woodbury

Professional Course**405A-405B-405C. Elementary Piano.**

(1-1-1) I, II, III.

Laboratory—2 hours. Prerequisite: (open to music majors and candidates for the general secondary credential with a minor in music.)

Mr. Baker

* Not to be given, 1967-68.

NEMATOLOGY

Merlin W. Allen, Ph.D., *Chairman of the Department*
Department Office, 223 Hoagland Hall

Professors:

Merlin W. Allen, Ph.D.
Dewey J. Raski, Ph.D.



Lecturers:

Bert Lear, Ph.D.
Benjamin F. Lownsbery, Ph.D.
Armand R. Maggenti, Ph.D.
David R. Viglierchio, Ph.D.

Upper Division Courses

100. General Plant Nematology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biology 1 or 10. An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.
Mr. Raski

110. Introduction to Nematology. (2) II.

Lecture—2 hours. The relationship of nematodes to man's environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil and as parasites of plants and invertebrate animals.
Mr. Allen

130. Principles of Nematode Control. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Recommended: Chemistry 8; Mathematics 13. Principles and techniques used for derivation of data and their interpretation as the basis for control of plant parasitic

nematodes. The biological, physical, and chemical factors influencing nematodes and their control are studied in laboratory and greenhouse. Some field trips required.

Mr. Lear

Graduate Courses

220. Principles and Techniques of Nematode Taxonomy and Morphology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Analysis and evaluation of the techniques used in the collection, extraction, and preparation of specimens, free-hand and histologic sections; presentation of illustrative material.

Mr. Maggenti

***222. Nematode Pathogenicity to Plants. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 100. Investigations of problems in proving nematode pathogenicity; the role of nematodes in plant disease.

Mr. Lownsbery

225. Nematode Taxonomy and Comparative Morphology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 220. The taxonomy, morphology, and comparative morphology of soil, freshwater, and marine nematodes.

Mr. Allen

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

299. Research. (1-6) I, II, III.

The Staff

NUTRITION—See Also Animal Sciences and Family and Consumer Sciences

NUTRITION (A Graduate Group)

Magnar Ronning, Ph.D., *Chairman of the Group*
Group Office, 234 Animal Science Building

Graduate Courses

201A. Advanced General Nutrition. (3) I.

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of protein and amino acid metabolism; animal energetics and energy metabolism. Comparative aspects.

The Staff (Mr. Hill in charge)

201B. Advanced General Nutrition. (3) II.

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of prob-

lems in nutrition with emphasis on minerals; water balance. Comparative aspects.

The Staff (Mr. Kratzer in charge)

201C. Advanced General Nutrition. (3) III.

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of metabolic function and nutritional importance of vitamins; essential fatty acids; deficiency and degenerative diseases. Comparative aspects.

The Staff (Mrs. Hurley in charge)

* Not to be given, 1967-68.

250. Concepts of Animal Nutrition. (3) II.

Lecture—3 hours. Prerequisite: courses 201A, 201B, 201C. Dynamic interrelationships between food, animal, and environment, including concepts in food intake, digestion, absorption, and utilization of nutrients. Mr. Lepkovsky

290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion and critical evaluation of advanced topics in nutrition research. The Staff (Mr. Ronning in charge)

298. Group Study. (1-5) I, II, III.

Discussion—1-5 hours.

The Staff (Mr. Ronning in charge)

299. Research. (1-12) I, II, III.

The Staff

ORIENTAL LANGUAGES**(Department of Anthropology)**

Department Office, 331 Voorhies Hall

Associate Professor:

Benjamin E. Wallacker, Ph.D.

Assistant Professors:

Eric S. Liu, Ph.D.

Bezalel Porten, Ph.D.

Stephen A. Tyler, Ph.D.

◇ ◇ ◇

Assistant Professor:

Olof G. Lidin, B.L., M.A. (*Acting*)

Lower Division Courses**1C-2C-3C. Elementary Modern Chinese.**

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Introduction to the standard or "National Language" (Kuo Yü) of China. Mr. Liu

4C-5C-6C. Intermediate Modern Chinese.

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Pre-requisite: course 3C. A continuation of 3C. Mr. Liu

1H-2H-3H. Elementary Hebrew. (4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours.

Mr. Porten

4H-5H-6H. Intermediate Hebrew. (4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Pre-requisite: course 3H. Mr. Porten

1J-2J-3J. Elementary Modern Japanese.

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours.

Mr. Lidin

4J-5J-6J. Intermediate Modern Japanese.

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Pre-requisite: course 3J. A continuation of 3J. Mr. Lidin

1T. Elementary Telugu. (4) I.

Lecture—3 hours; laboratory—2 hours. Offered in odd-numbered years. Mr. Tyler

20. Elementary Tamil. (4) I, II, III.

Lecture—3 hours; laboratory—2 hours.

Upper Division Courses**100A. Languages of Eastern Asia. (4) II.**

Lecture—3 hours; discussion—1 hour. A survey course on the nature and distribution of the main languages of Eastern Asia.

Mr. Wallacker

***100B. Languages of Eastern Asia. (4) II.**

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 100A. A survey course on the nature and distribution of the main languages of Eastern Asia.

Mr. Wallacker

101. Classical Chinese. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 6C. Readings in selected texts. May be repeated twice for credit. Mr. Wallacker

112. Chinese Literature in Translation. (4) I.

Lecture—3 hours; discussion—1 hour. No knowledge of Chinese is required. Representative works—including classics, histories, belles lettres, and fiction—in English translation.

Mr. Wallacker

123A. Chinese Grammar. (4) I.

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 1C; or consent of instructor.

Mr. Liu

123B. Chinese Grammar. (4) II.

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 123A.

Mr. Liu

132A. History of Japanese Literature. (4) I.

Lecture—3 hours; discussion—1 hour. From the beginning to modern times, with emphasis on Chinese, Buddhist, and Western influences.

Mr. Lidin

***132B. History of Japanese Literature. (4) II.**

Lecture—3 hours; discussion—1 hour. Pre-requisite: course 132A. From the beginning to modern times, with emphasis on Chinese, Buddhist, and Western influences.

Mr. Lidin

* Not to be given, 1967-68.

142. Civilization of Eastern Asia: Japan. (4) I.

Lecture—3 hours; discussion—1 hour. A broad survey of Japanese civilization dealing with cultural, literary, religious, and social developments.
Mr. Lidin

***146. The Dravidian Languages. (4) I.**

Lecture—3 hours; discussion—1 hour. Analysis of the structures and distribution of Dravidian languages. Offered in even-numbered years.
Mr. Tyler

***150A. Ancient Israel. (4) I.**

Lecture—3 hours; discussion—1 hour. The culture of Israel as reflected in the Bible and archaeological discoveries. Patriarchal period to the Judges.
Mr. Porten

***150B. Ancient Israel. (4) II.**

Lecture—3 hours; discussion—1 hour. The culture of Israel as reflected in the Bible and archaeological discoveries. Monarchy to Restoration.
Mr. Porten

PARK ADMINISTRATION—See Plant Sciences**PATHOLOGY**

Donald R. Cordy, D.V.M., Ph.D., *Chairman of the Department*

Department Office, 1221 Haring Hall

Professors:

Donald R. Cordy, D.V.M., Ph.D.
Peter C. Kennedy, D.V.M., Ph.D.
Jack E. Moulton, D.V.M., Ph.D.

Associate Professor:

Donald L. Dungworth, B.V.Sc., Ph.D.

◇ ◇ ◇

Assistant Professors:

David H. Gribble, D.V.M. (*Acting*)
William P. C. Richards, M.V.Sc. (*Acting*)

Upper Division Courses**122A. Veterinary Pathology. (5) I.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. The fundamental degenerative, vascular, and inflammatory processes, disturbances of cell growth, including oncology.
Mr. Cordy, Mr. Moulton

122B. Veterinary Pathology. (5) II.

Lecture—4 hours; laboratory—3 hours. Prerequisite: course 122A. Special pathology of organ systems and related communicable diseases. Mr. Gribble, Mr. Kennedy, Mr. Richards

122C. Veterinary Pathology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 122A. Special pathology of organ systems and related communicable diseases.
Mr. Dungworth, Mr. Moulton

151A. Ancient Jewish Civilization. (4) II.

Lecture—3 hours; discussion—1 hour. The culture of the Jews in Palestine and the Diaspora as reflected in the Apocrypha and Pseudepigraha; Josephus; Dead Sea Scrolls; Philo; Tannaitic and classical sources; archaeological discoveries. Alexander to Herod.
Mr. Porten

151B. Ancient Jewish Civilization. (4) III.

Lecture—3 hours; discussion—1 hour. The culture of the Jews in Palestine and the Diaspora as reflected in the Apocrypha and Pseudepigraha; Josephus; Dead Sea Scrolls; Philo; Tannaitic and classical sources; archaeological discoveries. Procurators to demise of Patriarchate.
Mr. Porten

199. Special Study for Advanced Undergraduates.

(1-3) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

Mr. Wallacker

Graduate Courses**250A—250B—250C. Necropsy Laboratory. (1) I, II, III.**

Laboratory—33 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Supervised experience in necropsy diagnosis, including techniques and interpretation. The Staff

280. Advanced Pathology. (4) III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 122A—122B—122C. Selected topics in the pathology of non-neoplastic diseases. Mechanisms of disease and patterns of reaction are stressed. Offered in odd-numbered years.
Mr. Cordy, Mr. Kennedy

281. Necropsy and Surgical Pathology.

(1-4) I, II, III.

Discussion—1 hour; laboratory—32 hours. Prerequisite: course 250C. Responsible diagnostic casework. Performance of necropsies; slide reading and case reporting.
The Staff

282. Tumor Pathology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 122A—122B—122C. The histogenesis, incidence, geographical distribution, etiology, transmission, immunity, host response, gross and microscopic structure, and metastasis of the neoplasms of domestic animals. Offered in odd-numbered years.
Mr. Dungworth, Mr. Moulton

* Not to be given, 1967-68.

290. Seminar in Veterinary Pathology. (1) I, II, III.
Seminar—1 hour. The Staff

291. Histopathology Conference. (1) I, II, III.
Discussion—1 hour. Prerequisite: course 250C. Discussion of selected cases based on records and slides. Defense of diagnosis. The Staff

PHILOSOPHY

*Marjorie Grene, Ph.D., *Chairman of the Department*

Professors:

Arthur Child, Ph.D.
Neal W. Gilbert, Ph.D.
*Marjorie Grene, Ph.D.

Associate Professor:

William H. Bossart, Ph.D.

Assistant Professors:

^{3,4} Ronald A. Arbini, Ph.D.
Joel I. Friedman, Ph.D.
³John F. Malcolm, Ph.D.

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The Major Program

Lower Division Courses.—Required: courses 12 and 20A–20B–20C.

Upper Division Courses.—Required: 36 units of upper division courses in philosophy, selected with the approval of the departmental major adviser, Mr. Friedman.

Graduate Study.—The Department of Philosophy offers programs of study leading to the M.A. and Ph.D. Degrees. Detailed information may be obtained by writing to the Graduate Adviser, Mr. Bossart.

Lower Division Courses

6. Introduction to Philosophy. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Political, aesthetic, religious, metaphysical, and other concerns of philosophy, as exemplified in major works from various periods.

Mr. Gilbert, Mrs. Grene, Mr. Malcolm

GF. Freshman Seminar in Philosophy. (4) I, II.

Seminar—4 hours. Prerequisite: consent of instructor. An intensive introduction to philosophical inquiry. Open only to freshmen with strong interest or background in philosophy, by consent of the department. Mr. Friedman

12. Introduction to Logic. (4) I, II.

Lecture—3 hours; discussion—1 hour. Principles of inference and definition for symbolic deductive systems; sentential connectives, quantifiers, classes and relations.

Mr. Arbini, Mr. Friedman

298. Group Study. (1–4) I, II, III.

Prerequisite: course 122A–122B–122C. Group Study of advanced topics in pathology. The Staff

299. Research in Veterinary Pathology.

(1–9) I, II, III, S The Staff

20A. History of Philosophy. (4) I, III.

Lecture—4 hours. A survey of Greek philosophy from the Pre-Socratics to Plotinus, with particular attention to Plato, Aristotle, Epicurus, the Stoics, and Scepticism. Mr. Malcolm

20B. History of Philosophy. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 20A. The history of philosophy from Augustine to the late Middle Ages. Emphasis on epistemology and metaphysics. Mr. Gilbert

20C. History of Philosophy. (4) III.

Lecture—3 hours; discussion—1 hour. The development of early modern philosophy. Readings from Descartes, Hobbes, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant. Mr. Friedman

Upper Division Courses

***101. Metaphysics. (4) II.**

Lecture and discussion—3 hours. Recommended: courses 20A, 20B, 20C, or 151. A critical analysis of various theories of being.

102. Theory of Knowledge. (4) I.

Lecture and discussion—3 hours. Philosophical problems of perception and thought, memory and precognition, imagination, truth and error, belief and knowledge. Types of epistemology. Mr. Child

***103. Philosophy of Mind. (4) III.**

Lecture and discussion—3 hours. The relation between mind and body, our knowledge of other minds, and the explanation of mental acts. Discussion of such concepts as action, intention, and causation. Offered in even-numbered years. Mr. Arbini

105. Philosophy of Religion. (4) I.

Lecture and discussion—3 hours. Nature of religion; its relations to morality and institutions; sources, status, and kinds of religious knowledge; existence and nature of God; man's relations to the divine; significance of death; concepts of survival; relations of church and state. Mr. Child

³ Not to be given, 1967–68.

³ Absent on leave, winter quarter 1968.

⁴ Absent on leave, spring quarter 1968.

107A. Philosophy of the Mathematical and Physical Sciences. (4) I.

Lecture-discussion—3 hours. Introduction to the nature of scientific laws, theories, explanations, and models. Problems of causality, induction and probability. Offered in odd-numbered years.

Mr. Friedman

***107B. Philosophy of the Biological Sciences. (4) II.**

Lecture-discussion—3 hours. The relation of the biological to the physical sciences; the nature of theories, explanations, and models in biology and psychology. Problems of taxonomy, ethology, and evolutionary theory. Offered in even-numbered years.

Mrs. Grene

***107C. Philosophy of the Social Sciences. (4) III.**

Lecture-discussion—3 hours. The nature of laws and explanations in the social sciences; their relation to mathematics and the physical sciences; the role of value judgments in the social sciences; theories of historical knowledge; theoretical problems of data-processing. Offered in even-numbered years.

114. Ethics. (4) III.

Seminar—4 hours. Recommended: course 6 or 6F. Principles of intelligent conduct: their status and nature; how they are discovered, known, and proved; their relationships to the principles of art, science, and logic. Mr. Child

***117. Political Philosophy. (4) II.**

Lecture and discussion—3 hours. Recommended: course 6 or 6F. Intensive examination of some central concepts of political thought such as the state, sovereignty, rights, obligation, freedom, law, authority, and responsibility. Offered in even-numbered years.

***123. Aesthetics. (4) III.**

Lecture and discussion—3 hours. Recommended: a course in art or music, and a course in philosophy. Nature of art, of artistic creation, of the work of art, and of aesthetic experience; nature and validity of criticism; relations of art to its environment.

Mr. Bossart

131. Philosophy of Logic. (4) III.

Lecture and discussion—4 hours. Prerequisite: course 12; or Mathematics 125. The nature of an axiomatic system: its formal development and the derivation of such properties as completeness and consistency. Philosophical interpretation of Gödel's Theorem. Discussion of such topics as necessity and possibility, descriptions, theory of types, and intuitionism.

Mr. Friedman

132. History of Logic. (4) III.

Lecture and discussion—3 hours. Prerequisite: course 12; or Mathematics 125. Recommended: course 131. Aristotle's *Organon*; Stoic logic; medieval Terminist logic; Leibniz' uni-

versal calculus; the logical contributions of Boole, De Morgan, and Peirce; and Frege's general logic. The initiation of contemporary logic by Peano, and by Whitehead and Russell. Offered in odd-numbered years. Mr. Gilbert

***137. Philosophy of Language. (4) II.**

Lecture and discussion—3 hours. Recommended: course 20C or 156. Problems that arise from the consideration of natural and formalized languages. Such authors as Aristotle, Wittgenstein, Austin, Carnap, Quine, and Ziff, and their contributions to semantic analysis. Offered in odd-numbered years. Mr. Arbini

***146. Renaissance Philosophy. (4) I, II.**

Lecture and discussion—3 hours. Renaissance conceptions of man, as found in the writings of Valla, Ficino, Pico, Pomponazzi, Erasmus, Vives, and Montaigne. Some reference to current religious and social developments. Offered in even-numbered years.

Mr. Gilbert

***151. Philosophy of the Nineteenth Century. (4) II.**

Lecture and discussion—3 hours. Recommended: courses 20A, 20B, or 20C. The idealism of Hegel, his contemporaries and his successors; Marxism; the positivism of Comte and Mill; the irrationalism of Kierkegaard and Nietzsche. Offered in even-numbered years.

Mr. Bossart

***155. American Philosophy. (4) I.**

Lecture—3 hours; discussion—1 hour. Recommended: course 6 or 6F. Study of such American thinkers as Peirce, James, Royce, Dewey, Santayana, Whitehead, and C. I. Lewis. Offered in even-numbered years.

156. Contemporary British Philosophy. (4) II.

Lecture and discussion—3 hours. Recommended: course 20C or 151. Interpretation and analysis of the most influential work of Bertrand Russell, G. E. Moore, Wittgenstein, J. L. Austin, and G. Ryle. Offered in odd-numbered years.

Mr. Arbini

157A. Contemporary European Philosophy. (4) I.

Lecture and discussion—3 hours. Recommended: course 20C, 151, or 175. A study of contemporary directions in European philosophy, with particular attention to the development of phenomenology and *Existenzphilosophie* in Germany. Readings in Husserl, Heidegger, Jaspers, and related philosophers. Offered in odd-numbered years.

Mr. Bossart

157B. Contemporary European Philosophy. (4) II.

Lecture and discussion—3 hours. A study of contemporary directions in European philosophy, paying particular attention to the development of phenomenology and existentialism in

* Not to be given, 1967-1968.

France. Readings in Sartre, Marcel, Merleau-Ponty, and related philosophers. Offered in even-numbered years.

Mr. Bossart

161. Plato. (4) I.

Lecture and discussion—3 hours. Offered in odd-numbered years.

Mr. Malcolm

162. Aristotle. (4) I.

Lecture and discussion—3 hours. Prerequisite: course 20A; or consent of instructor. Offered in even-numbered years.

Mr. Malcolm

163. Spinoza. (4) I.

Lecture and discussion—3 hours. Recommended: course 20C. Offered in even-numbered years.

Mrs. Grene

***170. Leibniz. (4) I.**

Lecture and discussion—3 hours. Recommended: course 20C. Offered in odd-numbered years.

Mr. Gilbert

172. Locke. (4) III.

Lecture and discussion—3 hours. Offered in odd-numbered years.

Mr. Child

174. Hume. (4) III.

Lecture and discussion—3 hours. Offered in even-numbered years.

Mr. Child

175. Kant. (4) II.

Lecture and discussion—3 hours. Recommended: course 20C. Offered in odd-numbered years.

Mr. Bossart

176. Hegel. (4) III.

Lecture and discussion—3 hours. Recommended: courses 20C and 175. Offered in even-numbered years.

Mr. Bossart

***183. Russell. (4) III.**

Lecture and discussion—3 hours. Recommended: course 12 or Mathematics 125. Offered in even-numbered years.

Mr. Arbini

***185. Founders of Modern Thought. (4) I.**

Lecture and discussion—3 hours. Not open to philosophy majors or students who have had

course 20C. A survey of modern philosophy from Descartes to Kant. Major emphasis upon problems still current today.

Mrs. Grene

198. Directed Group Study. (1-5) I, II, III. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor. The Staff

Graduate Courses

Graduate courses 201, 202, and 214 are offered every year, by different instructors, and may be repeated for credit with permission of the Graduate Adviser. The other graduate courses will be varied from year to year.

201. Metaphysics. (4) I.

Seminar—4 hours.

Mr. Arbini

202. Theory of Knowledge. (4) II.

Seminar—4 hours.

Mr. Bossart

209. Theory of History. (4) II.

Seminar—3 hours. Offered in odd-numbered years.

Mr. Child

214. Ethics. (4) III.

Seminar—3 hours.

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223. Aesthetics. (4) II.

Seminar—3 hours. Offered in even-numbered years.

Mr. Child

261. Plato. (4) III.

Seminar—4 hours. Offered in odd-numbered years.

Mr. Malcolm

262. Aristotle. (4) III.

Seminar—4 hours. Offered in even-numbered years.

Mr. Malcolm

290. Seminar in the History of Philosophy:

Leibniz. (4) III.

Seminar—3 hours.

Mr. Gilbert

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

PHYSICAL EDUCATION

Charles R. Kovacic, *Chairman of the Department*

Department Office, 264 Gymnasium

Professor:

Charles R. Kovacic, Ed.D.

Associate Professors:

William L. Lakie, Ed.D.

Willard S. Lotter, Ed. D.

Everett D. Ryan, Ed.D.

Marya Welch, Ed.D.

Assistant Professors:

William C. Adams, Ph.D.

Edmund M. Bernauer, Ph.D.



Lecturer and Supervisor of Physical Education:

George A. Stromgren, M.S.

* Not to be given, 1967-68.

Supervisor:

Herbert A. Schmalenberger, M.A.

Associate Supervisors:

Robert R. Brooks, M.A.

Robert I. Hamilton, M.S.

Barbara J. Heller, Ed.D.

Assistant Supervisors:

Carl E. J. Carlson, M.A.

Ramona J. Finnila, B.S.

Jerry W. Hinsdale, A.B.

Judith L. Meyers, M.A.

John W. Pappa, M.A.

Phillip S. Swimley, M.A.

The incidental fee payable by all students at the time of registration, entitles students to the use of gymnasium, swimming pool, shower, towels, lockers, tennis courts, and the athletic fields. Certain equipment for games and sports is available for exercise and recreation, either with or without instruction. Courses may be elected with or without academic credit. Lockers will be turned in on the last day of class, before the final examination period.

Fines are imposed for each formal transaction necessitated by failure of the student to comply with the regulations of the department.

Major Advisers.—Mr. Adams, Mr. Bernauer, Miss Heller, Mr. Kovacic, Mr. Lakie, Mr. Ryan, Miss Welch.

The Major Program

Students will specialize in one of two areas: biological aspects or psychological aspects of physical education.

Lower Division Courses.—Required of all students: Biology 1, Chemistry 1A, Mathematics 13, Physical Education 45, Physics 2A, Physiology 1, Psychology 1A, Zoology 102. Students interested in the biological aspects of physical education will be required to take Chemistry 8 and Zoology 2.

Upper Division Courses.—Required of all students: Physical Education 103, 104, 104L, 110, 120, and 135. Required of students in the biological area: Animal Science; Physiology 110A–110B and a minimum of 6 units selected from the following: Zoology 100, 100L, 106A, 106B, and Animal Physiology 102. Required of students in the psychological area: Psychology 112 and three courses selected from one of the following groups: a) Psychology 108, 130, 134, 147A; b) Psychology 145, Sociology 152, 160.

Students who are preparing for careers as teachers will, in consultation with their adviser, elect additional physical education courses that satisfy requirements for the teaching credential.

Graduate Study.—A program of study and research leading to the M.A. degree is available

in physical education. For detailed information regarding graduate study, write to the Graduate Adviser, Department of Physical Education.

Lower Division Courses**1. Physical Education for Men. (½) I, II, III.**

Laboratory—2 hours. Sections in archery, badminton, dance (social, folk and square), baseball, basketball, boxing, football, golf, trampolining, tumbling, wrestling, volleyball, handball, soccer, tennis, touch football, track, swimming. Men qualified for athletics may enroll in any sport pursued at Davis, such as baseball, basketball, football and receive credit. This course may be repeated for credit not to exceed a total of 6 units.

The Staff (Mr. Kovacic in charge)

5. First Aid. (2) I, II, III.

Lecture—2 hours. Standard course. Upon successful completion of the course the Red Cross Certificate is awarded.

Mr. Stromgren, Mr. Pappa, Mr. Swimley

10. Professional Physical Education Activities

(Men). (1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Fundamental knowledges and skills in swimming, basketball, football, track, baseball, tennis, golf, combative sports, developmental activities, court sports, tumbling and gymnastics.

The Staff (Mr. Kovacic in charge)

22. Professional Physical Education Activities

(Women). (1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Fundamental skills in aquatics (swimming—beginning, intermediate, advanced, synchronized; diving; lifesaving; water safety); archery; badminton; basketball; dance (folk and square, modern, social); tennis; track; tumbling; gymnastics; volleyball.

The Staff (Mr. Kovacic in charge)

25. The Theory of Lifesaving and Water Safety.

(1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 1 or 26 and a course in intermediate swimming. Basic skills in swimming and small craft safety. Life saving procedures and techniques for which Red Cross Senior Lifesaving Certificate will be awarded upon successful completion of necessary requirements.

Mr. Hinsdale

26. Physical Education for Women. (½) I, II, III.

Laboratory—2 hours. Sections in archery, badminton, dance (modern, social, folk, and square), golf, tennis, trampolining, tumbling, volleyball, swimming. This course may be repeated for credit not to exceed a total of 6 units.

The Staff (Mr. Kovacic in charge)

27. Organization and Teaching of Recreational and Competitive Swimming and Diving Skills.

(1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Prerequisite: Red Cross Lifesaving Certificate and Advanced Swimming and Diving. Organization and teaching of swimming and lifesaving skills. (Red Cross Water Safety instructors certificate awarded upon successful completion of necessary requirements.) Organization of competitive swimming and diving programs and coaching techniques.

Mr. Hinsdale

35. Rhythmic Form and Analysis. (1) I.

Lecture—1 hour; laboratory—2 hours. The fundamentals of rhythmic form, the use of rhythm as the basic element in activity and its application to physical education. A workshop class in the function of rhythm, form, and analysis.

Mrs. Finnila

36A-36B. Dance History and Practice. (3-3) I-II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: body mechanics section of course 26 (may be taken concurrently). A 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.

Mrs. Finnila

37A-37B. Contemporary Dance Theory and Practice. (3-3) I-II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 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.

Mrs. Finnila

44. Principles of Healthful Living. (2) II.

Lecture—2 hours. Use of scientific information, proper attitudes, knowledge, and health practices in daily living.

Miss Heller

45. Foundations of Physical Education. (4) I, III.

Lecture—4 hours. Survey of the mode, development, expressive form, and objective of human movement.

Mr. Adams

Upper Division Courses

103. Analysis of Human Movement. (5) I.

Lecture—4 hours; laboratory—3 hours. Prerequisite: Physics 2A; Zoology 102. Anatomical and physiological concepts and physical laws as applied to human movement.

Mr. Kovacic

104. Physiology of Muscular Activity. (4) II.

Lecture—4 hours. Prerequisite: Biology 1; Physiology 2. Circulatory-respiratory and meta-

bolic response to exercise in man under various physiological and ambient conditions.

Mr. Bernauer

104L. Physiology of Muscular Activity Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 104 to be taken concurrently. Laboratory in the systemic physiological response of man to exercise and physical stress.

Mr. Bernauer

110. Psychosocial Factors in Motor Performance. (4) III.

Lecture—3 hours. Prerequisite: Psychology 1A. Analysis of various psychological and social factors affecting the development and use of motor skills.

Mr. Ryan

120. Sports in American Society. (4) II.

Lecture—4 hours. Prerequisite: History 17A. The interrelationships of sports with other aspects of society, including the family, church, school and government; consideration of the manner in which sports may be used to contribute to human welfare in our advanced technological society.

Mr. Lakeie

130. Principles and Theory of Physical Education. (4) III.

Lecture—4 hours. A critical analysis of the assumptions underlying the physical education program.

Mr. Lakeie

135. Research Design and Instrumentation in Physical Education. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 13. Methods, techniques, and design of experimental research in physical education.

Mr. Bernauer

140. Recreation in the Community. (3) II.

Lecture—3 hours. The nature, scope and significance of recreation with its implications for leisure. The development, organization, and purpose of public and voluntary agencies which serve the recreational needs of the community.

Mr. Lotter

145. School Health Education. (3) III.

Lecture—3 hours. Prerequisite: course 44; or consent of instructor. A study of the school health program as an integral part of the school curriculum; the underlying principles and functions of health instruction, health service, healthful school living and the contributing community health agencies.

Miss Heller

171. Conditioning of Athletes and Care of Injuries (Men). (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 5; Physiology 2; or Zoology 102. Modern principles and practices in conditioning and care of athletes. Prevention and

care of athletic injuries; therapeutic exercises applied to athletic injuries; training room equipment, protective devices, and supplies.

Mr. Stromgren

180. Physical Education in the Secondary School.

(3) I.

Lecture—3 hours. An analysis and study of the principles and methods basic to physical education in the secondary school.

Miss Heller, Mr. Schmalenberger

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of department.

The Staff (Mr. Kovacic in charge)

200. Proseminar in Physical Education. (3) I, II, III.

Seminar—3 hours. Prerequisite: course 135. The meaning, methods, and techniques of research procedure as applied to physical education; a critical review of selected studies, literature, practices, and procedures in the field; application to a particular problem in the field.

Mr. Adams, Mr. Ryan

210. Historical and Cultural Bases of Physical Education. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 120. An examination of political, economic, social, and religious factors which have influenced sports in various countries and cultures.

Mr. Lakie

220. Kinesiology. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103. Critical review of current literature and research in kinesiology; neurophysiological concepts and physical laws.

Mr. Kovacic

221. Anthropometry in Relation to Physical Performance. (4) II.

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 104

PHYSICS

James E. Draper, Ph.D., *Chairman of the Department*

Department Office, 109 Physical Science

Professors:

James E. Draper, Ph.D.
Milton E. Gardner, Ph.D.
Kenneth R. Greider, Ph.D.
John A. Jungerman, Ph.D.
William J. Knox, Ph.D.
Charles G. Patten, Ph.D.

Associate Professors:

Richard L. Lander, Ph.D.
Douglas W. McColm, Ph.D.

and 135. Consideration of growth, physical constitution, body proportions and body composition in man as they affect physical performance; measurement of selected structural and functional changes accompanying prolonged, systematic physical conditioning; the concept and measurement of physical fitness.

Mr. Adams

222. Metabolic Functions in Exercise. (4) III.

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 104, Physiology 110B. A review of the current research literature on the metabolic responses to exercise in man; a laboratory survey of respiratory response, metabolic and water balances, blood gas adjustments and acid-base balance with particular reference to the effect of environmental conditions.

Mr. Bernauer

230. Motor Performance: Psychological Aspects.

(4) II.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 110. Critical review of current literature on motor learning; coordination; kinesthesis; and reaction, time; consideration of sensory-motor perception, motivation, and personality factors in relation to physical activities.

Mr. Ryan

299. Research. (1-12) I, II, III.

The Staff

Professional Course

380A-380B. Methods of Physical Education in the Secondary School. (3-3) II-III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 180 and demonstrated competence in selected skills. The methods of teaching group and individual activities in the secondary school; program planning; class management; organization of the intramural and extramural programs.

Miss Heller, Mr. Schmalenberger

William W. True, Ph.D.

Assistant Professors:

Franklin P. Brady, Ph.D.
Lindsay R. Dodd, Ph.D.
Glen W. Erickson, Ph.D.
Claude Garrod, Ph.D.
James P. Hurley, Ph.D.
Olaf S. Leifson, Ph.D.
James A. McCray, Ph.D.



Lecturers:

Natalie R. Leonard, B.A., (*Astronomy*)
Neal F. Peek, Ph.D.

Major Subject Advisers.—Mr. Brady, Mr. Erickson, Mr. Gardner, Mr. Hurley.

Bachelor of Arts Major Program

Lower Division Courses.—Required: Physics 4A, 4B, 4C, 4D, 4E, Chemistry 1A, 1B or 7A, 7B; Mathematics 1A, 1B, 1C, 2A, 2B, 2C. Recommended: A reading knowledge of French, German, or Russian.

Upper Division Courses.—Required: Physics 105A, 105B, 105C, 110A, 110B, 110C, 115A, either 116A or 122 (1 unit) or 122 (2 units); and additional units in upper division physics to make a total of at least 36 units.

Bachelor of Science Major Program

Lower Division Courses.—Required: Physics 4A, 4B, 4C, 4D, 4E, Chemistry 1A and either 1B-1C or 7A-7B, Mathematics 1A, 1B, 1C, 2A, 2B, 2C. Recommended: A reading knowledge of two of the following languages: French, German, or Russian.

Upper Division Courses.—Required: Physics 104A, 104B, 105A, 105B, 105C, 108 or 112A, 112B, 110A, 110B, 110C, 115A, 115B, 116A, 116B, 122, 129A, 129B, 140. Recommended: Mathematics 185.

Honors and Honors Program.—The honors program in physics consists of 4 units of course 194H, open to seniors who qualify for the honors program. Students may be graduated with honors in physics on completion of the required major and this program.

Graduate Study.—The Department of Physics offers programs of study and research leading to the M.A. and Ph.D. degrees.

Lower Division Courses

Physics 4A, 4B, 4C, 4D, and 4E are for students whose major is physics and for students preparing for applications of physics in Engineering and Chemistry.

All students planning to take lower division courses (except course 10) should have completed trigonometry.

The Physics 2 series may be started in any quarter and completed without interruption since either sequence, 2A, 2B, 2C or 2A, 2C, 2B, is satisfactory. Also, 2B and 2C may be taken concurrently.

The Physics 4 series may be started in either winter or spring quarter and completed without interruption since either sequence, 4A, 4B, 4C, 4D, 4E or 4A, 4C, 4D, 4B, 4E, is satisfactory.

Upper Division Courses

Courses 4A, 4B, 4C, 4D, 4E, or their equivalent, and differential and integral calculus are prerequisite to all upper division courses except

course 107; in addition, Mathematics 2C or its equivalent is recommended.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major for degree (A.B. or B.S.).

Teaching Minor.—The teaching minor must take Physics 4A, 4B, 4C, 4D, 4E, and any other upper division physics courses necessary to complete 30 quarter units.

Subject Representative: Mr. Gardner.

Astronomy**Lower Division Courses****1A. Introduction to General Astronomy: The Solar System. (4) II.**

Lecture—4 hours. Introduction to the celestial sphere, constellations of the seasons, effects of diurnal and annual motions of the earth; planetary motions, phases and configurations, including study of earth as planet. Not intended for advanced majors in a physical science. (Courses 1A and 1B may be taken in either order.)

Mrs. Leonard

1B. Introduction to General Astronomy: Stars and the Universe. (4) III.

Lecture—4 hours. Introduction to stellar motions, magnitudes and distances; distribution of stars in space; the sun; the galaxy. Not intended for advanced majors in a physical science. (Courses 1A and 1B may be taken in either order.)

Mrs. Leonard

Physics**Lower Division Courses****2A. General Physics Lecture. (3) I, II, III.**

Lecture—3 hours. Mechanics; introduction to electricity and magnetism.

I. Mr. Garrod, II. Mr. Patten, III. Mr. Peek

2B. General Physics Lecture. (3) II, III.

Lecture—3 hours. Prerequisite: course 2A. Electricity and magnetism, heat, kinetic theory, and thermodynamics.

II. Mr. Garrod, III. Mr. Brady

2C. General Physics Lectures. (3) I, III.

Lecture—3 hours. Prerequisite: course 2A. Wave motion, optics, modern physics.

I. ———, III. Mr. Garrod

3A. General Physics Laboratory. (1) I, II, III.

Laboratory—3 hours. Prerequisite: course 2A (may be taken concurrently). Mechanics, introduction to electricity and magnetism. Experimental work planned to accompany the lectures

in course 2A. Recommended for all students who elect course 2A.

I. Mr. Garrod, II. Mr. Patten, III. Mr. Peek

3B. General Physics Laboratory. (1) II, III.

Laboratory—3 hours. Prerequisite: course 2B (may be taken concurrently). Electricity and magnetism, heat, kinetic theory, and thermodynamics. Experimental work planned to accompany the lectures in course 2B. Recommended for all students who elect course 2B.

II. Mr. Garrod, III. Mr. Brady

3C. General Physics Laboratory. (1) I, III.

Laboratory—3 hours. Prerequisite: course 2C (may be taken concurrently). Wave motion, optics, modern physics. Experimental work planned to accompany the lectures in course 2C. Recommended for all students who elect course 2C.

I. ———, III. Mr. Garrod

4A. General Physics. (4) II, III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 1B (may be taken concurrently). Mechanics.

II. Mr. Gardner, III. ———

4B. General Physics. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4A; Mathematics 1C (may be taken concurrently). Properties of matter, special relativity, heat, kinetic theory, and thermodynamics.

Mr. Gardner

4C. General Physics. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4A; Mathematics 2A (may be taken concurrently). Electricity and magnetism.

Mr. Gardner

4D. General Physics. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4C and Mathematics 2B (may be taken concurrently). A.C. circuitry, wave motions, and sound.

Mr. Leifson

4E. General Physics. (4) I, III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4D. Optics and modern physics.

I. ———, III. Mr. Greider

10. Basic Concepts of Physics. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Survey of the basic principles of physics and how they have evolved since the time of Copernicus. Includes lecture-demonstrations and problem solving using elementary algebra. Not open to students who have completed any physics course in the 2 or 4 series, or equivalent.

Mr. Greider

Upper Division Courses

104A-104B. Introduction to Methods of Mathematical Physics. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 4C; mathematics 2C. Elements of vector and tensor analysis, matrix methods, boundary value problems, integral transforms with applications to physics.

Mr. Erickson

105A-105B-105C. Analytical Mechanics. (3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 4A; Mathematics 2C. Principles and applications of Newtonian mechanics.

Mr. McCray

107. Introduction to Electronics. (3) I.

Lecture—3 hours. Prerequisite: course 2B. Elementary principles of single-phase alternating-current circuits, characteristics of thermionic tubes and a study of simple electronic circuits.

Mr. Gardner

108. Physical Optics. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4E; Mathematics 2C. The phenomena of diffraction, interference, and polarization of light, and their applications.

Mr. Gardner

110A-110B-110C. Electricity and Magnetism.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 4D; Mathematics 2C. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves.

Mr. Patten

112A-112B. Thermodynamics and Statistical Physics. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 4B; Mathematics 2C. Thermodynamics, kinetic theory, and introduction to statistical mechanics.

115A-115B. Introduction to Quantum Mechanics.

(3-3) I-II.

Lecture—3 hours. Prerequisite: courses 4E, 104B, 105B. The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

Mr. Brady

116A. Electronic Instrumentation. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4D; Mathematics 2C. Recommended: course 104B and partial differential equations and Laplace transforms. An experimental and theoretical study of important electronic circuits commonly used in physics.

Mr. McCray

116B. Electronic Instrumentation. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 116A. Continuation of course

116A with special emphasis on recent developments in semiconductor circuitry. Mr. McCray

121. Introduction to Atomic Structure. (3) III.

Lecture—3 hours. Prerequisite: course 4E; Mathematics 1C. 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.

Mr. Patten

122. Advanced Physics Laboratory. (1-2) II, III.

Laboratory—3–6 hours. Prerequisite: courses 2C and 3C. Experimental techniques and measurements in atomic, nuclear, and solid-state physics. May be repeated for credit not to exceed a total of 3 units.

II. Mr. Leifson, III. Mr. McColm

129A. Nuclear Physics. (3) II.

Lecture—3 hours. Prerequisite: course 4E; Mathematics 2C. Survey of basic nuclear properties and concepts requiring only rudimentary knowledge of quantum mechanics.

129B. Nuclear Physics. (3) III.

Lecture—3 hours. Prerequisite: courses 115B, 129A. Continuation of course 129A.

140. Introduction to Solid-State Physics. (4) III.

Lecture—4 hours. Prerequisite: course 115A. A survey of the properties of solids. Types of crystals, mechanical properties, lattice vibrations; thermal, electrical, and magnetic properties of metals and non-metals; band theory of solids; semiconductors; ferromagnetism; superconductivity; lattice defects.

Mr. Leifson

194H. Special Study for Honors Students.

(4) I, II, III.

Prerequisite: open only to seniors who qualify for the honors program. Independent research and/or reading on selected topics. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

205A-205B. Theoretical Mechanics. (3-3) I, II.

Lecture—3 hours. Prerequisite: course 105C. I. The generalized methods of Lagrange and Hamilton. II. Hamilton and Jacobi theory; the formulation of quantum mechanics.

Mr. McColm

210A. Theory of Electricity and Magnetism. (3) III.

Lecture—3 hours. Prerequisite: course 110C; a course in differential equations. Classical description of static electromagnetic fields with emphasis on boundary value problems.

Mr. Hurley

210B. Theory of Electricity and Magnetism. (3) I.

Lecture—3 hours. Prerequisite: course 210A. Maxwell's equations, conservation laws, plane waves.

210C. Theory of Electricity and Magnetism. (3) II.

Lecture—3 hours. Prerequisite: course 210B. Special theory of relativity, covariant formulation of electromagnetic theory, radiating systems, and electron theory.

215A. Quantum Mechanics. (3) I.

Lecture—3 hours. Prerequisite: course 115B. Non-relativistic quantum mechanics. Formal development and interpretation of quantum mechanics, including the Schrödinger wave equation, matrix mechanics, and use of state vectors in describing a dynamical system.

Mr. Dodd

215B. Quantum Mechanics. (3) II.

Lecture—3 hours. Prerequisite: course 215A. Wave packets, Wentzel-Kramers-Brillouin approximation, and perturbation methods applied to atomic, nuclear, molecular, and solid-state problems.

Mr. Dodd

215C. Quantum Mechanics. (3) III.

Lecture—3 hours. Prerequisite: course 215B. Scattering theory, radiation theory, and a brief introduction to relativistic quantum mechanics and the Dirac equation.

Mr. Dodd

219A. Statistical Mechanics. (3) I.

Lecture—3 hours. Prerequisite: courses 112B and 115B. Foundations of classical and quantum statistical mechanics.

Mr. Hurley

219B. Statistical Mechanics. (3) II.

Lecture—3 hours. Prerequisite: course 219A. Applications to properties of solids, real gases, nuclear matter, fluctuations about the equilibrium state.

Mr. Hurley

221A-221B-221C. Atomic Physics. (3-3-3) I, II, III.

Lecture—3 hours. Prerequisite: course 215. Term structure of atoms using the angular momentum formalism; methods of computing wave functions and radial integrals; splitting in external fields; term structure in crystals; scattering and collisions.

Mr. Leifson, Mr. McColm

224A. Nuclear Physics. (3) I.

Lecture—3 hours. Prerequisite: course 215B. Comprehensive study of the nucleon-nucleon interaction including the deuteron, nucleon-nucleon scattering, polarization, determination of real parameters of S-matrix, and related topics.

Mr. Draper

224B. Nuclear Physics. (3) II.

Lecture—3 hours. Prerequisite: course 224A. Study of nuclear models, including shell model, collective model, unified model. Energy level spectra, static momenta, and electromagnetic transition rates.

Mr. Draper

229A. Advanced Nuclear Theory. (3) I.

Lecture—3 hours. Prerequisite: course 224C. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for two-body scattering.

Mr. Greider

229B. Advanced Nuclear Theory. (3) II.

Lecture—3 hours. Prerequisite: course 229A. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for three-body scattering.

Mr. Greider

230A. Quantum Theory of Fields. (3) I.

Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization.

Mr. Erickson

230B. Quantum Theory of Fields. (3) II.

Lecture—3 hours. Prerequisite: course 230A. Continuation of 230B, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations.

Mr. Erickson

239A. Quantum Many-Body Systems. (3) III.

Lecture—3 hours. Prerequisite: courses 215C and 219B. The quantum theory of many-particle systems. Theoretical analysis of superfluids, superconductors, and nuclear matter.

Mr. Garrod

239B. Quantum Many-Body Systems. (3) I.

Lecture—3 hours. Prerequisite: course 239A. Perturbation and variation techniques in many-

particle systems. Band theory of solids, electron-phonon interactions, and other topics.

Mr. Garrod

242A. Plasma Physics. (3) III.

Lecture—3 hours. Prerequisite: course 210C. Recommended: course 219. Motion of charged particles in electromagnetic fields, macroscopic equations, and plasma oscillations. Offered in odd-numbered years.

Mr. Hurley

242B. Plasma Physics. (3) I.

Lecture—3 hours. Prerequisite: course 242A. Boundary layer problems, diffusion and stability. Offered in odd-numbered years.

Mr. Hurley

245A-245B. High Energy Physics. (3-3) I, II.

Lecture—3 hours. Prerequisite: course 215A. Systematics of elementary particle interactions; determination of quantum numbers; interpretation of experiments; selected special topics in second quarter.

Mr. Lander

290. Seminar. (1-3) I, II, III.

Seminar—1-3 hours.

I. Mr. Draper, II. Mr. Greider, III. ———

291. Seminar in Nuclear Physics. (1-2) I, II, III.

I. ———, II. Mr. Draper, III. Mr. Brady

292. Seminar in Theoretical Physics. (1-2) I, II, III.I. Mr. Greider, II. Mr. Garrod,
III. Mr. Erickson**299. Research. (1-12) I, II, III.**

The Staff

PHYSIOLOGICAL SCIENCESRobert E. Smith, Ph.D., *Chairman of the Department*

Department Office, 2165 Haring Hall

Professors:

- ⁶ Arthur L. Black, Ph.D.
- Leo K. Bustad, D.V.M., Ph.D.
- Louis W. Holm, Ph.D.
- Stuart A. Peoples, M.D.
- Leon H. Schmidt, Ph.D.
- Robert E. Smith, Ph.D.

*Associate Professors:*

- Victor W. Burns, Ph.D.
- Richard A. Freedland, Ph.D.
- Douglas G. Stuart, Ph.D.

Lecturers:

- Allen C. Andersen, V.M.D., Ph.D.
- Gaylord M. Conzelman, Ph.D.
- Rocco J. Della Rosa, Ph.D.
- Marvin Goldman, Ph.D.
- Ethelda N. Sassenrath, Ph.D.

Upper Division Courses**101A-101B. Physiological Chemistry. (4-3) I, II.**

Lecture—4-3 hours. Prerequisite: quantitative and organic chemistry. Recommended: a course in physiology (may be taken concurrently). Chemical and physical properties of substances comprising the animal body, with major emphasis on the changes during metabolism and factors influencing these reactions.

⁶ Sabbatical leave in residence, 1967-68.

Biochemistry of the endocrine glands and other specialized tissues and body fluids; energy metabolism and nutrition.

Mr. Black, Mr. Freedland, Mr. Rogers

102A-102B. Physiological Chemistry Laboratory.

(1-2) I-II.

Laboratory—3 hours. Prerequisite: course 101A-101B (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.

Mr. Black, Mr. Freedland, Mr. Rogers

123. Comparative Pharmacology. (5) III.

Lecture—4 hours; laboratory—3 hours. Prerequisite: regular standing in the School of Veterinary Medicine or consent of the instructor. The action of drugs on the physiological mechanisms of domestic animals.

Mr. Peoples, Mr. Scholes

124. Comparative Pharmacology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 123 or consent of the instructor. The effect of drugs on organ systems of domestic animals and their application to the treatment of disease. Laboratory exercises to illustrate the principles of therapeutics and toxicology. Mr. Peoples, Mr. Scholes, Mr. Schmidt

140A. Mammalian Physiology. (5) II.

Lecture—5 hours. Prerequisite: good standing in the School of Veterinary Medicine or consent of the instructor, based upon evidence of adequate preparation in mathematics and the physical and biological disciplines. A comprehensive survey of comparative mammalian physiology with emphasis on systemic mechanisms. Messrs. Stuart, Parker, Bustad, Smith

140B. Mammalian Physiology. (5) III.

Lecture—5 hours. Prerequisite: good standing in the School of Veterinary Medicine or consent of the instructor, based upon evidence of adequate preparation in mathematics and the physical and biological disciplines. A comprehensive survey of comparative mammalian physiology with emphasis on systemic mechanisms. Messrs. Stuart, Parker, Bustad, Smith

141A. Laboratory in Mammalian Physiology. (2) II.

Laboratory—6 hours. Prerequisite: course 140A (may be taken concurrently). Laboratory exercises designed to illustrate physiological interactions among systems in a variety of mammalian forms.

Messrs. Stuart, Parker, Bustad, Smith

141B. Laboratory in Mammalian Physiology. (1) III.

Laboratory—3 hours. Prerequisite: course 140B (may be taken concurrently). Laboratory

exercises designed to illustrate physiological interactions among systems in a variety of mammalian forms.

Messrs. Stuart, Parker, Bustad, Smith

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

205. Intermediary Metabolism of Animals. (5) III.

Lecture—5 hours. Prerequisite: Biochemistry and physiology or consent of the instructor. Survey of metabolism, emphasizing studies on intact animals. Pathways and control in biosynthesis and degradation of major tissue constituents including carbohydrates, amino acids, proteins, lipids, nucleotides and porphyrins. Dynamics of animal metabolism including pools and turnover rates.

Mr. Black, Mr. Freedland, Mr. Rogers

225. Fundamentals of Radiation Biology. (5) I.

Lecture—5 hours. 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.

Mr. Bustad, Mr. Goldman, Mr. Della Rosa

243A-243B. Use of Isotopes as Tracers in Biological Research. (2-2) I, II.

Lecture—2 hours. Prerequisite: biochemistry or physiological chemistry, elementary physics and calculus or permission of instructor. Discussion of the properties of isotopes and their use as tracers in biological systems. Mr. Burns

243L. Laboratory in Use of Isotopes as Tracers in Biological Research. (2) II.

Laboratory—6 hours. Prerequisite: courses 243A and 243B concurrently and consent of the instructor. Study of radioisotope properties, uses and measurement methods relevant to the biological sciences. Mr. Burns

255. Pharmacogenetics. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: consent of instructors. The genetic basis of interspecific and intraspecific differences in animals to the action of drugs. The laboratory exercises are designed to illustrate these differences and their biological basis.

Mr. Scholes, Mr. Stormont

265. Experimental Physiology. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of the instructor. Selected lectures and experiments on cardiovascular, renal

and pulmonary mechanisms with emphasis on chronically maintained preparations and perinatal problems. Mr. Parker

298. Group Study. (1-4) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

PHYSIOLOGY—See Animal Sciences, and Zoology

PLANT PATHOLOGY—See Plant Sciences

PLANT SCIENCES

Dillon S. Brown, Ph.D., *Chairman of the Committee*
Committee Office, 1043 Wickson Hall

Committee in Charge:

Floyd M. Ashton, Ph.D. (*Botany*)
Dillon S. Brown, Ph.D. (*Pomology*)
James A. Cook, Ph.D. (*Viticulture*)
Paul E. Hansche, Ph.D. (*Pomology*)

Harry C. Kohl, Ph.D. (*Plant Physiology*)
Lysle D. Leach, Ph.D. (*Plant Pathology*)
Oscar A. Lorenz, Ph.D. (*Vegetable Crops*)
R. Merton Love, Ph.D. (*Agronomy*)

Participating Departments:

AGRONOMY

R. Merton Love, Ph.D., *Chairman of the Department*
Department Office, 131 Hunt Hall

Professors:

Fredrick T. Addicott, Ph.D.
Robert W. Allard, Ph.D. (*Agronomy and Genetics*)
John P. Conrad, Ph.D. (*Emeritus*)
Paulden F. Knowles, Ph.D.
Horton M. Laude, Ph.D.
R. Merton Love, Ph.D.
Ben A. Madison, B.S.A. (*Emeritus*)
Duane S. Mikkelsen, Ph.D.
Maurice L. Peterson, Ph.D.
Charles W. Schaller, Ph.D.
Francis L. Smith, Ph.D.
Ernest H. Stanford, Ph.D.

William A. Williams, Ph.D.
Frederick P. Zscheile, Jr., Ph.D.

Associate Professor:

Robert S. Loomis, Ph.D.



Lecturers:

Beecher Crampton, M.S.
Ray C. Huffaker, Ph.D.
Subodh K. Jain, Ph.D.
Milton B. Jones, Ph.D.
Charles A. Raguse, Ph.D.
Dale G. Smeltzer, Ph.D.
C. H. E. Werkhoven, Ph.D.

LANDSCAPE HORTICULTURE

Harry C. Kohl, Jr., Ph.D., *Chairman of the Department*
Department Office, 120 Landscape Field Headquarters

Professors:

Richard W. Harris, Ph.D.
Harry C. Kohl, Jr., Ph.D.

Assistant Professors:

James A. Harding, Ph.D.
Andrew T. Leiser, Ph.D.
Jack L. Paul, Ph.D.



Associate Professors:

John H. Madison, Ph.D.
Roy M. Sachs, Ph.D.

Lecturers:

Robert D. Danielson, M.S.
Leonard H. McVicar

PLANT PATHOLOGY

Lysle D. Leach, Ph.D., *Chairman of the Department*
Department Office, 354 Hutchison Hall

Professors:

James E. DeVay, Ph.D.
W. Harley English, Ph.D.
Raymond G. Grogan, Ph.D.
William B. Hewitt, Ph.D.
Byron R. Houston, Ph.D.
Lysle D. Leach, Ph.D.
George Nyland, Ph.D.
Edward E. Wilson, Ph.D.

Robert N. Campbell, Ph.D.
Tsune Kosuge, Ph.D.
Joseph M. Ogawa, Ph.D.
Thomas A. Shalla, Ph.D.

Assistant Professors:

Donald E. Mathre, Ph.D.
Robert K. Webster, Ph.D.

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Associate Professors:

Edward E. Butler, Ph.D.

Lecturer:

Robert J. Shepherd, Ph.D.

POMOLOGY

Dillon S. Brown, Ph.D., *Chairman of the Department*
Department Office, 1043 Wickson Hall

Professors:

Frank W. Allen, M.S. (*Emeritus*)
Royce S. Bringhurst, Ph.D.
Dillon S. Brown, Ph.D.
Lawrence L. Claypool, Ph.D.
Julian C. Crane, Ph.D.
Luther D. Davis, Ph.D., LL.D. (*Emeritus*)
William H. Griggs, Ph.D.
Carl J. Hansen, M.S.
Hudson T. Hartmann, Ph.D.
Claron O. Hesse, Ph.D.
Edward C. Maxie, Ph.D.
E. Louis Proebsting, Ph.D. (*Emeritus*)
Warren P. Tufts, Ph.D. (*Emeritus*)

Assistant Professor:

Paul E. Hansche, Ph.D.

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Lecturers:

Muriel V. Bradley, Ph.D.
Robert M. Carlson, Ph.D.
Peter B. Catlin, Ph.D.
Allan A. Hewitt, Ph.D.
Onund Lilleland, Ph.D. (*Emeritus*)
Roger J. Romani, Ph.D.
Kay Ryugo, Ph.D.
Eugene F. Serr, Jr., B.S. (*Emeritus*)
Noel F. Sommer, Ph.D.
Kiyoto Uriu, Ph.D.

Associate Professor:

Dale E. Kester, Ph.D.

VEGETABLE CROPS

Oscar A. Lorenz, Ph.D., *Chairman of the Department*
Department Office, 150 Hunt Hall

Professors:

Glen N. Davis, Ph.D.
James F. Harrington, Ph.D.
James E. Knott, Ph.D., Sc.D., (hon.c.)
(*Emeritus*)
Oscar A. Lorenz, Ph.D.
John H. MacGillivray, Ph.D. (*Emeritus*)
Leonard L. Morris, Ph.D.
Harlan K. Pratt, Ph.D.
Charles M. Rick, Jr., Ph.D.
Paul G. Smith, Ph.D.

Associate Professors:

William J. Flocker, Ph.D.
John C. Lingle, Ph.D.
Arthur R. Spurr, Ph.D.

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Lecturers:

Frederick D. Howard, Ph.D.
Lawrence Rappaport, Ph.D.
Masatoshi Yamaguchi, Ph.D.

VITICULTURE AND ENOLOGY

Harold W. Berg, M.S., *Chairman of the Department*
Department Office, 1023 Wickson Hall

Professors:

Maynard A. Amerine, Ph.D.
Harold W. Berg, M.S.
James A. Cook, Ph.D.
James F. Guymon, Ph.D.
Klayton E. Nelson, Ph.D.
Harold P. Olmo, Ph.D.
Robert J. Weaver, Ph.D.
A. Dinsmoor Webb, Ph.D.
Albert J. Winkler, Ph.D., LL.D. (*Emeritus*)

Associate Professor:

Lloyd A. Lider, Ph.D.

Assistant Professor:

Ralph E. Kunkee, Ph.D.

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Professors:

Frederick T. Addicott, Ph.D. (*Agronomy*)
George L. Marsh, M.S. (*Food Science and Technology*)

Lecturers:

W. Mark Kliewer, Ph.D.
Cornelius S. Ough, B.S.
Vernon L. Singleton, Ph.D.

Major Advisers.—See *Schedule and Directory Listing.*

Bachelor of Science Major Program and Graduate Study. See pages 53 and 127.

Plant Science

Lower Division Courses

1. Plants and Man. (3) II.

Lecture—3 hours. Plants as a basic resource for food, fiber, shelter, and recreation; their use and effect on man, past, present, and future.
Mr. Williams, Mr. Smeltzer

2. Production of Cultivated Plants. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 1. Principles of crop improvement, propagation, production, processing, storage, and marketing; conservation and utilization of land and water resources.
Mr. Flocker, Mr. Lider

Upper Division Courses

101. Ecology of Cultivated Plants. (3) II.

Lecture—3 hours. Prerequisite: course 2; Botany 111; Soil and Water Science 2. Plant

population dynamics in cultivated ecosystems; the response of plant communities to light, temperature, soil, water, and air-pollution.

Mr. Loomis, Mr. Kohl, Mr. Mikkelsen

102. Physiology of Cultivated Plants. (3) III.

Lecture—3 hours. Prerequisite: Botany 111. Recommended: course 101. The plant as a dynamic unit; physiological processes in the vegetative growth, development, flowering and fruiting of cultivated plants.

Mr. Sachs, Mr. Rappaport, —

113. Plant Breeding. (3) II.

Lecture—3 hours. Prerequisite: Genetics 100. The principles of plant breeding.
Mr. Knowles, Mr. Hansche

116. Principles of Plant Nutrition. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Botany 111; Chemistry 5. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition; relation to animal nutrition; experimental techniques, including solution culture and radioactive tracing.
Mr. Epstein

120. Introduction to Weed Science. (2) II.

Lecture—2 hours. Prerequisite: Botany 2; Chemistry 8. A general course covering the principles underlying the control of weeds.

Mr. Ashton

Agronomy

Lower Division Course

2. Forage Crops. (3) III.

Lecture—2 hours; laboratory—3 hours. Adaptation, establishment, management, and utilization of forage plants as irrigated pasture, range, hay, and silage; aspects of forage quality which affect feeding value to livestock. Field trips will be arranged to observe developments in irrigated pasture management and range improvement.
Mr. Jones, Mr. Love

Upper Division Courses

100. Principles of Agronomy. (3) I.

Lecture—3 hours. Prerequisite: Plant Science 1 and 2; Soil and Water Science 2; or consent of instructor. Fundamentals of field crop production, processing, and utilization. Demonstrations will supplement the lectures.

Mr. F. L. Smith

111. Small Grains, Corn, Sorghum and Beans. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100; or consent of instructor. Adaptation, distribution, culture, utilization, processing, and factors determining quality of wheat, oats, barley, rye, rice, corn, sorghum, and field beans.

Mr. Schaller

operation of research instruments, and laboratory practice in methods of plant analysis.

Mr. Zscheile, Mr. Huffaker

112. Forage Crop Ecology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100; or consent of instructor. Crop ecological principles in the establishment and management of such forages as irrigated pasture, hay, range, and silage, aspects of forage quality which affect feeding value to livestock. Multiple use capabilities of grasslands are stressed.

Mr. Raguse

113. Cotton, Sugar Beets, and Miscellaneous Crops.

(4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100; or consent of instructor. Adaptation, distribution, culture, utilization, processing, and other factors determining quality of cotton and other fiber crops, sugar crops, oil crops, and miscellaneous crops.

Mr. Mikkelsen

194H. Special Study for Honors Students.

(1–5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study, research and/or reading on selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of the instructor.

The Staff

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

Prerequisite: 6 upper division units of agronomy.

The Staff

Graduate Courses**205. Design of Field Experiments. (3) I.**

Lecture—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. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Chemistry 5 and 9. Advanced laboratory techniques and instrumental methods of analytical chemistry in biological research. Includes an introduction to laboratory research methods, preparation of samples, principles and

221. Advanced Plant Breeding. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Science 113. Advanced topics in plant breeding. Genetic diversity and centers of origin of cultivated plants, mating systems in plants, polyploidy, host-pathogen relationships, role of mutagensis in plant breeding, and other topics of current interest.

Mr. Stanford

222. Quantitative Genetics and Plant Improvement.

(4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Science 113; Genetics 105; or consent of instructor. The genetic forces affecting populations. Formulation of breeding plans based on principles of population and quantitative genetics. Offered in even-numbered years.

Mr. Allard

231. Advanced Topics in the Ecology of Crop

Plant Communities. (3) II.

Lecture—3 hours. Prerequisite: Plant Science 101; or consent of instructor. Analytical models and quantitative description of the structure and dynamics of field crop communities in relation to interplant competition, population functions and environmental adaptation.

Mr. Laude

232. Advanced Topics in the Physiology of Crop

Plants. (3) I.

Lecture—3 hours. Prerequisite: Plant Science 102; or consent of instructor. Physiological aspects of vegetative and reproductive growth of field crop plants in relation to their field behavior.

Mr. Huffaker

290. Seminar. (1) I, II, III.

Seminar—1 hour.

Mr. Knowles

298. Group Study. (1–3) I, II, III.

Directed study in the areas of plant physiology, plant genetics, plant bio-chemistry, agricultural chemistry, or soil-plant relationships of field crops or range and pasture plants.

The Staff

299. Research. (1–9) I, II, III.

Original research involving plant physiology, plant genetics, plant bio-chemistry, agricultural chemistry, or soil-plant relationships of field crops or range and pasture plants.

The Staff

Landscape Horticulture**Lower Division Courses****1. Introduction to Landscape Design. (3) II.**

Lecture—3 hours. Design principles and criteria used in analyzing, evaluating, and develop-

ing the visual and functional aspects of landscaped areas.

Mr. Danielson

1L. Introduction to Landscape Design Laboratory.

(2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1 (may be taken concurrently). Practice in analysis and design with reference to landscape problems.

Mr. Danielson

2. Elements of Landscape Design. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 1 and 1L. Analysis and solution of typical site problems related to land development.

Mr. Danielson

5A-5B-5C. Introduction to Ornamental Plants.

(2-2-2) I, II, III.

Lecture—1 hour; laboratory—3 hours. The identification, ecology, and uses of the more important ornamental plants (trees, shrubs, ground covers, annuals, perennials, turfgrasses, and greenhouse plants). This course is a broad survey recommended for nonmajors as well as majors.

Mr. Harding, Mr. Leiser,
Mr. Madison, Mr. Danielson

10. Landscape Horticulture for the Home and Community. (3) III.

Lecture—2 hours; laboratory—3 hours. The influences of climate, soil, and cultural practices on the growing of turf, flowers, and herbaceous and woody plants in the landscape.

Mr. Harris

49. Orientation in Landscape Horticulture. 1.5§

Prerequisite: consent of 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; teaching, research, and extension. Offered in odd-numbered years.

Mr. Harris

Upper Division Courses

104. Principles of Landscape Construction. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1; Engineering 1. The analysis and solution of construction problems as they relate to design and site development. Emphasis on physical structures rather than plant materials. Offered in even-numbered years.

Mr. Danielson

105A-105B-105C. Taxonomy and Ecology of Ornamental Plants. (2-2-2) I-II-III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 5C; or consent of instructor. The taxonomy, ecology, and uses of woody and herbaceous plants (trees, shrubs, turf, annuals, perennials, and greenhouse). Special emphasis will be on identification of plants of special im-

portance in Western and Southern United States and on the solution of problems of horticultural nomenclature.

Mr. Leiser, Mr. Harding

105D. Spring Field Course. (2) §§

Prerequisite: course 105B; or consent of instructor. The taxonomy, ecology, and uses of desert, tropical and semi-tropical landscape plants. Field study of landscape plantings, plant survey practices, and preparation of field reports. Offered in even-numbered years.

Mr. Leiser, Mr. Harding

121. Analysis of Horticultural Problems. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2; Soil and Water Science 2. Principles and methods of analyzing responses of ornamental plants to environment and cultural practices.

Mr. Paul

125. Floriculture and Nursery Management. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Science 2 or Botany 2. Practices and principles in planning, establishing and maintaining crops. Several field trips required.

Mr. Kohl

128. Advanced Landscape Horticulture. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2 or Botany 2. Practices and principles in planning, establishing, and maintaining plantings in the landscape with emphasis on trees and turf. Several field trips required.

Mr. Harris, Mr. Madison

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

Mr. Harris

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: 3 units of upper division work in landscape horticulture; consent of instructor. Selected problems in floriculture, nursery management, and landscape horticulture.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: 3 units of upper division work in landscape horticulture; consent of instructor.

The Staff

Graduate Courses

290. Seminar. (1) I, II, III.

Seminar—1 hour. Selected topics in floriculture, nursery management, and landscape horticulture.

The Staff

§§ To be given between the winter and spring quarters. Considered a spring quarter course for preenrollment.

298. Group Study. (1-6) I, II, III.

Group study on advanced topics in floriculture, nursery management, and landscape horticulture,
Mr. Sachs

299. Research. (1-6) I, II, III.

Prerequisite: graduate standing. Research in floriculture, nursery management, and landscape horticulture. The Staff (Mr. Madison in charge)

Landscape Horticulture— Park Administration

Upper Division Courses**100. City and Regional Aesthetics. (3) I.**

Lecture—3 hours. Perception of the city and regional physical environmental components in concept and actuality. Influence of utopian ideas, analysis of existing solutions, and consideration of alternative approaches. Mr. Danielson

110. Introduction to City Planning. (4) II.

Lecture—4 hours. City planning as it has evolved 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. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1. Principles, standards, and procedures in planning and design of areas for park recreation use. Offered in even-numbered years.
Mr. Danielson

140. Park Administration. (3) III.

Lecture—3 hours. Prerequisite: consent of instructor. The acquisition, development, and management of parks, street tree plantings, and other landscaped areas.
Mr. McVicar

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.
Mr. Danielson

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

Mr. Danielson

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: 3 units of upper division work in park administration; consent of instructor.
The Staff

* Not to be given, 1967-68.

Plant Pathology**Upper Division Courses****120. Introduction to Plant Pathology. (4) I, III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2. Recommended: Bacteriology 2. The nature, cause, and control of plant diseases. I. Mr. Campbell, III. Mr. English

122. Diagnostic Techniques. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120. Elementary diagnostic techniques used in the study of plant diseases and their causal agents. Mr. Nyland

***125. Diagnosis and Control of Plant Diseases.**

(4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120. Clinical plant pathology with major emphasis given to the diagnosis and control of diseases affecting fruits, vegetables, field crops, and ornamentals. Frequent field trips are required.

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**202A-202B. Research Techniques in Plant Pathology. (3-3) II-III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120. Principles and practices of advanced techniques used in plant pathological research. II. Mr. Nyland
III. Mr. Nyland, Mr. Shalla

202C. Research Techniques and Instrumentation.

(3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 202B; Chemistry 5. Laboratory methods and techniques in plant pathology with emphasis upon instrumentation. Mr. Kosuge

205. Advanced Study of Field and Vegetable Crop Diseases. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 202A; Botany 119A. A clinical study of the factors affecting disease development and severity with emphasis on ecology and the techniques involved in diagnosis. Frequent field trips are required.

Mr. Houston, Mr. Shepherd

206. Advanced Study of Fruit and Nut Diseases.

(4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 202A; Botany 119A. A clinical study of the factors affecting initiation, development, and control of selected fungus, bacterial, and virus diseases of perennial fruit and nut plants. Frequent field trips are required.

Mr. Ogawa

208. Principles of Plant Disease Control. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 120. Economic importance of diseases; evaluation of losses; control by exclusion, eradication, immunization, therapy, and protection. Classes of fungicides and bactericides: their application, depositional characteristics, phytotoxicity, regulation, assay methods, and mechanisms of action.

Mr. Leach, Mr. Wilson

210. Physiology of Plant Pathogens. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 202C; Biochemistry 101B. A study of the fundamental concepts and current information on the physiology of plant pathogens and host parasite relationships.

Mr. DeVay

215. Genetics of Plant Pathogens. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 120; Genetics 100; Botany 119B. Study of fundamental concepts, research techniques and current information of the genetics of plant pathogenic microorganisms; origin and determination of physiologic specialization, host resistance and virulence in the pathogen as related to the host-parasite interaction. Special emphasis on the fungi.

Mr. Webster

224. Pathogenic Fungi. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 119B. Morphology and taxonomy of plant pathogenic fungi.

Mr. Butler

226. Plant Virology. (5) II.

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 202C. Viruses as causal agents of plant diseases; chemical and physical properties of viruses; methods of transmission; procedures for assay and diagnosis; multiplication of viruses; pathological cytology and anatomy; application of equipment and techniques used in research.

Mr. Shalla, Mr. Shepherd

235A-235B. Advanced Plant Pathology. (4-4) I-II.

Lecture—3 hours; discussion—3 hours. Prerequisite: consent of instructor. A study of the factors influencing pathogenicity and of the reaction of host plants to disease.

I. Mr. Hewitt, II. Mr. Grogan

290. Seminar. (1) I, II, III.

Seminar—1 hour. I. Mr. Webster,
II. Mr. Nyland, III. Mr. Shepherd

291. Seminar in Host-Parasite Physiology.

(1) I, II, III.

Seminar—1 hour. Prerequisite: course 120.
Mr. DeVay, Mr. Kosuge

298. Special Group Study. (1-4) I, II, III.

The Staff

299. Research. (1-9) I, II, III.

The Staff

Pomology**Lower Division Courses****3. Citrus and Other Subtropical Fruits. (3) III.**

Lecture—3 hours. The production of the subtropical fruits including avocados, dates, olives, and citrus with special emphasis on citrus. A study of the fundamental information relating to orchard management as applied to these fruits.

Mr. Hesse

9. Principles of Plant Propagation. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Principles of propagating horticultural plants with special emphasis on anatomical and physiological relationships.

Mr. Hartmann

Upper Division Courses**100A. Principles of Pomology. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Origin, history, distribution, and adaptation of fruit and nut plants; their structure and function in relation to environment and cultural practices.

Mr. Kester

100B. Principles of Pomology. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Development of the vegetative structure of fruit and nut plants; the physiological responses to environment and cultural modification.

Mr. Crane

100C. Principles of Pomology. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Flowering and fruiting; the nature and development of buds, flowers, and fruits in relation to the culture of fruit and nut plants and to their environment.

Mr. Griggs

112. Post-Harvest Physiology and Handling of Fruits. (3) I.

Lecture—3 hours. Prerequisite: course 100C; Botany 111. Fundamentals of fruit-handling operations, cooling, storage, and transportation; emphasis on physiological principles underlying fruit maturity and post-harvest practices.

Mr. Claypool

112L. Post-Harvest Physiology and Handling of Fruits Laboratory. (1) I.

Laboratory—3 hours. Prerequisite: course 112, should be taken concurrently. Application and demonstration of principles underlying fruit maturity and post-harvest practices.

Mr. Claypool

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Hesse in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**201. Biochemistry and Physiology of Fruits. (3) III.**

Lecture—3 hours. Prerequisite: Biochemistry 101B; Botany 111; or consent of instructor. Biochemical and physiological phenomena of growth, maturation, ripening, and senescence of fruit. (Open to qualified undergraduates.)

Mr. Maxie

210. Fruit Morphology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2. The development of flower, fruit, and seed structures of representative fruit types.

Miss Bradley

216. Physiology of Fruit Plants. (4) II.

Lecture—4 hours. Prerequisite: courses 100A, 100B, 100C; Botany 111. Physiological processes in the growth and development of fruit plants; metabolic relationships; influence of environment and culture.

The Staff (Mr. Uriu in charge)

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff (Mr. Catlin in charge)

291. Seminar in Post-Harvest Physiology.

(1) I, II, III.

Seminar—1 hour. Prerequisite: consent of instructor. Selected topics in the field of post-harvest physiology of fruits and vegetables. Conducted jointly with Vegetable Crops 291.

Mr. Maxie

299. Research. (1-6) I, II, III, S.

The Staff

Vegetable Crops**Upper Division Courses****100. Principles of Vegetable Crops. (3) I.**

Lecture—3 hours. Prerequisite: Plant Science 1 and 2; or consent of instructor. The vegetable industry. Fundamentals of vegetable crop production, handling, processing and utilization. Demonstrations will supplement the lecture.

Mr. Lorenz

101. Major Vegetable Crops. (4) II.

Lecture—4 hours. Prerequisite: Plant Science 1 and 2; or consent of instructor. Recommended: course 100. Adaptation, growth habits and methods of culture and handling of the principal vegetable crops. The application of experimental evidence to production problems is stressed.

Mr. Lingle

105. Systematic Olericulture. (2) I.

Laboratory—6 hours. Prerequisite: Botany 2. Origin, history, types, classification, nomenclature, and adaptation of the more important American vegetable varieties; minor vegetable crops; trends in development of new varieties. One or more field trips.

Mr. Smith

112. Post-Harvest Physiology of Vegetables

(and Fruits). (3) I.

Lecture—3 hours. Prerequisite: Botany 111; or consent of instructor. Physiological processes contributing to the deterioration and quality of harvested vegetables (and fruits) and their relation to practices involved in harvesting, packing, transportation, storage, and marketing.

Mr. Morris

112L. Post-Harvest Physiology of Vegetable Laboratory. (1) I.

Laboratory—3 hours. Prerequisite: course 112, or consent of instructor. Demonstrations and experiments selected to follow subject matter of course 112.

Mr. Morris

118. Seed Physiology and Production. (3) II.

Lecture—3 hours. Prerequisite: Botany 111. Physiological factors affecting induction of seedling, seed development, viability and longevity of seed. Principles of seed production. One or more field trips.

Mr. Harrington

150. Vegetables as World Food Crops. (3) II.

Lecture—3 hours. Prerequisite: Botany 2; or consent of instructor. A technical course concerned with historical and current aspects of production and use of vegetables as human food; ecology, economics, geography, human cultural patterns, dietary preferences, nutritional values, and use of microclimates related to commercial and subsistence production.

190. Proseminar. (1) II.

Discussion—1 hour. Prerequisite: consent of instructor. Current problems and research in vegetable production.

Mr. Lorenz

197. Field Study of Vegetable Industry. (1) III.

Lecture—1 hour; field study—56 hours. Prerequisite: consent of instructor; limited to 25 students. A field study trip covering the major vegetable producing areas of California. Visits are made to packing sheds, seed companies, plant breeding industry, processors, vacuum coolers, mushroom plant, farmer operations, canneries, Los Angeles market, California Technical phytotron, etc.

Mr. Flocker

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Davis in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**220. Vegetable Genetics and Improvement. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 100B. Recommended: course 105; Plant Science 113. Breeding systems of vegetable species as affected by self-incompatibility.

bility, flower structure, pollen vectors, and other reproductive factors. Problems of chromosome number and structure, heterosis, pest resistance, and species hybrids peculiar to vegetable improvement.

Mr. Rick

221. Vegetable Physiology. (3) III.

Lecture—3 hours. Prerequisite: Botany 111. Physiological principles involved in the production of vegetable crop species.

Mr. Pratt

221L. Vegetable Physiology Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 221 concurrently; or consent of instructor. Demonstrations and experiments selected to follow subject matter of course 221.

Mr. Pratt

290. Seminar. (1) I, II, III.

Discussion—1 hour.

The Staff (Mr. Spurr in charge)

291. Seminar in Postharvest Physiology. (1) I, II, III.

Discussion—1 hour. Prerequisite: consent of instructor. An intensive study of selected topics in the field of postharvest physiology of fruits and vegetables. This seminar will be conducted jointly with Pomology 291.

The Staff (Mr. Pratt in charge)

298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Current concepts, techniques, and procedures applicable to research and to the production of vegetables.

The Staff (Mr. Yamaguchi in charge)

299. Research. (1-9) I, II, III.

The Staff

Viticulture and Enology

Lower Division Course

3. Introduction to Wine Making. (3) II.

Lecture—3 hours. An introduction to wine technology, including history, fermentation, production practices, wine types, and the wine industry of California and other wine producing areas.

Mr. Singleton, Mr. Amerine

Upper Division Courses

105. Systematic Viticulture Including Fruit Maturation and Handling. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Plant Science 2; or consent of instructor. Botanical classification of the grape—the principal varieties, rootstocks, and species; environmental factors affecting maturity and quality of the fruit for raisins, wine and table grapes; harvesting, handling, and marketing of table grapes; raisin making; costs and returns.

Mr. Nelson, Mr. Lider

116A. General Viticulture. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2; or consent of instructor. Principles underlying pruning, training, grafting, and propagation of vines; environmental and economic factors affecting choice of vineyard type and location; establishment of vineyards.

Mr. Cook, Mr. Lider

116B. General Viticulture. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 116A. Economics and scientific principles of recommended vineyard management practices including irrigation, mineral and carbohydrate nutrition, flower development and fruit set, virus and fungal diseases, and insect control.

Mr. Cook, Mr. Lider

190. Proseminar in Viticulture. (1) I.

Lecture—1 hour. Prerequisite: consent of instructor. Reports and discussions of recent advances in viticulture.

Mr. Olmo

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. The Staff

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

The Staff

Graduate Courses

208. Plant Hormones and Regulators. (4) I.

Lecture—4 hours. Prerequisite: Botany 111; Chemistry 8; or consent of instructor. Open to qualified upper division students. History, occurrence, extraction, measurement, chemical nature, developmental and physiological effects, role, and theories of action of plant hormones and growth regulators; methods of application of growth regulators and factors altering effectiveness; application in the control of plant and fruit responses.

Mr. Weaver, Mr. Addicott

208L. Plant Hormones and Regulators Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: course 208 (may be taken concurrently); or consent of instructor. Experiments in plant hormones and regulators using various bioassay methods for auxins, gibberellins, and kinins; preparation and testing of gibberellic acid; extraction and identification of naturally occurring plant hormones.

Mr. Weaver

290. Seminar. (1) II.

Seminar—1 hour. Prerequisite: consent of instructor.

Mr. Webb

299. Research. (1-6) I, II, III.

The Staff

POLITICAL SCIENCE

_____, Chairman of the Department

Department Office, 227 Voorhies Hall

Professors:

Richard W. Gable, Ph.D.
 Charles M. Hardin, Ph.D.
 Clyde E. Jacobs, Ph.D.
 Lloyd D. Musolf, Ph.D.
 Vernon J. Puryear, Ph.D.
 Paul E. Zinner, Ph.D.

Associate Professors:

Alexander J. Groth, Ph.D.
 John R. Owens, Ph.D.
 Donald S. Rothchild, Ph.D.
¹Marvin Zetterbaum, Ph.D.

Assistant Professors:

Edmund Costantini, Ph.D.
 Gerald Friedberg, Ph.D.
 Alvin D. Sokolow, Ph.D.
 Louis F. Weschler, Ph.D.

◇ ◇ ◇

Assistant Professors:

Stanley B. Bernstein, M.A. (*Acting*)
 Kenneth I. Hanf, M.A. (*Acting*)
 William S. Tuohy, M.A. (*Acting*)

Lecturers:

Joyce K. Kallgren, M.A.
 Dennis A. Livingston, A.B.
 Larry Peterman, M.A.

Associate:

Nancy W. Percy, M.A.

Department Major Advisers.—Mr. Costantini, Mr. Friedberg, Mr. Gable, Mr. Groth, Mr. Hanf, Mr. Hardin, Mr. Jacobs, Mrs. Kallgren, Mr. Livingston, Mr. Musolf, Mr. Owens, Mr. Puryear, Mr. Rothchild, Mr. Sokolow, Mr. Weschler, Mr. Zetterbaum, Mr. Zinner.

Graduate Advisers.—Mr. Puryear, Mr. Zinner, Mr. Groth.

The American History and Institutions Requirement may be satisfied by any two of the following courses: 1A, 1B, 100, 102, 103, 104, 105, 106, 113, 128A, 163, 164, 166. See also page 34.

The Major Program

Lower Division Courses.—Required: courses 1A, 1B, 2, 3, and two of the following: History 4A, 4B, 4C.

Upper Division Courses.—Required: 40 units as follows:

¹ Absent on leave, 1967-68.

(a) 28 units in Political Science with a minimum of two courses in each of three fields, which must be selected from two of the following groups:

Group A

Political Theory (courses 110-119).

Group B

American Government (courses 102-109).

Political Parties (courses 160-169).

Public Law (courses 150-159).

Public Administration (courses 180-189).

Group C

Comparative Governments (courses 140-149, 170-179).

International Relations (courses 120-139).

(b) 12 additional units in Political Science or related subjects.

Political Science students *must* maintain at least a grade C average in the major.

Graduate Study.—The Department offers programs of graduate study leading to the M.A. and Ph.D. degrees. Information concerning admission to these programs and requirements for completion is available in the department office.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Thirty units of political science to be selected in consultation with the subject representative.

Subject Representative: Mr. Sokolow

Lower Division Courses

1A. American Government. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. National, state, and local government in the United States.

The Staff

1B. American Government. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. National, state, and local government in the United States.

The Staff

2. Introduction to Government: Comparative Government. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Constitutional principles, governmental institutions, and political problems of selected European governments.

The Staff

3. International Relations. (4) I, II, III.

Lecture—3 hours; discussion—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.

The Staff

Upper Division Courses

100. American National Government. (4) I, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students having credit for course 1A or 1B. Presidential leadership; executive-legislative relationships; the development of effective and accountable administration; defense and foreign policy; and government and science.

The Staff

102. Comparative State Government and Politics. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students who have credit in course 104. The comparative study of the government and politics of American states, including their constitutional frameworks, their participation in the federal system, the dynamics of governmental institutions, and the behavior of parties and interest groups.

Mr. Sokolow

103. Local Government and Politics. (4) II.

Lecture—3 hours; discussion—1 hour. American local governments—cities, counties, and special districts—as legal, administrative, and political units; community politics and urbanism.

Mr. Sokolow

104. California State and Local Government. (3) III.

Lecture and discussion—3 hours. California's constitution, party system, legislature, executive agencies, administration, courts, major public programs and problems; state-local relations; county, city, school and special district governments. Offered in odd-numbered years.

Mr. Weschler

105. The Legislative Process. (4) II.

Lecture—3 hours; discussion—1 hour. An analysis of the legislative process with emphasis on the United States Congress; legislative organization and procedures, legislative leadership and policy making, legislators and constituents, relations between Congress and other agencies.

Mr. Owens

106. The Presidency. (4) III.

Lecture—3 hours; discussion—1 hour. The office, powers, and role of the President of the United States.

Mr. Hardin

108. Metropolitan and Regional Problems. (4) III.

Lecture—3 hours; discussion—1 hour. The organization, functions, and politics of government in the metropolitan and regional setting; special emphasis on the emerging forces and problems related to urbanization and regional growth. Offered in even-numbered years.

Mr. Weschler

110. Contemporary Political Science. (4) I.

Lecture and discussion—4 hours. History, nature, and methodology of the discipline; the problems, schools of thought, and trends within the field at present. To be offered in even-numbered years.

Mr. Friedberg

111. Systematic Political Science. (4) II.

Lecture and discussion—4 hours. Philosophical basis of modern political science; major specific approaches; selected concepts relevant to modern political concerns; and research design and execution.

Mr. Friedberg

112. Contemporary Democratic Theory. (4) II.

Lecture—3 hours; discussion—1 hour. The major contemporary attempts to reformulate traditional democratic theory; attempts to replace traditional theory by conceptual models derived from modern social science findings.

Mr. Peterman

113. The American Political Experience. (4) III.

Lecture and discussion—4 hours. Origins and nature of American political thought and practice from medieval background to the present. Study of America in comparative context to develop a comprehensive understanding of the unique character and limits of our heritage.

Mr. Friedberg

***114. Politics and Political Man in Political Theory. (4) III.**

Lecture—3 hours; discussion—1 hour. The defense and criticism of political life: an investigation of those political writers who have defended political life and political man against its critics.

117A. Marxism. (4) I.

Lecture and discussion—4 hours. Historical background and context of Marxism. Exploration of Marx's writings toward understanding his significance in the nineteenth century and his relevance today. Offered in odd-numbered years.

Mr. Friedberg

117B. Contemporary Marxism. (4) II.

Lecture and discussion—4 hours. Marxism after Marx to the present, with reference to Engels, Kautsky, Bernstein, Lenin, and contemporary figures and movements. Special attention to Marxism in America. Communism and democratic socialism as legacies of Marx related to contemporary problems. To be offered in even-numbered years.

Mr. Friedberg

118A. History of Political Theory. (4) I.

Lecture—3 hours. Critical analyses of the works of major political philosophers. Classical and medieval political philosophy—Plato, Aristotle, Cicero, St. Thomas.

Mr. Peterman

* Not to be given, 1967-68.

118B. History of Political Theory. (4) II.

Lecture—3 hours. Critical analyses of the works of major political philosophers. Modern political philosophy—Machiavelli, Hobbes, Locke, Rousseau, Burke, Nietzsche.

Mr. Peterman

119. Modern Political Thought. (4) II.

Lecture and discussion—4 hours. The search for community from Marx to the present. Communism, fascism, capitalism, socialism, irrationalism, immoralism, and existentialism as responses to the decline of liberalism and the nature of modern problems. Offered in odd-numbered years.

Mr. Friedberg

120. Science and International Relations. (4) II.

Lecture—4 hours. The impact of science and technology upon the international legal and political order.

Mr. Livingston

***122A. International Law. (4) II.**

Lecture—4 hours. Sources and theories of international law. The relation of international law to municipal law. Territory, sovereign immunity, responsibility, recognition, and succession in the law of nations.

122B. International Law. (4) III.

Lecture—4 hours. Neutrality, belligerency, and war in the international community. Pacific settlement of disputes.

Mr. Livingston

***123. Theories of International Politics. (4) II.**

Lecture—4 hours. Major contemporary approaches to the study of international politics, including balance of power, national interest, Marxist-Leninist theory, systems theory, and decision-making analysis.

124. International Organization. (4) I.

Lecture—4 hours. The preservation of world peace through collective security arrangements. Analysis of the conditions under which international organizations can or cannot preserve peace, through examination of the record of the United Nations, League of Nations, and more restricted security organizations.

Mr. Livingston

128A. Recent American Foreign Policy. (4) I.

Lecture—4 hours. Abandonment of isolation and assumption of leadership during the First World War. Return to isolationist policies in the twenties. The neutrality acts of the thirties. The second World War and reversal of the policy of isolation.

Mr. Puryear

128B. The Conduct of American Foreign Relations. (4) III.

Lecture—3 hours; discussion—1 hour. Diplomacy and the conduct and control of foreign relations. The Department of State and the Foreign Service. Case studies in recent diplomacy to illustrate policy formation and execu-

tion. Some comparative materials will be introduced but emphasis will be placed upon the United States.

131. Soviet Foreign Policy. (4) II.

Lecture—3 hours; discussion—1 hour. The conduct of Soviet foreign relations in contemporary world affairs; ideology and power as mainsprings of policy; foreign policy as an instrument of revolution; the role of diplomacy, economic aid and nuclear armaments.

Mr. Zinner

132. The Role of the United States in the Far East. (4) I.

Lecture—4 hours. Prerequisite: course 3 is recommended. A survey of the role the United States has played in the Far East through an examination of such topics as America's participation in Asiatic westernization, United States Far Eastern policy, Oriental attitudes toward the United States. An evaluation of present problems.

Mrs. Kallgren

***133. International Relations in the Far East. (4) III.**

Lecture—4 hours. Prerequisite: course 3 is recommended. Contemporary developments in the Far East, and selected issues of world significance.

Mrs. Kallgren

134. International Relations in Africa. (4) II.

Lecture—3 hours; discussion—1 hour. Inter-African state relations, pan-Africanism, regional integration, policies toward South Africa, and relations between African and major non-African powers.

Mr. Rothchild

137. Nationalism and Imperialism. (4) III.

Lecture—4 hours. Prerequisite: course 3 is recommended. The theory of nation building illustrated by Western and non-Western experience.

Mrs. Kallgren

***139. International Relations in Western Europe. (4) II.**

Lecture—4 hours. Study of the emerging unity in Western Europe and its implications for the North Atlantic area.

141. Soviet and East European Governments. (4) I.

Lecture—3 hours; discussion—1 hour. The governmental systems of the Soviet Union and the East European satellites; background seizure of power, techniques of totalitarian control.

Mr. Zinner

142. Revolution and Political Change. (4) III.

Lecture—4 hours. The attributes, problems, means, and impact of political change through evolution and revolution in the twentieth century. Emphasis upon movements and systems representative of communism, fascism, and nationalism.

Mr. Groth

* Not to be given, 1967-68.

143. Government and Politics of Overseas Economic Development. (4) III.

Lecture—3 hours; discussion—1 hour. Analysis of programs aimed at economic development with special reference to agriculture in selected Latin American and South Asian countries. To be offered in odd-numbered years. Mr. Gable

144. Government in Great Britain and the British Commonwealth. (4) III.

Lecture—3 hours; discussion—1 hour. The democratic process in Britain; party politics; the cabinet system; the colonies; the evolution of the British Commonwealth. Mr. Groth

***145. Government and Politics in Emergent Nations. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Conceptual study of problems of political organization and procedure in the context of rapid change engendered by social revolution in "emergent countries" and liberation from colonial oppression. To be offered in even-numbered years. Mr. Zinner

146A. African Governments and Politics. (4) II.

Lecture—4 hours. An analysis of political systems in Africa south of the Sahara.

Mr. Rothchild

146B. African Governments and Politics. (4) III.

Lecture—4 hours. A continuation of course 146A. Mr. Rothchild

***147A. Western European Governments: France and Italy. (4) I.**

Lecture—4 hours. The evolution and contemporary nature of French and Italian political institutions. Mr. Groth

147B. Western European Government: Germany. (4) II.

Lecture—4 hours. Comparative study of the politics and institutions of constitutional and totalitarian government in Germany since 1930. Current problems of a divided Germany. Mr. Groth

148A. Government and Politics in East Asia. (4) I.

Lecture—4 hours. The structure and evolution of political institutions in China, Japan, and Korea. Emphasis upon such topics as nationalism, political modernization, and ideology up to World War II. Mrs. Kallgren

148B. Government and Politics in East Asia. (4) II.

Lecture—4 hours. The structure and evolution of political institutions in China, Japan, and Korea since World War II, with emphasis upon political modernization, ideology, and nationalism. Mrs. Kallgren

* Not to be given, 1967-68.

149. International Communism. (4) III.

Lecture—3 hours; discussion—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. Mr. Zinner

150. Jurisprudence. (4) III.

Lecture—4 hours. An analysis of the nature and functions of law. Particular attention will be directed to law as an instrument of social control and the relationship between law and morality. Mr. Bernstein

151. Civil Rights and the Constitution. (4) I.

Lecture—4 hours. Prerequisite: course 1A. The constitutional rights and political possibilities of minority groups. Citizenship in the American federal system. Mr. Bernstein

155. Administrative Law. (4) I.

Lecture—3 hours; discussion—1 hour. The political-legal factors in the decision-making processes of administrative legislation, adjudication and discretion; legal controls as an aspect of administrative responsibility; relationship of substance and procedure in regulatory action. Mr. Musolf

157A. American Constitutional Law. (4) I.

Lecture—1 hour; discussion—3 hours. Prerequisite: courses 1A and 1B; or consent of instructor. Judicial review, jurisdiction of the federal courts, interstate and foreign commerce, and taxation. Mr. Jacobs

157B. American Constitutional Law. (4) II.

Lecture—1 hour; discussion—3 hours. Prerequisite: course 157A. The Bill of Rights of the Federal Constitution. Mr. Jacobs

159. Judicial Behavior. (3) I.

Lecture and discussion—3 hours. Prerequisite: course 1A. Analysis of the behavior of judges and courts in the political process. Techniques of judicial decision-making. Relationships among courts and other decision-making bodies. Mr. Bernstein

161. Political Behavior. (4) II.

Lecture—3 hours; conference—1 hour. Prerequisite: course 1A. The individual and group aspects of partisan behavior; political socialization, partisanship and political participation, voting behavior and group influence processes. Mr. Owens

163. Political Parties. (4) I.

Lecture—3 hours; discussion—1 hour. An analysis of the structure and operations of the party system in the United States; party func-

tions and organization, nomination processes, campaigns and elections, party trends and reforms. Mr. Owens

164. Group Politics. (4) II.

Lecture—3 hours; discussion—1 hour. An analysis of class, sectional, ethnic, religious, economic, and other interests in relation to constitutional government. The problem of balancing liberty and order and of reconciling claims of diversity with those of uniformity. Mr. Hardin

165. Public Opinion and Propaganda. (5) III.

Lecture—4 hours. Prerequisite: course 1A. The nature and function of public opinion; the formation of opinion with emphasis on the role of propaganda; the distribution of political attitudes among the public; the impact of public opinion. Mr. Costantini

166. Public Policy and the Government Process. (4) II.

Lecture—3 hours; discussion—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. Mr. Weschler

167. Government and the Economy. (4) II.

Lecture—3 hours; discussion—1 hour. The legal and political environment of economic controls; types and techniques of regulating and assisting various sectors of the economy; policy alternatives and administrative processes; the search for the public interest. Mr. Gable

***168. Policy and Politics in Agriculture and Water. (4) III.**

Lecture—3 hours; discussion—1 hour. Agricultural and water policies and their political implications, with chief emphasis upon the United States and with special attention to water policies in California. Mr. Hardin

181. Elements of Public Administration. (4) I.

Lecture—3 hours; discussion—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. Mr. Hanf

183. Administrative Behavior. (4) II.

Lecture—4 hours. The implications for American public administration of evolving concepts about behavior in organizations. Mr. Musolf

185. Comparative Administration. (4) III.

Lecture—3 hours; discussion—1 hour. Theories and models of comparison; the ecology of administrative systems; functional processes of

administration in developed and developing nations; role of bureaucracy in development and nation-building. Mr. Gable

187. Administrative Theory. (4) III.

Lecture—3 hours; discussion—1 hour. An historical and critical analysis of the principal theories of organization and management of public agencies in the light of such concepts as decision-making, bureaucracy, authority and power, communication and control; and examination of the role of government bureaucracies in the total society. Mr. Hanf

***190. Selected Problems in State and Local Government. (4) II.**

Seminar—4 hours. An undergraduate seminar for students enrolled in the Sacramento Seminar Program. Guests and staff members will conduct seminar sessions on contemporary problems in California government and politics. Students will have the opportunity to share in the experiences of actual practitioners. The Staff

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

Prerequisite: honors status. The Staff

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. The Staff

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

The Staff

Graduate Courses

***202. American State and Local Government. (4) I.**

Lecture—3 hours; discussion—1 hour. The analysis of American state and local government and politics. Special emphasis on community power structure, federalism, state legislatures, and state administration.

Mr. Sokolow, Mr. Weschler

213. Modern Political Thought. (4) III.

Seminar—3 hours. Mr. Friedberg

215. Basic Problems of Political Theory. (4) III.

Lecture—3 hours. Prerequisite: 4 units of political theory or consent of instructor. An examination of the fundamental assumptions underlying various approaches to an understanding of politics, emphasizing the scientific or value-free school, the historicist school, and the contributions of analytic philosophy.

Mr. Peterman

218. Political Theory. (4) I.

Seminar—3 hours. Mr. Peterman

223. International Relations. (4) II.

Seminar—3 hours. Mr. Puryear

* Not to be given, 1967-68.

224. International Organization. (4) II.		tions. Classical federal experience and experiments in developing countries will be considered.
Seminar—3 hours.	Mr. Livingston	Mr. Rothchild
230. American Foreign Policy. (4) III.		
Seminar—3 hours.	Mr. Puryear	
240. Democracy and Dictatorship. (4) I.		
Lecture—3 hours. Prerequisite: one upper division course in comparative government, or consent of the instructor. Analytical study of differences and similarities in the political process under democratic and dictatorial government. To be offered in odd-numbered years.	Mr. Zinner	Mr. Musolf
#241A–241B. Soviet and East European Governments. (4–4) I–II.		
Seminar—3 hours.	Mr. Zinner	Mr. Gable
246. Government in Africa. (4) II.		
Seminar—3 hours.	Mr. Rothchild	
247A. Western European Governments. (4) I.		
Seminar—3 hours. Contemporary problems, with emphasis on France and Italy.	Mr. Groth	Mr. Jacobs
*247B. Western European Governments. (4) III.		
Seminar—3 hours. Prerequisite: consent of instructor. Contemporary problems, with emphasis on Germany.		
248. The Far East. (4) III.		
Seminar—3 hours. Selected contemporary problems of government and international relations in the Far East.	Mrs. Kallgren	Mr. Hardin
261. Political Behavior. (4) III.		
Seminar—3 hours.	Mr. Owens	
270. Federalism and Regionalism. (4) I.		
Lecture—3 hours. Prerequisite: one upper division course in comparative government or international relations, or consent of the instructor. An examination of the means and motives of regional integration as well as the problems involved in operating and maintaining federal-		
		291. Seminar in American Constitutional Law. (4) III.
		Seminar—3 hours. Prerequisite: course 157B; or consent of instructor.
		Mr. Jacobs
		295. Political Parties. (4) II.
		Seminar—3 hours.
		296. Selected Problems in State and Local Government. (4) II.
		Seminar—3 hours. Prerequisite: course 202 or consent of instructor. Selected topics in state and local government and politics.
		Mr. Sokolow, Mr. Weschler
		298. Group Study. (1–4) I, II, III.
		The Staff
		299. Research. (1–12) I, II, III.
		The Staff
		299D. Directed Reading. (1–6) I, II, III.
		The Staff
		Professional Course
		400. Field Work in Political Science. (1–4) I, II, III.
		Directed study and internship in a government agency, office, or political party. May be repeated twice for credit.
		The Staff

POMOLOGY—See Plant Sciences**PORTUGUESE—See Spanish****PSYCHOLOGY**Robert Sommer, Ph.D., *Acting Chairman of the Department*

Department Office, 149 Young Hall

Professors:

William F. Dukes, Ph.D.
 Joseph Lyons, Ph.D.
 Robert Sommer, Ph.D.

* Not to be given, 1967–68.

† Not to be given, winter quarter 1968.

Associate Professors:

Jarvis R. Bastian, Ph.D.
 Stanley Coopersmith, Ph.D.
 Thomas Natsoulas, Ph.D.

Assistant Professors:

Gordon H. Berman, Ph.D.

Alan C. Elms, Ph.D.
 Benjamin L. Hart, Ph.D., D.V.M.
(Psychology and Anatomy)
 Rudolf Kalin, Ph.D.
 Dale F. Lott, Ph.D.
 Robert M. Murphey, Ph.D.
 Theodore E. Parks, Ph.D.
 Charles T. Tart, Ph.D.
 Edward D. Turner, Ph.D.

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Lecturers:

Richard A. Cahoon, Ph.D.
 Sumner B. Morris, Ed.D.
 Morris H. Woskow, Ph.D. (*Psychology and Food Science and Technology*)

Departmental Major Advisers.—Mr. Bastian, Mr. Bermant, Mr. Coopersmith, Mr. Kalin, Mr. Lott, Mr. Murphey, Mr. Natsoulas, Mr. Parks, Mr. Sommer, Mr. Tart, Mr. Turner.

The Major Program

Lower Division Courses.—Required: Psychology 1A, 1B, 1C, 3; either (a) Biology 1 or (b) Biology 10 plus any one of the following: Anthropology 1, Physiology 10, Zoology 25, Genetics 10, or for transfer students, their equivalents; 8 units of sociology and/or cultural anthropology.

Upper Division Courses.—Required: 36 units of advanced work in psychology (courses numbered above 99) including: course 196 (to be taken during the senior year); three courses from one of the following groups and two courses from the other:

- (Group A) 108, 130, 131, 134, 150.
 (Group B) 112, 145, 147A, 168.

Before graduation the student must complete 8 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 107).—The honors program comprises course 194H, which includes an honors thesis, to be taken normally during the senior year.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Thirty units in psychology.
Subject Representative: Mr. Turner.

Lower Division Courses

1A. Introduction to Psychology: General Processes.

(4) I, II, III.

Lecture—4 hours. Sensation, perception, learning, memory, motivation, and emotion.

The Staff

1B. Introduction to Psychology: Biological Bases of Behavior. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 1A.

An analysis of behavior in terms of its evolutionary, genetic, and physiological determinants.

The Staff

1C. Introduction to Psychology: Personality and Social Psychology. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 1A. The normal and abnormal personality. The influence of social factors on the individual.

The Staff

3. Quantitative Description of Behavior.

(4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A; two years of high school algebra or the equivalent. Not open for credit to students who have received credit for a course in statistics. Principles and problems of measurements; inference and prediction from psychological data. Primarily for psychology majors. Mr. Turner

33. Personal and Social Adjustment. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A. The dynamics of normal personality development. Family relationships, social adjustment, and self-evaluation are emphasized. Primarily for students who will not major in psychology.

Mr. Cahoon, Mr. Morris

Upper Division Courses

106. Experimental Psychology. (4) I, II, III.

Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 1A, 3. Laboratory investigation of selected problems, including the design, execution, and formal reporting of experiments.

Mr. Tart

107. Advanced Statistical Methods in Psychology.

(4) III.

Lecture—4 hours. Prerequisite: course 3. Application of hypothesis-testing techniques to specific problems of psychological research and related behavioral research areas. Mr. Turner

108. Physiological Psychology. (5) I, III.

Lecture—3 hours; laboratory—4 hours. Prerequisite: course 1B; or course 1A and upper division standing in a biological science. An analysis of some of the contributions of neuroanatomy, neurophysiology, and neurochemistry to a mechanistic understanding of human and animal behavior. A reductionistic approach within a behavioristic framework. Mr. Hart

112. Developmental Psychology. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A; not open for credit to students who have received credit for Human Development 131. An ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction.

† Not to be given, fall quarter 1967.

120. History of Psychology. (4) II.

Lecture—4 hours. Prerequisite: course 1A and senior standing. The historical development of psychological theories and research.

Mr. Woskow

129. Sensory Processes. (4) III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 1B; upper division standing in psychology; or consent of instructor. The sensory capabilities of man and animals. Behavioral evidence for sensory capacity and relationships to the structure and function of the sense organs.

Mr. Woskow

130. Learning. (4) I, III.

Lecture—3 hours; laboratory—2 hours. Consideration of major theories of learning and memory, with critical examination of relevant experimental data.

Mr. Parks

131. Perception. (3) I, II.

Lecture—3 hours. Prerequisite: course 1A. The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.

131L. Laboratory in Perception. (2) I, II, III.

Laboratory—4 hours. Prerequisite: course 106, 131 completed or in progress. Experimental work in perceiving.

132. Language and Cognition. (4) I.

Lecture—4 hours. Prerequisite: course 1A and 6 units of upper division work in psychology. Psychological examination of linguistic actions, their development and role in human conduct; analysis of their contribution to perception and thought.

Mr. Bastian

†134. Motivation. (4) I, III.

Lecture—4 hours. Prerequisite: course 1A. Factors activating and directing behavior; contemporary theories of motives; pertinent data from laboratory, clinic, and field observation.

Mr. Lott

†135. Psychology of Consciousness. (3) I.

Lecture—3 hours. Prerequisite: course 1A. Consideration of major theories of consciousness, with critical examination of relevant experimental, clinical, and field data.

Mr. Natsoulas

145. Social Psychology. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction: group tensions, norm-development, attitudes, values, public opinion, status.

Mr. Elms, Mr. Sommer

147A. Personality Theory and Assessment. (4) I.

Lecture—4 hours. Prerequisite: course 1A and 6 units upper division work in psychology.

† Not to be given, fall quarter 1967.

A systematic consideration of contemporary theories of personality. Mr. Elms, Mr. Kalin

147B. Personality Theory and Assessment. (4) II.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 147A. An exploration and evaluation of the principal methods in personality research.

Mr. Elms, Mr. Kalin

150. Comparative Psychology. (4) I, III.

Lecture—4 hours. Prerequisite: course 1B or appropriate biological training. Perspectives in animal behavior: zoological, physiological, psychological. Functional behavior categories: orientation and locomotion, feeding, reproduction, communication, learning. Behavioral theory as derived from psychological and ethological contexts.

Mr. Berman, Mr. Lott

150L. Comparative Psychology Laboratory. (2) I, III.

Laboratory—4 hours. Prerequisite: concurrent enrollment in course 150. Observation and analysis of behavior at various phyletic levels, with correlated outside readings.

Mr. Berman, Mr. Lott

165. Introduction to Clinical Psychology. (4) I, II.

Lecture—4 hours. Prerequisite: course 1C; 145 or 168; and 112 or 134 or 147A. Psychological assessment procedures in clinical psychology; psychological methods for modifying disordered behavior—rationale, process, and outcome.

Mr. Lyons

168. Abnormal Psychology. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A. A descriptive and functional account of behavioral disorders, with primary considerations given to neurotic and psychotic behavior.

Mr. Murphrey, Mr. Sommer

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: 20 units in psychology and honors status. Independent investigation of an empirical problem.

The Staff

196. Advanced General Psychology. (4) II, III.

Lecture—4 hours. Prerequisite: 18 units upper division work in psychology. Exploration of the present status of systematic psychology. An integrative treatment of the major areas, problems, and methodologies. Required of all majors in their senior year.

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**201A. Psychobiology. (4) I.**

Seminar—4 hours. An intensive consideration of behavior studies in physiological and comparative psychology, and other biological sciences.

Mr. Berman, Mr. Hart,

Mr. Lott, Mr. Murphrey

201B. General Experimental Psychology. (4) II.

Seminar—4 hours. An intensive consideration of major areas and problems in general experimental Psychology.

Mr. Bastian, Mr. Dukes, Mr. Natsoulas,
Mr. Parks, Mr. Turner, Mr. Woskow

201C. Personality-Social Psychology. (4) III.

Seminar—4 hours. An intensive consideration of basic psychological processes in social situations including the study of variables characterizing the individual personality.

Mr. Coopersmith, Mr. Elms,
Mr. Kalin, Mr. Sommer, Mr. Tart

206. Advanced Research Methods. (4) II.

Seminar—4 hours. A survey of research methods in various areas of psychology, including naturalistic observation, correlation studies, systematic assessment, and experimental studies, and an examination of the basic assumptions underlying the use of these methods.

Mr. Tart or Mr. Turner

208. Physiological Psychology. (4) II.

Seminar—4 hours. A conceptual analysis of the contributions of neuroanatomy, neurophysiology and neurochemistry to an understanding of animal and human behavior. Mr. Hart

288. Research Preceptorship. (4) I, II, III.

Laboratory and discussion—6-9 hours. Prerequisite: consent of instructor. The Staff

RANGE MANAGEMENT

John A. Zivnuska, Ph.D., *Chairman of the Committee (Berkeley Campus)*

R. Merton Love, Ph.D., *Vice-Chairman of the Committee*

Committee Office, 131 Hunt Hall

Committee in Charge:**Professors:**

Harold H. Biswell, Ph.D. (*Forestry; Berkeley Campus*)

Harold F. Heady, Ph.D. (*Forestry; Berkeley Campus*)

R. Merton Love, Ph.D. (*Agronomy*)

William C. Weir, Ph.D. (*Animal Husbandry*)

William A. Williams, Ph.D. (*Agronomy*)

John A. Zivnuska, Ph.D. (*Chemistry*)

Lecturers:

Beecher Crampton, M.S. (*Agronomy*)

Arnold M. Schultz, Ph.D. (*Forestry*)

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.

† Not to be given, fall quarter 1967.

290. Seminar: Special Topics. (4) I, II, III.

Seminar—4 hours. A seminar devoted to a highly specific research topic in any area of basic psychology. Special topic selected for a quarter will vary depending on interests of instructor and students.

The Staff

†291. Seminar in Psychobiology. (4) I, II, III.

Seminar—4 hours. The Staff

292. Experimental Study of Personality.

(4) I, II, III.

Seminar—4 hours.

Mr. Coopersmith, Mr. Kalin

†293. Environment and Behavior. (4) I.

Seminar—4 hours. The social psychology of the environment. Research into the use of space and its design implications. Mr. Sommer

294. Psycholinguistics. (4) III.

Seminar—4 hours.

Mr. Bastian

295. Comparative and Physiological Psychology of Reproductive Behavior. (4) II.

Seminar—4 hours. Biological bases of reproductive behavior; neural, hormonal, and environmental controls.

Mr. Bermant, Mr. Hart, Mr. Lott

298. Group Study. (1-4) I, II, III.

The Staff

299. Research. (2-9) I, II, III.

The Staff

Major Advisers.—See *Schedule and Directory Listing*.

Bachelor of Science Major Program and Graduate Study. See pages 53 and 127.

Lower Division Course**1. Introduction to Range Management. (4) II.**

Lecture—3 hours; discussion—1 hour. Basic principles of range management and their relationships to the management of wildlands for livestock production, wildlife, water, recreation, and timber.

Mr. Biswell

Upper Division Courses**100. Range Plants. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2. Systematic relationships and identification of range grasses; legumes, forbs, and shrubs; their distribution, environmental requirements, and use. One Saturday field trip.

Mr. Crampton

103. Grassland Inventory, Analysis and Planning.

(4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100; or consent of 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. Mr. Heady

105. Summer Field Course. (6) Extra-Session.

Lecture—8 hours; laboratory—24 hours. Prerequisite: consent of instructor. Four weeks devoted to field studies of range condition and methods of utilization in various parts of the state. Required of all students with a major in range management. Mr. Love

133. Grassland Ecology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course in plant ecology; or consent of instructor. Composition, structure, development, and habitat factors of native North American grasslands. Concepts used in vegetative measure-

ments. Principles of grassland management for forage production. Offered in even-numbered years. Mr. Schultz

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. The Staff

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: senior standing and consent of instructor. The Staff

Graduate Courses**290. Seminar. (1-2) I, II, III.**

Seminar—1-2 hours.

Mr. Love

299. Research. (1-9) I, II, III.

The Staff

RHETORIC

James J. Murphy, Ph.D., *Chairman of the Department*

Department Office, 207 North Hall

Professor:

James J. Murphy, Ph.D.

Associate Professors:

Gerald P. Mohrmann, Ph.D.

Ralph S. Pomeroy, Ph.D.

Assistant Professor:

Donovan J. Ochs, Ph.D.

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Assistant Professor:John L. Vohs, M.A. (*Acting*)**The Major Program****Departmental Adviser.**—Mr. Murphy.

Lower Division Courses.—Required are courses 1A-1B and 15. Recommended: courses in classical languages.

Upper Division Courses.—Thirty-six units in rhetoric, including: (1) courses 110, 120 in the first quarter of upper division work; (2) at least one additional course from each of the following series: 110, 120, and 150; (3) course 190 in the senior year.

Required courses outside the Department of Rhetoric.—A coherent program of twelve quarter units selected in consultation with the Departmental adviser from appropriate courses outside the Department of Rhetoric. This program will ordinarily be chosen from a designated set

of courses related to one of the four course series in the Department of Rhetoric (Series 110, 120, 150, or 160).

The Department will certify completion of a major program only on the basis of at least a C average in the upper division courses taken in the Department.

Teaching Major.—Same as major.

Teaching Minor.—Thirty quarter units, including Rhetoric 1A-1B, 15, 41, and eighteen upper division units including either course 110 or 120.

Lower Division Courses**1A. Introduction to Public Speaking. (4) I, II, III.**

Lecture—4 hours. Practice in the preparation and delivery of speeches with an introduction to rhetorical theory and criticism as applied to public address. The Staff

1B. Introduction to Public Speaking. (4) II, III.

Lecture—4 hours. Prerequisite: consent of instructor or course 1A. Further study and practice in selected areas and media of speech communication. Mr. Vohs

2A. Introduction to the Oral Interpretation of Prose. (4) I, II, III.

Lecture—4 hours. Introduction to the theory of oral interpretation, with criticism and practice of the oral reading of prose literature. —

2B. Introduction to the Oral Interpretation of Poetry. (4) I, II, III.

Lecture—4 hours. Introduction to the oral reading of poetry, with criticism and practice of the oral reading of poetic literature. The Staff

15. Introduction to Rhetorical Studies. (4) III.

Lecture—4 hours. Examination of the rhetorical tradition of the Western world, illustrated by selections from influential theorists (such as Aristotle or Whately), by important speakers (such as Demosthenes, Cicero, or Roosevelt) and by major forms of public address (such as legislative debates or sermons). Mr. Murphy

41. Introduction to Advocacy. (4) I, II.

Lecture—4 hours. Introduction to the rhetoric of controversy, with emphasis upon the nature of public debate, the analysis of issues, and the logical presentation of evidence in support of arguments. Provision for practice in inter-collegiate debate. Mr. Mohrmann

Upper Division Courses

110. Classical Rhetorical Theory. (4) I.

Lecture—4 hours. Origins of Greek and Roman rhetorical theory, with emphasis upon the contributions of Isocrates, Plato, Aristotle, Cicero, and Quintilian. Mr. Murphy

111. Medieval and Renaissance Rhetorical Theory. (4) II.

Lecture—4 hours. Development of the European rhetorical tradition to 1700 through the contributions of such writers as Augustine, Alcuin, Wilson, and other Ciceronians, with attention to the anti-Ciceronian reaction represented by Ramus, Francis Bacon, and Fenelon. Mr. Murphy

112. Early Modern Rhetorical Theory. (4) III.

Lecture—4 hours. English and continental theories of rhetoric to 1900, with reference to developments in psychology, philosophy, and belles lettres. Emphasis upon the works of Ward, Priestley, Campbell, Blair, and Whately. Mr. Pomeroy

113. Contemporary Rhetorical Theory. (4) I.

Lecture—4 hours. Current approaches to rhetorical theory, from the James-Winans theory of attention to the Hovland, Janis, Kelley studies of persuasion. Mr. Vohs

120. Classical Public Address. (4) I.

Lecture—4 hours. Public address as a force in the development of Greek and Roman civilizations, with special attention to Demosthenes, the Attic Orators, and Cicero. Mr. Murphy

121. British Public Address to 1914. (4) II.

Lecture—4 hours. British public address in the eighteenth and nineteenth centuries, with

special attention to the parliamentary speaking of Burke, Fox, Pitt, Grattan, Peel, Disraeli, and Gladstone. Mr. Pomeroy

122. American Public Address from Edwards to Lincoln. (4) II.

Lecture—4 hours. A survey of major speakers from the colonial period to the era of the Civil War. Mr. Mohrmann

123. American Public Address from Grady to Wilson. (4) III.

Lecture—4 hours. A survey of major speakers from the Reconstruction Period to the founding of the League of Nations. Mr. Mohrmann

125. Contemporary Public Address. (4) III.

Lecture—4 hours. Public address in the twentieth century, with special attention to the speeches of Churchill, Roosevelt, Hitler, and Ghandi. Mr. Mohrmann

150. Modes of Discourse. (4) III.

Lecture—4 hours. Study of problems peculiar to various forms of discourse such as the uninterrupted address, the dialogue, and the debate, with special attention to differences between writing and speaking as they affect the understanding or acceptance of ideas. Mr. Vohs

151. Methods of Advocacy. (4) I.

Lecture—4 hours. Study of problems inherent in securing acceptance of ideas; consideration of logical and nonlogical means of persuasion. Mr. Pomeroy

152. Study of a Major Rhetorician. (4) II.

Lecture—4 hours. Prerequisite: consent of instructor. Intensive study of a major theorist, such as Aristotle, Cicero, Whately, or Toulmin, with emphasis upon the relation of his theory to the cultural environment of his time. Mr. Murphy

153. Experimental Studies in Rhetoric. (4) II.

Lecture—4 hours. Prerequisite: consent of instructor. Consideration of contributions derived from sociometric and psychometric approaches to analysis of rhetorical process. Mr. Vohs

154. Forensics Laboratory. (1) I, II, III.

Laboratory—2 hours. Prerequisite: consent of instructor. Practice in the principles of forensics, including argumentation and debate. Inter-collegiate and tournament forensics. May be repeated for credit up to a total of six units. Mr. Mohrmann

160. Rhetorical Criticism. (4) I.

Lecture—4 hours. Prerequisite: course 15; or consent of instructor. Methods of evaluating public address, with emphasis on such factors as structure, language, and effectiveness. Mr. Mohrmann

190. Senior Proseminar. (4) II, III.

Lecture—2 hours; seminar—2 hours. Prerequisite: required of majors with senior standing. Individual research on a rhetorical topic approved by a committee of the faculty.

The Staff

RUSSIAN

Department Office, 416 Sproul Hall

Associate Professor:

Valerie A. Tumins, Ph.D.

Assistant Professor:

Alex M. Shane, Ph.D.

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Assistant Professor:

Rodney L. Patterson, M.A. (*Acting*)

Departmental Major Adviser.—Miss Tumins.*The Major Program*

The requirements are Russian 1 through 6 (or the equivalent); Russian 40, 41, 42, and a minimum of 36 units of upper division course work including Russian 40, 41, 42, 101A, 101B, 101C, 102A, 102B, and 190, with a passing grade in the Senior Comprehensive Examination.

Honors and Honors Program (see page 107).—The honors program comprises two quarters of study under course 194H, which will include a research paper.

Teaching Major.—Requirements for the teaching major are the same as those for the departmental major with the addition of course 300.

Teaching Minor.—Six quarter courses in the lower division or their equivalents. Usually these will consist of Russian 1, 2, 3, 4, 5, 6. A total of 18 upper division units is required, including courses 101A, 101B, 101C, 102A, 102B.

Subject Representative: Mr. Shane.

Lower Division Courses**1. Elementary Russian. (5) I.**

Recitation—3 hours; discussion—2 hours; optional language laboratory practice.

Mr. Patterson

2. Elementary Russian. (5) II.

Recitation—3 hours; discussion—2 hours; optional language laboratory practice.

Miss Tumins

3. Elementary Russian. (5) III.

Recitation—3 hours; discussion—2 hours; optional language laboratory practice.

Mr. Patterson

4. Intermediate Russian. (5) I.

Recitation—5 hours. Prerequisite: course 3.

Mr. Patterson

5. Intermediate Russian. (5) II.

Recitation—5 hours. Prerequisite: course 4.

Mr. Shane

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

The Staff (Mr. Murphy in charge)

*Graduate Course***299. Individual Study. (1–12) I, II, III.****6. Intermediate Russian. (5) III.**

Recitation—5 hours. Prerequisite: course 5.
Miss Tumins

39. Great Russian Writers. (3) I.

Lecture—3 hours. Knowledge of Russian not required. An introduction to major prose and dramatic works of such writers as Gogol, Turgenev, Dostoevsky, Tolstoy, Chekhov, and Sholokhov.

Miss Tumins

40. Survey of Russian Literature to 1800. (4) I.

Lecture—3 hours. Knowledge of Russian not required. Offered in even-numbered years.

41. Survey of Russian Literature: Nineteenth Century. (4) II.

Lecture—3 hours. Knowledge of Russian not required. Offered in odd-numbered years.

Miss Tumins

42. Survey of Russian Literature: Twentieth Century. (4) III.

Lecture—3 hours. Knowledge of Russian not required. Offered in odd-numbered years.

Mr. Shane

1G. Russian for Graduate Students. No Credit. II.

Lecture—3 hours. A course designed to prepare students for the graduate reading examination.

Mr. Patterson

Upper Division Courses**101A. Advanced Grammar, Composition, and Conversation. (4) I.**

Lecture—3 hours. Prerequisite: course 6.

Mr. Patterson

101B. Advanced Grammar, Composition, and Conversation. (4) II.

Lecture—3 hours. Prerequisite: course 6.

Mr. Shane

101C. Advanced Grammar, Composition, and Conversation. (4) III.

Lecture—3 hours. Prerequisite: course 6.

Miss Tumins

102A. Russian Composition. (4) I.

Recitation—3 hours. Prerequisite: course 101C.

Miss Tumins

102B. Russian Composition. (4) II.

Recitation—3 hours. Prerequisite: course 102A.
Miss Tumins

121. The Russian Novel: Pushkin to Turgenev. (4) I.

Lecture—3 hours. Knowledge of Russian not required. Offered in odd-numbered years.
Mr. Shane

123. The Russian Novel: Saltykov to Pasternak.

(4) III.

Lecture—3 hours. Knowledge of Russian not required. Offered in even-numbered years.
Mr. Shane

125. Russian Drama of the Nineteenth Century.

(4) I.

Lecture—3 hours. Prerequisite: course 6. Offered in odd-numbered years. Miss Tumins

127. The Golden Age of Russian Poetry. (4) II.

Lecture—3 hours. Prerequisite: course 101A. Offered in even-numbered years. Study of Russian versification; readings from Pushkin, Lermontov, and other poets of the first half of the nineteenth century. Mr. Patterson

128. Russian Poetry from Nekrasov to the Present.

(4) III.

Lecture—3 hours. Prerequisite: course 127. Offered in even-numbered years. Mr. Patterson

140. Dostoevsky. (4) II.

Lecture—3 hours. Knowledge of Russian not required. Offered in odd-numbered years.
Mr. Shane

141. Tolstoy. (4) II.

Lecture—3 hours. Knowledge of Russian not required. Offered in even-numbered years.
Mr. Shane

190. Senior Proseminar. (4) III.

Group conference and assigned reading in preparation for the senior comprehensive examination.
Miss Tumins

194H. Special Study for Honors Students.

(5) I, II, III.

Prerequisite: open only to honors students.
The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Professional Course**300. The Teaching of a Modern Foreign Language.**

(3) III.

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.
Mr. Kawczynski

SANSKRIT—See Classics**SOCIOLOGY**Bennett M. Berger, Ph.D., *Chairman of the Department*

Department Office, 308 Voorhies Hall

Professors:

Bennett M. Berger, Ph.D.
Edgar Z. Friedenberg, Ph.D.
'Cesar Graña, Ph.D.
Edwin M. Lemert, Ph. D.

Associate Professors:

'Guenther Roth, Ph.D.
Julius Roth, Ph.D.

Assistant Professors:

Isoo Fujimoto, Ph.D. (*Acting*)
Bruce Hackett, Ph.D.
Kenneth C. W. Kammeyer, Ph.D.
J. Rolf Kjolseth, Ph.D.
Robert H. Maisel, Ph.D.
Joseph Zelan, Ph.D.

Departmental Major Advisers.—(a) Undergraduate: Mr. Kjolseth, Mr. G. Roth, Mr. J.

¹ Absent on leave, 1967-1968.

Roth, Mr. Graña, (b) Pre-Social Welfare: Mr. Zelan, (c) Graduate: Mr. Berger, Mr. Friedenberg, Mr. Lemert, Mr. Maisel.

The Major Program

Lower Division Courses.—Required: Sociology 1, 2, 12, 46A, 46B, and 46C or their equivalent; 8 units selected from Anthropology 2, Economics 1A, 1B, and Psychology 1A, 1B and 1C. Recommended: Anthropology 1 and Philosophy 12, 20A-20B-20C.

Upper Division Courses.—Required: 36 units of Sociology including 165A, 165B and 165C. Recommended: Anthropology 102, 119A, 119B, 124, 128A, 128B; History 101A, 101B; Philosophy 107C, 151, 156; Political Science 150, 161; Psychology 145; Mathematics 105A, 105B.

Pre-Social Welfare Students

Lower Division Courses.—Required: Sociology 1, 3, 46A, 46B, 46C, or their equivalent, and Psychology 1A, 1B and 1C. Recommended: Anthropology 2, Sociology 2, Economics 1A, 1B, Philosophy 12, Political Science 1A, 1B.

Upper Division Courses.—Required: Sociology 120A, 120B, 165A or 165B or 165C, 185, and Psychology 112, 147A, 147B, 165, 168; 8 additional units selected from Sociology 130, 131A, 131B, 140, 150, 152, 170; Psychology 145. Recommended: Anthropology 119A, 119B, 128A, 128B; Economics 116, 130A, 130B, 150A, 150B; Consumer and Family Sciences 136, 138A, 138B; Political Science 103, 104, 181.

Graduate Study.—The Department offers a program of study leading to the M.A. and Ph.D. degrees in sociology. Further information regarding graduate study may be obtained at the department office.

Teaching Major.—Requirements for the teaching major are the same as for the departmental degree plus Sociology 122 or 124, 130 and 140.

Teaching Minor.—Thirty units of sociology taken in consultation with the subject representative.

Subject Representative: Mr. Kjolseth.

Lower Division Courses

1. Introduction to Sociology. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and personality.

2. Introduction to Sociology: Social Organization. (4) II, III.

Lecture—4 hours. Prerequisite: course 1. A study of social organization and institutions, with attention to the application of concepts and related research findings.

3. Social Problems. (4) I, III.

Lecture—4 hours. A general sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement.

12. Introduction to Sociological Theory. (4) III.

Lecture—4 hours. An introduction to classic texts and problems in the tradition of sociological inquiry. Representative works of important figures, such as Marx, Comte, Weber, and Durkheim; the relevance of these materials for contemporary sociology.

Mr. Maisel

25. Sociology of Popular Culture. (4) II.

Lecture—4 hours. The historical emergence of popular culture. "High" culture, "folk" culture and "mass" culture; the democratization of culture values; the organization of popular tastes; characteristic art forms of popular culture: literature, music, the graphic arts. The social structure of audiences.

Mr. Graña

46A. Introduction to Social Research. (3) I.

Lecture—3 hours. Prerequisite: 8 units of Sociology. Examination of the methodological problems of social research. Selection and definition of problems of investigation, data-gathering techniques, and sampling. Mr. Kammeyer

46B. Introduction to Social Research. (3) II.

Lecture—3 hours. Prerequisite: course 46A. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association.

Mr. Kammeyer

46C. Introduction to Social Research. (3) III.

Lecture—3 hours. Prerequisite: course 46B. An introduction to the statistical analysis of social data, emphasizing the logic and use of statistical measures and procedures especially relevant to sociological analysis. Mr. Kammeyer

Upper Division Courses

104. Empirical Social Research and Social Theory. (4) III.

Lecture—4 hours. Prerequisite: courses 12 and 46C or its equivalent or consent of instructor. An examination of important works in sociology in the light of the ways in which theory informs and shapes actual research operations and the ways in which the results of empirical research mold social theory.

Mr. Zelan

*106. Quantitative Methods of Research. (4) II.

Lecture—4 hours. Prerequisite: course 46C or equivalent. Logical and technical features of multiple and partial correlation and regression analysis. Scaling theory and factor analysis. Introduction to mathematical models in sociology.

107. Modes of Sociological Analysis. (4) I.

Lecture—4 hours. Prerequisite: junior or senior standing and 9 units of sociology. The place of sociology among the sciences and the humanities; generalization and explanation in sociology. Styles of sociological inquiry, functional analysis, historical sociology, social criticism.

Mr. Berger

108. Advanced General Sociology. (4) III.

Lecture—4 hours. Prerequisite: junior or senior standing and 9 units of sociology. Critical analysis of basic concepts in sociology: social organization, culture, socialization, stratification, and their application to specific problems. The bearing of such analysis on problems of social order and social change.

Mr. Berger

118. Political Sociology. (4) II.

Lecture—4 hours. Prerequisite: course 1; or consent of instructor. The relation of social cleavages and social cohesion to the functioning

* Not to be given, 1967-68.

of political institutions; the social bases of local and national power structures; social sources of political movements; analysis of concepts of alienation, revolution, ideology, ruling class, and elite.

Mr. G. Roth

120A. Deviation and Society. (3) I.

Lecture—3 hours. Prerequisite: course 2 and junior or senior standing. Theory and studies of deviation in relation to societal reaction, group processes, and social roles. Stigma and incapacity; cosmetic defect.

Mr. Lemert

120B. Deviation and Society. (3) II.

Lecture—3 hours. Prerequisite: course 2 and junior or senior standing. Continuation of course 120A. Deviation theory applied to selected crimes, prostitution, drugs, alcohol use, and mental disorders. Creativity and society.

Mr. Lemert

122. Sociology of Adolescence. (4) III.

Lecture—4 hours. Prerequisite: 8 units of Sociology. Chronological age and social status; analysis of social processes bearing upon the socialization of children and adolescents. The emergence of "youth cultures." Generational succession as a cultural problem.

Mr. Friedenberg

123. American Society. (4) III.

Lecture—4 hours. Prerequisite: 8 units of social science; or consent of instructor. The institutional structure and social organization of the United States.

Mr. Friedenberg

124. Sociology of Educational Institutions. (4) II.

Lecture—4 hours. Prerequisite: 4 units of sociology. Public schools as arenas of intergroup conflict and as instruments of social mobility. The meaning of local autonomy in the context of prevailing arrangements for certification and public support. The relevance of public education to the ethos and mythos of American society.

Mr. Friedenberg

125. Sociology of Intellectual Life. (4) I.

Lecture—4 hours. Prerequisite: upper division standing and consent of instructor. Sociological analysis of the intelligentsia; types of intellectuals, theories concerning their social role; research on the social sources of intellectual work in politics, literature, art, and science; historical considerations of intellectual milieu; international comparisons of intellectuals.

Mr. Graña

126. Social Structure and Personality. (4) I.

Lecture—4 hours. Prerequisite: course 2. Exposition of concepts, theories, and research relating the disciplines of sociology and psychology. Mechanisms of social influence on behavior. Complementarity of personality and learned roles; processes of internalization of roles and norms.

130. Race Relations and Minority Groups. (4) I.

Lecture—4 hours. Prerequisite: 8 units of social science; or consent of instructor. A study of contacts and interaction between racial and ethnic groups; sources and effects of prejudice and discrimination; programs for reducing intergroup tensions.

131A. Sociology of Family and Kinship: General Principles. (3) I.

Lecture—3 hours. Prerequisite: course 2. Biological basis of familial functions; biological and sociological kinship. Familial and extra-familial determinants of age-graded and sex roles. Normative supports of reproductive institutions; types of descent groups and status ascription. Relation of kinship to other social institutions.

131B. Sociology of Family and Kinship: Industrial Societies. (3) II.

Lecture—3 hours. Prerequisite: course 2. Comparative family structure in simple and advanced societies; current trends in industrial societies. Relations of family and stratification: hypergamy, industrialized status ascription, geographical mobility. Detailed study of events of the family cycle in industrial societies.

140. Social Stratification. (4) III.

Lecture—4 hours. Prerequisite: course 1. Systems of social ranking; theories of stratification; power, prestige, culture, and styles of life of various social classes; social mobility and its consequences for social structure.

Mr. Hackett

141. Industrialization and Social Change. (4) II.

Lecture—4 hours. Prerequisite: 4 units of sociology. The interrelations between technological and social change, the social conditions of economic development, and the social implications of automation in highly industrialized countries.

Mr. G. Roth

142. Comparative Institutions and Social Structures. (4) I.

Lecture—4 hours. Prerequisite: 8 units of sociology. The central institutions and cultural legacies of the principal complex societies. Western nations will be compared with the USSR and newly developing states with respect to their patterns of institutional persistence and change.

Mr. G. Roth

143. Urban Society. (4) I.

Lecture—4 hours. Prerequisite: 8 units of sociology. Urbanization as a social process; comparison of urban, suburban, metropolitan and rural phenomena; types of cities; the subcultures of cities; the urban future.

Mr. Hackett

144. Rural Society. (4) III.

Lecture—4 hours. The characteristics of rural social systems in contrast to urban; the nature of peasant and folk societies; the impact of social change upon rural community life considered from the standpoint of regional differences in the United States and selected world areas.

Mr. Fujimoto

145. Social Structure of the U.S.S.R. (4) II.

Lecture—4 hours. A survey of the major institutions of Soviet society, including the family, education, work, health and welfare, the arts, ethnic and national groups.

Mr. Zelan

146. Sociology of Religion. (4) II.

Lecture—4 hours. Prerequisite: 8 units of sociology; or consent of instructor. The relationship between social structure and religious life. Social class, political behavior, and religious affiliation. The passage from "sacred" to "secular" ways of life. Religion and social change in advanced societies. Churches as social organizations. "Established" churches and religious "cults."

Mr. Graña

148. Collective Dynamics and Social Movements.

(4) III.

Lecture—4 hours. Prerequisite: course 1; or consent of instructor. Non-institutionalized forms of group behavior; social contagions, fashion movements, public opinion formation, reform and revolutionary movements. Their relations to social change in mass societies.

150. Criminology. (4) III.

Lecture—4 hours. Prerequisite: 8 units of social science; or consent of instructor. The sociological analysis of criminal behavior in relation to social structure and the criminalization process.

Mr. Lemert

152. Juvenile Delinquency. (3) II.

Lecture—3 hours. Prerequisite: 8 units of sociology or psychology. Study of juvenile delinquency in relation to the family, peer groups, community, and institutional structures. Consideration of processing of the delinquent by formal agencies of control, with special attention given to the juvenile court.

Mr. Lemert

154. Sociology of Medicine. (4) I.

Lecture—4 hours. Prerequisite: 4 units of sociology. An overview of sociological research in medicine and health care, with emphasis on the organizational and institutional aspects.

Mr. J. Roth

155. Sociology of Law. (4) III.

Lecture—4 hours. Prerequisite: 8 units of social science. Law considered as social control; relation of legal institutions to society as affecting judicial decision-making and administration of justice. Lawyers as an occupational group. Legal reform.

Mr. Lemert

159. Sociology of Occupations. (4) II.

Lecture—4 hours. Prerequisite: 8 units of sociology or consent of instructor. The natural history of occupations; the institutional matrix of occupations; colleague and client relationships; occupational social controls; career lines, and occupational-related self-definitions; occupational politics.

Mr. G. Roth

160. Work and Leisure. (4) II.

Lecture—4 hours. Prerequisite: course 1. Historical and comparative analysis of problems associated with quality of work and quantity of leisure; impact of cultural and social change on occupational pattern and leisure activity.

Mr. Berger

165A. Sociological Theory. (3) I.

Lecture—3 hours. Prerequisite: 8 units of sociology. Major sociological theorists of the nineteenth century. Conservative, liberal, and radical traditions of sociological thought. Thinkers discussed include Comte, Saint Simon, Marx, Spencer, and Toennies.

165B. Sociological Theory. (3) II.

Lecture—3 hours. Prerequisite: 8 units of sociology. Sociological theorists of the late nineteenth and early twentieth centuries. Theorists discussed include Weber, Durkheim, Pareto, and Simmel.

165C. Sociological Theory. (3) III.

Lecture—3 hours. Prerequisite: 8 units of sociology. The development of the American sociological tradition, with emphasis on major contemporary theorists. Theorists discussed include Mead, Cooley, Park, Merton, and Parsons.

170. Population. (4) I.

Lecture—4 hours. Prerequisite: 8 units of social science; or consent of instructor. Introduction to the study of human population, including theories and statistical measures; social causes and consequences of population trends; changes in population structure; geographical distribution; migration; socio-psychological factors affecting fertility.

Mr. Kammeyer

174. Sociology of Language. (4) III.

Lecture—4 hours. Prerequisite: 6 units of sociology. The relation of language patterns to social patterns; "talk" as a multi-level social phenomenon; relationship of dialects to social groups; sociological analyses of stability and change in language; problems of learning and un-learning languages.

Mr. Kjolseth

175. Sociology of Communication. (4) I.

Lecture—4 hours. Prerequisite: 4 units of sociology. Sociological analysis of sources and consequences of oral and written communica-

tive styles. Literacy and mass society. Institutionalization of personal and bureaucratic modes of address.

Mr. Friedenberg

180. Complex Social Organization. (4) II.

Lecture—4 hours. Prerequisite: course 1; or consent of instructor. Institutional analysis of administrative structures and voluntary associations; consideration of informal organization, ideologies, bureaucracy, decision-making, and morale in selected areas of government, industry, religion, and education.

Mr. Hackett

185. The Field of Social Welfare. (3) III.

Lecture—3 hours. Prerequisite: course 2 and upper division standing. A sociological analysis of social work as an institution. Attention given to agency organization and functions.

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: open to seniors only.

The Staff (Mr. Lemert in charge)

Graduate Courses

201. The Fields of Sociology. (3) I, III.

Lecture and discussion—3 hours. Critical analysis of major fields of contemporary sociology. Core problems, theories, and findings of research in these fields.

The Staff (Mr. Maisel in charge)

202. Field Work in Sociology. (2) I, II, III.

Seminar—2 hours. Prerequisite: consent of instructor. Field work as a method of data-collection and interpretation, and as a social process. Readings and individual and group discussions will deal with general problems of field work with the students' studies serving as concrete illustrations of these problems. May be repeated for credit.

Mr. J. Roth

205. Methodological Critique of Research. (3) III.

Lecture and discussion—3 hours. Prerequisite: course 46C; or consent of instructor. Methodological analysis and criticism of empirical research exemplifying different types of research design. Examination of surveys, experiments, historical and comparative studies, and studies using biographical and demographic data.

Mr. Kammeyer

207. Methods of Survey Analysis. (3) I.

Lecture—3 hours. Principles and procedures in the analysis of survey data. Forms of multivariate relations; typologies; scaling; panel analysis; contextual analysis.

Mr. Zelan

220. Deviance, Law, and Social Control. (3) I.

Lecture and discussion—3 hours. Prerequisite: courses 120A and 120B; or consent of instructor. The relation of crime, mental disorder, and other forms of deviance to cultural values, norms, and legal institutions; formal and informal means for the social control of deviance.

Mr. Lemert

226. Social Interaction and Personality. (3) II.

Lecture and discussion—3 hours. Prerequisite: course 126; or consent of instructor. The influence of social structure, personality, and social interaction in face-to-face social situations; the relations of role-taking and personal autonomy to the development of the self; social-psychological processes in intimate and small-group situations.

242. Comparative Method in Historical Sociology.

(3) III.

Lecture and discussion—3 hours. Prerequisite: course 142; or consent of instructor. Comparative approaches to major historical phenomena such as nationalism, bureaucratization, feudalism, and capitalism; the relevance of psychological and sociological theories to historical interpretation; the verifiability of historically grounded hypotheses; the meaning of analogy, correspondence, and causality.

Mr. G. Roth

252. Sociology of Art. (3) III.

Lecture and discussion—3 hours. Prerequisite: course 25 and 125; or consent of instructor. The relationship of social class, institutions, and value system to art. The art of primitive, aristocratic, and democratic societies. Art and political ideology. The question of art as "representative" of social values. Artists as a social type.

Mr. Graña

265. Sociological Theory. (3) II.

Lecture and discussion—3 hours. Prerequisite: courses 165A, 165B, and 165C; or consent of instructor. The emergence of sociological thinking as part of the history of ideas; the application of sociological analysis to sociological ideas. The French sociological tradition from Saint-Simon to Durkheim; the influence of Marxist thinking on subsequent sociological ideas.

290. Seminar. (3) I, II, III.

Seminar—3 hours.

The Staff

299. Individual Study. (1-6) I, II, III.

The Staff (Mr. Berger in charge)

SOIL SCIENCE—See Soil, Water and Atmospheric Sciences

SOIL, WATER AND ATMOSPHERIC SCIENCES

Victor V. Rendig, Ph.D., *Chairman of the Committee*

Committee Office, 251 Hoagland Hall

Committee in Charge:

Kinsell L. Coulson, Ph.D. (*Agricultural Engineering*)

C. C. Delwiche, Ph.D. (*Soil Science*)

Donald R. Nielson, Ph.D. (*Water Science and Engineering*)

Vernon V. Rendig, Ph.D. (*Soils and Plant Nutrition*)

Verne H. Scott, Ph.D. (*Water Science and Engineering*)

Participating Departments:

AGRICULTURAL ENGINEERING

Coby Lorenzen, Jr., M.S., *Chairman of the Department*

Department Office, 207 Walker Engineering Building

Professor:

Kinsell L. Coulson, Ph.D.

Assistant Professor:

Leonard O. Myrup, Ph.D.

SOILS AND PLANT NUTRITION

C. C. Delwiche, Ph.D., *Chairman of the Department*

Department Office, 139B Hoagland Hall

Professors:

Daniel G. Aldrich, Ph.D. (*Irvine Campus*)

Francis E. Broadbent, Ph.D.

C. C. Delwiche, Ph.D.

Emanuel Epstein, Ph.D.

Frank F. Harradine, Ph.D.

Victor V. Rendig, Ph.D.

Perry R. Stout, Ph.D.

Assistant Professor:

Richard G. Burau, Ph.D.

◆ ◆ ◆

Lecturers:

Eugene L. Begg, B.S.

Arthur L. Brown, Ph.D.

Gordon L. Huntington, M.S.

Jerome J. Jurinak, Ph.D.

H. Michael Reisenauer, Ph.D.

Associate Professor:

Lynn D. Whittig, Ph.D.

WATER SCIENCE AND ENGINEERING

Verne H. Scott, Ph.D., *Chairman of the Department*

Department Office, 113 Veihmeyer Hall

Professors:

Jaime Amorocho, Ph.D. (*Water Science and Engineering and Civil Engineering*)

Robert H. Burgy, M.S. (*Water Science and Engineering and Civil Engineering*)

Lloyd D. Doneen, Ph.D.

Robert M. Hagan, Ph.D.

Delbert W. Henderson, Ph.D.

James N. Luthin, Ph.D. (*Water Science and Engineering and Civil Engineering*)

Verne H. Scott, Ph.D. (*Water Science and Engineering and Civil Engineering*)

Frank J. Veihmeyer, C.E., Ph.D.
(*Emeritus*)

Associate Professor:

Donald R. Nielsen, Ph.D.

Assistant Professors:

Theodore C. Hsiao, Ph.D.

Theodor S. Strelkoff, Ph.D. (*Water Science and Engineering and Civil Engineering*)

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Lecturers:

James W. Biggar, Ph.D.

William E. Hart, M.S.

William O. Pruitt, Jr., M.S. (*Water Science and Engineering and Civil Engineering*)

Departmental Major Advisers—See Schedule and Directory Listing.

Bachelor of Science Major Program and Graduate Study. See pages 53 and 127.

Atmospheric Science

Lower Division Courses

20. Introduction to Meteorology. (3) III.

Lecture—3 hours. Prerequisite: Mathematics 1B or equivalent. Basic concepts of modern meteorology: weather and weather elements, atmospheric circulations, clouds, precipitation, radiation, instruments and observations, meteorological satellites.

Upper Division Courses

120. Atmospheric Thermodynamics and Statics. (3) I.

Lecture—3 hours. Prerequisite: Mathematics 2C, Physics 4C. The atmosphere at rest: atmospheric composition and structure, thermodynamics of atmospheric gases, thermal properties of dry and moist air, hydrostatic equilibrium and stability criteria, and thermodynamic diagrams in meteorology. Mr. Myrup

121. Dynamics of the Atmosphere. (3) II.

Lecture—3 hours. Prerequisite: Atmospheric Science 120. The atmosphere in motion: the equations of motion on a rotating earth, pressure and temperature fields and their relations to atmospheric circulations, modern numerical methods in meteorology. Mr. Myrup

122. Atmospheric Radiation. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 2C, Physics 4C. Basic laws of radiation; properties of solar radiation; absorption, reflection and scattering in atmosphere; planetary albedo; absorption and emission by atmospheric gases and aerosols; atmospheric energy budget.

Mr. Coulson

123. Micrometeorology. (3) III.

Lecture—3 hours. Prerequisite: Atmospheric Science 120, 121, 122. Properties of the atmosphere near the earth's surface: frictional effects, mass and energy transfers across the surface-atmosphere interface, and the effect of these in modifying the localized environment are the principal topics discussed. Mr. Coulson

124. Meteorological Instruments and Observations. (3) I.

Lecture—2 hours. Prerequisite: course 20 or equivalent. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included. Mr. Coulson

Plant Science

Upper Division Course

116. Principles of Plant Nutrition. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Botany 111, Chemistry 5. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition; relation to animal nutrition; experimental techniques, including solution culture and radioactive tracing. Mr. Epstein

Soil Science

Upper Division Courses

105. Summer Field Course. (8) .

Lecture—8 hours; field study—48 hours. Prerequisite: course 120B or consent of instructor. Field study of soils, *in situ*, with special emphasis on their characteristics, morphology, and genesis. Field exercises in classifying and mapping soils, and preparation of soil survey reports. Practice in identifying and evaluating soils for agricultural, range, forest, and other use.

Mr. Begg, Mr. Huntington

109. Soil Fertility and Fertilizers. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Soil and Water Science 2. The forms and availability of plant nutrient elements in soils; composition and use of fertilizers and soil amendments; laboratory exercises in fertility assays and their interpretation. Mr. Reisenauer

120A. Soil Genesis and Morphology. (2) II.

Lecture—2 hours. Prerequisite: Soil and Water Science 2; Geology 1 or 2. Basic principles of geomorphology; soil forming factors and processes as they influence the genesis and characteristics of soil properties. Mr. Harradine

120B. Soil Classification, Mapping, and Evaluation. (3) III.

Lecture—2 hours; laboratory or field—3 hours. Prerequisite: course 120A. Basic principles underlying various systems of soil classification and mapping; methods of evaluating and rating soils for land use. Mr. Harradine

123. Chemistry of Arid Soils. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Chemistry 5; Soil and Water Science 102. Diagnostic procedures for assessing features of soil chemistry related to plant growth, with emphasis on soils of arid regions and problems of salinity. Theoretical basis of the procedures and its bearing on the interpretations of results. Mr. Brown

144. Advanced Instrumentation in Biology. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. The application of electronic and mechanical devices to solution of problems of measurement and control in biological research; emphasis given to the synthesis and application of low current or low potential measurement equipment, vacuum techniques, optical processes, and electromagnetic transduction.

Mr. Delwiche

194H. Special Study for Honors Students.

(1–5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff

198. Directed Group Study. (1–5) I, II, III.

Directed group study in soil science for advanced undergraduates.

The Staff

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

The Staff

Graduate Courses**207. Soil Physics. (3) III.**

Lecture—3 hours. Prerequisite: Soil and Water Science 101; recommended: Mathematics 2C. Physical processes occurring in soils; selected topics in the soil-plant relationship.

208. Soil-Plant Interrelationships. (3) III.

Lecture—3 hours. Prerequisite: Botany 111; Soil and Water Science 104; or consent of instructor. An advanced course on the effects of soil factors on plant development; the influence of soil conditions, processes, and reactions on metabolic reactions in plants; effects of plant root activity on the nature of the rhizosphere.

Mr. Rendig

211. Soil Microbiology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8; Soil and Water Science 102. Soil microorganisms and their biochemical activities; plant residue decomposition; soil organic matter and its properties.

Mr. Broadbent

214. Soil Mineralogy. (5) I.

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: Chemistry 109B or 110B; Soil and Water Science 102. Nature, properties, and occurrence of the more common minerals in soils and rocks. Application of mineral analysis methods in the study of the formation and properties of soils and of weathering of minerals. X-ray, thermal, and chemical analyses of mineral fractions.

Mr. Whittig

215. Physical Chemistry of Soils. (3) I.

Lecture—3 hours. Prerequisite: Chemistry 110C; Soil and Water Science 102. Physicochemical, colloidal, and surface aspects of the soil system. Offered in even-numbered years.

Mr. Jurinak

222. Salt-affected Soils. (3) II.

Lecture—3 hours. Prerequisite: Soil and Water Science 102, or consent of instructor. Scope of soil problems in salt-prone arid zone climates; origin and encroachment of salt; chemical interactions with alumino silicates under alkaline situations. Physiological characteristics of native and crop plant species governing salt tolerance and sensitivity.

Mr. Whittig

290. Seminar. (1) I, II, III.

Seminar—1 hour. Prerequisite: graduate standing in soil science, plant physiology, or related subjects. Topics of current interest in soil science, including research recently carried out by students, will be discussed. Each student will prepare and present reports to the seminar.

Mr. Delwiche

299. Research. (1–12) I, II, III.

The Staff

Soil and Water Science**Lower Division Courses****1. Soil, Water, and Air Resources. (3) I.**

Lecture—3 hours. Prerequisite: Biology 1 or consent of instructor. Interrelationships of man and environmental factors; utilization and development of renewable natural resources; characteristics of soil, water, and air and their relation to management and planning concepts. Open to nonmajors.

Mr. Henderson

2. Soil, Water, and Air Resources. (3) II.

Lecture—3 hours. Prerequisite: course 1; Biology 1. Recommended: Physics 2A. Development and properties of soils; source and properties of water; properties of the atmosphere; soil, water, and air management in relation to crop production; planning concepts related to agricultural development and production.

Mr. Whittig

Upper Division Courses**101. Physics of Soil and Water Systems. (5) I.**

Lecture—3 hours; discussion and laboratory—4 hours. Prerequisite: course 2; Physics 2B; Mathematics 16B. Factors affecting soil physical condition and irrigation; soil texture, structure, aeration, and strength. Principles of soil management; basic concepts of hydraulics, soil water storage and movement, infiltration, water potential, irrigation and drainage. Principles of irrigation practices.

102. Soil and Water Chemistry. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Chemistry 5; course 2. Chemical nature of the mineral and organic constituents of soil and of the soil solution; ion exchange and other colloidal phenomena including the effect of soil amendments and fertilizers; microbiological processes in soils.

Mr. Burau

103. Water Quality, Salt Control, and Reclamation.

(4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 102 or consent of instructor. Water quality, water analysis, salinity, salt and plant relations, reclamation of water and soil, infiltration problems, and soil amendments.

Mr. Doneen

104. Soil-Water-Plant Relationships. (4) II.

Lecture—4 hours. Prerequisite: courses 101, 102; Botany 2. Influence of soil physical, chemical, and biological properties and of soil water supply on plant growth; availability, uptake, and use of nutrients and water by plants; principles of soil structure, irrigation, and fertilizer management for crop production.

Mr. Hsiao

Water Science and Engineering**Lower Division Course****10. Water and Man. (3) III.**

Lecture—3 hours. Water as a factor in civilization and man's environment. Water supply and utilization problems of agricultural, domestic, industrial, and other water users in developed and developing nations. A cultural and technical course providing an introduction to water science and engineering.

Mr. Hagan

Upper Division Courses**106. Principles of Soil Water Movement. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Soil and Water Science 101 (may be taken concurrently or with consent of the instructor). An introduction to basic mechanisms of soil water movement with emphasis on infiltration, evaporation, and redistribution within the soil profile. Laboratory measurements of the forces involved in soil water movement.

Mr. Nielsen

110A. Irrigation Principles and Practices. (3) II.

Lecture—3 hours. Prerequisite: Physics 2B. A general course for engineering and agricultural students. Principles for relating water, soil, plant and atmospheric conditions to irrigation planning and practices. Selecting lands for irrigation, water-soil-plant relations, irrigation requirements for principal crops, irrigation scheduling for maximum efficiency.

Mr. Henderson

110B. Irrigation Principles and Practices. (3) III.

Lecture—3 hours. Prerequisite: Physics 2B. A general course for engineering and agricultural students. Farm irrigation distribution systems, water measurement, farm water supply including wells and pumping plants, land preparation for irrigation, water application, and drainage requirements.

Mr. Henderson

116. Processes of Water and Soil Pollution. (2) II.

Lecture—2 hours. Prerequisite: Soil and Water Science 102 recommended and consent of instructor. Physical, chemical and biological processes, natural and man-made, that cause pollution of water and soil; nature of pollutants, persistence, and control.

Mr. Biggar

118A. Hydraulics. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 1C or 16C; Physics 2B and 2C. Principles of incompressible fluid mechanics and hydraulics. Applications to the analysis of water conveyance, control and measurement systems.

Mr. Amorocho

118B. Hydraulics. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 118A. Continuation of course 118A.

Mr. Amorocho

140. Farm Drainage Systems. (2) III.

Lecture—2 hours. Prerequisite: Soil and Water Science 101. Drainage principles and methods including investigation of drainage problems, types of drainage systems and layout of farm drains, and drainage requirements for land reclamation and irrigated agriculture.

Mr. Luthin

141. Hydrology. (3) II.

Lecture—3 hours. Prerequisite: course 118A or Engineering 103A. Principles of hydrologic analysis including consideration of precipitation, stream flow and ground water phenomena.

Mr. Burgy

150. Water Rights and Irrigation Institutions. (3) I.

Lecture—3 hours. Water rights: kinds, requirements, adjudication, administration, loss and evaluation. Irrigation enterprises: kinds, organization, financing, public regulation, operation, and usefulness under different conditions.

Mr. Clendenen

160. Farm Irrigation Systems. (3) III.

Lecture—3 hours. Prerequisite: senior standing in Soil and Water Science or Civil Engineering, or consent of instructor. Design, construction, operation and maintenance of farm irrigation systems including appurtenant structures. Preparation of land for irrigation. Analysis of irrigation systems and water application methods.

Mr. Hart

170. Irrigation and Drainage Summer Laboratory. (3)

Lecture—15 hours total; laboratory—45 hours total. Prerequisite: senior standing in Soil and Water Science or Civil Engineering or consent of instructor. Laboratory and field exercises conducted during the summer. Such topics as ground water, wells, and pumping plants; soil-water characteristics and water-soil-plant relations; farm irrigation system design and operation; evaluation of water application methods; drainage investigation techniques; and layout of farm drainage systems.

Mr. Hart

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open to majors in Soil and Water Science who are honors students of senior standing. Independent study of selected topics under direction of a member of the staff. Completion will involve writing of a paper.

The Staff

198. Directed Group Study. (1-5) I, II, III.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: senior standing.

The Staff

Graduate Courses**200. Water-Soil-Plant Relationships in Irrigation Programming. (3) III.**

Lecture—3 hours. Prerequisite: Soil and Water Science 104 or consent of the instructor. Selected topics including prediction of crop responses to irrigation, evapotranspiration and water requirements, production functions, strategy for using limited water supplies, and irrigation planning and operations for optimizing water use and crop production under conditions of developed and developing nations. Mr. Hagan

201. Water in Physiology and Biochemistry of Plants. (3) I.

Lecture—3 hours. Prerequisite: Botany 111; Chemistry 5. Recommended: Biochemistry 101B; Botany 120A and a course in physical chemistry. Solute-water interactions; water and the structure of biological macromolecules; cell-water relations; physiology and biophysics of water uptake, transport and dissipation by

plants; physiology and biochemistry of stomata; water stress and plant metabolism. Mr. Hsiao

202. Evapotranspiration: Summer Course. (2).

Lecture—18 hours total, laboratory—9 hours total. Prerequisite: Agricultural Engineering 106. Analysis and prediction of evapotranspiration. Influence of climate, vegetative cover, and soil on crop water use. Field and laboratory techniques of measuring evaporation radiation, sensible heat fluxes, and determination of profiles of temperature, humidity, and wind.

Mr. Pruitt

215. Advanced Topics in Water Chemistry. (3) II.

Lecture—3 hours. Prerequisite: Soil and Water Science 102. Recommended: Chemistry 110C; Soil and Water Science 103. An advanced course in water chemistry emphasizing principles governing interactions of ionic constituents in water with soils and plants. Topics include electro-kinetic properties of clays, diffusion mechanisms, hydrodynamic dispersion during leaching, and irreversible thermodynamics in soil-salt systems.

Mr. Biggar

215L. Advanced Topics in Water Chemistry**Laboratory. (1) II.**

Laboratory—3 hours. Prerequisite: course 215 concurrently or consent of instructor. Laboratory techniques for studying the physical and chemical interactions of soil and water.

Mr. Biggar

250. Physics of Soil Water Movement. (3) I.

Lecture—3 hours. Prerequisite: Mathematics 2C or consent of instructor. Recommended: course 106. The physics of fluid flow through porous media; miscible and immiscible displacement theories; theory of capillary pressure and pore size distribution with emphasis on unsaturated flow problems; physical aspects of permeability, porosity, specific surface, and pore structure.

Mr. Nielsen

290. Seminar. (1) II.

Seminar—1 hour. Required of all graduate students in Irrigation Science. Discussion of advanced problems in irrigation. Mr. Nielsen

298. Group Study. (1-9) I, II, III.

The Staff

299. Research. (1-9) I, II, III.

The Staff

SPANISHDonald G. Castanien, Ph.D., *Chairman of the Department*

Department Office, 622 Sproul Hall

Professors:

Donald G. Castanien, Ph.D.

Homero Castillo, Ph.D.

Iver N. Nelson, Ph.D. (*Emeritus*)**Associate Professor:**

Daniel S. Keller, Ph.D.

Assistant Professors:

Didier T. Jaén, Ph.D.
Robert M. Scari, Ph.D.

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Assistant Professors:

M. Roberto Assardo, M.A. (*Acting*)
Jerry R. Craddock, A.B. (*Acting*)
Dale E. Enwall, M.A. (*Acting*)
Edwin T. Williams, M.A. (*Acting*)

Lecturers:

David H. Allen, Jr., M.A.
Robert E. Kelsey, A.B.

Associates:

Skaidrite V. Ranne, M.A.
Ronald R. Senft, B.A.

The Major Program

Lower Division Courses.—Required: Spanish 1, 2, 3, 4, 5, and 6, or their equivalents; 26A–26B–26C. Recommended: one year of college Latin or the equivalent.

Upper Division Courses.—Required: 36 units of upper division courses including 101A–101B, 180, one course in each of the following areas: literature of the Golden Age, twentieth-century Spanish literature, twentieth-century Spanish American literature. The remaining units may be from any of the upper division courses.

Honors and Honors Program (see page 107).—The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

The Master of Arts Degree

The Department offers courses leading to the M.A. degree in Spanish to students who have completed with distinction the A.B. degree in Spanish, or its equivalent. Candidates will be recommended for admission to graduate studies in Spanish provided they meet the requirements of the Graduate Division and the Department of Spanish. Detailed information may be obtained by writing to the Graduate Adviser, Department of Spanish.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Spanish 1, 2, 3, 4, 5, 6, 26A–26B–26C, or their equivalents. At least 16 units of upper division work, including Spanish 101A–101B, 134 or 135 and one of the following courses: Spanish 131A, 120A, 104C, or 122.

Subject Representative: Mr. Keller.

Portuguese**Lower Division Courses****1. Elementary Portuguese. (4) I.**

Laboratory—2 hours; recitation—3 hours. Portuguese grammar, conversation, and reading.

No credit will be allowed if the student has completed two or more years of high school Portuguese.

Mr. Assardo

2. Elementary Portuguese. (4) II.

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 1. A continuation of course 1.

Mr. Assardo

3. Elementary Portuguese. (4) III.

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 2. A continuation of course 2.

Mr. Assardo

Upper Division Courses**104. Survey of Brazilian Literature: Prose Fiction.**

(4) I.

Lecture—3 hours. Prerequisite: course 3.

Mr. Assardo

***105. Survey of Brazilian Literature: Poetry. (4) II.**

Lecture—3 hours. Prerequisite: course 3.

Mr. Assardo

***106. Survey of Brazilian Literature: Drama and Essay. (4) III.**

Lecture—3 hours. Prerequisite: course 3.

Mr. Assardo

Spanish

Departmental Major Advisers.—Mr. Assardo, Mr. Jaén, Mr. Keller, Mr. Kelsey, Mr. Williams, Mr. Scari.

Graduate Adviser.—Mr. Castanien.

Lower Division Courses**1. Elementary Spanish. (4) I, II, III.**

Laboratory—2 hours; recitation—3 hours.

The Staff

2. Elementary Spanish. (4) I, II, III.

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 1. A continuation of course 1.

The Staff

3. Elementary Spanish. (4) I, II, III.

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 2. A continuation of course 2.

The Staff

4. Intermediate Spanish. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 3.

The Staff

5. Intermediate Spanish. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 4. Continuation of course 4.

The Staff

* Not to be given, 1967–68.

6. Intermediate Spanish: Conversation and Reading.
(3) I, II, III.

Recitation—3 hours. Prerequisite: course 5. Spoken Spanish stressed through class discussion of a variety of selected readings. The Staff

26A-26B-26C. Introduction to Spanish Literature.**(3-3-3) I, II, III; I, II, III; I, II, III.**

Lecture—3 hours. Prerequisite: course 6.
The Staff

Upper Division Courses**101A-101B. Grammar and Composition.****(4-4) I, II; II, III.**

Lecture—3 hours. Prerequisite: course 6.
The Staff

104A. History of Spanish-American Literature:
Colonial Period to the Nineteenth Century.**(4) I.**

Lecture—3 hours. Prerequisite: course 26C.
Mr. Keller

104B. History of Spanish-American Literature:
the Nineteenth Century through Modernismo.**(4) II.**

Lecture—3 hours. Prerequisite: course 26C.
Mr. Keller

104C. History of Spanish-American Literature:
Modernismo to the Present. (4) III.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Keller

***105. Spanish Drama of the Nineteenth Century.**
(4) I.

Lecture—3 hours. Prerequisite: course 26C.
Offered in even-numbered years. Mr. Scari

109A-109B. Spanish Drama of the Golden Age.
(4-4) II-III.

Lecture—3 hours. Prerequisite: course 26C.
Offered in even-numbered years. Mr. Kelsey

***111. Don Quijote. (4) II.**

Lecture—3 hours. Prerequisite: course 26C.
Offered in odd-numbered years. Mr. Castanien

112. Prose of the Golden Age. (4) II.

Lecture—3 hours. Prerequisite: course 26C.
Offered in even-numbered years. Mr. Castanien

***115. Lyric Poetry of the Golden Age. (4) I.**

Lecture—3 hours. Prerequisite: course 26C.
Offered in even-numbered years. Mr. Kelsey

119. Spanish Novel of the Nineteenth Century. (4) I.

Lecture—3 hours. Prerequisite: course 26C.
Offered in odd-numbered years. Mr. Scari

***120A. Twentieth-Century Spanish Prose. (4) I.**

Lecture—3 hours. Prerequisite: course 26C.
Offered in even-numbered years. Mr. Williams

***120B. Twentieth-Century Spanish Drama. (4) II.**

Lecture—3 hours. Prerequisite: course 26C.
Offered in odd-numbered years. Mr. Williams

***120C. Twentieth-Century Spanish Poetry. (4) III.**

Lecture—3 hours. Prerequisite: course 26C.
Offered in odd-numbered years. Mr. Enwall

122. Spanish-American Fiction of the Twentieth Century. (4) II.

Lecture—3 hours. Prerequisite: course 26C.
Offered in even-numbered years. Mr. Assardo

125A. Modernism: The Precursors. (4) I.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Castillo

125B. Modernism: The Major Poets. (4) II.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Castillo

127. Poetry of Post-Modernism and Vanguardism.
(4) III.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Castillo

131A. Modern Spanish Syntax. (4) I.

Lecture—3 hours. Prerequisite: course 101B.
Mr. Craddock

131B. Modern Spanish Syntax. (4) II.

Lecture—3 hours. Prerequisite: course 101B.
Mr. Craddock

132. Introduction to Spanish Linguistics. (3) III.

Lecture—3 hours. Prerequisite: course 101B. Principles of classical phonemics and morphemics together with more recent developments; descriptive analysis of modern Spanish sounds and forms. Theoretical and practical comparison with English and other Romance Languages. Mr. Craddock

134. Survey of Spanish Culture. (4) II.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Jaén

135. Survey of Spanish-American Culture. (4) III.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Assardo

141. Introduction to Old Spanish Language. (4) II.

Lecture—3 hours. Prerequisite: courses 26C and 101B. Major phonological and morphological developments in Spanish with special attention to the verb system. Emphasis on the period of old Spanish from the twelfth to the sixteenth century. Offered in even-numbered years.

Mr. Craddock

* Not to be given, 1967-68.

142. Medieval Spanish Literature. (4) III.

Lecture—3 hours. Prerequisite: courses 26C and 101B. Literary analysis of representative works of medieval Spanish literature. Offered in even-numbered years.

Mr. Craddock

150. Masterpieces of Spanish Literature. (4) I.

Lecture—3 hours. Reading, lectures, and discussion in English. May not be counted as part of the major in Spanish.

Mr. Castanien

***151. Study of a Major Writer. (4) I, II, III.**

Lecture—3 hours. Prerequisite: course 26C. May be repeated for credit with consent of the instructor.

The Staff

180. History of Spanish Literature. (4) III.

Lecture—3 hours. Prerequisite: open only to majors in their senior year; consent of instructor.

Mr. Scari

194H. Special Study for Honors Students.

(4) I, II, III.

Prerequisite: open only to honors students. Guided research leading to an honors thesis.

The Staff

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

The Staff

Graduate Courses**210. Literary Criticism: Poetry. (4) I.**

Seminar—3 hours. Offered in odd-numbered years.

Mr. Castillo

***230A. History of the Spanish Language. (4) I.**

Seminar—3 hours. Prerequisite: Latin 1.

Mr. Craddock

***230B. History of the Spanish Language. (4) II.**

Seminar—3 hours. Prerequisite: Latin 1.

Mr. Craddock

***231A–231B. Spanish Literature of the Golden Age. (4–4) II–III.**

Seminar—3 hours. Offered in odd-numbered years.

Mr. Castanien

***234A. Twentieth-Century Spanish Poetry. (4) I.**

Seminar—3 hours. Offered in even-numbered years.

Mr. Enwall

***234B. Twentieth-Century Spanish Poetry. (4) II.**

Seminar—3 hours. Offered in odd-numbered years.

Mr. Enwall

SUBJECT A

Department Office, TB 123, Room 105–106

Instruction Supervisor:

Leonard G. Homann, A.B.

* Not to be given, 1967–68.

235A. Twentieth-Century Spanish Prose. (4) I.

Seminar—3 hours. Offered in odd-numbered years.

Mr. Williams

235B. Twentieth-Century Spanish Prose. (4) II.

Seminar—3 hours. Offered in even-numbered years.

Mr. Williams

***238A. Spanish-American Drama: 1880–1930. (4) III.**

Seminar—3 hours. Offered in odd-numbered years.

Mr. Keller

238B. Spanish-American Drama: 1930 to Present. (4) III.

Seminar—3 hours. Offered in even-numbered years.

Mr. Keller

239. Nineteenth-Century Spanish Literature. (4) II.

Seminar—3 hours. Offered in even-numbered years.

Mr. Scari

***241A. Spanish American Novel, 1900–1920. (4) I.**

Seminar—3 hours. Offered in even-numbered years.

Mr. Castillo

***241B. Spanish American Novel, 1920–1940. (4) II.**

Seminar—3 hours. Offered in odd-numbered years.

Mr. Castillo

***242. New Trends in Spanish American Fiction from 1940 to the Present. (4) III.**

Seminar—3 hours. Offered in odd-numbered years.

Mr. Castillo

245. Darío and His Contemporaries. (4) II.

Seminar—3 hours. Offered in even-numbered years.

Mr. Castillo

247. New Directions in Spanish American Poetry. (4) III.

Seminar—3 hours. Offered in even-numbered years.

Mr. Castillo

299. Research. (2–5) I, II, III.

The Staff

Professional Course**300. The Teaching of Modern Foreign Language. (3) III.**

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

The Staff

TEXTILES AND CLOTHING—See Family and Consumer Sciences**VEGETABLE CROPS—See Plant Sciences****VETERINARY MICROBIOLOGY**

² John W. Osebold, D.V.M., Ph.D., *Chairman of the Department*
 Clyde Stormont, Jr., Ph.D., *Acting Chairman of the Department*

Department Office, 2004 Haring Hall

Professors:

Norman F. Baker, D.V.M., Ph.D.
 Ernst L. Biberstein, D.V.M., Ph.D.
 Hugh S. Cameron, D.V.M., Ph.D.
 (Emeritus)
 James R. Douglas, Ph.D.
 Delbert G. McKercher, D.V.M., Ph.D.
²John W. Osebold, D.V.M., Ph.D.
 Clyde Stormont, Jr., Ph.D.

Assistant Professor:

Yuan C. Zee, D.V.M., Ph.D.

**Lecturers:**

Michel M. J. Lavoipierre, M.B., Ch.B.
 Margaret E. Meyer, Ph.D.
 Richard N. Rossan, Ph.D.

Upper Division Courses**111. Immunogenetic and Electrophoretic Techniques. (2) I.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: Animal Genetics 107 (may be taken concurrently) or consent of the instructor. Immunologic and electrophoretic techniques used in the exploration of heritable differences in red cell antigens, serum proteins and enzymes of domestic animals. Mr. Stormont

120. Principles and Techniques of Bacteriology.

(2) I.

Lecture—3 hours; laboratory—6 hours (completed in 4 weeks). Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the instructor. The lectures deal with the fundamental physical and physiological properties of bacteria, microbial classification, and nomenclature. The laboratory exercises are designed to acquaint the student with basic methods used in studying bacteria. Mr. McKercher

121. Immunity and Serology. (3) I.

Lecture—3 hours; laboratory—6 hours (completed in 6 weeks). Prerequisite: course 120 or consent of the instructor. The principles of immunity and serology. Mr. Osebold, Mr. Stormont

² Absent on leave, fall quarter 1967.

122. Bacterial and Mycotic Pathogens of Domestic Animals. (4) II.

Lecture—4 hours; laboratory—8 hours (completed in 5½ weeks). Prerequisite: course 121, or consent of instructor. The biology of infectious animal diseases caused by bacteria and fungi.

Mr. Biberstein, Mr. Zee

123. Fundamentals of Virology and Virologic Techniques. (3) II.

Lecture—4 hours; laboratory—8 hours (completed in 4½ weeks). Prerequisite: course 122, or consent of the instructor. The basic physical and physiological properties of viruses and the virus-host relationship; laboratory methods of propagating viruses, with respect to their immunologic, serologic and pathologic properties. Mr. McKercher

124. Veterinary Protozoology. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: second year standing in the School of Veterinary Medicine or consent of the instructor. The protozoan parasites of domesticated animals with emphasis on biology, life history, identification, and control. Mr. Baker

125. Veterinary Helminthology and Entomology.

(5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: second year standing in the School of Veterinary Medicine or consent of the instructor. The helminth and arthropod parasites of domestic animals with emphasis on biology, life history, identification, and control.

Mr. Baker, Mr. Douglas, Mr. Lavoipierre

127. Introduction to Immunology. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Bacteriology 2; Chemistry 8, Zoology 2 recommended. Principles of infection and resistance, nature and manifestations of immune and allergic responses in higher animals.

Mr. Biberstein

128. Medical Microbiology. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 127. The microorganisms, exclusive of protozoa and metazoa, pathogenic for man.

Mr. Biberstein, Mr. Zee

199. Special Study for Advanced Undergraduates.

(2–8) I, II, III.

The Staff

Graduate Courses**201. Clinical Microbiology. (2) II.**

Laboratory—6 hours. Prerequisite: course 121, junior standing in School of Veterinary Medicine. Principles and methods of etiological diagnosis of bacterial, mycotic, viral, protozoan, helminthic, and ectoparasitic infections affecting domestic animals.

The Staff

240. Lethal Genes and Karyotypic Anomalies. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Genetics 100. A survey of lethal traits and chromosomal anomalies in animals. The laboratory is designed to illustrate genetic abnormalities at both the phenotypic and chromosomal levels.

Mr. Stormont

Mr. Osebold

270. Advanced Immunology. (6) III.

Lecture—3 hours; laboratory—9 hours. Prerequisite: courses 120–123 or 127 or consent of the instructor. Dynamics of infection and resistance: antibody production and manifestations of antigen-antibody reactions, immuno-chemistry, hypersensitivity. Immunological considerations of the groups of disease agents. Offered in even-numbered years.

Mr. Osebold

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

298. Group Study. (1–5) I, II, III.

The Staff

299. Research. (1–12) I, II, III.

The Staff

VITICULTURE AND ENOLOGY—See Food Science and Plant Science**WATER SCIENCE AND ENGINEERING—See Soil, Water and Atmospheric Sciences****ZOOLOGY**Herman T. Spieth, Ph.D., *Chairman of the Department*Milton Hildebrand, Ph.D., *Vice-Chairman of the Department*

Department Office, 205 Horticulture

Professors:

- Charles R. Goldman, Ph.D.
- Milton Hildebrand, Ph.D.
- Everett W. Jameson, Jr., Ph.D.
- Loye H. Miller, Ph.D., LL.D. (*Emeritus*)
- Milton A. Miller, Ph.D.
- Lauren E. Rosenberg, Ph.D.
- Herman T. Spieth, Ph.D.
- Tracy I. Storer, Ph.D., LL.D. (*Emeritus*)
- Kenneth E. F. Watt, Ph.D.

Associate Professors:

- Ronald J. Baskin, Ph.D.
- William J. Hamilton, III, Ph.D.
- Robert L. Rudd, Ph.D.
- George W. Salt, Ph.D.

Assistant Professors:

- Peter B. Armstrong, Ph.D.
- Dennis Barrett, Ph.D.
- Robert D. Grey, Ph.D.
- William M. Hamner III, Ph.D.
- Ann E. Kammer, Ph.D.
- Warren G. Kinzey, Ph.D. (*Zoology and Anthropology*)
- Stephen L. Wolfe, Ph.D.

Professor: ◇ ◇ ◇

Associate Professor:

- Norman F. Baker, D.V.M., Ph.D.
(*Veterinary Microbiology*)

Lecturer:

- William M. Longhurst, Ph.D.

Bachelor of Arts Major Program

Lower Division Courses.—Required: Biology 1, Zoology 2, Botany 2 or Bacteriology 2, Chemistry 1A, 1B, and 1C or 8.

Upper Division Courses.—Required: 36 units of upper division courses in Zoology (not more than 5 units of courses in the 190 series may be counted in this requirement). Students in the A.B. program are required to complete a course in four of the five following core areas:

1. Vertebrate Embryology: Zoology 100; or Vertebrate Comparative Anatomy: Zoology 106A.

2. Invertebrate Zoology; Zoology 112.

3. Genetics: Genetics 100.

4. Physiology with laboratory: Zoology 142 and 142L, Zoology 160, Physiology 100A, 100B, and 100L; Physiology 107 and 107L; or Physiology 110A, 110B, 111A and 111B.

5. Cell Biology: Zoology 121 or Botany 130A.

Any courses taken outside the department in partial satisfaction of the core course requirement will be counted toward the satisfaction of the 36-unit requirement.

Within the major program there are four principal areas of concentration for which electives are recommended as follows:

¹ Absent on leave, 1967–68.

1. Preparation for Graduate Study.—With attention to the requirements for advanced degrees, additional courses in botany, biochemistry, chemistry, at least one foreign language, physics, calculus, and statistics.

2. Preparation for Careers as Teachers.—To provide desirable breadth of training, additional courses selected from botany, bacteriology, cell biology, chemistry, and courses in physics, entomology, field zoology and physiology.

3. Preparation for Careers as Technicians.—Courses 104, 107, 110, and electives in biochemistry, parasitology and physiology.

4. Preparation for Careers in Wildlife.—The A.B. program may serve as preparation for careers in wildlife, but the B.S. program is specifically designed for that purpose. Hence, students in the A.B. program interested in this field should select as many electives as possible from the courses listed under the B.S. program.

Bachelor of Science Major Program

The B.S. program is an interdisciplinary major for students with professional orientation in the field of wildlife.

Lower Division Courses.—Required: Biology 1, Zoology 2; Botany 2; Chemistry 1A, 1B, 1C, 8; Entomology 1; Mathematics 13, 16A. Recommended: Bacteriology 2; Geology 1; Physics 2A, 2B; Mathematics 15, 16B; Nutrition 110.

Upper Division Courses.—At least 36 units, 18 of which must be in upper division zoology courses. Not more than 5 units of courses in the 190 series may be counted toward the upper division course requirement.

Required: Genetics 100; Zoology 116.

Elective groups: 18 units of upper division electives including courses from at least four of the following groups:

Group 1. Limnology and Oceanography.—Zoology 140, 140L, 144.

Group 2. Physiology, Nutrition, and Biochemistry.—Zoology 142, 142L; Nutrition 110; Physiology 110A, 110B; Biochemistry 101A, 101B.

Group 3. Biometry.—Mathematics 105A, 105B.

Group 4. Parasitology and Bacteriology.—Bacteriology 110, 130; Veterinary Microbiology 124, 125.

Group 5. Vertebrate Zoology.—Zoology 133, 134, 106A, 106B.

Group 6. Ecology.—Zoology 125, 125L; Botany 117.

Honors and Honors Program (see page 107).—The honors program comprises courses 194H and 195H. These two courses will be accepted as part of the 36-unit requirement in upper division courses.

Graduate Study.—The Department of Zoology offers programs of study and research leading to the M.A. and Ph.D. degrees. For detailed information regarding graduate study, write to the Graduate Adviser, Department of Zoology.

Teaching Major.—Required lower division

courses are Biology 1, Zoology 2, Chemistry 1A and 1B or 8. A total of 24 upper division units is required, including a course in four of the following five areas:

1. Vertebrate Embryology or Vertebrate Comparative Anatomy: Zoology 100 or 106A.

2. Invertebrate Zoology: Zoology 112.

3. Genetics: Genetics 100.

4. Physiology with laboratory: Zoology 142, 142L, or any related animal physiology courses.

5. Cell Biology: Zoology 121 or Botany 130A.

Recommended: additional courses in botany, bacteriology, cell biology, chemistry and physics, entomology, field zoology, and physiology.

Teaching Minor.—A minimum of 30 units in zoology, including Biology 1, Zoology 2, and 18 units of upper division courses in zoology or closely related fields chosen in consultation with the subject representative. An upper division course in invertebrate zoology is recommended, and it is recommended that the remaining upper division units cover as many other areas as possible (e.g., cell biology, physiology, ecology, genetics, and evolution).

Subject Representative: Mr. Wolfe.

Physiology

Lower Division Courses

2. Introductory Physiology. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Biology 1. The physiology of muscular contraction, nervous integration, sensation, circulation, respiration, excretion, and digestion.

Miss Kammer

2L. Introductory Physiology Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: Physiology 2; completed or in progress. Miss Kammer

10. Elementary Physiology. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: not open for credit to students who have had Biology 1. An introductory course in physiology for nonscience majors.

Zoology

Lower Division Courses

2. General Zoology. (6) I, II.

Lecture—4 hours; laboratory—6 hours. Prerequisite: Biology 1. A survey of the diversity of animal life and the basic principles of adaptation, evolution, and integration in animals.

I. Mr. Salt, II. Mr. Miller

Upper Division Courses

100. Vertebrate Embryology. (5) I, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Embryonic development of vertebrates with emphasis on amniotes.

I. Mr. Hildebrand, III. Mr. Armstrong

102. General Human Anatomy. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biology 1; recommended: Physiology 2. Demonstration and laboratory study of prepared human dissections, models, roentgenograms, and microscopic materials. Not open to premedical students.

Mr. Kinzey

103. Developmental Biology. (6) I.

Lecture—3 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: course 100; Genetics 100 or 115, and consent of the instructor. Mechanisms of growth and differentiation; experimental manipulation and biochemical analysis of a variety of embryonic materials.

Mr. Barrett

***104. Principles of Microscopy. (4) III.**

Lecture—1 hour; laboratory—9 hours. Prerequisite: course 2. History, theory, and application of methods of microscopy, including sectioning and staining, phase contrast in microscopy, fluorescence microscopy, photomicrography, autoradiography, and preparations for the electron microscope.

106A. Analysis of Vertebrate Structure. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2. Recommended: course 100. The interpretation of vertebrate structure with emphasis on phylogeny.

Mr. Hildebrand

106B. Analysis of Vertebrate Structure. (3) III.

Lecture—1 hour; laboratory—4 hours. Prerequisite: course 2. The interpretation of vertebrate structure with emphasis on function.

Mr. Hildebrand

107. Microanatomy. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. The finer structure and activities of organs, tissues, and cells of vertebrates, with emphasis on those of mammals.

Mr. Rosenberg

110. Protozoology. (6) III.

Lecture—3 hours; laboratory—9 hours. Prerequisite: Biology 1. Structure, life history, and ecology of the groups of protozoa with emphasis on relationships to biological problems.

Mr. Rosenberg

112. Invertebrate Zoology. (6) III.

Lecture—3 hours; laboratory—9 hours. Prerequisite: course 2. Comparative anatomy, classification, phylogeny, and natural history of the invertebrate Metazoa.

Mr. Miller

116. Principles of Animal Resource Management. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biology 1; Mathematics 13 and 16A.

Population dynamics and management of marine, freshwater, and terrestrial animal resources; analysis and solution of problems in maximization of animal resource production.

Mr. Watt

121. Cell Biology. (4) II.

Lecture—4 hours. Prerequisite: Biochemistry 101A and 101B, and Genetics 100. The mechanics of living systems. A combined ultrastructural, physiological, and biochemical analysis of subcellular organization, including such topics as nucleic acid "code," synthesis of specific macromolecules, contractility, photosynthesis and respiration, cell division, molecular structure of organelles, and cell regulatory mechanisms.

Mr. Baskin

***121L. Cell Biology Laboratory. (2) II.**

Laboratory—6 hours. Prerequisite: course 121. Exercises illustrating principles of cell biology; individual programs of research, employing one or more advanced techniques.

125. Animal Ecology. (3) II.

Lecture—3 hours. Prerequisite: course 2 and one course in biological science having at least part of the studies conducted in the field (e.g., courses 112, 133, 134, 140L, Botany 108 or Botany 117.) Theory of relationships between animals and their environments.

Mr. Salt

125L. Field Ecology. (3) III.

Laboratory—9 hours. Prerequisite: course 125. Laboratory and field investigations of ecological phenomena.

Mr. Salt

133. Biology of the Cold-Blooded Vertebrates. (5) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2. Identification; ecologic and geographic distribution; field study of habits and life histories; emphasis on species in California and western North America. Mr. Jameson

134. Biology of Birds and Mammals. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Identification; ecologic and geographic distribution; field study of habits and life histories; emphasis on species in California and western North America. Field trips included.

Mr. Rudd

140. Limnology. (3) III.

Lecture—3 hours. Prerequisite: Biology 1 and junior standing. The biology and productivity of inland waters with emphasis on the physical and chemical environment.

Mr. Goldman

140L. Limnology Laboratory. (3) III.

Laboratory—6 hours. Prerequisite: course 140 (may be taken concurrently). Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology. Mr. Goldman

* Not to be given, 1967-68.

142. Invertebrate Physiology. (4) III.

Lecture—3 hours. Prerequisite: course 112; Chemistry 1A, 1B; Physics 2B. Recommended: Physiology (Animal) 100B. Comparison of the physiology of invertebrate organ systems. Offered in odd-numbered years. Miss Kammer

142L. Invertebrate Physiology Laboratory. (3) III.

Laboratory—8 hours. Prerequisite: course 142 (may be taken concurrently). Studies and experiments on the physiological mechanisms of invertebrate organ systems. Offered in odd-numbered years. Miss Kammer

***144. Oceanography. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biology 1. Biological, chemical, physical, and geological aspects of the marine environment. Consideration of biological communities, productivity, the distribution of currents and tides, the origin of ocean basins, and marine sedimentation. Mr. Goldman

147. Zoogeography. (4) III.

Lecture—3 hours. Prerequisite: course 2 or Entomology 1. Movements of terrestrial animals. The role of geologic, climatic, and biologic changes in the geographic distribution of animals. Mr. Jameson

148. Animal Phylogeny and Evolution. (5) II.

Lecture—5 hours. Prerequisite: course 2 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. Mr. Rudd

155. Animal Social Systems. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 2. The behavioral basis, organization, and evolution of animal societies. Offered in odd-numbered years. Mr. Hamilton

156. Dynamics of Animal Coloration. (5) I.

Lecture—3 hours; discussion—1 hour; special project or term paper. Prerequisite: course 2. The role of animal coloration with respect to animal behavior; predator-prey relationships, and solar and animal radiation. Particular emphasis is given to the evolution of behavior and population dynamics as exemplified by coloration. Offered in even-numbered years. Mr. Hamilton

158. Introduction to Physico-Chemical Biology.

(4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2; Physics 2B; Chemistry 8. Recommended: Mathematics 1B or 16B. The application of physico-chemical principles to the study of living organisms. Mr. Baskin

* Not to be given, 1967-68.

160. Invertebrate Neurophysiology. (5) III.

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: an upper division course in physiology or physico-chemical biology or invertebrate zoology. Comparisons of the nervous systems of invertebrates with emphasis on nervous processes related to behavior. Offered in even-numbered years. Miss Kammer

194H. Special Study for Honors Students.

(2-5) I, II, III.

The Staff

195H. Honors Thesis in Zoology. (2) I, II, III.

Prerequisite: course 194H and second quarter senior standing. A comprehensive paper incorporating the studies undertaken in 194H. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**202. Biomathematics. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 16B and 105B; or consent of instructor. Mathematical aspects of physiology, ecology, and epidemiology; development and testing of models, mathematical description of biological systems; measurement, analysis, simulation and optimization in biology. Mr. Watt

210. Objectives and Methods for College Teaching of Biology. (3) I.

Lecture—1 hour; discussion—1 hour; assignments and reports. Analysis of the elements of effective teaching. Undergraduate enrollment limited. Offered in even-numbered years. Mr. Hildebrand

222. Mathematical Models of Ecosystems. (4) III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Math 1B or 16B; 105B or 231C; Zoology 116 or 125. Use of mathematical models and computer simulation to discover effect of varying behavioral, physiological, population, and community parameters on energy flux in ecosystems. Offered in odd-numbered years. Mr. Watt

223. Seminar in Fisheries Management. (4) III.

Seminar—4 hours. Prerequisite: course 116; Mathematics 16B, 105B. Analysis of fish population problems, including review of recent research. Offered in even-numbered years. Mr. Watt

225. Cellular Aspects of Development. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Zoology 103 and 121, or equivalent. Interaction of cells and tissues in development; cellular basis of morphogenesis.

226. Nuclear Aspects of Development. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103 and Biochemistry 101B, or equivalents with consent of instructor. Open to qualified undergraduates. Critical examination of the evidence for inputs to the nucleus and outputs from the nucleus in the control of development.

Mr. Barrett

230. Advanced Cytology. (2) II.

Seminar—2 hours. Prerequisite: consent of instructor. Topics of current interest in the ultrastructure of cells. Offered in odd-numbered years.

Mr. Wolfe

231. The Ultrastructure of Self-Reproducing Systems.

(3) III.

Lecture—3 hours. Recommended: courses in cytology, cell biology or cytogenetics and Genetics 100B. Structure and function of self-reproducing subcellular organelles illustrated primarily in metazoan animals.

Mr. Wolfe

240. Muscle Physiology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: an upper division course in animal physiology; Mathematics 1B or 16B; or consent of instructor. The physical and chemical aspects of muscle function.

Mr. Baskin

250. Recent Developments in Zoology. (1) II.

Seminar—1 hour. Prerequisite: graduate standing in Zoology.

The Staff

287. Seminar in Animal Behavior. (1) I, II.

Seminar—1 hour. Prerequisite: consent of instructor. Reports and discussion on the principles and recent developments in invertebrate and vertebrate animal behavior.

Mr. Hamilton, Mr. Spieth

288. Seminar in Physicochemical Biology. (1) III.

Seminar—1 hour. Prerequisite: consent of the instructor. Discussion of recent literature on the physicochemical aspects of the organization and function of living systems. Physicochemical

properties on the molecular and cellular levels will be considered.

Mr. Baskin

289. Seminar in Analysis of Vertebrate Structure.

(1) I.

Seminar—1 hour. Prerequisite: course 106A. Recommended: course 106B. Offered in odd-numbered years.

Mr. Hildebrand

291. Seminar in Protozoology. (2) I.

Seminar—2 hours. Prerequisite: course 110; or consent of instructor.

Mr. Rosenberg

292. Seminar in Development. (1) II.

Seminar—1 hour. Prerequisite: consent of instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms.

Mr. Barrett

293. Seminar in Invertebrate Zoology. (1) I.

Seminar—1 hour. Prerequisite: course 112; or consent of instructor.

Mr. Hamner, Miss Kammer, Mr. Miller

294. Seminar in Animal Ecology. (1) I.

Seminar—1 hour. Prerequisite: course 125; or consent of instructor.

Mr. Rudd, Mr. Salt

295. Seminar in Limnology. (2) II.

Seminar—2 hours. Prerequisite: course 140; or consent of instructor. Recent developments in limnology and related advances in oceanography.

Mr. Goldman

297. Seminar in Systematic Zoology and Evolution.

(1) III.

Seminar—1 hour. Prerequisite: consent of instructor. Principles of animal classification, speciation, and the evolution of higher categories; emphasis on modern concepts and pertinent contributions from the fields of genetics and paleontology.

Mr. Rudd

299. Research. (1-9) I, II, III.

The Staff

Index

- Absence, leave of (*see Withdrawal*)
Academic Senate, 17
Adding or dropping courses, 28
 in Letters and Science, 102
Administration, University, 17
Administrative officers, general, 9
 at Davis, 10
 of the colleges and schools, 11
Admission to the University, 19-27
 application procedures, 24
 by examination, 20
 change of campus, 26
 eligibility, notification of, 25
 failure to register, 26
 in advanced undergraduate standing, 26
 in freshman standing, 19
 in graduate standing, 26
 in limited status, 24
 in special status, 24
 intention to register, statement of, 25
 intercampus transfer, 26
 of applicants for second bachelor's degree,
 24
 of applicants from other counties, 23
 of out-of-state applicants, 21
 preparatory high school subjects, 22
 reapplication, 26
 transcript of record for, 25
 vaccination certificate, 25
Admission requirements in the
 College of Engineering, 83
 Graduate Division, 128
 School of Law, 112
 School of Medicine, 115
 School of Veterinary Medicine, 121
Advanced undergraduate standing, requirements for admission, 26
Advisers, faculty (*see also under various departments*)
 College of Agriculture, 54
 College of Engineering, 85
 College of Letters and Science, 100
 for foreign students, 48
Aerospace Engineering, curriculum, 87
Agricultural
 Biosciences, curriculum, 57
 Business Management, requirements for
 the major, 61
 Chemistry, graduate group, 139
 Economics, Department of, 185
 courses in, 186
 requirements for the major, 61, 185
Education, Department of, 141
 courses in, 142
 requirements for the major, 63
Engineering, Department of, 143, 193, 306
 courses in, 143, 193
 curriculum, 87
Placement Service, 47, 55
Practices, Department of, 144
 program, 55
Science and Management, committee, 144
 curriculum, 65
Toxicology, committee, 146
Agriculture, College of 53-81
 curricula and majors, 57-81
 dismissal and probation rules, 32
 graduate instruction and degrees, 56
 honors, 55
 requirements for Bachelor of Science
 degree, 53
 scholarships, 56
 study-list requirements, 54
 teaching credentials, 57
Agronomy, Department of, 280
 courses in, 282
American History and Institutions, 34, 244,
 289
American History and Literature, committee,
 146
 major program, 146
Anatomy, Department of, 147
 courses in, 147
Animal Biochemistry, courses in, 152
Animal Genetics, courses in, 152
Animal Husbandry, Department of, 149
Animal Physiology, Department of, 149
 courses in, 154
Animal Science, courses in, 151
 requirements for the major, 57, 58
 specialization, 67
Animal Sciences, committee, 149
Anthropology, Department of, 156
 courses in, 157
 major program, 157
Application for admission, procedures, 24
Applied Science, Engineering, Department
 of, 194
 courses, 195
 graduate study, 95
Approved living quarters, 42
Archaeology, courses in (*see Anthropology*)
Architecture, courses in (*see Art*)
Area requirements, Letters and Science, 98

- Art, Department of, 160
 courses in, 160
 major program, 160
- Assistantships, teaching and research, 131
- Associated Students, 49
- Astronomy, courses in, 275
- Athletic Association, Women's, 50
- Athletics (*see also* Physical Education),
- Atmospheric Science
 courses in, 307
 major requirements, 78
- Attorney in Residence Matters, 29
- Avian Medicine (*see* Epidemiology and Preventive Medicine)
- Awards (*see* Honors and Prizes)
- Bachelor of Arts degree, requirements (*see also* under various departments)
 College of Letters and Science, 97
 general University, 33
- Bachelor of Science degree, requirements
 College of Agriculture, 53
 College of Engineering, 84
 College of Letters and Science, 98
 general University, 33
 School of Veterinary Medicine, 125
- Bachelor's degree, applicants for a second, 24
- Bacteriology, Department of, 164
 courses in, 165
 major programs, 165
- Biochemistry, major requirements, 74
- Biochemistry, Animal, courses in, 152
- Biochemistry and Biophysics, Department of, 166
 courses in, 166
- Biochemistry, Comparative, graduate group, 181
- Biological Sciences, committee, 168
 courses in, 169
 major programs, 168
- Biology, courses in, 169
 Quantitative, 74
- Biophysics (*see* Biochemistry and Biophysics)
- Biosciences, Agricultural (*see* Agricultural Biosciences)
- Board and room, 37
- Botany, Department of, 169
 courses in, 170
 major programs, 170
- Breadth requirements, Letters and Science, 97
- Brewing technology specialization, 72
- Business Administration, School of, preprofessional requirements, 104
- Business Management (*see* Agricultural Economics and Business Management)
- Calendar, 5
- Campuses of the University, 17
- Candidacy for degrees, filing of announcement, 35
- Change of
 campus before registration, 28
 college, school, or major, 28
 major in Letters and Science, 100
 name, 28
- Chemical Engineering, Department of, 198
 courses in, 198
 curriculum, 89
- Chemistry, Department of, 173
 courses in, 174
 major programs, 173
- Chemistry, Agricultural, graduate group, 139
- Child Development, requirements for the major, 71
- Chinese, courses in (*see* Oriental Languages)
- Civil Engineering, Department of, 200
 courses in, 200
 curriculum, 90
- Classics, Department of, 176
 courses in, 176
- Clinical Pathology, Department of, 179
 courses in, 179
- Clinical Sciences, Department of, 179
 courses in, 180
- Comparative Biochemistry, graduate group, 181
- Composition, English, required, 34
- Conduct and discipline, 48
- Consumer Economics, courses in, 221
- Consumer Sciences, Department of, 220
- Counseling Service, 47
- Courses, classification and numbering, 137
- Credentials, teaching, 107, 130
- Credit
 and scholarship, 31
 by examination, 33, 35
 for work taken in other colleges, 22, 138
 upon repetition of a course, 31
 value of courses, explained, 137
- Curricula (*see* various Colleges and Schools)
 preparation for University, 22
 preprofessional, 104-107
- Dairy technology specialization, 72
- Deans of the colleges, schools, and graduate division, 11
- Defense Language Institute, 17
- Deficiencies
 disciplinary action, 31
 of transfer students, 22
 removal of grade deficiencies, 31

- Degree requirements
 Bachelor of Arts
 College of Letters and Science (*see also*
 various departments), 97
 general University, 33
 Bachelor of Science
 College of Agriculture, 53
 College of Engineering, 84
 College of Letters and Science, 98
 general University, 33
 School of Veterinary Medicine, 125
 Graduate degrees (*see* Graduate Division,
 also various Colleges and Schools)
 Dental Hygiene, 105
 Dentistry, School of, preprofessional
 requirements, 105
 Departmental majors, Letters and Science,
 100
 Design
 courses in, 221
 requirements for the major, 71
 teaching faculty, 220
 Dietetics and Nutrition, requirements for the
 major, 69, 71
 Dining Commons, 43
 Discipline
 for scholastic deficiencies, 31
 degrees of, 48
 Discontinuance without notice (*see*
 Withdrawal)
 Dismissal for scholastic deficiency, 31
 Dramatic Art, Department of, 181
 courses in, 182
 major program, 182
 University Theatre, 182, 14
 Dravidian languages, course in (*see* Oriental
 Languages)
 Dropping courses
 general regulations, 28
 Letters and Science, 102
 Economics, Department of, 185
 courses in, 186
 major program, 185
 Economics, Agricultural (*see* Agricultural
 Economics)
 Consumer, courses in, 221
 Education, Department of, 189
 courses in, 189
 Agricultural (*see* Agricultural Education)
 Education Abroad Program, 15, 48
 Educational Placement Service, 46
 Electrical Engineering, Department of, 204
 courses in, 204
 curriculum, 92
 Eligibility for admission, notification of, 25
 Employment, student, 46
 College Work-Study program, 46, 55
 Engineering, Department of, 191
 courses in, 191-209
 Engineering, College of, 83-95
 admission to, 83
 applied science, 95
 dismissal and probation rules, 32
 examination for foreign students, 23
 graduate study, 95
 honors with bachelor's degree, 85
 humanistic-social studies, 85
 lower division program, 86
 minimum scholarship requirements, 35
 requirements for Bachelor of Science
 degree, 84
 study-list requirements, 85
 technical electives, 86
 upper division curricula, 86-95
 Engineering
 aerospace, curriculum, 87
 Agricultural, Department of, 143, 193
 courses in, 143, 193
 curriculum, 87
 Applied Science, Department of, 194
 courses in, 195
 Chemical, Department of, 198
 courses in, 198
 curriculum, 89
 Civil, Department of, 200
 courses in, 200
 curriculum, 90
 core courses, 191
 Electrical, Department of, 204
 courses in, 204
 curriculum, 92
 Mechanical, Department of, 207
 courses in, 207
 curriculum, 93
 English, Department of, 210
 courses in, 210
 major program, 210
 English Examination, Subject A, 34
 for foreign students, 23, 34
 English requirement
 for admission to the University, 19
 in the College of Engineering, 85
 in the College of Letters and Science, 98
 Enology (*see* Viticulture and Enology)
 specialization, 72
 Enrollment limitation in School of Veterinary
 Medicine, 121
 Entomology, Department of, 216
 courses in, 216
 requirements for the major, 57, 59

- Entrance examinations
 for California residents, 20
 for nonresidents, 21
- Entrance requirements (*see Admission*)
- Environment engineering specialization, 90
- Epidemiology and Preventive Medicine, 218
 courses in, 218
- Examinations
 American History and Institutions, 34, 244, 289
 credit by, 33, 35
 engineering for foreign students, 23
 English composition, Subject A, 34
 entrance, 21
 final, 33
 foreign language placement, 27
 in English for foreign students, 23
 Law School admission, 111
 medical required, 27, 45
 Medical School admission, 115
 regulations concerning, 14
- Expenses of students (*see also Fees*), 37
- Extension courses, acceptability of
 approval required, 138
 in the College of Letters and Science, 98
 taken at another institution, 22
- Extension, University, 16
- Extra-session courses defined, 138
- Faculty advisers (*see Advisers, faculty*)
- Family and Consumer Sciences, committee, 220
 courses in, 221
 curriculum, 69
- Farm management (*see Agricultural Economics*)
- Fees and deposits
 application for admission, 25
 Subject A course, 37
 health insurance, 37
 incidental, 37
 intention to register, 25
 late registration, 27
 Memorial Union, 37
 nonresident, 29
 parking, 37
 reapplication, 26
 refunds, 38
 registration, 37
 residence hall contract, 42
 student body membership, 37
 tuition, 29
 transcript of record, 33
- Fellowships, assistantships, and loans, 131
- Final examinations, regulations concerning, 33
- Financial aids, 37
- Food science, committee, 225
 curriculum, 72
- Food Science and Technology, Department of, 225
 courses in, 226
- Food technology specialization, 67, 69
- Foods, courses in, 222
 requirements for the major, 69, 72
- Foreign language
 Letters and Science requirement, 98
 placement test, 27, 102
 professional courses in teaching (*see under various departments*)
 requirement for admission, 19
 training at Defense Language Institute, 17
- Foreign literature in translation, courses in, 229
- Foreign students
 admission to the Graduate Division, 129
 adviser for, 48
 American History and Institutions, 35
 courses in English for, 211
 examination in English for, 23
 health insurance required, 45
 requirements for admission, 23
 rules governing residence, 28
 Subject A examination, 34
- Forestry (*see Preforestry*)
- Fraternities, 43
- French (Department of French and Italian), courses in, 230
 major program, 230
- Freshman standing, admission to, 19
- Fruit and Vegetable Technology, 72
- Genetics, Department of, 233
 courses in, 233
 courses in animal genetics, 152
 courses in plant genetics (*see Plant Sciences*)
- Geography, Department of, 234
 courses in, 235
 major program, 235
- Geology, Department of, 237
 courses in, 237
 major programs, 237
- German, Department of, 239
 courses in, 240
 major program, 240
- Government of the University, 17
- Grade points defined, 31
 computation of grade-point average, 31
- Grades defined, 31
 Pass or Fail, 31, 54, 99, 121
- Graduate degrees offered, 127

- Graduate Division, 127-132
 fellowships, assistantships, and loans, 131
 majors and degrees, 127
 program of study, 130
 requirements for admission, 128
 requirements for foreign students, 129
 teacher credential program, 130
- Graduate students
 financial aids, 41, 131
 grades of Satisfactory or Unsatisfactory, 31
 readmission, 129
 scholarship deficiencies, 32
- Graduate study
 College of Agriculture, 56
 College of Engineering, 95
 Engineering, Applied Science, 95
 School of Veterinary Medicine, 125
 without degree objective, 130
- Graduation, University requirements for, 33-35
- Grants, 39
- Greek, courses in, 177
- Group majors in
 College of Letters and Science, 100
 Graduate Division, 128
- Gymnasium, use of, 272
- Health insurance, supplementary, 45
 fee, 37
 required for foreign students, 45
- Health Service, Student, 45
- Hebrew, courses in (*see* Oriental Languages)
- High school
 preparation for Engineering, 83
 preparatory subjects for University curricula, 22
 requirements for admission, 19
- History, Department of, 244
 courses in, 245
 major program, 244
- History and government of the University, 17
 of the Davis campus, 13
- History requirement for admission, 19
- Home Economics, requirements for the major, 72
- Home Management, courses in, 223
- Honor Spirit, 14
- Honors
 at entrance, 35
 at graduation, 36
 College of Agriculture, 56
 College of Engineering, 85
 College of Letters and Science, 107
 deans lists, 36
 prizes, 36
- Honors courses defined, 138
- Honors programs, Letters and Science, 107
- Honors students
 credit by examination, 33-36
 Pass or Fail grades, 31, 54, 99, 121
 privileges, Letters and Science, 107
- Housing, information, 42
- Human development, courses in, 222
- Humanistic-social studies, College of Engineering, 85
- Humanities, Letters and Science
 breadth requirement, 98
 list of courses, 108
- Incidental fee, 37
- Incomplete, grade of, 31
- Index, departments by college and school, 133
- Individual group majors, Letters and Science, 100
- Institution Management, courses in, 223
- Insurance, health (*see* Health Insurance)
- Intention to register form, 25
- Intercampus transfer, 26
- Intercampus exchange program for graduate students, 131
- Interdepartmental majors, Letters and Science, 100
- International Agricultural Development, committee, 250
 courses in, 250
 graduate group, 128
 requirements for the major, 64
- International Relations, committee, 251
 major program, 251
- International students, adviser for, 48
- Irrigation (*see* Water Science and Engineering)
- Italian (Department of French and Italian), courses in, 233
- Japanese, courses in (*see* Oriental Languages)
- Laboratory science, requirement for admission, 19
- Landscape Horticulture, Department of, 280
 courses in, 283
- Park Administration, courses in, 285
- Language requirement for admission, 19
- Late admission and registration, 27
- Latin, courses in, 177
 major program, 177
- Law, School of, 111-113
 Department of, 252
 courses in, 252
 residence rules for LL.B. candidates, 35
- Leave of absence (*see* Withdrawal)

- Letters and Science, College of, 97-109
 area requirement lists of courses, 108
 breadth requirements, 98
 faculty advisers, 102
 honors, 107
 majors available, 100
 minimum scholarship requirements, 99
 preprofessional study, 104
 probation and dismissal rules, 31
 requirements for the bachelor's degree, 98
 study-list regulations, 101
- Library, University, 15
- Limited status, requirements for, 24
- Linguistics, committee, 253
 courses in, 253 (*see also Anthropology*)
- Livermore, courses in Engineering, Applied Science, 195
- Living accommodations, 42
- Loans, 40-42
 for graduate students, 131
- Lower division courses defined, 137
- Lower division requirements (*see under various Colleges and Schools*)
- Major, change of, 28, 100
- Management, Business (*see Agricultural Economics and Business Management*)
- Management, Home, courses in, 223
- Management, Institution, courses in, 223
- Married students, housing for, 43
- Mathematics, Department of, 254
 courses in, 255
 major programs, 254
- Mathematics requirement for admission, 19
- Meat and poultry products technology specialization, 72
- Mechanical Engineering, Department of, 207
 courses in, 207
 curriculum, 93
- Medical examination, required, 27, 45
- Medicine, School of, preprofessional requirements, 104, 115
- Medical Technology, preparation for postgraduate training in, 106
- Memorial Union
 Dining Commons, 43
 fee, 37
- Microbiology, graduate group, 260
 courses in, 260
- Microbiology, Veterinary (*see Veterinary Microbiology*)
- Mid-term warning notices, 33
- Military Science, Department of, 260
 courses in, 261
- Military training
 Army ROTC program, 47, 48, 260
- scholarships, 41
- Minimum undergraduate scholarship requirements, 31
- Music, Department of, 262
 courses in, 263
 major program, 262
- Name change, 28
- Natural sciences, Letters and Science
 breadth requirement, 98
 list of courses, 109
- Nematology, Department of, 266
 courses in, 266
- Nonresident students
 admission requirements, 21
 rules governing residence, 28
 tuition fee for, 29, 38
- Nursing, School of, preprofessional requirements, 105
- Nutrition (*see also Dietetics and Nutrition*), Department of, 223
 courses in (Animal Sciences), 153
 courses in (Family and Consumer Sciences), 223
 graduate group, 266
 major requirements, Dietetics and Nutrition, 69, 71
 major requirements, 74
- Off-campus living accommodations, 43
- Officers, administrative, 9
- Optometry, School of, preprofessional requirements, 105
- Oriental languages, courses in, 267
- Out-of-state applicants
 admission requirement, 21
 rules governing residence, 28
- Park Administration (Landscape Horticulture), courses in, 283
- Parking fee, 37
- Pass or Fail grades, 31, 54, 99, 121
- Pathology, Clinical (*see Clinical Pathology*)
- Pathology, Department of, 268
 courses in, 268
- Pharmacy, School of, preprofessional requirements, 106
- Philosophy, Department of, 269
 courses in, 269
 major program, 269
- Physical Education (Department of, 271
 courses in, 272
 major program, 272
- Physical examination required, 27, 45
- Physical Therapy, School of, preprofessional requirements, 106

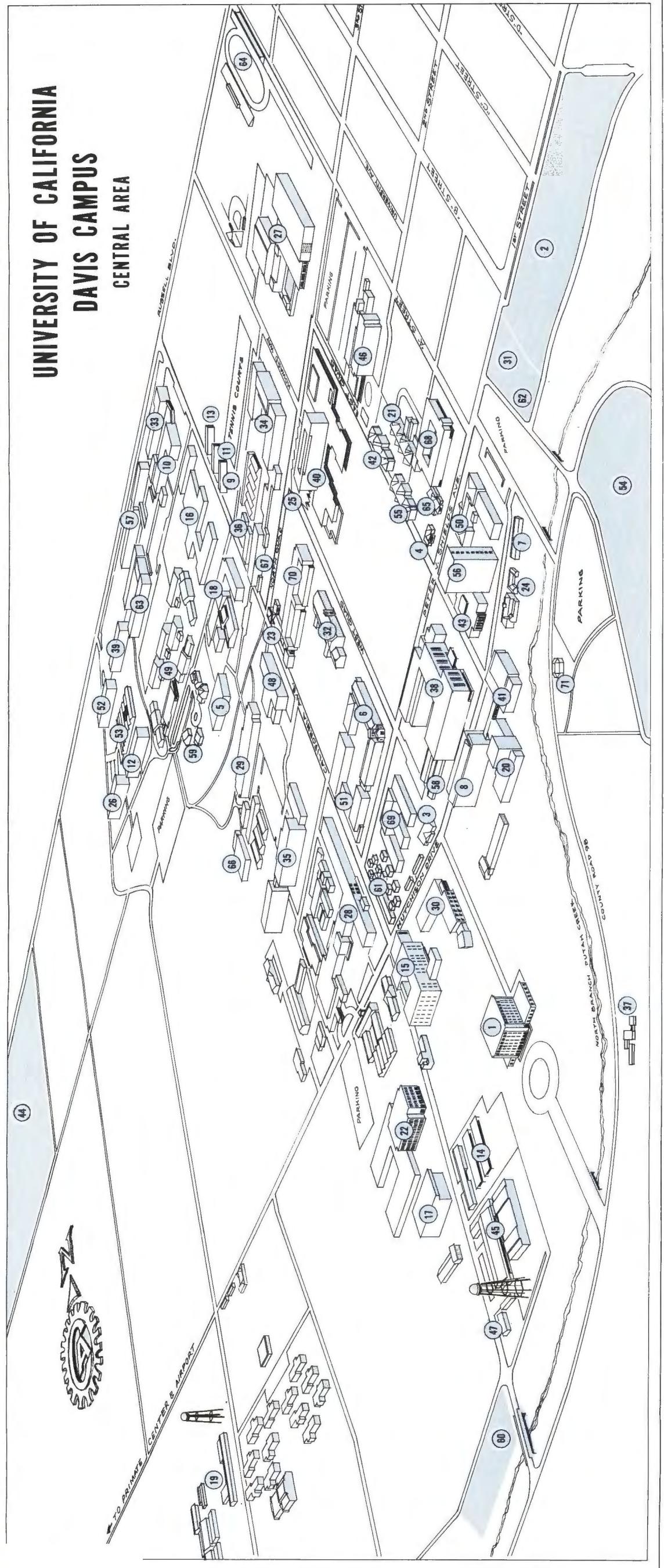
- Physics, Department of, 274
 courses in, 275
 major programs, 275
- Physiological Sciences, Department of, 278
 courses in, 278
- Physiology**
 courses in (Animal Sciences), 154
 courses in (Zoology), 316
- Placement examination in foreign languages, 27
- Placement Service, Student, 46
- Plant genetics, courses in (*see* Plant Sciences)
- Plant Pathology, Department of, 281
 courses in, 285
- Plant Physiology, graduate group, 128
- Plant Protection, requirements for the major, 57, 61
- Plant Science
 courses in (Plant Sciences), 282, 307
 courses in (Soils and Plant Nutrition), 307
 requirements for the major, 57, 59, 67
 specialization, 67
- Plant Sciences, committee, 280
- Political Science, Department of, 289
 courses in, 289
 major program, 289
- Pomology, Department of, 281
 courses in, 286
- Portuguese, courses in, 311
- Poultry Husbandry, Department of, 150
- Preforestry curriculum, 78
- Preparation for
 College of Engineering, 83
 professional schools not at Davis, 104
 School of Law, 111
 University curricula, 22
- President's Scholarship, 39
- Preveterinary medicine curriculum, 81, 121
- Prizes (*see* Honors)
- Probation, rules governing, 31
- Professional courses
 defined, 138
 in foreign language teaching (*see under various departments*)
- Professional schools, preparation for admission,
 Business Administration, 104
 Dental Hygiene, 105
 Dentistry, 105
 Forestry, 78
 Law, 111
 Medicine, 115
 Nursing, 105
 Optometry, 105
 Pharmacy, 106
 Physical Therapy, 106
- Veterinary Medicine, 121
- Psychology, Department of, 294
 courses in, 295
 major program, 295
- Public Health (*see* Epidemiology and Preventive Medicine)
- Quantitative Biology, curriculum in, 74
- Quarter system, explanatory note, 137
- Quarter units, how to convert, 31
- Range Management, committee, 297
 courses in, 297
 requirements for the major, 57, 60
- Readmission
 after an absence, 28
 after dismissal, 32
 health requirement, 45
 of graduate students, 129
- Reapplication for admission, 26
- Reexaminations, 31
- Refunds of fees, 38
- Regents of the University, 9
- Registration procedure, 27
- Reports of student grades, 31
- Requirements for
 for admission, 19–27
 for graduation, 33–35
- Research assistantships, 131
- Reserve Officers' Training Corps, 47, 48, 260
- Residence halls, 42
 requirement for graduation, 35
 requirement in Letters and Science, 99
 rules governing, 28
 statement of, 27
- Resource technology specialization, 68
- Rhetoric, Department of, 298
 courses in, 298
 major program, 298
- ROTC Army program, 47, 48, 260
 scholarship program, 41
- Russian (Department of German and Russian), 300
 courses in, 300
 major program, 300
- Sanskrit, courses in, 178
- Satisfactory and Unsatisfactory, grades of, 31
- Scholarship
 deficiencies, 31
 grades of, 31
 honors and prizes, 35
 mid-term warning notices, 33
 requirements for admission, 19
 requirement for graduation, 33

- Scholarships, 39
 in the College of Agriculture, 56
 ROTC program, 41
- Science requirement for admission, 19
- Sculpture, courses in (*see Art*)
- Second bachelor's degree, applicants for, 24
- Selective Service, 47
- Social sciences, Letters and Science
 breadth requirement, 98
 list of courses, 109
- Social Welfare, preparation for postgraduate training, 106
- Sociology, Department of, 301
 courses in, 302
 major program, 301
- Soil Science, courses in, 307
- Soil and Water Science, courses in, 308
 major requirements, 77
- Soils and Plant Nutrition, Department of, 306
- Soils, Water and Atmospheric Sciences, 306
 courses in, 307
- Spanish, Department of, 310
 courses in, 311
 major program, 311
- Special admission categories, 23
- Special-study courses defined, 137
- Speech (*see Rhetoric*)
- Statement of
 intention to register, 25
 residence, 27
- Structural engineering and mechanics
 specialization, 91
- Student
 activities, 45, 49
 conduct and discipline, 48
 employment, 46
 expenses, 37
 Health Service, 45
 Honor Council, 49
 publications, 50
- Student Body membership fee, 37
- Student Honor Council, 49
- Study-list regulations
 at registration, 27
 College of Agriculture, 54
 College of Engineering, 85
 College of Letters and Science, 101
- Subject A
 at registration, 27
 department of, 313
 requirements for graduation, 34
- Summer Sessions, 16
 course acceptability in Letters and Science, 97
 courses and residence requirement, 35
 credit from other institutions, 138
- Symbols, footnotes, 138
- Tamil, courses in (*see Oriental Languages*)
- Teacher education
 credentials, 107, 130
 credentials in College of Agriculture, 57
 curricula in College of Agriculture, 64
 in College of Letters and Science, 107
 requirements (*see under various departments*)
- Teaching assistantships, 131
- Telugu, courses in (*see Oriental Languages*)
- Tests (*see Examinations*)
- Textile Science, requirements for the major, 72
- Textiles and Clothing, courses in, 224
- Theatre, University, 14, 182
 Wyatt Pavilion, 14
- Toxicology, Agricultural (*see Agricultural Toxicology*)
- Transcripts of record, 25, 32
 for admission, 25
 for transfer students, 26
 for intercampus transfer, 26
 from the University, 32
- Transfer students
 application for admission, 26
 American History and Institutions
 requirement, 34
 requirements for admission, 19
 Subject A, 34
 Transfer credits, Letters and Science, 99
- Transfer to another campus, 26
 regulations for students dismissed or on probation, 32
- Tuition, for nonresidents, 29, 38
- Units of credit, 137
 computation of grade-point average, 31
 maximum and minimum limitations, 27
- Agriculture, 54
 Engineering, 85
 Letters and Science, 99
 University requirement for graduation, 33-35
- University Extension, 16
 course acceptability, 22, 98, 138
- University of California, history and government
 the Davis campus, 13
 the statewide University, 17
- University Theatre, 14, 182
- Upper division courses defined, 137
- Vaccination certificate required, 25, 45

- Vegetable Crops, Department of, 287
courses in, 287
- Veterans Benefits, 41
- Veterinary Medicine, School of, 121-125
admission to, 121
graduate study, 125
minimum scholarship requirements, 32
plan of study, 122
requirements for D.V.M., 123
requirements for the Bachelor of Science,
125
selection of applicants for, 121
- Veterinary Microbiology, Department of, 314
courses in, 314
- Viticulture and Enology, Department of,
226, 282
courses in, 228, 288
- Warning notices, mid-term, 33
- Water resources engineering specialization,
91
- Water Science and Engineering, Department
of, 306
courses in, 309
- Welfare Council (*see* Student Honor
Council), 49
- Withdrawals, 28
- Women's Athletic Association, 50
- Work-Study Program, 46, 55
- Wyatt Pavilion Theatre, 14, 182
- Zoology, Department of, 315
courses in, 316
major programs, 315

CAMPUS MAP

**UNIVERSITY OF CALIFORNIA
DAVIS CAMPUS
CENTRAL AREA**



- 1 Administration Building
- 2 Aggie Villa
- 3 Agricultural Education
- 4 Agricultural Extension
- 5 Agricultural Toxicology
- 6 Animal Science
- 7 Art Laboratory
- 8 Art Building
- 9 Ash Hall
- 10 Beckett Hall
- 11 Birch Hall
- 12 Bixby Hall
- 13 Cedar Hall
- 14 Central Garage
- 15 Chemistry Building
- 16 Cowell Student Health Center
- 17 Crocker Nuclear Laboratory
- 18 Cruess Hall
- 19 Dairy Cattle Research
- 20 Dramatic Art Building
- 21 East Hall
- 22 Engineering Building
- 23 Enology Laboratory
- 24 Fire House
- 25 Freeborn Hall
- 26 Gilmore Hall
- 27 Gymnasium
- 28 Haring Hall
- 29 Hoagland Hall
- 30 Home Economics Building
- 31 Home Management
- 32 Horticulture Building
- 33 Hughes Hall
- 34 Hunt Hall
- 35 Hutchison Hall
- 36 Irrigation Laboratory
- 37 Landscape Horticulture Field Station
- 38 Library
- 39 Malcolm Hall
- 40 Memorial Union
- 41 Music Building
- 42 North Hall
- 43 Olson Hall
- 44 Orchard Park Apartments
- 45 Physical Plant
- 46 Physical Sciences
- 47 Police
- 48 Poultry Husbandry
- 49 Regan Hall
- 50 Roadhouse Hall
- 51 Robbins Hall
- 52 Ryerson Hall
- 53 Segundo Hall
- 54 Solorano Park Apartments
- 55 South Hall
- 56 Sprout Hall
- 57 Struve Hall
- 58 Temporary Buildings (5-6)
- 59 Temporary Buildings (13-16)
- 60 Temporary Buildings (29-35)
- 61 Temporary Buildings (100-115)
- 62 Temporary Buildings (116-124)
- 63 Titus Hall
- 64 Toomey Field
- 65 University House
- 66 Vegetable Crops Facility
- 67 Veihmeyer Hall
- 68 Vories Hall
- 69 Walker Engineering Building
- 70 Wickson Hall
- 71 Wyatt Pavilion Theatre



In one of his last speeches Adlai Stevenson referred to Franklin, Jefferson, Madison, Adams, Hamilton, and Marshall in these words: "Our revolutionary leaders must have been, bar none, the most soundly educated group of radicals the world has ever seen. And I believe that that precise and precious balance between vision and practicability that we find in our early constitutional experiments reflects above all the wisdom and realism of well-nourished minds."

At a time when students are asking for a share in determining the form and means by which knowledge is transmitted, it is appropriate for us to consider Stevenson's words. The collaboration between Students and Faculty can well be important in determining the proper diet for "Well-Nourished Minds" today. The particular strength of students is in contributing new ideas generated by their practical concerns. The faculty, on the other hand, offers the wisdom to evaluate traditional forms of education. The result can be a better diet, balanced between "Wisdom and Realism."

EMIL M. MRAK