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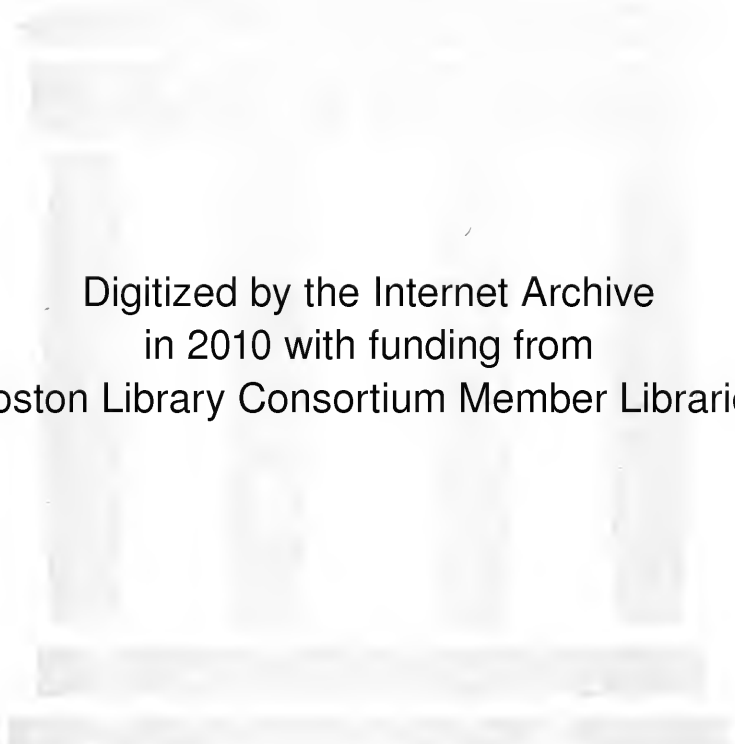
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Summer

Sessions

1963

THE UNIVERSITY OF MASSACHUSETTS
BULLETIN

UNIVERSITY
OF
MASSACHUSETTS



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The University of Massachusetts is the Land-Grant University of the Commonwealth, its primary purpose being to serve the people and the interests of the State and the Nation.

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SUMMER SESSION HIGHLIGHTS

PROGRAM FOR STUDENTS GRADUATING FROM HIGH SCHOOL
IN JUNE, 1963

JOB RELATED COURSES AND WORK CONFERENCES
FOR PROFESSIONAL GRADUATE NURSES

WORKSHOPS AND SEMINARS IN EDUCATION

COURSES IN ENGINEERING, FORESTRY, HOME ECONOMICS, AND NURSING

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CALENDAR FOR THE SUMMER SESSION

Registration for both Sessions**	June 24, 1963
First Classes	June 25, 1963
Classes Held	June 29, 1963
Holiday	July 4, 1963
Classes Held	July 6, 1963
Classes Held	July 13, 1963
Six-week Classes End	August 2, 1963
Eight-week Classes End	August 16, 1963

**Registration for six-week and eight-week classes held in the Student Union Ballroom.

Registration for other summer courses at Registrar's Office, South College, on the first day of the session. On June 24, the following schedule will be followed (students may register *after* their assigned time, but not before) :

Last name beginning with

A—B	8:00 a.m.
C—D	9:00 a.m.
E—H	10:00 a.m.
I—M	11:00 a.m.
closed	12:00-1:00 p.m.
N—R	1:00 p.m.
S—T	2:00 p.m.
U—Z	3:00 p.m.
	Registration closes 5:00 p.m.

To avoid delays on Registration Day, all students should send in their applications, residence forms, and certificates of residence (if applicable) at the earliest possible date.

General Information

The University of Massachusetts is the state university of the Commonwealth, founded in 1863 under provisions of the Morrill Land Grant Act passed by the United States Congress one year earlier.

Now observing its Centennial, the University is a member of the great community of Land Grant colleges and state universities serving the nation as principal resources of higher education for the country's citizenry. Incorporated as the Massachusetts Agricultural College in April, 1863, the institution was opened to a handful of students in 1867. Rooted in the liberal arts tradition (its early presidents were graduates of such colleges as Dartmouth, Williams, Amherst, and Harvard), it has grown steadily from the four teachers and four wooden buildings available for its opening session. Reflecting the broadening interests of its students, the General Court of the Commonwealth of Massachusetts authorized a second name, Massachusetts State College, in April, 1931. Sixteen years later, in May, 1947, the institution became the University of Massachusetts.

Situated in one of the most picturesque sections of the state, the University joins with its academic neighbors—Amherst, Smith, and Mount Holyoke Colleges—in maintaining the rich tradition of educational and cultural activity associated with this beautiful Connecticut Valley region. The University's campus consists of approximately 750 acres of land and 90 buildings. These structures—including classroom and laboratory facilities as well as dormitories and other units—extend in a great circle around the Campus Pond. This arrangement helps in maintaining the University as a community in which the individual holds central importance.

The community itself is located in a region that offers outstanding opportunities for a student's cultural development. Art exhibits, dramatic productions, concerts, and other activities in the Four College area are fully available to all students. In addition, the University maintains excellent recreational facilities as well as intercollegiate and intramural sports activities. The total program is dedicated to giving every student a chance to develop all of his capabilities under the best possible conditions. As the University moves into its second century, this will continue to be its prime objective.

THE UNIVERSITY RESERVES, FOR ITSELF AND ITS DEPARTMENTS, THE RIGHT TO WITHDRAW OR CHANGE THE ANNOUNCEMENTS MADE IN THIS CATALOGUE.

Summer Session -- 1963

Programs Offered

The Summer Session for 1963 at the University of Massachusetts will begin on June 24, Registration Day, and end on August 16. During this period, courses will be offered for two lengths of time. Some courses will begin on June 24 and end on August 2, running for six weeks. Some courses will begin on the same date and end on August 16, running for eight weeks. (Special courses will run for shorter periods beginning on June 3. These are described in the Directory of Courses section.) Students may elect courses of either six or eight weeks' duration without conflict, subject only to the study load limitation described on page —.

Students who are enrolled in one of the special courses which meet for one, two or three weeks normally will enroll for that course only. Most of these courses run for eight hours a day, so that dual registration is not possible.

During the Summer Session most of the basic courses will be offered, enabling a student to make substantial progress toward his degree. With careful planning and regular attendance, it is possible, through judicious use of Summer Session attendance, to obtain a bachelor's degree in three calendar years.

The full facilities of the University—its professional teaching staff, classrooms, libraries, laboratories, dining rooms and dormitories—will be available this summer.

ENTERING FRESHMEN

The University of Massachusetts is inviting well-qualified high school graduates to begin their college education immediately after June, 1963, graduation. Because of the rising enrollment pressures on University facilities, the University believes that for certain students a summer program of studies might be helpful. For the good student who, perhaps, is already convinced his formal education will require graduate or professional studies after his undergraduate work, an early start may save him valuable time. Similarly, students in financial need may find it less expensive overall to complete their undergraduate work in as short a time as possible. Summer Session attendance can substantially reduce the time necessary to get a bachelor's degree. Students who wish to start their undergraduate work in the Summer of 1963 *must apply for regular admission*. Further information will be sent to each applicant by the Registrar with the application form.

June graduates of high schools, certified for college work, may begin required freshman courses including those in English, languages, natural and social sciences and physical education. (All entering freshmen will be required to take physical education in the summer for non-academic credit. This course is timed so that it will not conflict with a regular program of study and this credit may be taken in addition to the normal study load.)

SPECIAL PROGRAM FOR TEACHERS

Program for Teacher Improvement. The School of Education is continuing its program of preparation toward teacher certification for undergraduates and graduates of colleges of liberal arts and science who wish to teach in either elementary or secondary schools and who find it difficult to take courses during the regular university year. The program includes four professional courses, three of which may be taken during the summer session, and student teaching in public schools during the fall. In certain cases in emergency fields such as elementary education, foreign languages, mathematics, and sciences it may be possible to arrange a year's internship with full pay in a public school in place of student teaching. There are several courses which are of particular interest to mathematics and science teachers which include Education 52, 62, 88, 130 and the two new courses being offered for the first time, Education 216-4 Developments in Secondary Science and 216-5 Developments in Secondary Mathematics. (Students electing Education 52, 88 for secondary certification or Education 60, 61, 62 for elementary certification must present a transcript showing an average of at least C.)

Study-Experience Program. Certain courses in Elementary Education, Reading and the Gifted Child offer excellent opportunities to learn course content and then to apply it by direct contact with children in a workshop. These Study-Experience Program courses include: (1) 60, 160 Elementary School Curriculum—215-2 Workshop: Elementary School Social Studies, (2) 216-2 Seminar Gifted—215-1 Workshop: Gifted, (3) 216-6 Seminar: Kindergarten—215-3 Workshop: Kindergarten, (4) 263 Diagnosis of Reading Problems—264 Individual Case Studies of Reading Problems, (5) 265 Techniques of Remedial Reading—215-4 Workshop: Remedial Reading. Special attention is drawn to the fact that in the Study-Experience Program a student must not take a workshop course unless he takes simultaneously or had taken the accompanying content course. Experience teachers, however, may, with the permission of the instructor, take a workshop course without the content course.

Specialization. Attention is also drawn to the areas of concentration or specialization in these particular fields: (1) Audio-Visual — 120, 121, 122, 66, 166 (2) Guidance — 77, 177, 216, 241, 242 (3) Reading—61, 161, 263, 264, 265, 215-4 (4) Administration—211, 214, 216-1, 283 and (5) Vocational Education—72, 172, 75, 175.

For a more detailed description of the various programs and for application materials the candidate should write to the Dean, School of Education, University of Massachusetts, Amherst.

STUDY LOAD

A normal study load for a student during the Summer Session is figured on the basis of the number of weeks of attendance. If a student

plans to be on campus only for six weeks, the normal load will be six credit hours. However, if a student plans to be on campus for the full eight weeks, the normal load will be eight credit hours. During the eight-week session a student normally would carry eight credit hours, but may carry nine credit hours without special permission. Entering freshmen and others who elect the required physical education courses for one hour of non-academic credit may elect seven credit hours during the six-week session or a maximum of ten credit hours during the eight-week session.

University of Massachusetts undergraduates will receive permission to carry one course beyond the maximum only if their scholastic average has been 3.0 or better for the last two semesters. A student from another college can enroll for more than the normal load only if the appropriate official of his own college submits a statement recommending such a program and certifying that he is an honor student at that institution.

CREDIT FOR SUMMER WORK

All courses carry degree credit and are equivalent in method, content, and credit to courses offered in the University during the regular academic year. Credits obtained in these courses are ordinarily accepted as transfer credits by other colleges and universities. Students desiring to pursue courses for the advanced degrees must seek the approval of the Dean of the Graduate School.

THESIS AND SPECIAL PROBLEMS CREDIT

Graduate students contemplating special problems course work and thesis work during the Summer Session should seek the permission of their Department Heads and/or advisers and get approval from the Dean of the Graduate School. Such programs, although not listed by title and number in the Summer Session bulletin, are available by many departments on campus during the Summer Session.

EXPENSES

Tuition for residents of Massachusetts	\$10.00 per credit hour
Tuition for non-residents of Massachusetts	15.00 per credit hour
Health Fee	1.00 per week
Student Union Fee	1.00 per week
Student Recreation Fee	1.00 per session

Board

One week	\$10.00
Two weeks	20.00
Three weeks	31.00
Six weeks	64.00
Eight weeks	84.00

Rent

One week	9.00
Two weeks	19.00
Three weeks	28.00
Six weeks	56.00
Eight weeks	75.00

Books, Stationery and Supply Expenses:

Students should be financially prepared to pay for necessary books and incidental supplies. Certain departments also make special charges for necessary laboratory supplies.

Special Examinations:

Students receiving credit by special examination must pay \$5.00 per credit before the examination may be taken.

Tuition and Fee Refunds

A student who leaves the University for any reason except as specified below before a term is completed will be granted a refund of tuition and fees in accordance with the following schedule:

- a. During the first week—60%
- b. During the second week—20%
- c. After the second week—no refund

A student who makes an advance payment and then for any reason does not attend any part of the term at the University will be given a full refund of tuition and fees.

A student who is involuntarily called into military service before the completion of a term will be given a pro rata refund of tuition and fees provided that he receives no academic credit for the work of that term. If academic credit is given, there will be no refund.

A student who is suspended or expelled from the University for disciplinary reasons forfeits all rights to a refund.

ADVANCE ENROLLMENT

(UNDERGRADUATE AND GRADUATE STUDENTS)

To expedite advance enrollment, or to obtain approval of admission, undergraduate students contemplating attendance should notify the Registrar as soon as possible, using the application form on page 35 of this bulletin. Graduate students must use the application form on page 37 of this bulletin. Graduate students must receive approval for admission from the Dean of the Graduate School. *Payment of fees and other costs prior to the registration date is strongly advised to insure enrollment in certain courses offered.*

RESIDENCE

New students who are residents of Massachusetts must file certificate of residence with the Treasurer's Office in order to obtain the residential tuition rate (see page 41 of bulletin for form to be filled out).

HOUSING AND BOARD

It is the policy of the Board of Trustees that all men and women undergraduate students shall be housed in campus residence halls and be required to eat at University dining halls unless given permission to commute from their parents' homes. University board is optional for seniors and those over 21 and is available on a cash basis.

Residence halls will be open for occupancy at 2:00 p.m. on the day immediately preceding registration day and will close on the day following the final day of classes. Brett House will be the residence hall for women and Gorman House for men. Room assignments will be available from the Head of Residence of each dormitory on arrival.

Most rooms are double and are provided with basic furniture, including mattress. Each student is responsible for providing study lamp, metal wastebasket, ash tray if desired, also pillow, blankets, bed linen, and towels, either supplying them personally or subscribing to a linen service, available locally.

Married students may write to the University Housing Office regarding accommodations.

Meal tickets for dormitory residents provide board at the University Dining Commons on a five-day basis (Monday through Friday, except that Saturdays are included when classes are held). Cafeteria service is available in the Coffee Shop of the Student Union on weekends and during the summer for other students desiring food service.

VETERANS

Veterans who plan to enroll under the G. I. Bill (P. L. 550) should present—not later than the time of registration — evidence of eligibility or make application for training at that time. Students already enrolled under P. L. 550 should re-enroll for Summer Session work. Under this law, veterans receive an education and training allowance from the Veterans Administration from which they pay their own university fees and purchase their own books and supplies. Students already enrolled under P. L. 634 also should re-enroll for Summer Session work. Students should see Mr. George Emery, Machmer Hall, for further information on this program.

SERVICES AND RECREATION

During Summer Session the facilities of the University are at the disposal of students. In addition to the classrooms, the laboratories, and library facilities available for student use, a number of other agencies and services are offered.

UNIVERSITY HEALTH SERVICE

Medical consultation and treatment is available to students at the University infirmary. The infirmary, located east of French Hall and Durfee Conservatory and north of Brooks House, furnishes ordinary medical care for students.

PLACEMENT AND FINANCIAL AID SERVICES

Loans. Three types of loans are available to students—University Short-Term loans, Massachusetts Higher Education loans and National Defense Education Act loans. Students should see Mr. David P. Lawrence, Assistant Director, Placement & Financial Aid Services, Machmer Hall, for information on these programs.

Part-Time Student Employment. Campus part-time jobs are available for a limited number of students. Students seeking employment should see Mr. George Emery, Placement Officer for Men, and Miss Carolyn Hawes, Placement Officer for Women. These offices are located in Machmer Hall.

RECREATION AND ENTERTAINMENT

The Student Union Building, a center of student activity and social life, serves as a recreational center and common meeting place for students. Attractively furnished, the Union provides lounges, music listening rooms, piano practice rooms, reading room, meeting rooms, barber shop, food service area, bookstore, information, lost and found, and games area consisting of billiards, bowling alleys, table tennis, television, and card table games.

A Student Activities Office and staff, located in the Student Union Building, plan and execute the social and recreational programs for the Summer Session students. The natural environment in which the University is located affords almost unlimited facilities for combining recreational activities with academic and professional achievement. Indoor and outdoor extracurricular activities are designed to meet varying interests of individuals. Such features as band concerts, movies, dances, professional entertainment are planned along with arrangements for summer theatre. In addition, programs for recreation offering informal sports such as swimming, softball, tennis and hiking are available. A get-acquainted barbecue is scheduled during the session. A golf course, located within five minutes drive of the University campus, is available to students upon payment of greens fees. Outdoor swimming is available at the community pool and several small lakes in the immediate area.

REGULATIONS

Normal University regulations will apply during the Summer Session. The regulation concerned with adding and dropping courses will be as follows for the shorter Summer Session: Students may add or drop any course within four class days without penalty. Students may drop any course between the fourth day but before the eleventh day with a mark of W (Withdrawn) being recorded. After the tenth day any course dropped is recorded WF (Withdrew Failing). This grade is computed in the quality point average. An exception may be made to this rule in certain cases of protracted illness or serious personal or social problems. In such exceptions, a WP (Withdrew Passing) may be recorded if the student obtains (1) the favorable recommendation of the appropriate University Health or Student Personnel officer, (2) the approval of his advisor and the Provost, and (3) a certificate from his instructor that the student was passing the course at the time that he first contacted the University Health or Student Personnel officer with regard to his problem. An overload of courses is not considered sufficient grounds for dropping under this arrangement.

Course Directory

The information in the Directory of Courses section of the bulletin is complete for each course. Preceding the course title is the course number, which follows a definite pattern. Courses numbered from 1 to 49 are freshman and sophomore courses. Courses numbered from 50 to 99 are junior and senior courses. These courses (50-99) may be followed by a second number after a comma, such as 51, 151 or 77, 177. This indicates that these courses may also be taken for graduate credit with the completion of additional requirements as determined by the instructor. Courses numbered from 100-149 are graduate level courses, as are courses numbered 200 and above.

Following the course title is a code which indicates the credit for the course, the length (six or eight weeks) in which it will be taught, a letter indicating the hour of the day, and an abbreviated version of the building and room in which the course will be taught. For instance, 3 cr 6 wk A Dra 122 indicates that this course is offered for three credits during the six week term, and that it meets in the 7:45 to 9:15 block in Draper Hall, Room 122.

The name following the course write-up is that of the instructor. Where no name appears, the instructor had not been determined when the catalogue went to the printer. This information is accurate as of the date the catalogue goes to press, but may be changed if necessary before the beginning of the Summer Session.

Six-week courses will meet five days a week for one hour and twenty minutes. Eight-week courses will meet either five days a week for an hour or four days a week (Monday, Tuesday, Thursday and Friday) for an hour and fifteen minutes.

The letter code for the time periods is as follows:

A	7:45- 9:15 a.m.
B	9:15-10:45 a.m.
C	10:45-12:15 p.m.
D	Afternoon period starting at 1:15 p.m.
E	Afternoon period starting at 4:00 p.m.

The abbreviations for University buildings are as follows:

B	Bartlett Hall
CH	Clark Hall
Dra	Draper Hall
Ed	Education Building
EB	Engineering Building
Fe	Fernald Hall
G	Goessmann Laboratory
H	Hasbrouck Laboratory
HP	Hicks Physical Education Building
Mach	Machmer Hall

M
OC
PHB
Sk

Morrill Science Center
Old Chapel
Public Health Building
Skinner Hall

Final examinations will be given during the regular class hour and may take two days at the option of the instructor.

The University reserves the right to *withdraw* regular *undergraduate* courses which do not have a *minimum enrollment of 10* and regular *graduate* courses which do not have a *minimum enrollment of 5* by *May 15*. *Special courses* must have sufficient enrollment to justify their being given. *Advance registration for the Summer Session is strongly advised to insure that the courses you desire will be given.*

College of Agriculture

Entomology 26 General Entomology 3 cr 6 wk A,D. Fe. D,H

A brief survey of the entire field of entomology: structure, development, classification, biology, and control of insects. Formation of an insect collection.

Forestry 55, 155 Elements of Forest Mensuration 3 cr MacConnell and Lindsay

Methods of determining the volume and value of the forest growing stock; type mapping; methods of predicting growth of trees and stands. Three 44-hour weeks: June 3-22. Conservation Building.

Forestry 78, 178 Harvesting of Forest Products 3 cr Foster and MacConnell

Practice in the harvesting and preparation of direct forest products. Field trips to active forest properties and to visit pulpwood operations and manufacturing plants. Three 44-hour weeks: June 24-July 13. Conservation Building.

Statistics 77, 177 Elementary Experimental Statistics 3 cr 6 wk
A Dra 125 _____

Covers basic concepts and techniques for determining reliability and significance of small samples. Confidence limits: X^2 , t , and F tests, and simple regression and correlation.

Statistics 79, 179 Elementary Economic Statistics 3 cr 8 wk B
Dra 125 _____

Covers charting, tables, frequency distribution, central tendency, dispersion, basic concepts of reliability and significance of small samples, index numbers, simple regression and correlation and time series analysis.

College of Arts and Sciences

DEPARTMENT OF ART

- Art 33 Basic Drawing 3 cr 6 wk D B225 Goodyear
Introduction to drawing in black and white, applying pencil, crayon, charcoal techniques to representation in line and tone, emphasizing sound observation and effective presentation.
- Art 51, 151, 52, 152 Water Color 3 cr 6 wk A,B B209 Hill
Initial concentration on transparent water color, emphasizing control of techniques and mastery of color relationships. Further experience with opaque water color, such as gouache, casein. Prerequisites, Art 31 and Art 33.
- Art 57, 157, 58, 158 Printmaking 3 cr 6 wk B,C B219 Coughlin
Basic study of materials, techniques, aesthetic considerations peculiar to graphic media of lithography and intaglio (etching, aquatint, etc.), permitting students to print their own work. Prerequisites, Art 31, 34 or permission of instructor.

DEPARTMENT OF BOTANY

- Botany 1 Introductory Botany 3 cr 6 wk B,D M203, 301 Petersen
The morphology and physiology of plants.

DEPARTMENT OF CHEMISTRY

- Chemistry 1 & 2 General Chemistry 6 cr 8 wk A,C,D G(Peters) 252, 57 Oberlander, Zajicek
A study of the fundamental chemical laws and theories, with the object of giving the student a sound scientific training through a course in chemistry.
- Chemistry 27 Analytical Chemistry 4 cr 8 wk B,D G252, 228 Roberts
A broad look at the principles of analytical chemistry, for students not majoring in chemistry. Basic laboratory techniques and operations of quantitative analysis. Not acceptable for major credits except by special arrangement. Prerequisite, Chemistry 2 or 4.
- Chemistry 29 Qualitative Analysis 4 cr 8 wk C,D G252, 257 Wynne
Systematic semi-micro analysis in a study of the principles and laws of the behavior of solutions of electrolytes. Prerequisites, Chemistry 2 or 4 (or equivalent).

Chemistry 33 Organic Chemistry 4 cr 8 wk A,D G252, 33
McEwen

A short course intended to satisfy the requirements in this field for all students who do not specialize in chemistry. Prerequisite, Chemistry 2.

DEPARTMENT OF ECONOMICS

Economics 25 Elements of Economics 3 cr 8 wk B Mach W36
Chaudhry

Definitions and introductory principles of production, exchange, and the financial organization of society, with a short survey of the economics of distribution and the use of wealth and income.

Economics 26 Problems of the National Economy 3 cr 8 wk C
Mach W36 Miller

A continuation of Course 25. Current problems, including international economic planning in peace and war. Prerequisite, Economics 25.

Economics 56, 156 Business Fluctuations and Forecasting 3 cr
8 wk A Mach W 36 Miller

Nature and causes of business fluctuations; methods of forecasting; government policy for stability; utility of available statistical data as guides to private and public policy. Prerequisites, Economics 25, 53 or Finance 55.

Economics 73, 173 Modern Economic Theory and Analysis 3 cr
8 wk A Mach 34 Chaudhry

Micro-economic analysis; types of markets; applications of linear programming, theory of games and other techniques for rational business planning; balancing forces in free-enterprise economy. Prerequisite, Economics 25.

DEPARTMENT OF ENGLISH

English 1-1 English Composition 2 cr 6 wk B B316 Stone

English -2 English Composition 2 cr 8 wk A B316 Wolf

Practice in exposition for college and professional use reinforced by adult readings and an introduction to literary criticism.

English 2-1 English Composition 2 cr 6 wk C B314 Barron

English -2 English Composition 2 cr 8 wk B B314 Gozzi
Continuation of English 1.

English 25-1 Masterpieces of Western Literature 3 cr 6 wk B
B325 Williams

English -2 Masterpieces of Western Literature 3 cr 8 wk A
B314 Ratner

An analysis of selected masterpieces designed to enrich the student's appreciation of literary values and to sharpen his understanding of abiding human issues.

- English 26-1 Masterpieces of Western Literature 3 cr 6 wk C
B325 Stone
- English -2 Masterpieces of Western Literature 3 cr 8 wk B
B206 Weston
Continuation of English 25.
- English 57, 157 Major American Writers 3 cr 6 wk C B316
Williams
Selected major American writers of the nineteenth and twentieth centuries, including Emerson, Hawthorne, Longfellow, Lowell, James, Adams, Fitzgerald, and Hemingway.
- English 58, 158 Major American Writers 3 cr 8 wk A B325
Gozzi
Selected major American writers of the nineteenth and twentieth centuries, including Cooper, Poe, Melville, Thoreau, Whitman, Twain, Crane, Dreiser, Wolfe, and Faulkner.
- English 60, 160 History of the English Language 3 cr 8 wk A
B305 Duckert
The development of English, including a study of vocabulary and usage levels, grammars, and dictionaries. Special attention to matters crucial to the teaching of English in secondary schools.
- English 61, 161 History of English Literature 3 cr 6 wk B B212
Helming
A study of the major phases of English literary history. Representative writers from Chaucer to Dryden will be examined.
- English 62, 162 History of English Literature 3 cr 8 wk A
B212 Weston
A study of representative English writers from the eighteenth century to the present. A continuation of English 61 but may be elected independently.
- English 66, 166 Chaucer 3 cr 8 wk C B212 Duckert
The major works, especially *Troilus* and selected *Canterbury Tales*, as combinations of medieval art and thought with pre-Renaissance motifs and Chaucer's genius for realism.
- English 67, 167 Shakespeare 3 cr 8 wk C B303 Wolf
The dramatic art of Shakespeare as revealed in a study of approximately twenty plays.
- English 85, 185 Modern European Drama (in translation) 3 cr
6 wk A B303 Barron
Major modern dramatists beginning with Ibsen and including Chekhov, Pirandello, Strindberg, Giraudoux, Shaw, and others. Emphasis on comparative currents in various European nations.
- English 87, 187 Modern Novel: 1890-1920 3 cr 8 wk B B303
Ratner
The expanding form of the novel and increasing interest in social causes as exhibited in some twelve novels.

English 203 Middle English 3 cr 6 wk C B456 Helming
The language of Chaucer and the medieval romances. This (or 201) required of all English majors.

English 251 Shakespeare 3 cr 8 wk B B456 O'Donnell
A close study of two comedies, two histories, and two tragedies.
Prerequisite, English 155.

DEPARTMENT OF GERMAN-RUSSIAN

German 2 Elementary German 3 cr 6 wk B B208 Hauser
Conversation, reading, grammar, and composition.

German 1, 2 Intensive Elementary 6 cr 6 wk A, C B210
Schiffer
Conversation, reading, grammar, and composition. Covers German 1 and 2 in six weeks, that is, a whole year of elementary German. Admission by permission of department. Students may enroll only for this sequence and for no other courses.

German 7 Intermediate 3 cr 6 wk A B208 Stawiecki
Reading, conversation, composition. Grammar review. Prerequisites, German 1 and 2. (Covers the first half of a year's course in intermediate German.)

German 8 Intermediate 3 cr 6 wk B B210 Weeks
Reading, conversation, composition. Grammar review. Prerequisites, German 1 and 2 and German 7. (Covers the second half of a year's course in intermediate German.)

German 67 German Masterpieces in Translation 3 cr 6 wk C
B208 Hauser
Literary works ranging from the Middle Ages to the present. Admission by permission of department.

German 270 Kafka 3 cr 6 wk B B274 Heller
Proseminar. Kafka. An intensive study of major works.

German Graduate Reading 0 cr 6 wk C B274 Heller
Designed for graduate students preparing for their M.A. or Ph.D. reading examination. No previous knowledge of German required.

Russian 2 Elementary Russian 3 cr 6 wk B B302 Tikos
Grammar, exercises in composition and conversation, selected readings. Prerequisite, previous language training.

Russian 1, 2 Intensive Elementary 6 cr 6 wk A, C B302 Davis
Grammar, exercises in composition and conversation, selected readings. Prerequisite, previous language training. Covers Russian 1 and 2 in six weeks, that is, a whole year of elementary Russian. Admission by permission of department. Students may enroll only for this sequence and no other courses.

- Russian 7 Intermediate 3 cr 6 wk A B203 Gladir
A review of the fundamentals of grammar followed by more advanced study of grammatical construction and idiom. Composition, conversation, and readings in Russian fiction. Prerequisite, Russian 1, 2. (Covers the first half of a year's course in intermediate Russian.)
- Russian 8 Intermediate 3 cr 6 wk C B203 Gladir
A review of the fundamentals of grammar followed by more advanced study of grammatical structure and idiom. Composition, conversation, and readings in Russian fiction. Prerequisites, Russian 1, 2, and 7. (Covers the second half of a year's course in intermediate Russian.)
- Russian 61 Advanced Russian 3 cr 6 wk A B307 Tikos
Building vocabulary and improving reading ability through selections from the Classical and Soviet Periods. Compositions and classroom discussions in Russian on reading material are required. Prerequisites, Russian 7 and 8.

DEPARTMENT OF GOVERNMENT

- Government 25 American Government 3 cr 6 wk A Mach W26 Steamer
A study of the principles, machinery, dynamics and problems of American national government.
- Government 56, 156 The Legislative Process 3 cr 8 wk B Mach W23 Havard
The functions of national and state legislatures, legislative procedures, and the role played by political parties and pressure groups in the legislative process.
- Government 63, 163 Political Parties and Elections 3 cr 6 wk A Mach W23 Healy
A study of the American political process, with emphasis on parties, pressure groups, and public opinion.
- Government 65, 165 Constitutional Law 3 cr 6 wk C Mach W23 Steamer
An historical study of the United States Constitution as interpreted by decisions of the Supreme Court.
- Government 66, 166 American Political Thought 3 cr 8 wk C Mach W25 Havard
A study of the development of American political thought from colonial times to the present.
- Government 95, 195 Seminar. The Common Market and European Politics 3 cr 6 wk B Mach W25 Vile
- Government 277 Directed Studies in Politics 3 cr 6 wk C Mach W31 Vile
The study in depth of a particular aspect of political behavior. The content of this course will vary with the particular research interests of the instructor and the students.

Government 290 Comparative Government—Great Britain and the Commonwealth 3 cr 6 wk A Mach W31 Vile
An historical and functional analysis of the institutions of government in modern democracies and dictatorships. Prerequisite, Government 26.

DEPARTMENT OF HISTORY

- History 5-1 Modern European Civilization 3 cr 6 wk B B227
Williams
- History -2 Modern European Civilization 3 cr 6 wk A B227
Gagnon
The historical development of the western European countries, their ideas and institutions.
- History 6-1 Modern European Civilization 3 cr 6 wk B B308
Greenbaum
- History -2 Modern European Civilization 3 cr 6 wk A B308
J. Thompson
A basic survey course covering the period from 1815 to the present.
- History 25 The Development of American Civilization 3 cr 6 wk
B B310 J. Thompson
A survey of the American national growth.
- History 26 The Development of American Civilization 3 cr 6 wk
C B310 Smith
A survey of the national development including political, social, economic, and cultural factors in the growth of American democracy. This course covers the period from 1865 to the present.
- History 63, 163 History of American Thought and Culture 3 cr
6 wk A B310 A. W. Thompson
The basic strands of American thought and their reflection in American culture. This course deals with the period before 1865. Hist. 63 or 64 may be elected independently.
- History 64, 164 History of American Thought and Culture 3 cr 8 wk
B B312 A. W. Thompson
The basic strands of American thought and their reflection in American culture. This course deals with the period after 1865. Hist. 63 or 64 may be elected independently.
- History 75, 175 Europe in the Enlightenment, 1685-1789 3 cr
6 wk C B308 Greenbaum
Civilization of Western Europe in the eighteenth century, its social milieu, intellectual setting, institutional forces, religious tendencies, aesthetic contributions. and the growth of revolutionary spirit.
- History 78, 178 France Since 1789 3 cr 6 wk C B312 Gagnon
A study of selected, formative political crises from 1789 to the present, and their settings in the economic, social and intellectual life of modern France.

History 82, 182 Diplomatic History of the United States 3 cr 6 wk
B B323 Smith
The development of American foreign relations, 1776 to the present. Prerequisites. History 25, 26, or permission of the instructor.

DEPARTMENT OF MATHEMATICS

Mathematics 1 Introductory Mathematics I 3 cr 8 wk B Mach
E35

Basic set-theoretic and axiomatic concepts, number systems and equations. A study of elementary functions, algebraically and by the methods of analytic geometry.

Mathematics 2 Introductory Mathematics II 3 cr 8 wk A Mach
E35

A terminal course intended for students whose curriculum calls for just one year of mathematics. A continuation of Mathematics 1, including topics from the calculus, statistics, and mathematics of finance. Prerequisite, Math 1.

Mathematics 6 Introductory Calculus for Engineering 4 cr 8 wk
A Mach W21

Continuation of Math 5. Prerequisite, Math 5.

Mathematics 7 Algebra and Trigonometry 3 cr 8 wk C Mach
W21

For freshman engineers who are deficient in trigonometry. Fractions, quadratic equations, exponents, logarithms, variation, determinants of the second and third orders, and plane trigonometry.

Mathematics 9 Analytic Geometry and Calculus I 3 cr 8 wk B
Mach W21

Logic, sets, topics from algebra, introduction to analytic geometry, functions, limits and derivatives, differentiation of algebraic functions, tangent and normal lines. Prerequisite, proficiency in trigonometry.

Mathematics 53, 153 Introduction to Modern Algebra 3 cr 8 wk
A Mach W27

Basic concepts, groups, rings, the real and complex fields. Prerequisite, Math 30 or 31.

Mathematics 85, 185 Introductory Modern Analysis I 3 cr 8 wk
C Mach W27

Real and complex numbers. Basic topology of the real number system. Limit concept and continuity. Differentiation. Partial differentiation. Prerequisite, Math 91.

Mathematics 113S Modern Geometry 3 cr 8 wk B Mach W27

Primarily an axiomatic study of Euclidean geometry based on postulates which include a distance function; a preliminary study of sets, functions, operations, and relations; brief mention of non-Euclidean geometrics. Not open to Mathematics majors. Primarily for secondary school teachers.

DEPARTMENT OF MICROBIOLOGY

- Microbiology 1 Introductory Microbiology 3 cr 6 wk B, D
PHB208, 36 Czarnecki
General and broad considerations of microorganisms, their activities, and their significance to human and animal health. Not for major credit.

DEPARTMENT OF MUSIC

- Music 1 Music Appreciation—Introduction to Music 3 cr 6 wk C
O.C. Aud. Schwartz
Open to all students not majoring in music. Previous musical training is not required. Basic music materials, principles of design, and the cultural significance of representative works from the ninth century to the present are studied and discussed.

DEPARTMENT OF PHILOSOPHY

- Philosophy 25 Introduction to Philosophy 3 cr 6 wk C B206
Brentlinger
An introduction to some of the most important of the general questions, ideas, theories, and methods of inquiry which have given direction to Western thought.
- Philosophy 31 Introduction to Logic 3 cr 6 wk A B206 Clay
An inquiry into the nature of critical thinking, including (1) the functions of language, (2) the structure of deductive argument, (3) a glimpse at inductive methods.
- Philosophy 52, 152 History of Modern Philosophy 3 cr 6 wk A
B312 Shute
Continuation of Phil. 51 from the Renaissance and the rise of modern science to 19th century idealism, positivism and voluntarism.
- Philosophy 81, 181 Philosophy of Religion 3 cr 6 wk C B227
Shute
Readings in contrasting religious philosophies followed by analysis of concepts involved in understanding religion as coherently related to the other aspects of experience.

DEPARTMENT OF PHYSICS

- Physics 6 General Physics 3 cr 8 wk B, D H100, 108 Gray
Heat, electricity, and magnetism. Prerequisites, Math 5; Phys 5; Math 6 concurrently.
- Physics 67, 167 Statistical Mechanics and Information Theory 3 cr
8 wk A H203 Fuller
A study of the concepts of entropy, information, and order. Prerequisite, Phys 61.

Physics 200 Special Problems: Introduction to Quantum Field Theory 3 cr 8 wk B H203 Fuller
Quantum electrodynamics and other related topics. Prerequisite: Phys 212.

DEPARTMENT OF PSYCHOLOGY

- Psychology 1 General Psychology 3 cr 6 wk C B61 Price
An introduction to the principles and study of behavior. Topics considered include development of behavior, sensation, learning, thinking, motivation, intelligence, attitudes, and personality.
- Psychology 56, 156 Educational Psychology 3 cr 6 wk A B61 Wagner
Psychological facts and principles of development, learning and measurement as applied to educational situations. Prerequisite, Psych 1 or 5.
- Psychology 65, 165 Child Psychology 3 cr 6 wk B B61 Price
The psychological development of the child including maturation and development of behavior, language, emotions, intelligence, social behavior, motivation and personality. Nursery school observation and practice. Prerequisite, Psych 1 or 5.
- Psychology 81, 181 Psychological Tests 3 cr 6 wk E B3 Cann
Survey of tests of intelligence, aptitude, interest, personality and adjustment. Test rationale, construction, characteristics, uses and evaluation are emphasized. Prerequisite, Psych 1 or 5.
- Psychology 257 Seminar 2 cr 6 wk B B3 _____
Selected topics of current significance in psychology. Research studies will be analyzed and theoretical advances explored. Prerequisite, permission of instructor.

DEPARTMENT OF ROMANCE LANGUAGES

- French 7, 8 Intermediate French; French Life and Culture 6 cr 8 wk A, C B202 Johnson
Offered as if simultaneously but sequential in course content. To meet two hours per day, five days per week. Students would elect French 7, 8 as a package. Open to new freshmen by placement, transfers, and students who failed French 7 last year.
- French 54, 154 French Literature of the Twentieth Century 3 cr 6 wk B B202 Niedzielski
A critical study of the contemporary French novel from Proust to the present. Open to graduates and undergraduates.
- French Graduate Reading Course 0 cr 6 wk A B256 _____
For graduate students wishing to prepare for the graduate reading examination.
- Spanish 1, 2 Elementary Spanish 6 cr 8 wk A, C B207 Stais
An indivisible full course equivalent to two semesters of elementary work.

- Spanish 7 Intermediate Spanish 3 cr 6 wk A B205 _____
 For upperclassmen who have completed Spanish 1-2, and those freshmen and transfer students who are found qualified by placement examination. Training in the language skills, with emphasis on speaking and understanding; readings in cultural and literary texts. Students completing Spanish 7 will fulfill the language requirement by taking Spanish 8.
- Spanish 8 Intermediate Spanish: Hispanic Culture 3 cr 6 wk B B207 Greenfield
 For students who have completed Spanish 6 or 7, or by special permission of the department. Continuation of language skill training, with emphasis on reading and discussion of cultural and literary texts; composition.

DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

- Sociology 25 Introduction to Sociology 3 cr 6 wk B Mach E37
 A study of the social order, and of the individual considered as a member of his various groups.
- Sociology 51, 151 Urban Sociology 3 cr 6 wk A Mach E34 Manfredi
 A study of urban American social conditions with reference to population, ecology, health, and the classically defined institutional complexes and their problems of adjustment. Prerequisite, Soc 25.
- Sociology 56, 156 Race Relations 3 cr 6 wk A Mach E36 _____
 The social, economic and political aspects of racial and ethnic problems in the United States, plus briefer consideration of similar problems in Africa and Asia. Prerequisite, Soc 25.
- Sociology 57, 157 The Family 3 cr 6 wk B Mach E34 _____
 The development of the customs of courtship and marriage of the contemporary American family. The basic causes of changes and trends of the family. Prerequisite. Soc 25.
- Sociology 78 Criminology 3 cr 6 wk C Mach E36
 The nature of crimes and the factors underlying criminal behavior. The machinery of justice; the law, courts, police systems, and correctional institutions. Prerequisite, Soc 25.
- Sociology 82 Sociological Theory 3 cr 6 wk C Mach W33 Manfredi
 An examination of contributions of European and American writers who have concerned themselves with theories of the origin, growth, and development of human social organization. Prerequisite, Soc 25.
- Sociology 95, 195 Research Methods 3 cr 6 wk C Mach E33 Park
 A consideration of research methods and techniques employed in sociology. Each student is required to design and complete a research project of limited scope. Prerequisite, Soc 25.



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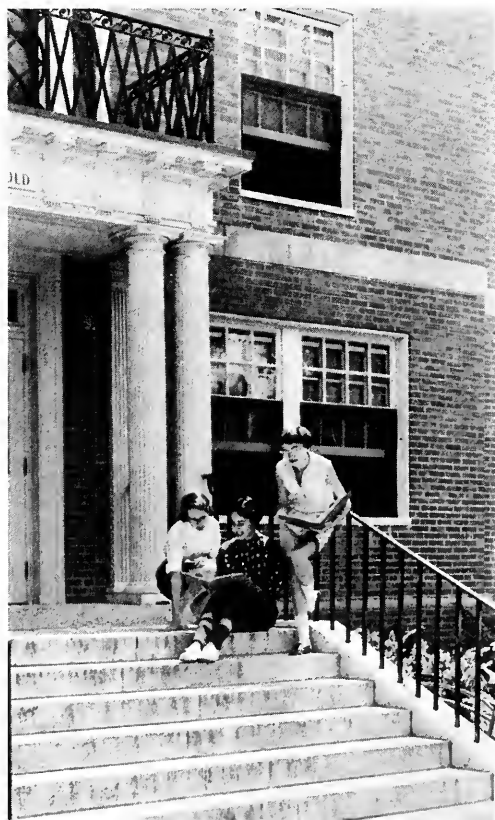






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Anthropology 63, 163 Introductory Anthropology 3 cr 6 wk A
Mach E37 Fraser

An introduction to the fields of anthropology; human evolution and race; prehistory; variations among societies in kinship, economic, political and religious organizations.

Anthropology 73, 173 The Peoples of Southeast Asia 3 cr 6 wk B
Mach W33 Fraser

An introduction to the history and ethnography of the native cultures of Southeast Asia, including consideration of the peasant populations and their expanding role in the development of modern Southeast Asian states.

DEPARTMENT OF SPEECH

Speech 3 Oral Communication 2 cr 6 wk C B109 Labelle
Introductory instruction and practice in oral self-expression: literary interpretation and public speaking.

Speech 81, 181 Phonetics 3 cr 6 wk B B110 Labelle

A scientific study of the sounds of English; descriptive analysis of individual vowels and consonants. Study of the International Phonetic Alphabet; training in auditory discrimination.

Speech 82, 182 Introduction to Clinical Practice 3 cr 6 wk A
B108 Hanifan

Training in basic diagnostic and therapeutic techniques for various speech handicaps; emphasis on articulation defects, delayed speech and stuttering. Supervised practice required. Prerequisites, Speech 81, 85.

Speech 86, 186 Rehabilitation of the Acoustically Handicapped 3 cr 6 wk C B108 Hanifan

Training in the techniques of speech therapy, auditory training, and speech reading for children and adults with hearing impairments. Laboratory practice under supervision. Prerequisite, Speech 84.

Speech 88, 188 Advanced Clinical Practice 3 cr 6 wk B B108
Hegarty

Advanced training in clinical practice under supervision; special consideration of organic speech disorders. Prerequisite, Speech 82.

DEPARTMENT OF ZOOLOGY

Zoology 1 Introductory Zoology 3 cr 8 wk C, D M Aud. 336
Spandorf

Introduction to the principles of biology with special reference to the zoological aspects; protoplasm and the cell, vertebrate anatomy and physiology, embryology, genetics, principles of classification, comprehensive survey of major groups of the animal kingdom, and evolution.

Zoology 54 Natural History 3 cr 6 wk C, D M138, 338 _____

Designed to orient the student to features of sky, climate, and terrain, of importance to the teaching naturalist. Methods of identification, collecting data, etc. Prerequisites, Bot 1, Zoo 1.

INTERDEPARTMENTAL COURSES

Computer Science 21 Introduction to Automatic Computation 1 cr
6 wk C by arrgt. Rowell

An introduction to the programming of digital computers. Topics included are basic programming systems, compiler language, and the logic of programming and compilation. Prerequisites, Math 2 or equivalent.

Introduction to Computer Programming 0 cr 6 wk by arrgt.
Rowell

The course content is similar to C. S. 21 but designed as a non-credit service course for faculty, graduate students, and Senior Honors students regularly enrolled in the University working on theses, but includes more laboratory work (by arrangement) and emphasis on individual instruction.

School of Business Administration

DEPARTMENT OF ACCOUNTING

Accounting 25 Introduction to Accounting I 3 cr 6 wk A Dra
122 Krzystofik

An introduction to the principles underlying the collection recording, and interpretation of accounting data.

Accounting 73, 173 Federal Tax Procedure 3 cr 6 wk B Dra
122 Krzystofik

A study of federal income tax laws and regulations as they affect individuals; the preparation of tax returns. Prerequisite, Acct. 25.

DEPARTMENT OF GENERAL BUSINESS AND FINANCE

Finance 65 Corporation Finance 3 cr 6 wk C Dra 117 Rivers
Social significance of corporate financial behavior, internal administration and control, expansion, capital readjustment, and social control. Prerequisite, Acct. 25 or consent of instructor.

General Business 71 Business Law I 3 cr 6 wk A Dra 117
Burak

The law of contract and sales.

DEPARTMENT OF MANAGEMENT

Management 61 Principles of Management 3 cr 6 wk B Dra
117 Claunch

The basic course dealing with the fundamental principles and practices of the managerial process in business enterprises.

Management 64 Personnel Management 3 cr 6 wk A Dra 111
Claunch

The principles and policies followed by management in the procurement, development, direction and control of personnel.

DEPARTMENT OF MARKETING

- Marketing 53 Principles of Marketing 3 cr 6 wk C Dra 122
Drew-Bear
The problems involved in the distribution of industrial and consumer goods, including wholesaling, retailing and sales promotion activities.
- Marketing 54 Salesmanship and Sales Management 3 cr 6 wk
B Dra 111 Johnson
The principles and practices of selling, the management of sales personnel and the control of sales operations.
- Business Administration 200 Problems in Business Administration
3 cr 6 wk By arrgt. ——
Independent study and research on selected problems in Business Administration. Permission of the instructor and the Dean required.

School of Education

- Education 51, 151-1 History of Education 3 cr 8 wk A Ed
227 Wellman
- Education -2 History of Education 3 cr 8 wk B Ed
226 Osgood
Educational movements are traced from early Greece to the present with the aim of better understanding of modern problems.
- Education 52, 152 Principles and Methods of Teaching 3 cr 8 wk
B Ed 225 Thelen
By means of discussion, case studies, and current educational literature, teaching ideals and procedures are set up and applied to the major teaching fields.
- Education 53, 153 Educational Tests & Measurements 3 cr 8 wk
A Ed 126 Lovering
The most serviceable tests for measuring achievement are considered; test construction, administration, scoring, and interpretation of results are studied and applied to the classroom.
- Education 60, 160 Elementary School Curriculum 3 cr 8 wk B
Ed 22 Darnell
From the standpoint of content and methodology. Emphasis on the unit method and the activity program.
- Education 61, 161 Elementary Reading & Language Arts 3 cr
8 wk C Ed 123 Benz
Discussions and demonstrations of principles and effective practices in the teaching of all phases of the language arts.
- Education 62, 162 Elementary School Arithmetic 3 cr 8 wk A
Ed 222 Hall
Methods and materials in teaching arithmetic in elementary grades will be studied and demonstrated.

- Education 64, 164 Principles of Elementary Education 3 cr 8 wk
B Ed 228 Benz
The aims, organization, program and pupil population of the elementary school and the relationship between elementary and secondary schools are the areas of concentration.
- Education 66, 166 Audiovisual Materials in Teaching 3 cr 6 wk
A Ed 124 Wyman
Study is made of available machines, materials and techniques for teaching groups of students.
- Education 72, 172 Vocational Education in Agriculture 3 cr 6 wk
A Ed 223 Jones
A survey of vocational agricultural education and an introduction to teaching of vocational agriculture at the secondary level. Admission by permission of instructor.
- Education 75, 175 Techniques of Teaching Vocational Agriculture 3 cr 6 wk B Ed 223 Jones
The materials, methods, policies, and special requirements of Massachusetts for teaching vocational agriculture and related subjects in high schools and in special county agricultural schools. Prerequisite, Education 72 or permission of the instructor.
- Education 77, 177 Principles of School Guidance 3 cr 8 wk A
Ed 128 Pippert
The need for guidance in the schools, the nature of guidance, and an overview of an adequate guidance service for a school system.
- Education 88, 188 Secondary School Curriculum 3 cr 8 wk C
Ed 225 Barfield
Learning materials and activities and their organization in various teaching fields.
- Education 120 Construction of Audiovisual Aids 3 cr 6 wk B
Ed 122 Sleeman
Designed to help teachers and audiovisual specialists to prepare audiovisual materials for use in an educational program. Students will prepare slides, graphics, recordings, still pictures, motion pictures. Prerequisite, Ed 166.
- Education 121 Teaching with Television and Radio 3 cr 6 wk C
Ed 226 Wyman
Provides the classroom teacher with an understanding of television and radio so that he can participate in the preparation, utilization, and evaluation of educational programs using these media. Prerequisite, Ed 166.
- Education 122 Photography in Education 3 cr 6 wk A Ed 122
Sleeman
Theory and practice of taking and processing photographs for use in educational activities. Prerequisites, Ed 120 and 166.
- Education 130 Elementary School Science 3 cr 8 wk B Ed 222
Hall
Methods and new materials of instruction.

- Education 211 Community Relations for School Personnel 3 cr
8 wk A Ed 20 Oliver
The development of good public relations policies and the techniques of assisting lay people in interpreting school activities, policies, and objectives.
- Education 214 Principles of Supervision 3 cr 6 wk A Ed 230
Bertrand
Principles and problems of supervision and the exercise of educational leadership in the improvement of instruction in the elementary curriculum and the secondary school content fields.
- Education 215-1 Workshop: Gifted 3 cr 6 wk C Ed 230
McManamy
Designed to include opportunity for work with selected children of upper elementary levels. Discussion sessions will relate practical experience to theory and to research studies.
- Education 215-2 Workshop: Elementary School Social Studies 3 cr
8 wk C Ed 22 Darnell
Cross cultural studies and their implications for international education will be developed and demonstrated with elementary school children.
- Education 215-3 Workshop: Kindergarten 3 cr 6 wk C Ed 124
Practicum experiences with pre-school children in which students will work in the laboratory school kindergarten preparing materials, and experiencing new methods in teaching the children. Prerequisite: Ed 216-6 or kindergarten teaching experience. Ed 216-6 may be taken concurrently.
- Education 215-4 Workshop Remedial Reading 3 cr 8 wk C
Ed 125 O'Leary
This may be taken in conjunction with Techniques in Remedial Reading (Ed. 265) by a selected group of experienced teachers. It involves working with individual elementary school pupils in the Remedial Reading Clinic. Prerequisite, Ed 160.
- Education 216-1 Seminar: Secondary Methods 3 cr 6 wk A
Ed 130 Anthony
An exploration in depth of several fundamental principles of teaching. Prerequisite, Ed 52 or its equivalent.
- Education 216-2 Seminar: Gifted 3 cr 6 wk B Ed 230
McManamy
An exploration of various methods of giving enriched academic experiences to the gifted in public schools. Prerequisite, teaching experience.
- Education 216-4 Seminar: Developments in Secondary Science
3 cr 8 wk A Ed 225 Barfield
A critical evaluation of the current literature, yearbooks, research, and experiments in the curriculum and teaching of secondary school science.

- Education 216-5 Seminar: Developments in Secondary Mathematics
3 cr 8 wk C Ed 227 Thelen
A critical evaluation of the current literature, yearbooks, research, and experiments in the curriculum and teaching of secondary school mathematics.
- Education 216-6 Seminar: Kindergarten 3 cr 6 wk B Ed 126
Research, lectures, demonstrations, and group discussions for developing various techniques in the organization and administration of kindergarten education. Prerequisite: Elementary certification.
- Education 230 Comparative Education 3 cr 8 wk A Ed 226
Wellman
Studies of contemporary systems of education in foreign countries. Prerequisite, Ed 151.
- Education 231 Contemporary Problems in Education 3 cr 8 wk
B Ed 227 Osgood
An intensive examination of several major issues confronting American education today. Evaluation and criticism of proposals being offered for their solution.
- Education 241 Administration of School Guidance 3 cr 8 wk
B Ed 128 Pippert
Operative framework of guidance programs in terms of personnel, functions, physical facilities, institutional integration, finance and laws. Prerequisites, Ed 177, teaching experience and permission of the instructor.
- Education 263 Diagnosis of Reading Difficulties 3 cr 8 wk A
Ed 125 Byrne
Theory and interpretation of diagnostic procedures to develop a background of information in the diagnosis and treatment of reading difficulties. Prerequisite, Ed 161.
- Education 264 Individual Case Studies of Reading Problems 3 cr
8 wk B Ed 125 Byrne
Practical experience in the gathering and summation of information to form a case study of a child in order to determine the seriousness of the reading problem and the underlying causes and to make recommendations for their correction or remediation. Prerequisite, Ed 263.
- Education 265 Techniques in Remedial Reading 3 cr 8 wk B
Ed 123 O'Leary
Methods and materials in diagnosis and remedial instruction. Prerequisite, Ed 161.
- Education 283 Comprehensive High School 3 cr 6 wk B Ed
130 Anthony
Critical study of the historical development, objectives, course offerings, and crucial issues confronting the all-purpose high school.

Education 291 Educational Research 3 cr 8 wk A Ed 126
Duncan

The principles and methods of research with special emphasis upon the technique used in Education. Statistics are studied chiefly from the standpoint of reporting and understanding the results of research.

NOTE: High School manual arts teachers may wish to take Mechanical Drawing in High Schools (M.E. 104), listed with the offerings of the School of Engineering.

School of Engineering

Civil Engineering 27 Plane Surveying 3 cr Hendrickson

The basic principles of mensuration; use of tape, transit, and level; a brief consideration of route surveying for forestry majors. Prerequisites, Math 5 or Math 7. Three 40-hour weeks: July 15-August 2. Engineering Building

Electrical Engineering 85 Electrical Measurements 3 cr Roys and Laestadius

Theory and practice of electric and magnetic measurements; accuracy, precision, and limitations of measurements devices. Prerequisite, Elect Engineering 42. Three 40-hour weeks: July 29-August 16; August 19-September 6. Engineering Building

Mechanical Engineering 23 Materials Processing Laboratory I 3 cr Patterson and Costa

Welding and machine shop, use of various machine and hand tools used in metal working. Three 40-hour weeks: July 29-August 16; August 19-September 6. Engineering Shop

Mechanical Engineering 25 Materials Processing Laboratory II 2 cr Hopkins and Patterson

An understanding of the weldability of metals using manual and automatic processes applicable to machine design and industrial processes. Prerequisite, Mech. Engin I. Two and one-half 30-hour weeks: June 3-June 19; June 19-July 5. Engineering Shop

Mechanical Engineering 26 Materials Processing Laboratory III 2 cr Costa and Bates

An understanding of the machining of metals using standard machine tools applicable to machine design and industrial processes. Prerequisite, Mech. Engin I. Two and one-half 30-hour weeks: June 3-June 19; June 19-July 5. Engineering Shop

Mechanical Engineering 104 Mechanical Drawing in High Schools 3 cr A, B, D Kroner

Discussion of course material for pre-engineering high school mechanical drawing courses. Theory and laboratory practice. Limit: 30 participants. June 24-July 12. Engineering Building

School of Home Economics

Management and Food Economics 130 Home Management for Today's Families 1 cr or 0 cr Dr. Esther C. Bratton, Cornell University, and Staff

Emphasis on management principles involved in decision-making in the home. For teachers, extension workers and others in an advisory capacity with families. July 8-12. Daily, Monday through Friday, 9-5. Skinner Hall

Home Economics Education 182 Curriculum in Home Economics 1 cr or 0 cr Sullivan

Philosophy and content of newer curricula, development of resource units to meet the present day needs of secondary school students. June 24-28. Daily, Monday through Friday, 9-5. Skinner Hall

Management and Food Economics 210 Seminar in Family Economics 1 cr or 0 cr Knapp, Miller, Higgins

(1) The Consumer in our Economy. (2) Housing the Family. Basic concepts of economics and their application to the consumer; the economics of home building, including a consideration of construction costs and the financing procedures. July 15-19. Daily, Monday through Friday, 9-5. Skinner Hall

School of Nursing

Nursing 54(S)G.N. Interpersonal Relations in Nursing 2 cr PHB Hall

An introduction to interpersonal relations in nursing. Opportunity will be provided for directed clinical experience. July 1-13, 9-12 noon and 1-3 p.m. daily.

Nursing 58(S)G.N. Public Health Nursing 3 cr PHB Byrne & Wisnieski

An introduction to Public Health Science and Public Health Nursing Practice designed primarily for nurses employed in community nursing services. June 24-July 12, Daily 9-5.

Nursing 60(S)G.N. The Direction of Learning in Nursing 2 cr PHB Griffin

The role of the teacher and learner in various learning experiences related directly to nursing. July 15-26, 9-12 noon and 1-3 p.m. daily.

School of Physical Education

Men's Physical Education 1a, 1b Physical Education (Freshman) 1 cr 6 wk E HP Staff

Designed to develop an adequate knowledge of and a basic technique in physical education activities through the medium of individual, dual and team sports. Not quality point credit.

- Men's Physical Education 31a, 31b Physical Education (Sophomore)
1 cr 6 wk E HP Staff
A continuation of Phys Ed 1a and 1b.
- Men's Physical Education 80 Driver Education Instructor Course
3 cr 6 wk A HP Briggs
Driver Education and Driver Training at the Instructor's level
leading to Instructor Certification.
- Women's Physical Education 1a, 1b Physical Education (Freshman)
1 cr 6 wk E HP Staff
Designed to develop knowledge and basic skills in physical education activities through the medium of individual and dual sports.
Not quality point credit.
- Women's Physical Education 31a, 31b Physical Education (Sophomore)
1 cr 6 wk E HP Staff
A continuation of Women's Phys Ed 1a and 1b.

Summer Session Features at Other New England Land-Grant Universities

The following special summer courses are available at the institutions listed below:

UNIVERSITY OF CONNECTICUT

American Maritime History—a unique history course in the setting of Mystic Seaport.

Graduate program in Physical Education.

Graduate program in Industrial Arts Education.

Administrative Science Seminars:

- (a) Elementary School Principals
- (b) Junior High School Leadership
- (c) Secondary School Principals
- (d) The Superintendency

Undergraduate and graduate courses in theatre, offered in conjunction with the Nutmeg Summer Playhouse

UNIVERSITY OF MAINE

Field Course in Natural History

Natural Science Education (Coastal)—Ed X 31s (131s) for Elementary School Teachers; Ed X 41s (141s) for Secondary School Teachers.

This course is intended for anyone who wishes to increase his knowledge of the elementary facts and relationships of the natural environment. The program consists of selected field studies of plants, animals, stars, weather, rocks, and minerals. Special attention will be given to the marine life of the Maine coast. Coursework will consist of field study, lectures, and library assignments. The educational use of natural science information at various grade levels will also be discussed. Enrollment limited to 35. Three credit hours, graduate or undergraduate credit. Three weeks, June 17-July 5, at Goose Cove, Sunset, Maine.

Workshop in Music

Elementary Education (Music)—Ed X 62s (162s), Secondary Education (Music) Ed X 72s (172s)

This workshop is conducted for music teachers and supervisors of music, classroom teachers with no prior experience in teaching music, and administrators. Daily sessions include singing, dancing, listening, use of percussion instruments, piano, autoharp, instrumental and vocal ensembles, and junior high school music. Participation and a realistic approach to the teaching of music is the keynote of the workshop. Cooperative planning by students and staff insures a program best suited to meet individual needs and

interests. Music supervisors will gain many helpful ideas on how to conduct "in-service" training with their own classroom teachers. Enrollment will be limited to 100. Three credit hours, graduate or undergraduate credit. Three weeks, June 17-July 5.

Reading Laboratory

Clinical Practices in Reading—Ed X 11s (111s)

Practice in diagnosing and correcting reading deficiencies in elementary and secondary school children. During the summer session, the clinic enrolls children with reading deficiencies in grades 3-12 for a period of five weeks. Teachers enrolled in the course will work with one or two children. Six credit hours, graduate or undergraduate credit. Six weeks, July 8-August 16.

UNIVERSITY OF NEW HAMPSHIRE

Summer Youth Music Festival

Coeducational

August 18-31, 1963

Now in its 17th year the University of New Hampshire Summer Youth Music School has become one of the most widely attended on the East coast. Approximately 300 high-school boys and girls, representing at least 20 different states are in attendance. Daily classes are held with individual and group instruction, and two public concerts are given by the students. Supervised dormitories, extra-curricula and recreational programs. Guest conductors from America's foremost music schools. For descriptive brochure write: Prof. Karl H. Bratton, Chairman, Department of Music, University of New Hampshire, Durham, N.H.

Public Library Techniques

July 28-August 10, 1963

Now in their 9th year, these non-credit courses, part of a four-year program, are planned for library workers needing a knowledge of library skills, techniques, and an understanding of the purpose, organization, and activities of small public libraries. The courses cover administrative practice, organizing materials, cataloguing, selecting and promoting reading for children, young people and adults. A certificate is awarded to students completing the prescribed number of courses. For descriptive brochure write: Conferences and Institutes, University of New Hampshire, Durham, New Hampshire.

UNIVERSITY OF RHODE ISLAND

Art Workshop by the Sea, July 1-August 9

Summer Course in Gas Chromatography, July 15-19

Counseling and Guidance Training Institute, July 1-August 9

Conference on Reading and the Language Arts, July 1-12

Conference on the Social Studies: The Foreign Policy of the United States in this Revolutionary Age, July 8-19

Theatre Workshop, July 1-August 9

UNIVERSITY OF VERMONT

Saint Cloud Method of Teaching French in the Elementary School
Administration of Physical Education and Athletic Programs

Reading German for Ph.D. Candidates

Workshop in Ethnic Problems and Intergroup Relations

School Library Administration:

Classification and Cataloging of Library Materials

Books and Materials

Warren R. Austin Institute in World Understanding—Lectures and
discussions by international leaders: July 15, 22, 29 and
August 5.

Seminar in Theater Production—This course is offered in connec-
tion with the University's Fifth Annual Champlain Shake-
speare Festival

**UNIVERSITY OF MASSACHUSETTS
SUMMER SESSION**

Application for Undergraduate Students

Prospective undergraduate students should fill out this application, the Summer Session Residence form, and the Certificate of Residence (if applicable) and send to the Registrar, University of Massachusetts.

This application is primarily for students who attend or have attended other colleges. Under certain circumstances (e.g., for professional improvement), persons who have not attended college may qualify. Such persons should submit a letter to the Registrar with the application stating their academic background and their reasons for wanting to take the courses they have selected. Regularly enrolled students at the University of Massachusetts should secure and file a special Summer Session application at the Registrar's Office.

Mr.

Name Mrs.

Miss Last First Middle

Home address

Street and Number

.....

City State

Date of Birth Sex Single Married

Attendance

Secondary School Dates

Attendance

College(s) attended Dates

If not now attending, what was your reason for leaving?

.....

Have you ever applied for admission to the University of Massachusetts?

If so, when?

Will you commute from home? or require a dormitory room?
(In either case, residence form *must* be submitted)

In order to attend the University of Massachusetts Summer Session, a student must be in good standing (eligible to continue studying) at the college which he attended. Have the following statement completed by your Registrar. A transcript of record is not required.

This is to certify that

Student's name

is (or left) in good standing at

Name of college

and has our approval to take the courses listed on this application.

Date Signed

Title

Tentative Program

The normal program consists of one course during a special session, six credit hours for the six-week term, and eight credit hours in the eight-week term. (Students may take up to nine credit hours without special permission).

List the department, number, title and credits of the course(s) for which you wish to be registered as they appear in the catalog (e.g., Art 33, Freehand Drawing, 3 credits).

Dept. No. Title Class

Special:

Six-weeks:

.....

Eight-weeks:

.....

SPECIAL PROBLEMS

Any student who needs exemption not provided above may apply and **MUST SECURE WRITTEN PERMISSION** for the Summer Session through the offices of the Deans of Men and Women. This must be done prior to May 15, 1963. If no exemption permission has been obtained, the student will be billed for the appropriate charges.

In case of serious health handicap requiring restricted diet, secure written exemption from the Director of the University Health Service and file with the Dean of Men/Women.

Those observing religious dietary laws may, if they can confirm appropriate alternate arrangements, apply to the appropriate University Chaplain for written board exemption, which must then be filed with the Dean of Men/Women.

(Not an application for exemption. Validation must still be obtained from the appropriate office.)

CERTIFICATION OF RESIDENCE

To be entitled to the low tuition rate established for residents of Massachusetts, applicants for admission to the University Summer Session must return this form with the application.

Student's Name

Statement of Town or City Clerk

This will certify that

Parent or guardian's name or student's name if over 21

is a resident of

Town or City

Massachusetts, on 196.....

Date

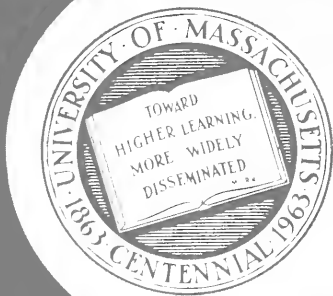
(Seal)

Signed

Title

NOTE: For the purposes of this certification, a person is considered a resident who has established a bona fide residence or domicile in the Commonwealth with the intention of continuing to maintain it as such.

In addition to its program of instruction during the regular academic year and Summer Sessions, the University of Massachusetts has been a focal point for gatherings of educators, research workers, government officials, and citizens who meet to discuss problems related to the advancement of academic, professional, vocational, civic and cultural interests.



UNIVERSITY OF MASSACHUSETTS
BULLETIN

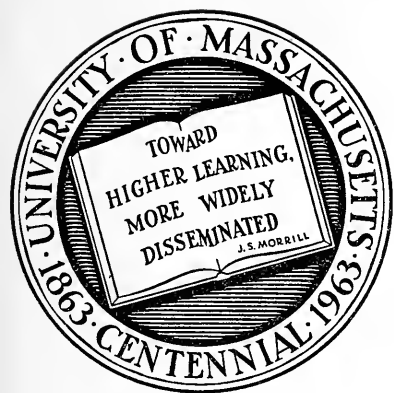
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A

**UNDERGRADUATE
SCHOOLS | 1963-64**





UNIVERSITY
OF
MASSACHUSETTS
Amherst

CATALOGUE OF THE UNIVERSITY
1963-1964

FOREWORD

This Catalogue of the University of Massachusetts presents announcements concerning its Colleges, Schools and Divisions for the sessions of 1963-1964. The University reserves, for itself and its departments, the right to withdraw or change the announcements made in its Catalogue.

Volume LV • MARCH, 1963 • Number II

Published five times a year by the University of Massachusetts in February, March, April, August and November.

Second class mail privileges authorized at Amherst, Mass.

The University Catalogue for the sessions 1963-1964 is part of the Ninety-ninth Annual Report of the University of Massachusetts and as such is part II of Public Document 31, Sec. 8, Chapter 75, of the General Laws of Massachusetts.

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Correspondence

regarding various phases of the University program should be directed as follows:

Office of the President

JOHN W. LEDERLE

Academic Affairs

GILBERT L. WOODSIDE, *Provost*

Admission, Registration and Transcripts

MARSHALL O. LANPHEAR, *Registrar*

Expenses, Payments

WILLIAM THALER, *Associate Treasurer*

Extra-Curricular Activities

WILLIAM D. SCOTT, *Director, Student Union*

Four College Cooperation

GILBERT L. WOODSIDE, *Provost*

Graduate School

EDWARD C. MOORE, *Dean*

Housing for Men

HERBERT A. RANDOLPH, *Housing Supervisor*

Housing for Women

HELEN S. CURTIS, *Dean of Women*

Office of Institutional Studies

LEO REDFERN, *Director*

Loans, Scholarships, Student Employment

ROBERT J. MORRISSEY, *Director, Placement and Financial Aid Services*

Men's Affairs

ROBERT S. HOPKINS, *Dean of Men*

Publications, News

WILLIAM DEMINOFF, *Director of Publications and News Editor*

Short Courses

FRED P. JEFFREY, *Associate Dean, College of Agriculture*

Stockbridge School of Agriculture

FRED P. JEFFREY, *Director*

Student Affairs

WILLIAM F. FIELD, *Dean of Students*

Summer Session

WILLIAM C. VENMAN, *Director*

Veterans' Affairs

GEORGE E. EMERY, *Veterans' Coordinator*

Women's Affairs

HELEN S. CURTIS, *Dean of Women*

Calendar—1963-1964

Spring Semester — 1963

January	3	Thursday	Classes resume at 8 a.m.
	11	Friday	Last day of classes.
	14	Monday	Final examinations begin at 8 a.m.
	22	Tuesday	Final examinations end at 5:30 p.m.
	31	Thursday	Registration.
February	1	Friday	Classes begin at 8 a.m.
	22	Friday	Holiday, no classes.
March	23	Saturday	Mid-term marks close, spring recess begins after last class.
April	1	Monday	Classes resume at 8 a.m.
	11	Thursday	Easter recess begins after last class.
	15	Monday	Classes resume at 8 a.m. Friday class schedule will be followed.
	19	Friday	Holiday, no classes.
May	7	Tuesday	Counseling Day for four-year students.
	9	Thursday	Honors Day.
	22	Wednesday	Last day of classes. Friday class schedule will be followed.
	24	Friday	Final examinations begin at 8 a.m.
	30	Thursday	Holiday, no examinations.
June	3	Monday	Final examinations end at 5:30 p.m.
	7	Friday	
	8	Saturday	} Commencement.
	9	Sunday	

Summer Session — 1963

June	24	Monday	Registration in the morning. Classes begin in the afternoon.
August	2	Friday	Six-week session ends.
	16	Friday	Eight-week session ends.

Calendar

Fall Semester — 1963-64

1963:—

September	12	Thursday	Registration.
	13	Friday	Classes begin at 8 a.m.
October	12	Saturday	Holiday, no classes.
November	2	Saturday	Mid-term marks close.
	11	Monday	Holiday, no classes.
	26	Tuesday	Thanksgiving recess begins after last class.
December	2	Monday	Classes resume at 8 a.m.
	3	Tuesday	Counseling Day for four-year students.
	18	Wednesday	Christmas recess begins after last class.

1964:—

January	2	Thursday	Classes resume at 8 a.m.
	11	Saturday	Last day of classes.
	13	Monday	Final examinations begin at 8 a.m.
	21	Tuesday	Final examinations end at 5:30 p.m.

Spring Semester — 1964

January	30	Thursday	Registration.
	31	Friday	Classes begin at 8 a.m.
February	22	Saturday	Holiday, no classes.
March	21	Saturday	Mid-term marks close.
	26	Thursday	Easter recess begins after last class.
April	6	Monday	Classes resume at 8 a.m.
	20	Monday	Holiday, no classes.
May	6	Wednesday	Counseling Day for four-year students.
	14	Thursday	Honors Day.
	21	Thursday	Last day of classes. Saturday class schedule will be followed.
	22	Friday	Final examinations begin at 8 a.m.
	30	Saturday	Holiday, no examinations.
June	1	Monday	Final examinations end at 5:30 p.m.
	5	Friday	} Commencement.
	6	Saturday	
	7	Sunday	

Board of Trustees

ALDEN CHASE BRETT, B.S., LL.D. (University of Massachusetts), Belmont	1964
ERNEST HOFTYZER, B.S. (Ohio State University), Marion	1964
J. JOHN FOX, LL.B. (Boston University), Boston	1965
MISS VICTORIA SCHUCK, A.B., M.A., PH.D. (Stanford University), South Hadley	1965
DENNIS MICHAEL CROWLEY, B.S., M.S. (University of Massachusetts), LL.B. (Boston College), Boston	1966
MRS. KATHRYN FORAN FURCOLO (Elmira College), (Northeastern Law School), Chestnut Hill	1966
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GEORGE L. PUMPHRET, Dorchester	1967
HARRY DUNLAP BROWN, B.S. (University of Massachusetts), Harbor Coves, North Chatham	1968
JOHN WILLIAM HAIGIS, JR., B.A. (Amherst College), Greenfield	1968
MOST REVEREND CHRISTOPHER JOSEPH WELDON, D.D., A.B. (St. Joseph's Seminary), (Montreal College), (Catholic University of America), J.U.D. (Holy Cross College), LL.D. (St. Michael's College, Boston College, St. Anselm's College), Springfield	1969
FRED C. EMERSON, (Bay Path Institute), Agawam	1969
EDMUND J. CROCE, B.S. (Holy Cross College), M.D. (Harvard Medical School), Worcester	1969
CALVIN H. PLIMPTON, B.A. (Amherst College), M.D. (Harvard Medical School), M.A. (Harvard University), MED. SCI. D. (Columbia University), Amherst	1969
HUGH THOMPSON, Milton	1969
JOSEPH P. HEALEY, A.B. (Harvard University), M.B.A. (Harvard Business School), LL.B. (Harvard Law School), Arlington	1970
FREDERICK SHERMAN TROY, A.B. (University of Massachusetts), M.A. (Amherst College), Boston	1970

Board of Trustees

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HIS EXCELLENCY ENDICOTT PEABODY, A.B. (Harvard College), LL.B. (Harvard Law School), Cambridge, *Governor of the Commonwealth.*

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JOHN WILLIAM RYAN, B.A. (University of Utah), M.A., PH.D. (Indiana University), Amherst, *Secretary.*

KENNETH WILLIAM JOHNSON, B.S. (University of Vermont), Amherst, *Treasurer.*

General Information

THE UNIVERSITY OF MASSACHUSETTS is the state university of the Commonwealth, founded in 1863 under provisions of the Morrill Land-Grant Act passed by the United States Congress one year earlier.

Presently observing its Centennial, the University is a member of the great community of Land-Grant colleges and state universities serving the nation as principal resources of higher education for the country's citizenry. Incorporated as the Massachusetts Agricultural College in April, 1863, the institution was formally opened to a handful of students in 1867. Rooted in the liberal arts tradition (its early presidents were graduates of such colleges as Dartmouth, Williams, Amherst, and Harvard), it has grown steadily from the four teachers and four wooden structures available for its opening session. Reflecting the broadening interests of its students, the General Court of Massachusetts authorized a second name, Massachusetts State College, in April, 1931. Sixteen years later, in May, 1947, the institution became the University of Massachusetts.

Situated in one of the most picturesque sections of the state, the University joins with its academic neighbors—Amherst, Smith, and Mount Holyoke Colleges—in maintaining the rich tradition of educational and cultural activity associated with this Connecticut Valley region. The University's central campus consists of approximately 750 acres of land and 100 buildings. Physical growth has been carefully planned, with provisions for additional buildings and facilities to accommodate an enrollment of approximately 20,000 students by 1975. Offering a comprehensive program of instruction and research, the University is thus the Commonwealth's major resource of public higher education dedicated to the preservation and continued development of the country's free institutions.

BRANCHES OF INSTRUCTION

The Undergraduate College

The University offers four-year undergraduate instruction leading to the following degrees: Bachelor of Science, Bachelor of Arts, Bachelor of Science in Chemical, Civil, Electrical, Industrial and Mechanical Engineering, and Bachelor of Business Administration.

This instruction is assigned to the College of Arts and Sciences, the College of Agriculture, the Schools of Business Administra-

General Information

tion, Education, Engineering, Home Economics, Nursing and Physical Education. The aim of the four-year course is to give as high a degree of proficiency in some particular branch of learning as is possible without sacrificing the breadth, knowledge, and training which should characterize a well-rounded college education.

The Bachelor of Arts degree is conferred upon those candidates who fulfill the requirements for this degree specified by the College of Arts and Sciences and the School of Education. The Bachelor of Science degree is conferred upon those candidates who fulfill the requirements for this degree in the College of Arts and Sciences, the College of Agriculture, the Schools of Home Economics, Nursing, and Physical Education. All graduates from the School of Engineering receive the appropriate degrees of Bachelor of Science in Chemical Engineering, Civil Engineering, Electrical Engineering or Mechanical Engineering. All graduates from the School of Business Administration receive the degree of Bachelor of Business Administration.

Special arrangements are made for some graduates of county agricultural schools and of agricultural departments of certain high schools to complete the college course with majors in agriculture or horticulture. Upon the completion of their course they are granted a Bachelor of Vocational Agriculture degree.

Undergraduate work is available in the following areas:

College of Arts and Sciences

Art
Astronomy (Four College
Cooperation Program)
Botany
Chemistry
Economics
English
French
Geology
German
Government
History
Journalism
Mathematics
Microbiology
Music
Philosophy
Physics
Pre-Dental
Pre-Medical
Pre-Veterinary
Psychology

Russian
Sociology and Anthropology
Spanish
Speech
Zoology

College of Agriculture

Agricultural and Food
Economics
Agricultural Engineering
Animal Sciences
Entomology
Food Management
Food Science and
Technology
Forestry
Landscape Architecture
Plant and Soil Science
Poultry Science
Wildlife and Fisheries
Biology

School of Business Administration

Accounting
General Business
Business Administration
and Economics
Finance
General Management
Marketing
Personnel Management and
Industrial Relations
Production Management
Retailing

School of Education

Education
Elementary Education

School of Engineering

Chemical Engineering
Civil Engineering
Electrical Engineering
Industrial Engineering
Mechanical Engineering

School of Home Economics

Dietetic and Institutional
Administration
Food and Nutrition in
Business
Fashion in Retailing and
Business
Nursery School Education
Secondary Education and
Extension

School of Nursing

Basic Nursing

School of Physical Education

Physical Education for Men
Physical Education
for Women
Recreation Leadership

Department of Public Health

Public Health

The Graduate School

Graduate work leading to the Doctor of Philosophy degree may be taken in the following fields: Agronomy, Animal Science, Botany, Chemistry, Economics, Entomology, Food Science and Technology, French, Geology, German, Government, Microbiology, Plant Pathology, Poultry Science, Psychology, Sociology, and Zoology.

A cooperative Ph.D. program involving Amherst, Mount Holyoke and Smith Colleges and the University of Massachusetts is also available in the biological sciences, Chemistry, French, Geology, and German.

The following departments offer major work leading to a Master's degree: Accounting, Agricultural and Food Economics, Agricultural Engineering, Agronomy, Botany, Business Administration, Chemical Engineering, Chemistry, Civil Engineering, Dairy and Animal Science, Economics, Education, Electrical Engineering, English, Entomology, Finance, Food Science and Technology, Forestry, Geology, German, Government, History, Home Economics, Horticulture, Industrial Engineering, Landscape Architecture, Mathematics, Mechanical Engineering, Microbiology, Philosophy, Physics, Physical Education, Plant Pathology, Poultry Science, Psychology, Public Health, Romance Languages (French and Spanish), Sociology, Speech, Wildlife Management, Zoology.

General Information

The general requirements of the Graduate School regarding admission, residence, credits, tuition, etc., together with specific information concerning details of interest to prospective students, are outlined in a separate bulletin, which may be obtained upon request from the Dean of the Graduate School.

The Stockbridge School of Agriculture

The Stockbridge School of Agriculture, founded in 1918, is part of the College of Agriculture. It is a two-year school and offers the associate degree in the following thirteen areas: Animal Science, Arboriculture and Park Management, Dairy Technology, Floriculture, Food Distribution, Food Management, Fruit Growing, Landscape Operations, Poultry Science, Turf Management, Vegetable Crops, and Wood Products.

High school graduates are eligible to apply, and there are no formal entrance tests. Preference is given to students with a good preparation in English, mathematics, and science. A particular effort is made to select applicants who have demonstrated a strong motivation in their major field of interest. On-the-job placement training is required of all students during the summer period between the first and second year.

The Stockbridge School issues its own catalogue and a copy may be obtained by writing to the Director of the Stockbridge School of Agriculture, University of Massachusetts, Amherst, Massachusetts.

Summer Session

The Summer Session at the University enables a student to earn the equivalent of a full academic year's work in three summers. The Summer Session is open to freshmen who wish to begin their college education immediately upon graduation from high school, thus making it possible to obtain a degree in three calendar years instead of the usual four. For students whose career goals include provision for further education, such as graduate school or professional school, the Summer Session offers an opportunity to reach these goals earlier. Students who are in financial need are encouraged to make use of low cost loans to complete their education. Attendance at the Summer Session offers an opportunity to finish degree work a year earlier at a total cost which is somewhat lower than that incurred in the regular four-year program.

Students who begin their college careers in the summer are advised to plan their programs carefully with the aid of their advisers. Normally, it is wise to plan to take the required courses during the summer, and to take electives and major courses during the fall and spring semesters. Sequential required courses are gen-

erally offered during both of the main semesters, so that work begun in the summer can be completed during the fall semester. Similarly, work begun in the spring semester can in most cases be completed in the summer following.

The Summer Session also serves the needs of other groups. Students who are currently enrolled in other colleges can come to the University of Massachusetts to do college work in the summer. Graduate students are offered courses which enable them to continue their education around the calendar. Professional workers are offered courses in their specialized fields.

A bulletin describing the entire summer program is available from the Director of the Summer Session.

New England Regional Program

The University participates in a cooperative program conducted by the six New England state universities under auspices of the New England Board of Higher Education. Under this program, a student wishing to pursue studies in a major field not offered at his own state university may attend another New England state university at the in-state tuition rate. Information about the program is available in the Office of the Provost.

GENERAL SERVICES

University Library

The University Library now consists of the Goodell Library built in 1935 together with a new library addition of seven floors completed in September 1959 which is twice the size of the original library building. The library complex will provide space for the future expansion of the book collection to 460,000 volumes. Seating capacity is provided for 1350 readers and includes special study areas and reading rooms.

The present book collection exceeds 250,000 volumes in the University Library and the 23 departmental and laboratory libraries. Facilities in the University Library include rooms for reference materials and current periodicals, a rare book room, an extensive microfilm collection, microfilm reading units, a map room, an exhibition area, and a typing room for researchers. The University Library is also a depository for the publications of the United States Government as well as the State Agricultural Experiment Stations.

General Information

Hampshire Inter-Library Center

The University Library is a participating member of the Hampshire Inter-Library Center, a cooperative facility for the acquisition, storage and servicing of research materials, especially journals, documents and reference sets. Incorporated in 1951 to augment library resources in the area, HILC is jointly operated by the four Connecticut Valley colleges—Amherst, Mount Holyoke, Smith, and the University of Massachusetts. The collection numbers more than 18,000 volumes. It is located on the second level of the new addition to the University Library.

Alumni Association

The Associate Alumni is the general alumni organization of the University of Massachusetts. The association maintains headquarters at Memorial Hall, erected by alumni and friends in honor of those men of the University who died in World War I.

The association publishes a magazine, *The Massachusetts Alumnus*, as the alumni publication of the University.

According to its by-laws, the corporation is constituted for the purpose of promoting the general usefulness of the University of Massachusetts; of cultivating among its graduates and former students a sentiment of mutual regard; and of strengthening their attachment to their Alma Mater.

Under sponsorship of the University of Massachusetts Building Association, composed of alumni who volunteered their services, 19 dormitories, two faculty apartment centers, and a Student Union Building have been constructed on the campus.

The governing body of the Associate Alumni consists of its officers and a board of directors. Four directors are elected each year and serve a term of four years. All graduating seniors become members of, and contributors to, the association at graduation, according to a tradition set by the Class of 1940.

Audiovisual Center

The Audiovisual Center is organized and equipped to aid the professional staff with audiovisual equipment and materials. The Center is located in the north patio level of the School of Education. Libraries of motion pictures, filmstrips and slides are maintained. Major types of audiovisual machines are available on short-term loan for classroom teaching. Machines permanently located in various buildings are maintained and repaired. Assistance is available in the preparation of charts, graphs, maps, and diagrams.

Photographic and diazo reproductions are made on paper or in the form of transparencies. Recordings can be made or reproduced.

Massachusetts Experiment Station

Making science useful for the benefit of all citizens and the improvement of the agricultural industry continues to be the primary responsibility of the Massachusetts Experiment Station established by the state legislature in 1887.

Basic scientific investigation is conducted to find satisfactory solutions to the problems involved in the production, processing and marketing of food and other agricultural products. A large part of the work of the staff centers around research in biochemistry, plant pathology, genetics, microbiology, soils, plant physiology, animal physiology and veterinary science, forestry, entomology and food technology.

Engineering research to develop new and improved methods and techniques for the processing and marketing of food, flowers and nursery crops is an important part of the Experiment Station program.

Economic research is conducted to provide facts and figures upon which to base wise management decisions by individuals and firms involved in the broad agricultural industry. More and more attention is being given to the many problems involved in regional planning, land-use and wise development of natural resources for the benefit of industry, agriculture and local residents.

The science center (Field Station) at Waltham is a part of the Experiment Station established and maintained by the University to serve the people of the state through scientific investigation in the biological fields considered as "plant science." Problems involved in the genetics, culture, disease and pest control of flowers, vegetables and ornamental plants receive major emphasis. Similar research but directed at the specific problems of the cranberry industry is carried on at the Cranberry Research Station in East Wareham.

Public Service and Regulatory Activities

In addition to its research responsibilities the Experiment Station carries on many public service activities and administers statutory regulations pertaining to the sale of feeds, fertilizers, seeds and the use of milk testing glassware. These duties have been assigned by the state legislature to the Experiment Station which is equipped with the necessary laboratories and scientific personnel.

General Information

Cooperative Extension Service

The Massachusetts Extension Service conducts educational programs for adults and off-campus youth (4-H) in agriculture and home economics. These programs help people apply scientific and research information in reaching solutions to their problems. Programs are conducted with farm production, food processing, food distribution and other types of agricultural business, with homemakers and with other groups interested in family living, the development of youth, use of agricultural resources, and our rural communities.

The Extension Service is a cooperative teaching effort between the United States Department of Agriculture, University of Massachusetts and the several counties of the state. Many staff members in a wide range of fields at the University of Massachusetts participate in Extension education, as well as research and resident teaching. County Extension workers cooperate with University personnel in planning and conducting the work. A variety of educational techniques and communications media are used.

Bureau of Government Research

The Bureau of Government Research was established at the University of Massachusetts in 1955. The Bureau is staffed by professional personnel experienced in local government research. Its work consists of research in governmental problems, publication of studies in public administration, conducting training institutes for public officials, providing consultative services to cities and towns, and the maintenance of a research library.

The Massachusetts Population Research Institute

The Massachusetts Population Research Institute, established in September, 1961 by the Department of Sociology and Anthropology, has a twofold purpose: (1) to serve as a center for the analysis of the structure of and changes in contemporary Massachusetts population; and (2) to provide training for undergraduate and graduate students in the techniques of demographic analysis. The Institute publishes a series of working papers on the major aspects of Massachusetts demographic structure.

Office of Institutional Studies

The Office of Institutional Studies is established to collate materials and information on the University of Massachusetts and insti-

tutions of higher education in general. It provides a library of published information on higher education, including studies done at other institutions. It serves as a clearing house for information on our own institutional growth and development; and it undertakes to assist faculty and administration in the continuing analysis of our institutional practices.

Publications and News Office

The University recognizes its obligation to provide the public with accurate information about its educational program. With rising public interest in higher education, news of the University is sought by all communications media, including the daily and weekly press, radio and television.

In addition to providing information through mass media, the Publications and News Office maintains contacts with institutions of higher learning throughout the country through exchange of information in professional journals and publications of educational societies.

Daily training in news writing is provided for a limited number of students who report on University activities and prepare copy for general news releases.

The catalogues describing various phases of the academic program of the University are edited in the Publications and News Office.

Speech and Hearing Center

The Center's services are available for rehabilitation of adults with speech and hearing problems which may affect vocational and professional performances and placement. Illustrative clients at present include stutterers, and people with voice problems, hearing loss, and aphasia—both men and women from surrounding communities who have been given released time from their work-day for receiving speech therapy. No fees are charged. Cooperative planning with the Massachusetts Rehabilitation Commission is also available for vocational placement.

Consultation service is also available for public schools conducting speech surveys. No fee is charged.

Center's present activities include institute-workshop for school administrators in speech surveys and organization of public school speech and hearing programs—on campus with demonstrations in Speech and Hearing Center facilities. Similar workshops for industrial management could also be arranged without fee.

General Information

Institutes and Other Research Facilities

The University maintains major scientific institutes and other research facilities for the advancement of knowledge in various fields.

The Polymer Research Institute carries on a program of advanced studies directed toward gaining greater understanding of the chemistry of plastics. Research is conducted to find better methods for studying the properties of plastic films, fibers and rubbers, and for establishing a relationship between the structure and properties of these materials.

The Institute of Agricultural and Industrial Microbiology is presently engaged in research regarding the use of microorganisms in the production and processing of agricultural and industrial products such as foods and fibers and the control of microorganisms harmful to man and his environment.

The Institute of Environmental Psychophysiology has been established for long-range studies of the effects of technological and natural stress factors on the health, safety and efficiency of persons working in various industrial and other settings.

Important to the many research projects undertaken on a continuing basis at the University is the Research Computing Center housing computer apparatus and peripheral equipment needed for rapid solution of mathematical and statistical problems associated with such projects. The University also has a subcritical nuclear reactor, electron microscope and other important scientific equipment for use in modern research.

Admission

Applications for admission may be obtained by writing the Registrar of the University. Candidates are advised to file their applications early in the senior year and certainly not later than March 1 of the year they plan to enter.

Qualified applicants are admitted at the beginning of the fall and spring semesters and the beginning of the University summer session. Since there are many more qualified applicants than can be admitted, however, preference has to be given to those with the highest ratings.

All applicants for admission except veterans and candidates for the Bachelor of Vocational Agriculture degree must take the Scholastic Aptitude Test given by the College Entrance Examination Board. In addition, the University reserves the right to require three Achievement Tests administered by the same Board if the applicant's scholastic record includes several subjects below the college recommending grade of the school. Each applicant will be informed of the procedure he must follow at the time his application is acknowledged.

Methods

A. *High School Seniors*

High school seniors are advised to file their applications early in the senior year. The Scholastic Aptitude Test may be taken on any of the scheduled dates. The January date is recommended except for those applying for early acceptance. The May date is usually too late for seniors, but is appropriate for juniors taking the test for guidance purposes.

Some applicants have a definite first preference for the University and have records that deserve early consideration. Such applicants will be accepted early in their senior year under the following conditions. They must be taking the usual college preparatory course in high school and maintaining the college recommending grade of the school in all of their courses. They must take the College Board Scholastic Aptitude Test in the junior year, preferably in May, and make a score satisfactory to the University. They must indicate the University as their first preference.

Under these conditions the University will be glad to accept such students in recognition of excellent achievement in high school and to reduce some of the anxiety that an applicant feels during

Admission

the senior year while waiting for action usually taken in the spring. In this way, too, the burden of multiple applications on high school principals and college admissions officers may be lessened.

B. *High Ranking High School Juniors*

Applicants who have completed with very high academic standing work through the junior year may be admitted to the University for the semester following the junior year. Such applicants must take the Scholastic Aptitude and three achievement tests given by the College Board in May of the junior year and make scores satisfactory to the University. They must be highly recommended by their high school principal. The maturity and social adjustment of the applicant will be considered along with his intellectual development. Such applicants should apply before the end of the junior year.

C. *Veterans*

Veterans are not required to take the Scholastic Aptitude Test. Instead, they must take entrance examinations in algebra, English and a College Qualification Test. These are administered by the University Testing Service in January, June and August. Information in regard to these tests will be furnished the veteran at the time he files his application for admission. "Six Months Active Duty for Training" students are not considered veterans. They must take the College Board Scholastic Aptitude Test rather than the Veterans' Examinations.

D. *Bachelor of Vocational Agriculture Degree*

Superior graduates of vocational schools of agriculture in Massachusetts and vocational agricultural departments in Massachusetts high schools may be accepted for the Degree of Bachelor of Vocational Agriculture, provided:

- a. They are unqualifiedly recommended by the Vocational Division of the Department of Education as *bona fide* Vocational Graduates with superior ranks; and
- b. That they can present at least 16 units of certified entrance credits, approved as to quality and quantity by the State Department of Vocational Education; and
- c. That they successfully pass the English and College Qualification Test administered by the University Guidance Office. Those who have had algebra will be required to include the algebra examination.

E. *Transfer*

A limited number of transfers from approved colleges may be admitted. Since applicants for such transfer exceed the number that can be admitted, they are placed on a competitive basis. Ratings will be based upon high school and college records and on the College Board Scholastic Aptitude Test, which is required of all transfers. The University reserves the right to require the College Board Achievement Tests also, if the applicant's records make such advisable. Information in regard to transfer may be obtained by writing the Registrar.

At least 45 semester credits taken in residence at the University are required of all transfers who are candidates for the Bachelor's Degree.

Subject Requirements

The subjects of preparatory study required for admission call for the satisfactory completion of a four-year high school course or its equivalent and are stated in terms of units. A unit is the equivalent of at least four recitations a week for a school year. High school graduation alone is not sufficient. The applicant's record must indicate capacity for handling the quality of scholastic work which the University has established as its standard of achievement.

Sixteen units of secondary school work must be offered, selected according to the following requirements:

College Preparatory Mathematics	3*
English	4
Foreign Language (2 years of 1 language)	2
U. S. History	1
Laboratory Science	1

The remaining units are elective and may be selected from the following subject matter:

- a. Mathematics
- b. Science
- c. Foreign Language
- d. History and Social Studies
- e. Free electives (not more than four units)

Free elective subjects are those not included in groups a-d, as for example: Music, art, drawing, typewriting, aeronautics, agriculture, home economics, etc. Such free electives are allowed in order that the student who wishes may have some opportunity to elect other

* Preferably two years of Algebra and one of Plane Geometry.

Admission

high school offerings, while at the same time covering the fundamental requirements for college work.

Students planning to major in the physical sciences and mathematics should, if possible, offer two years of algebra, one of plane geometry, and one-half year of trigonometry. Analytical or solid geometry, chemistry, and physics, and an introduction to analytical geometry and calculus are also strongly recommended.

Students planning to pursue an engineering curriculum should offer two years of algebra, one of plane geometry, and one-half year each of trigonometry and solid geometry. Chemistry and physics are also advised. Those deficient in the mathematics should plan to cover it during the summer prior to entrance or expect to take five years to complete the college course.

Candidates of exceptional ability and promise may be considered for admission even though some of the prescribed courses were not included in their high school program.

College Entrance Examination Board Advanced Placement

Successful completion in secondary school of courses approved by the College Entrance Examination Board Advanced Placement Program, or the equivalent as approved by the University, will be regarded as meeting the equivalent requirement and will be accorded credit toward graduation.

Physical Examination

All students who are entering the University for the first time, and students who are returning after an absence of one semester or more, are required to present certain health information. Forms for recording details of medical history and details of a physical examination by the student's personal physician will be forwarded shortly after acceptance. In the case of freshmen these must be returned to the University Health Services at least one week prior to the summer counseling appointments. In the case of other students, they must be returned at least two weeks prior to registration.

Small pox vaccination within three years and active tetanus immunization within one year are required as part of the physical examination record. It is recommended that students also be immunized against poliomyelitis and diphtheria.

Financial Information

EXPENSES

University Charges

Expenses vary from approximately \$1000 to \$1200 per year for the normally economical student. First year costs are usually greater than those of the other three years and there is less opportunity for earnings. Therefore, a student is advised to have a definite plan for meeting the expenses of the first year before entering.

The following *estimate* of a year's expenses, based chiefly upon last year's costs, includes only those items which are strictly college and does not include amounts for clothing, laundry, travel, etc. These costs vary slightly from year to year. Tuition for residents of Massachusetts is \$200 per year and for others \$600.

ESTIMATE

	<i>Normal</i>
Tuition (citizens of Massachusetts)	\$200.00
Room in college Residence Hall or private home (approx.)	300.00
Board at college Dining Halls (approx.)	420.00*
Athletic Fee	30.00
Student Union Fee	20.00
Student Activity Tax (approx.)	28.00
Student Health Services Fee	30.00
Student Medical/Surgical Insurance, 12 months' coverage (optional)	16.00
Books, stationery, laboratory and other supplies (estimate)	100.00
	<hr/> \$1,144.00

* Above plan for 7 days; 5-day plan available for approximately \$340.00 per year or \$170.00 per semester.

Financial Information

Initial Payment for Freshmen

The initial payment for first semester expenses required of freshmen at the time of fall registration is indicated below and is made up of the following items:

Tuition (citizens of Massachusetts)	\$100.00
Room rent in college Residence Halls (approx.)	150.00
Board at college Dining Halls (approx.)	210.00*
Athletic Fee	15.00
Student Union Fee	10.00
Student Activity Tax (approx.)	14.00
Student Health Services Fee	15.00
Student Medical/Surgical Insurance, 12 months' coverage (optional)	16.00
Physical Education Equipment Fee (men only)	10.00
Books, stationery, laboratory and other supplies (estimate)	100.00
	<hr/>
	\$640.00

The above are only *approximate* figures. A bill will be rendered to the parent of each student prior to the beginning of the semester.

Tuition

As a state institution the University of Massachusetts offers a low rate of tuition to all students entering from the Commonwealth. Eligibility for admission under the low residential rate is determined in accordance with the following policy established by the Board of Trustees.

A student must present evidence satisfactory to the Treasurer of the University that his domicile is in the Commonwealth of Massachusetts in order to be considered eligible to register in the University as a resident student. This means that he must have established a "bona fide" residence in the Commonwealth with the intention of continuing to maintain it as such.

The domicile of a minor shall follow that of the parents unless such minor has been emancipated. In case of emancipation the student, in addition to the requirements of these regulations, respecting residence, shall present satisfactory proof respecting

* Above plan for 7 days; 5-day plan available for approximately \$340.00 per year or \$170.00 per semester.

emancipation. Minors under guardianship shall be required to present, in addition to the certification of the domicile of the guardian, satisfactory documentary evidence of the appointment of the guardian.

No student shall be considered to have gained residence by reason of his attendance in the University nor shall a student lose residential preference during his continuous attendance at the University.

The residence of a wife shall follow that of the husband.

The prescribed form of application for classification as to residence status must be executed by each student. Misrepresentation of facts in order to evade the payment of out-of-state tuition shall be considered sufficient cause for suspension or permanent exclusion from the University.

Discretion to adjust individual cases within the spirit of these rules is lodged with the President of the University.

Room Rent

It is the policy of the Board of Trustees that all men and women undergraduate students shall be housed in campus residence halls. Permission for certain students to commute from their parents' home or to live at sorority or fraternity houses must be obtained from the appropriate student personnel Deans each semester.

Board

All freshmen, sophomores, and juniors residing in University residence halls will be required to board at University dining halls. Students who are members of fraternities or sororities may be permitted to board at their respective fraternities or sororities, upon receiving written permission from their respective student personnel Deans.

Those not required to board on campus may eat at the Dining Commons on a cash basis.

Weekend board is also available on an optional basis. This plan provides for Saturday breakfast and lunch, and Sunday dinner and supper (holiday weekends excluded).

Athletic Fee

Funds received from this charge are used to support comprehensive men's and women's intercollegiate programs as well as fine intramural programs.

Student Union Fee

Funds received from this charge are used to support the Student Union and meet the operating costs of its various activities.

Financial Information

Student Activity Tax

This tax, authorized by vote of the undergraduate students with the approval of the Board of Trustees, provides each student with the "Collegian," the student newspaper; "Index," University year-book; student government, class and other activities.

Health Services Fee

Funds received from this charge are used to support the medical, psychiatric and health services provided by the staff of the Infirmary.

Medical/Surgical Insurance

This is an *optional* plan intended to supplement the care received by students at the Infirmary. It provides hospital, medical and surgical care on a twelve-month basis for injuries or illness during the school year, holidays, summer vacation and other times when the student is away from Amherst.

Students who register for the fall semester have only *one opportunity* to enter or reject this program each year, at the time of payment of the fall semester bill. It is also offered on the spring semester bill for new spring registrants only.

Married students desiring family coverage under the plan now in existence at the University are advised to contact the Student Health Services.

Physical Education Equipment Fee

Income from this fee is used for the purchase of all clothing issued to male students for use in the required physical education program, intramural athletics and general recreation.

Book, Stationery, and Supply Expenses

Students should be financially prepared to pay for necessary books and incidental supplies. Certain departments also make special charges for necessary laboratory supplies. Freshmen entering the School of Engineering should be prepared to meet an expense of approximately \$45.00 for drawing equipment and slide rule.

Admission (Matriculation) Payment

New students are required to make a matriculation payment of \$15.00 to the Treasurer of the University as soon as they are notified by the Registrar that they are accepted for admission. Failure to promptly make this payment will preclude admission to the University. This payment is not refundable and will be considered as payment for admissions and registration expense if the student does not matriculate.

Financial Information

This \$15.00 payment will be considered as first payment on University charges, the balance of which will be due prior to September registration.

A Certificate of Residence form furnished by the University must be properly filled out by the parent, and the town or city clerk, and returned with the \$15.00 advance (matriculation) payment.

Summer Counseling Fee

Members of the incoming freshman class attending the summer counseling program will pay a non-refundable fee to cover the cost of meals, housing, testing and counseling. Full details of the program will be mailed to those who have paid the matriculation fee.

Special Undergraduate Students

The Special Student tuition rate is \$10.00 per credit hour for Massachusetts residents, up to a maximum of \$100.00, and \$30.00 per credit hour for non-residents, up to a maximum of \$300.00.

All students must pay a \$1.00 identification card fee yearly, and students taking three or more *courses* a semester must pay a student union fee of \$10.00 and a health fee of \$15.00.

Payment Due Dates

In accordance with University policy, all charges for tuition, fees, board and room rent in University Residence Halls are due and payable approximately twenty-one days prior to the date of registration of each semester. Bills will be rendered in advance with due date shown and payment may best be made by mail. Students may not register until all University charges are paid.

Scholarship Payments

It is the responsibility of all scholarship holders to see that the University is adequately notified prior to the time fee bills are prepared. Known scholarships are shown on the fee bills. If such items are not shown, deductions may not be made from the bill until satisfactory evidence has been presented to the Treasurer of the University by the donor.

Late Payment and Registration

Any student who does not make payment of his semester charges by the date specified may be required to pay a late payment fee of \$5.00. The process of completing arrangements for housing and board according to schedules set forth by the University is to be considered a part of general registration procedures.

Financial Information

Credit by Special Examination

Students receiving credit by special examination must pay \$5.00 per credit before the examination may be taken. This fee is non-refundable.

Tuition and Fee Refunds

A student who leaves the University for any reason except as specified below before a semester is completed will be granted a pro rata refund of tuition and fees.

A student who makes an advance payment and then for any reason does not attend any part of the next semester or term at the University will be given a full refund of tuition and fees. The \$15.00 admission (matriculation) payment fee required of new students is not refundable.

A student who is involuntarily called into military service before the completion of a semester will be given a pro rata refund of tuition and fees provided that he receives no academic credit for the work of that semester. If academic credit is given, there will be no refund.

A student who is suspended or expelled from the University for disciplinary reasons forfeits all rights to a refund.

Refund Schedule

Regular Term

- a. Within the first two weeks from the beginning of semester or term—(Registration Day)—80%.
- b. During the third week—60%.
- c. During the fourth week—40%.
- d. During the fifth week—20%.
- e. After the fifth week—no refund.

Summer Session

- a. During the first week—60%.
- b. During the second week—20%.
- c. After the second week—no refund.

Room Rent Refunds

It is the policy of the University that there will be no refund of prepaid room rent after the semester has commenced. A student who has made an advance payment of room rent who fails to attend any part of the next semester or term or does not reside in a residence hall or other housing will be granted a full refund of prepaid room rent.

Students involuntarily called to military service may be granted a refund on a pro rata basis.

Board Refunds

Prepaid board will be refunded on a special pro rata per diem basis. A student who is suspended or expelled from the University for disciplinary reasons forfeits all rights to a refund.

FINANCIAL AID

Loans

Several types of loans are available as follows:

University Loans

Through the generosity of friends of the University, funds have been donated to provide loans for a limited number of students of the three upper classes to assist in paying tuition or other college expenses. These loans are granted, after proper consideration, to needy students of good scholarship whose habits are economical. All loans are secured by a note endorsed by a responsible party as collateral. In general, if loans are taken out by a senior, they must be paid before graduation; otherwise they are due before the beginning of the next school year. Upon withdrawal from the University, loans automatically become due. On most of the funds, interest is charged at the rate of 3% to maturity and 5% thereafter. The Lotta M. Crabtree Agricultural Fund loans are made without interest. Application for loans should be made to the Placement and Financial Aid Services. No loan under this plan will be granted in excess of \$200 in any one year.

If funds are available at the beginning of the second semester, loans may be made in exceptional cases to members of the freshman class whose scholastic record is satisfactory and whose budget calculations have been upset through circumstances beyond their control.

Higher Education Loan Plan

Loans up to \$500 per year may also be obtained by students in the three upper classes from the bank of their choice through the Higher Education Loan Plan. Certification of attendance and other information relative to the student's over-all record will be submitted to the bank prior to receipt of the loan. Further information can be obtained through the Placement and Financial Aid Services.

National Defense Student Loan Program

Students may borrow up to \$1000 per year under this program. Interest at 3% starts one year after completion of the program and is repayable within 10 years. Special consideration in the granting of these loans is given to needy students of superior scholarship who

Financial Information

are majoring in engineering or a physical science, studying a modern foreign language, or planning to teach in a public school. Because of the amount of money available, this is necessarily a limited, selective program. Further information and application forms may be secured from the Placement and Financial Aid Services.

Special Financial Aid for Graduates Interested in Farming

The Lotta M. Crabtree Agricultural Funds make available to graduates of the University of Massachusetts funds to be used for farm financing.

The purpose of loans from these funds is to assist meritorious graduates who are without means in establishing themselves in agricultural pursuits. These loans are made without interest or service charges other than the cost of title search and legal papers. They must, however, be paid back in full amount within a reasonable length of time and there are certain restrictions on their use.

Applications for the "Lotta Crabtree Agricultural Fund" should be addressed to the Trustees of the Lotta M. Crabtree Estate, 619 Washington Street, Boston, Massachusetts, or may be secured at the Placement and Financial Aid Services Office at the University. Decisions regarding the granting of a loan rest entirely with the Trustees under the terms of Miss Crabtree's will.

Part-time Employment

Part-time employment on campus is available, except for freshmen who are not granted part-time work the first semester unless extreme need prevails. Jobs in various categories, both on and off campus, are filled each year. All jobs are cleared through the Placement and Financial Aid Services. Wages vary according to the type of job and the student's past experience; however, those allowed to work should plan to spend no more than ten to fifteen hours per week on such work. In order to give assistance to as many needy students as possible, the maximum wages earned are limited to the equivalent of board. The average earnings of students engaged in part-time work are approximately \$200 per year.

Prizes and Awards

For detailed listing of Prizes and Awards, see Appendix, Page 239.

Scholarships

Scholarships are awarded only to needy and deserving students of high character whose habits are economical and whose scholastic

records are satisfactory; that is, at least a 2.5 quality point average. A limited number of scholarships are available to entering freshmen who have made outstanding records in high school.

Scholarships are paid in installments at the beginning of each semester in the form of a credit on the student's bill. A scholarship may be discontinued at the close of any semester.

If the scholarship student withdraws from the University, any refund of University fees or charges must first be applied to reimburse the scholarship fund for the full amount of the scholarship received by the student for the semester.

Applications for scholarships may be obtained from the Placement and Financial Aid Services and must be completed and returned by March 1 to be considered.

For a detailed listing of available Scholarships see Appendix, Page 234.

Veterans and Veterans' Dependents Benefits

Veterans or dependents of veterans eligible for education and training under the Disabled Veterans Bill 894, the Korean Veterans Bill 550, or the War Orphan Bill 634 should present a Certificate of Eligibility at registration. Monthly attendance reports to assure payment of benefits are cleared through the Placement and Financial Aid Services. A staff member of these services coordinates all veteran affairs and stands ready to assist you in the appropriate clearance and liaison with the Veterans Administration for receipt of your benefits and allowances.

Veterans who are transferring to the University of Massachusetts from another institution or who have done summer work at another institution will be required to submit a supplemental Certificate of Eligibility at registration. This may be obtained by applying through the veterans' office at the institution last attended.

General Academic Regulations

Attendance

The attendance of students at all regularly scheduled classes at the University of Massachusetts is expected. No administrative control of attendance is exercised except as hereinafter provided.

In cases of illness, students are to explain their absences directly to their instructors. The grade of the student who has met the requirements of the instructor in making up his work shall not be reduced for absence because of illness.

Because the University believes fully in the educational value of outside-of-class activities, including trips which will take students off campus, students are not to be penalized for official absences incurred as a result of such activities. Any student going on such a trip will be entitled to receive make up work from the instructor in classes missed, including make up tests and examinations. If the instructor finds it inconvenient to give a special examination, he has the alternative of not counting the examination missed by the student in computing the final average.

The University has a responsibility for all groups of students who are to be away from their classes or from the University on trips for activities which are sponsored by the University, required as part of course work, or for participation in recognized extra-curricular activities. The person in charge of any such activity involving authorized absence from class shall place the trip announcement on file in the office of the appropriate Dean or Department Head, with a copy to the Schedule Office. The listing shall show the designation of the group or groups to be making the trip, time of departure, destination, and time of return. This information is to be filed at the beginning of the semester for all activities scheduled at that time, otherwise at as early a time during the semester as the information becomes available. In no event should such announcement be later than ten days prior to the day of departure.

Authorization for trips may be made by the Director of Athletics for regularly scheduled athletic events; by the appropriate Student Personnel Dean for extra-curricular trips; and by the Academic Dean or designated Department Head for class trips.

For trips extending beyond the normal business hours of the University, a trip list should be submitted to the Office of the Dean

General Academic Regulations

of Men for use in case of possible emergencies. This list should include an alphabetical list of student participants, the place at which the event is to be held, the mode of travel, and the name of the instructor or staff member who is to accompany the group. If overnight absence is involved, the place where the students are staying is to be indicated in the statement.

Students are expected to inform instructors of their absence on authorized trips as soon as the event is announced. Any instructor desiring additional information should make contact directly with the agency authorizing the trip. (No absence or excuse cards will be issued.)

Automobiles

Only members of the senior class, students 21 years old or over, and commuters are permitted to have automobiles or other types of automotive equipment on the campus or in the Town of Amherst. Vehicles must be registered with the Campus Police. Driving to and from classes is not permitted. Exceptions may be made in the case of an individual who has a severe physical limitation. Requests for such exceptions must be made through the University Health Service.

Conduct

The customary high standard of college men and women in honor, self-respect, and consideration for the rights of others constitutes the ideal of student conduct.

The privileges of the University may be withdrawn from any student at any time if such action is deemed advisable.

It should be understood that the University, acting through its president or any administrative officer designated by him, distinctly reserves the right, not only to suspend or dismiss students, but also to name conditions under which they may remain in the institution.

Hazing in the sense of the punishment or humiliation of students is not permitted.

Dining

All freshmen, sophomores and juniors residing in University residence halls will be required to board at University dining halls except that such students who are members of fraternities or sororities may be permitted to board at their respective fraternities or sororities by permission of the appropriate student personnel dean. University board is optional for seniors and is available on a cash basis.

General Academic Regulations

Grade Reporting

Enrollment in and graduation from the University involve both quality and quantity of work. The quantity of work is measured by the credits obtained by successful completion of courses. The quality of work is measured by grades. Each grade is equated with a quality point as noted below.

Grades

Grades shall be reported according to the following letter system. No other interpretation of this letter system shall be authorized.

- A — Excellent
- B — Good
- C — Average
- D — Passing (but not satisfactory)
- F — Failure
- Inc. — Incomplete

The grade of Incomplete shall be reported:

When a portion of the assigned or required class work has not been completed because of necessary absence of the student, or other reasons equally satisfactory to the instructor. And then only when he considers the work already done to be of passing quality.

When because of serious illness or other cause beyond the control of the student, he is unable to take the final examination. In this case an *Incomplete* is to be given only if the instructor judges that the quality of the student's work is such that by satisfactory performance in the examination he could complete the work of the course with a passing grade. If the student's record is such that he would fail the course regardless of the result of the examination, he is to be given a failure.

A student can obtain credit for an *Incomplete* only by finishing the work of the course before the end of the fourth week of his next semester. A mark of *Incomplete* will be automatically converted to a failure if the course requirement has not been satisfied by this time. The initiative in arranging for the removal of the *Incomplete* rests with the student.

An incomplete in a final grade report is calculated as an F in arriving at a temporary quality point average. When the incomplete is later converted to a grade, the permanent record is changed and the student is notified.

Quality Points

Quality points per semester hour will be assigned as follows: A, 4; B, 3; C, 2; D, 1; F, 0.

Averages will be computed as follows:

Semester Grade Point Average. To compute the semester grade point average, the total points earned will be divided by the total credits carried, which includes the total credits earned and failed.

Cumulative Average. To compute the cumulative grade point average, the total points earned will be divided by the total credits carried, which is the sum of the total credits earned and failed. A course once passed cannot be repeated for a higher grade.

Semester and cumulative grade point averages will be recorded to one decimal place. At the end of the senior year, the cumulative average for all the student's academic work will be recorded to two decimal places.

In computing grade point averages the following will not be included:

1. Freshmen and Sophomore required Physical Education.
2. Courses for which the student does not receive credit toward the degree.
3. Grades not earned at the University.
4. Courses satisfied by advanced placement.

This means that the cumulative credits carried on each semester's grade report do not, necessarily, reflect the credits which have been accrued towards graduation.

Warning. Any student whose semester quality point average falls below the cumulative quality point average requirement of his class will be warned of his status by the Registrar and informed of the rules governing dismissal. A copy will be sent to his parent.

Dismissal

Dismissal from the University for scholastic reasons shall be based upon regulations to be administered by the Committee on Admissions and Records. Changes in these regulations may be made by the Faculty Senate and the University faculty. By action of the University Senate, the following cutting points and graduation requirements have been set for the Class of 1964 and thereafter:

1. GRADUATION AVERAGE IS 1.80.
2. Second Semester JUNIOR Year, First Semester SENIOR Year:

CUMULATIVE AVERAGE must be 1.7 unless the SEMESTER AVERAGE is 1.8 or better.

General Academic Regulations

3. Second Semester SOPHOMORE Year, First Semester JUNIOR Year:
CUMULATIVE AVERAGE must be 1.6 unless the current SEMESTER AVERAGE is 1.7 or better.
4. Second Semester FRESHMAN Year, First Semester SOPHOMORE Year:
CUMULATIVE AVERAGE must be 1.5 unless the current SEMESTER AVERAGE is 1.6 or better.
5. First Semester FRESHMAN Year:
A Student will be dismissed if he has failed three academic courses with a combined aggregate of eight or more semester hours, and has not made a C grade in each of his other academic subjects.

No new quality point hurdle is raised against students at the end of the fall semester: the cutting point in effect for the class at the end of the preceding semester remains in effect for the class until the next requirement takes effect at the end of the academic year.

A student will be dismissed for academic deficiency at the end of seven, eight, or nine semesters if he has failed to satisfy the cutting point requirements of his class set for the seventh semester. A student so dismissed may apply for readmission in the usual way.

A transfer or returning student must satisfy the cumulative quality point average of the class to which he is assigned.

Failures

A failed course in a subject required for the degree must be repeated. If the failed course is not required, a substitution may be made upon the approval of the adviser.

Although repeated, the original failed course continues a part of the student's quality point and course record.

Final Examinations

It is University policy not to require a student to take more than two final examinations in one day. When the examination schedule is published, any student who finds himself scheduled for two examinations at the same time or for three examinations on the same day, is to report this situation directly to the University Schedule Office for adjustment.

Graduation Requirements

All four-year curricula of the University conform to the following basic conditions:

Quality Point Average

Beginning with the class of 1964 the graduation requirement is a cumulative average of 1.80. A transfer or returning student must satisfy the cumulative quality point average of the class to which he is assigned.

Accumulated Credits

The successful completion of at least 120 semester hours of academic credit. Individual colleges, schools, divisions and departments may require more than 120 semester hours of academic credit. These are exclusive of required physical education courses.

Subject Requirements

An introduction to the basic skills of communication by successful completion of English 1 and 2 and Speech 3.

An introduction to the humanities by the successful completion of English 25 and 26 and of one other semester course of three hours of academic credit chosen from art, English (excluding technical writing), foreign-language literature, music and philosophy courses and Speech 51.

An introduction to the development of Western culture and of the modern social sciences gained through the successful completion of nine semester hours of credit in courses chosen from the offerings of at least two of the following departments: economics, history, government, psychology, and sociology.

An introduction to mathematics and natural sciences to be achieved by the successful completion of 12 semester hours of credit in courses chosen from the offerings of at least two of the following three broad academic divisions: mathematics, biological sciences and physical sciences.

Intensive or specialized work in a particular department, division, school or college constituting a major and consisting of the successful completion of at least 15 semester hours of credit in junior-senior courses in the area of the major.

A basic physical education course is required of all students.

A veteran of two or more year's service is not required to take physical education. "Six Months Active Duty for Training" students are not excused from physical education.

A transfer student awarded 15 or more transfer credits must complete the physical education semesters of the class to which he is assigned (i.e. A transfer given 30 transfer credits must complete the sophomore year of phys. ed.)

All male non-veteran members of the graduating class of 1966 must complete one year of required basic military. Members of the

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classes of 1963-65 must complete two years of basic military. Students graduating in the class of 1967 and thereafter may elect basic military on a voluntary basis. The basic course carries graduation credit.

Residence Requirements

It is the policy of the University that the final year's scholastic work be accomplished in residence, which is defined for this purpose as continuous enrollment and regular attendance in classes conducted on the campus of the University. This requirement may be waived by the Board of Admissions and Records upon the recommendations of the major department and Dean of the College or School.

The Board may also waive the requirement for a student admitted to an appropriate professional school after completion of six or more semesters of work at the University, provided:

1. That the cumulative average at the University has been 2.5 or higher.
2. That satisfactory evidence is presented indicating completion of work comparable to that offered at the University in amount sufficient to satisfy requirements for the appropriate bachelor's degree.
3. That the major department and Dean of the College or School approve.

No student is allowed more than ten semesters, including semesters at other colleges, to attain the required graduation average. Twelve semester credits earned in summer schools at the University or other colleges constitute a semester.

A student who has met the required graduation average but is deficient in course requirements may continue for one additional semester (total 11).

Financial Requirements

Diplomas, transcripts of record, and letters of honorable dismissal will be withheld from all students who have not paid all bills and all loans due the University. All such bills due the University must be paid ten days preceding Commencement. If paid after that date and the student is otherwise eligible, he may graduate the following year.

Honors

- A. *University Honors Groups.* At the beginning of each semester a list is posted of those students who, during the previous

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semester, made a semester grade point average of 3.0 or higher. Three groups are recognized as follows:

- First Honors . . . 3.8 (3.75) or higher
- Second Honors . . . 3.4 (3.35) to 3.7 (3.74) inclusive
- Third Honors . . . 3.0 (2.95) to 3.3 (3.34) inclusive

B. *Graduation with Distinction.* High ranking students will be graduated as follows:

- Summa Cum Laude—Cumulative average 3.80 or higher.
- Magna Cum Laude—Cumulative average 3.40 to 3.79 inclusive.
- Cum Laude—Cumulative average 3.00 to 3.39 inclusive.

A transfer, to be eligible for consideration for graduation with distinction, must have earned his final 60 semester hours of credit in residence at the University.

Reports

A. Mid-Semester Report:

Freshman and sophomore mid-semester reports are given to students by advisers and also sent home each semester. No mid-semester reports are prepared for juniors and seniors.

B. Final Grades:

- First semester; given to students before being sent home.
- Second semester; mailed to homes.

Transcripts

Two transcripts of a student's record will be furnished without cost by the Registrar's Office. For each additional copy there will be a charge of \$1.

REGISTRATION

General

Pre-Registration

Every student must report for pre-registration on the appointed day. Late pre-registrations will be charged a fee of \$5. A student who does not pre-register is not assured admission into the next semester.

Registration

Each student must report for registration on the appointed day. Late registrants must pay a \$5 fine.

General Academic Regulations

Course Registration

No course will be recorded on the permanent records of the University nor will a student receive credit for it unless he has registered for such a course in accordance with established procedure on a regularly scheduled registration day or unless his registration shall have been made official by the signature of the Registrar. In the latter case a Program Change Card must be signed by the student's adviser and the Registrar approving the course, and by the instructors of the courses to be dropped and added. No instructor should allow a student to enter his class unless the student was officially enrolled on a regularly scheduled registration day or submits such a Program Change Card authorizing his admission to the class.

A student may not drop a course without the approval of his adviser and the Registrar on a Program Change Card and the release of the instructor. A course dropped without this approval will be recorded as a Failure.

Adding or Dropping Courses

No new course may be added to a student's schedule after ten calendar days from the first scheduled classes of the semester. A course added without the recommendation of the advisers and Registrar on a Program Change Card will not receive credit. Cards are available in the Registrar's Office.

A student may withdraw from a course without its being recorded on his permanent record provided he does so within ten calendar days from the date of the first scheduled classes of the semester. A student may withdraw from a course after this ten day period but within 28 calendar days from the date of the first scheduled classes of each semester with a mark of "W", withdrawn, recorded on his permanent record. A "W" does not affect the student's quality point average—it serves only to indicate attendance beyond the ten day limit.

Any course dropped after 28 calendar days from the day of the first scheduled classes of the semester is recorded by WF (withdrew failing). This grade will be computed in the quality point average. An exception may be made to this rule in certain cases of protracted illness or serious personal or social problems. In such exceptions, a WP (withdrew passing) will be recorded if the student obtains (1) the favorable recommendation of the appropriate University Health or Student Personnel Officer, (2) the approval of his adviser and the Provost, and (3) a certificate from his instructor that the student was passing the course at the time that he first contacted the University Health or Student Personnel Officer, with regard

to his problem. An overload of courses is not considered sufficient grounds for dropping under this arrangement.

The minimum load that can be approved for any student is 12 semester hours. A student is not allowed to reduce his credits below this minimum either by W or WP without the permission of his adviser and the Provost.

A course dropped any time without the approval of the adviser and Registrar on a Program Change Card will be recorded as a failure.

Withdrawal from the University

If a student voluntarily withdraws from the University after the announced closing date for submission of mid-semester grades, each course for which he is registered will be recorded on his permanent record as WF or WP in accordance with his standing in the course at the time of formal withdrawals.

Change of Major

A student wishing to change his major must get a Major Change Card at the Registrar's Office. This change is to be approved by the head of the Department or School in which he is now majoring and also by his new major adviser. This card, properly endorsed, must be returned to the Registrar's Office before the change receives final approval. As part of the major change procedure, the student takes his Academic Records Folder to the new department.

SPECIAL COURSE REGISTRATION

Advanced Placement

If a student is given advanced placement by a placement examination or by some other means, and if he completes the advanced work (the next course when the courses are in sequence) with a grade of C or better, he will be given credit but no grade for the omitted work. If the grade in the advanced work is D, he will be considered to have completed any requirement represented by the omitted work but will not receive credit for the omitted work. Credit with no grade awarded in this manner will be treated as transfer credit in the computation of quality-point averages.

Auditing

A full-time undergraduate student may audit a course by presenting his ID card to the instructor of the course, providing that the instructor can accommodate the auditor in his class, feels that the student has sound academic reasons for the audit and that the

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student has the proper preparation. The student will be expected to pay laboratory fees, where applicable.

Credit by Special Examination

The requirements of any course approved for credit may be met by examination upon arrangement with the Dean of the School or College and the head of the department offering the course, provided the student's quality point average is 2.5 or higher. All such arrangements must be completed prior to the mid-semester. No student may earn more than thirty (30) semester hours of credit in this manner.

Four College Courses

The University shares with nearby Smith, Mount Holyoke, and Amherst Colleges an exchange course program for *advanced and outstanding students*. With the permission of the student's Adviser, Department Head, and the Provost, enrollment may be made in an advanced course in the student's major which is *not available at the University*, which is associated with the student's career goals, and which is vital to the student's education. Mutually acceptable arrangements among the four colleges have been made concerning costs and transportation. Applications are available at the Provost's Office and must be completed at or prior to Counseling Day.

RESIDENCE

Student Housing Policy

It is the policy of the Board of Trustees that all men and women undergraduate students shall be housed in University residence halls.

Permission for certain students to commute from parents' home or to live at sorority or fraternity houses must be obtained from the appropriate student personnel dean.

Students who are assigned to housing operated by the University are expected to remain in occupancy for the academic year and may not be released sooner except as their places are taken by suitable substitutes.

The University of Massachusetts reserves the right to change room assignments whenever necessary.

Most residence hall rooms are double and are furnished with beds, mattresses, desks, chairs, and a chest of drawers. Students care for their own rooms and are responsible for any damage.

General Academic Regulations

Residence halls will be open for occupancy on the day immediately preceding the opening of the University.

All student property must be removed from the rooms and the key turned in immediately after final examination in June. Such property not removed by the owner will be removed by the University and stored at the owner's expense.

Students assigned to residence hall rooms will be responsible for the room rent of the entire semester. Room rent is not refundable.

Room rental charges do not include the several regular school vacation periods. The University reserves the right to utilize student rooms during vacations for conferences and other groups which meet occasionally on the campus.

Rooms for Men Students

Assignment of rooms in men's residence halls is under the supervision of the Housing Office. Requests for permission to live off campus must be made in writing to the Dean of Men.

A full-time Head of Residence who is a member of the professional staff of the Dean of Men's Office is in charge of each residence hall. While these Heads of Residence are responsible for the enforcement of University rules and regulations, their primary concern is to counsel students. In each residence hall they are assisted by Floor Counselors in maintaining good living and study habits.

Residence halls are governed by an elected Student House Council, advised by the Head of Residence, a procedure which gives the students valuable training in dealing with the problems of group living.

Rooms for Women Students

Assignments of rooms in women's residence halls are made by the Office of the Dean of Women.

Under the supervision of the Dean of Women, life in each residence hall is directed by a council of student leaders, advised by a full time head of residence, so that conditions in the residence halls are conducive to study and good living habits. Through the women's branch of the Student Government, the responsibility is put upon each student to live according to her own best standards as well as according to the standards of the group.

Freshman girls will be assigned rooms in the resident hall and will be notified of the assignment prior to the beginning of college.

In the spring of each year, upperclass women have an opportunity to choose rooms for the coming year.

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Only students living in their own homes may commute. Upper-class women may apply to the Dean of Women for permission to live in a sorority house, or to earn room and board in a private home.

Residence halls are maintained for undergraduates; graduate women from other countries are also accommodated whenever possible. The Dean of Women's Office maintains a list of rooms in Amherst available for graduate women students.

Apartments for Married Students

The University owns and operates two groups of apartments; Lincoln Apartments for junior faculty, graduate and undergraduate students, and County Circle apartments for graduate and undergraduate students. Apartments are unfurnished with the exception of kitchen units which contain an electric range and refrigerator.

Apartments are assigned as of date of availability. New junior faculty, married graduate students and undergraduate students with children receive consideration in that order.

Further information and applications may be obtained from the University Housing Office, Draper Hall.

Every effort will be made to assist applicants in obtaining housing either on or off campus. Listings of off campus housing are available at the Housing Office. Due to daily changes in these listings and the fact that all off campus arrangements must be made by the parties involved these listings cannot be given out except on a personal visit.

Insurance

It is not possible for the University to carry insurance which will compensate students or their families for losses suffered on the campus due to such hazards as fire, theft, water damage, etc. For most families such insurance is highly desirable, either as an extension of your present home insurance or as a special contract.

Services to Students

Academic Programs for Superior Students

The University provides superior students with challenging educational opportunities beyond those normally encountered in the regular four-year curricula. A flexible program of honors work, intended to develop and expand the potential of academically gifted students, is offered in the following areas.

Freshman, Sophomore, and Junior Honors Colloquia

Honors Colloquia provide students of outstanding talent an opportunity to work in small inter-disciplinary groups of ten students and two professors from all colleges and departments of the University. Reading lists of widely-selected materials and discussion emphasize breadth of learning, the ability to make significant personal investigations, to communicate ideas effectively orally and in writing, and to defend these under critical examination of the group. Each student works under close supervision of the two instructors. To provide an extension of the student's viewpoints in areas other than his own, and to expand the scope of his work rather than emphasize intensive study of one field, as is done in senior honors, assigned readings treat topics of broad, central concern which cut across several disciplines and fields, demonstrate the unity of knowledge, and lend experience in intellectual inquiry, analysis, and synthesis. Several academic privileges are accorded Honors Colloquia members, and one credit per semester is granted.

Senior Departmental Honors

Departmental Honors are designed to recognize merit and give highly qualified students time and opportunity for independent study under closer, more personal direction than is ordinarily provided in the University curriculum. Such study shall be devoted to a careful exploration of some question, problem or theme of significance within the student's major field. The ultimate aim of Departmental Honors is to afford talented students maximum freedom to develop their powers of initiative and resourcefulness and greater freedom to make at least a beginning in original, contributive research. To be eligible for admission to Departmental Honors, a student should have a scholastic record of 3.0 or higher for the first five semesters of college work and demonstrate outstanding promise in his major field. In exceptional cases students who have

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averages lower than 3.0 but show unusual aptitude for independent work may be accepted if a written statement establishing this is presented to the Director of Honors. Departmental Honors candidates are assigned an advisor who supervises the preparation of the thesis to be submitted to his department and to the Honors Council. The candidate also presents an oral defense of his thesis. If by the excellence of his work he satisfies all the requirements of his department and the Honors Council, the candidate is awarded honors in the field of his specialization upon graduation. During the senior year, independent study is carried forward each semester as a three-credit course in the department of the major. Senior Honors students have the privilege of enrolling in courses normally limited to graduate students. By permission of the head of the department of their major, Senior Honors students may gain admission to the Graduate School of the University and enroll in courses for graduate credit, provided requirements for the baccalaureate are separately fulfilled.

Opportunities for Independent Study

Students majoring in the College of Arts and Sciences who have a cumulative quality point average of 3.0 or better may, upon the recommendation of their major department, the Honors Council, and the approval of the Dean, pursue special courses of study during the senior year. The program must be the equivalent of thirty semester hours of credit, and students electing such programs will be granted release from other formal requirements of the senior year.

Counseling and Guidance Services

The Counseling and Guidance Office assists students with personal, emotional, social and vocational choice problems. Students are sometimes referred to this Office by faculty advisers, Student Personnel staff, or dormitory counselors. Many students make appointments directly.

Guidance problems such as those associated with choice of major or change of major are ordinarily discussed with faculty advisers. When additional assistance is required, students are often referred, or come of their own choosing, to the Counseling and Guidance Office.

Help with reading and study skills is also available in this Office. Special courses in *reading and study skills* development are offered in the School of Education each semester. Arrangements to take such a course should be made through the Counseling and Guidance Office.

Advisory System

Each student is assigned to a faculty adviser in the department or school in which he has chosen to major. A student will ordinarily see his adviser when he has questions about selection of courses, school or departmental requirements, change of major, or other problems that are primarily of an academic nature. He routinely sees his adviser for mid-semester marks and to pre-register for the next semester. A change of major ordinarily entails a change of adviser. The University also forwards reports of academic standing to the parents. Both students and parents are encouraged to consult with the adviser whenever there are problems regarding studies or personal adjustments to college life.

Faculty advisers sometimes refer students to the Deans of their schools or the Counseling and Guidance Office when special problems arise. Students may also make appointments directly.

Freshman Counseling Program

Members of the incoming freshman class are required to attend a summer orientation program of two and a half days. This is a period of testing, counseling and pre-registration. A series of guidance and placement tests will be given and then scored. The student will be assigned to a faculty counselor who will help him select his courses for the fall semester and plan his schedule of hours.

If a student is given advanced placement by a placement examination or by some other means, and if he completes the advanced work (the next course if the courses are in sequence) with a grade of C or better, he will be given credit toward graduation but no grade for the omitted work; if the grade in the advanced work is D, he will be considered to have completed any requirement represented by the omitted work but will not receive credit for the omitted work. Credit with no grade awarded in this manner will be treated as transfer credit in the computation of quality-point averages.

A special program for parents is arranged for the final day of the session at which time they learn about the tests and the results, the student's proposed courses and schedule for fall semester, and the facilities and opportunities at the University.

Distinguished Lectureships, Seminars, Colloquia

Each year the University brings distinguished personages to the campus to lecture on topics of major significance in the arts, sciences, public affairs, and other areas of human concern. Each talk is given either as a single public lecture or as part of a program of panel discussions and lectures sponsored by a University group for

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public presentation. Included in the yearly schedule of such events are the Alumni War Memorial Lectures; Distinguished Visitors' Program; the University of Massachusetts Assembly lectures and seminars; public lectures of the University's Distinguished Professors of Public Affairs; panel discussions and talks delivered during International Weekend; and the Phi Kappa Phi and Sigma Xi lectures. In addition, individual departments sponsor continuing programs of extra-curricular lectures, seminars and colloquia for the benefit of majors in those departments as well as for other interested persons.

Recognizing that a comprehensive education is not sustained through curricular experience alone, the University urges all of its students to attend as many of the extra-curricular lectures as they possibly can. Students undertaking honors work or participating in Honors Colloquia programs are informed of forthcoming lectures through an Honors Council newsletter. The student body at large is kept informed of such events through notices in the college newspaper as well as through posters, class announcements, and other means. The entire program is directed towards giving students fresh perspectives and a broader experience than that afforded by the University curriculum alone.

Four College Cooperation

Amherst, Mount Holyoke, and Smith Colleges and the University of Massachusetts have for some time combined their academic activities in certain selected areas for purposes of extending and enriching their collective educational resources. Under this cooperative program, a student in any one of the four institutions may enroll in courses given at the other three if he has the necessary qualifications and the approval of the Dean or Provost of his own institution. See "Course Registration," Page 40.

The oldest and perhaps most important of the Four College cooperative ventures is the Hampshire Inter-Library Center, a separate legal entity with a Board of Directors composed of the four Presidents, the four Librarians, and representatives from each of the Faculties. HILC is a depository for research materials and learned periodicals of a kind and in a quantity well beyond the reach of any one of the four libraries operating independently. The Center is now located on the University campus in the new addition to Goodell Library.

An FM radio station, WFCR (88.5), is similarly a Four College activity, operating as a legal entity under a Board of Directors made up of representatives of the four institutions. Other cooperative activities, all designed to give added strength in one way or

another to each institution, include: a joint astronomy department; new courses in the history of science; new courses in non-Western studies, financed for three years by the Ford Foundation; a Ph.D. program; a Film Center; a common calendar of lectures and concerts on all four campuses; and a committee on transportation. Additional cooperative projects are in the planning stage. The entire program is under the supervision of a Coordinator who is a member of the administration of all four institutions.

Health Service

The Health Service is devoted to the promotion of optimum health among members of the University community. Its concern is for the total health of individuals and groups, as reflected in the need for complete physical, mental, and social well-being.

An expansion of the work of the Health Service has been made possible with the opening of the new Infirmary. The building contains an out-patient department with offices and examining facilities for care of ambulatory patients. In addition, there are 88 beds available for care of students whose needs are best met by hospitalization. X-ray, laboratory, and physiotherapy facilities are available to help in reducing time lost by students for reasons of health.

Recognition of the specific emotional needs of students in an educational environment has led to the provision of an active mental health program including diagnostic and limited treatment services. Orthopedic and radiological consultants are available regularly; other consultation services can be arranged as the need arises. Hospitalization for conditions requiring more specialized care than is available in the Infirmary can be arranged at the Cooley-Dickinson Hospital in Northampton.

The Health Service works closely with the School of Physical Education in adapting the facilities of the School to the individual needs of students for restricted or remedial activity. The health status of participants in the athletic program, both intramural and intercollegiate, is under Health Service supervision; and care is always available for any injuries resulting from these activities.

The Health Service also has an active concern for matters of sanitation and safety which affect the health of students, faculty, employees, and visitors. A physician is always on duty at the Infirmary, or on call, to attend emergency needs among families, visitors, and members of conference groups, as well as regular members of the University community.

Students are urged to consult a member of the Health Service staff as soon as any indication of a physical or emotional disorder is evident. It is much easier for the staff, and less time-consuming

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for the student, to rectify minor difficulties before they have become sources of disability.

Students who are under medical supervision prior to entrance are urged to have their physicians write the Health Service, giving reports and instructions in appropriate detail. Every effort is made to continue treatment without interruption. In brief, the Health Service attempts to provide all students with a coordinated and comprehensive program of health supervision formerly provided by their family physicians.

Student Personnel Services

Under Dean William F. Field the office of the Dean of Students is responsible for coordinating the wide variety of personnel services available to students. The office of the Dean of Students, as well as those of the Deans of Men and Women, Placement and Financial Aid Services, and Counseling and Guidance are located in the east wing of Machmer Hall. The coordinator of Student Activities and the Student Activities Office are located on the second floor of the Student Union. The University Health Services are located in the Infirmary building.

The Deans' offices are always ready to counsel or assist with matters concerning students.

The *Dean of Women's* staff advises and serves as liaison on administrative matters for the Committee on Women's Affairs, House Counselors, Interdorm Council, Panhellenic Council, and all sororities, Mortar Board, Scrolls and other activities of particular interest to women. The Dean of Women is responsible for all women's residences and room assignments and maintains an up-to-date directory of campus and home addresses of women students.

Office of the *Dean of Men* has primary responsibilities for all phases of out-of-class matters with which male students are concerned. For example, it relates to residence halls, fraternities, the Men's Affairs Committee, conduct, and a host of individual and personal matters.

Placement and Financial Aid Services

The primary functions of the Placement and Financial Aid Services lie in vocational and financial counseling and the administration of the techniques involved in aiding students to seek appropriate positions and careers; the granting of loans and scholarships; the assignment of part-time work; the coordination of veterans' affairs; and the dissemination of information relative to military service through the draft or reserves.

Senior Placement

While providing vocational and career counseling for all undergraduates, special emphasis is given to seniors who are provided with job-hunting techniques and other media for determining their future plans following graduation. Actual contact with employers is made during the year when employers from business, industry, schools, and other sources visit the campus to interview prospective graduates.

Cumulative student personnel records, occupational information and industrial literature libraries, prepared credentials, including personal resumes and recommendations, along with counseling and guidance are furnished to enable senior men and women accomplish their career objectives consistent with their interests, abilities, aptitudes and education.

Financial Aid

See "Financial Information," Page 29.

Military Service Information

The Office of Placement and Financial Aid Services also provides information concerning draft status and military reserve duty. Students who reach draft age (18) may register through this office, which notifies the local draft board. Information is transmitted to local draft boards continuously concerning the status of individual students. Attempt is also made to keep abreast of military reserve affairs to aid students who have questions in this regard.

Religious Activities

The University is concerned in an age of anxiety with the needs for spiritual undergirdings for the educated man. In this day of uncertainty, such concern for the affairs of the spirit has an equal prominence with searching for scientific truths and knowledge in human relations.

The University gives support to the religious life of its students in various ways. It affords the use of University facilities for student groups of all faiths. It cooperates with the official agencies of the three faiths most largely represented at the University by recognizing the contributions of their privately supported chaplains and by giving them facilities and privileges for their work.

On the campus, the religious life of Catholic students is enriched by the program of the Newman Club, of which Rev. David J. Power is chaplain and Rev. J. Joseph Quigley is assistant chaplain. Jewish students participate in services and activities sponsored by the B'nai B'rith Hillel Foundation, of which Rabbi Louis Ruchames

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is the director. Protestant students join in worship, study, and service planned by the Christian Association, with the guidance of Rev. J Springer, Protestant chaplain, and several denominational Associates.

Other religious groups such as the Inter-Varsity Christian Fellowship, the Orthodox Club, the Christian Science Organization, and the Lutheran Club also meet regularly on campus and students interested in their programs are welcome to attend. The Campus Religious Council provides a cooperative inter-relationship among the campus religious groups and serves the whole University community by sponsoring the Annual Blood Drive, book and clothing drives, and the Religious Handbook for Freshmen.

The local Protestant and Catholic churches of Amherst provide opportunities for Sunday worship, and Sabbath services for Jewish students on Friday evenings are held at the Student Union. Students are encouraged to attend the services of their respective faiths. Several denominations sponsor active student programs centered in the local churches as well, and students are welcome to attend events and join groups sponsored by the denominations.

Student Identification Card

All undergraduate students at the University of Massachusetts are required to obtain an official University of Massachusetts Identification Card and to carry it on their persons at all times. A fee of one dollar per year, which appears on the fall bill, is charged for the card.

I.D. cards are used for the purpose of identification in the Library, for cashing checks, etc.

As undergraduate students pay an activities fee for attendance at athletic events, concerts, etc., the I.D. card serves in lieu of a ticket for these functions.

The Student Union

The Student Union is the community center for all members of the University family—students, faculty, administration, alumni, and guests. It is not just a building: it is an organization and a program which together constitute a well-defined plan for a fruitful community life on campus.

Constructed in 1957 by the University of Massachusetts Building Association, the Union is the center not only of major social activities, but also of many other organized endeavors forming an important adjunct program in the general educational process of the University as a whole.

Thus, the Union houses the offices of the Coordinator of Student Activities, R.S.O. Business Manager, University and Student Union Program offices, student publications, the Chaplains, and the Student Senate. Service departments of the Union include: the University Store, carrying a complete stock of books and student supplies; the Union Food Service, providing snacks and lunches or catered meals; the Games Area, with bowling, billiards, table tennis and other table games; the seven-chair Barber Shop; and the Lobby Counter, the Union's general service facility (newspaper stand, box office, check-cashing service, record lending library, lost and found information desk).

Three large lounges—the Cape Cod, Colonial, and Governor's—are available for reading and conversation. There is also a Music Room, for listening or piano practice; a Reading Room, containing home-town newspapers and periodicals; and ten Meeting Rooms for use by campus organizations.

Student Union program activities are selected, planned and executed by the Student Union Program committees. These groups are composed of interested volunteer students, and their activities are coordinated by a full-time Program Adviser.

The construction cost of the Student Union is being defrayed by a Student Union Fee of \$10 per student per semester. The excess of student fees over the bond schedule, plus revenue earnings, compose the operating fund for the Union building.

Student Activities and Organizations

Participation in extra-curricular activities offers opportunities to further the broader objectives of a college experience. The knowledge, skills and judgment developed in the classroom can be tested and refined through use in the organizational setting. Thus, more than fifty professional clubs exist on campus as a means of stimulating vocational interest through close contact with members of the teaching staff and representatives of the professions. Student government offers a forum for debate on matters of importance to the entire University community. For those interested in communications, there are several campus publications as well as an FM radio station. Experience in music and drama is available in a number of forms.

Such activities can be a profitable means of fostering maturity and general enrichment in those students who wish to take optimum advantage of all that the University can offer. In encouraging participation in these activities, the University asks only that students plan their time well, in order that they may profit as much as possible from a total University program devoted, first and foremost, to academic studies.

The Student Activities Office is the headquarters for Recognized Student Organizations (R.S.O.) and the University Program Office. It provides a banking, bookkeeping and auditing service for student organizations, as well as help and counsel on planning, budgeting, purchasing, contracting, and most other aspects of the affairs of student organizations. An adviser is available to work closely with officers and faculty advisers of student organizations to help them attain their goals and best serve the University.

The University Program Office provides a resource office available to any campus individual or organization with problems relating to programming.

All extra-curricular activities are supervised by the Committee on Recognized Student Organizations composed of alumni, faculty, and students. Recognition for outstanding achievement in this area is given at an annual Student Leaders Night held in the spring. An office devoted to administering and assisting in the conduct of student activities is located in the Student Union. Detailed information about student organizations may be obtained by contacting the Student Activities Office.

Student Government

The Student Senate, operating under a student approved Constitution, has vested in it all legislative functions of student government and has the primary goal of promoting the welfare of the entire student body. The Senate levies student taxes and appropriates money for many student activities and services. At the same time, the Senate acts as the official representative of the students both on and off the campus. In coordination with the Dean of Men and the Dean of Women, the Senate has the responsibility of establishing effective rules guiding the activities of students at the University.

STUDENT ORGANIZATIONS

Academic Honor Societies

See Appendix, Page 245.

Campus Publications

The Collegian. Tri-weekly newspaper published by undergraduates.

Index. The University yearbook.

Caesura. Magazine for the publication of literary and artistic efforts of undergraduates.

Ya Hoo. Campus humor magazine, published three times a year.

Engineering Journal. Quarterly open to science and engineering students for the publication of technical articles and essays of general interest.

University Music Organizations

Campus music organizations provide experience in musical and allied activities for performers and technicians with various kinds of interest and ability. Membership is open to all students, faculty, alumni, and others in the area community.

Bands. The University Bands program offers opportunity to virtually all interested students to participate in one of the member units. The *Concert Band* is a symphonic group of qualified wind instrumentalists. The *Redmen Band* performs during the football season at all home and some away games. The *Varsity Pep Band* plays for basketball games. The *Dance Band* performs at campus dances and concerts. The *Precisionettes* are a 48-girl drill team active during the football season.

Student Activities and Organizations

Chorale. The University's choral group rehearses notable works for presentation on campus and on tour. Smaller choral ensembles are trained for special musical events.

Operetta Guild. The Guild produces standard works from the repertoire of American musical theater. Membership is open to persons interested in an art form which provides experience in many elements of musical performance as well as in staging, acting, and other theater activities. The Guild sponsors an Opera Workshop each year as well as miniature musical theater groups.

Concert Association. The Association offers students an opportunity to stage professional concerts and recitals and to administer a large-scale annual enterprise involving major financial and promotional concern. The Association each year presents distinguished attractions including national symphony orchestras, outstanding operatic performers, instrumental virtuosi, and other offerings.

The University Theatre

The University Theatre is sponsored by the Department of Speech. Dedicated to the ideal that it has an academic responsibility to every student of the University of Massachusetts as well as those studying theatre, the University Theatre schedules four great plays a year, a program designed to give every student the opportunity of seeing living examples of the dramatic heritage of Western Civilization, in all forms and styles. The University Theatre productions serve as the laboratory for all students majoring in theatre; however, all phases of work on these productions are open to all students regardless of school or major. Roister-Doisters, the student extra-curricular dramatic society (incidentally, the oldest extra-curricular student society on the campus) works in conjunction with the University Theatre and students may earn points toward admission into Roister-Doisters by working on the University Theatre productions. National Collegiate Players, the National Honorary Dramatic Society, is sponsored by the Department of Speech and membership to this society is achieved through recognition of meritorious work done in the University Theatre.

Professional and Special Interest Clubs

Numerous professional clubs, established in connection with the various major courses of study, stimulate students' professional interest in their chosen fields and afford opportunity for discussion of technical subjects of mutual interest.

Student Activities and Organizations

Among the special-interest groups are the Debating, Flying, Parachute, Equestrian, Ski, Water Ski, and Outing clubs.

Student Honor and Service Societies

Adelphia. The men's senior honor society brings together the most representative men in college who are leaders in various branches of student activity. In recognizing men who have attained a high standard of leadership in college activities, the society strives to preserve valuable traditions and customs and to advance the University of Massachusetts in all ways. Membership is limited to a total of 20 men from the senior and junior classes.

Mortar Board. The Isogon Chapter of Mortar Board was installed at the University of Massachusetts in 1955. The purpose of the Society is to promote college loyalty, to advance the spirit of service and fellowship among University women, to maintain a high standard of scholarship, to recognize and encourage leadership, and to stimulate and develop a fine type of college woman. Membership is composed of a total of not less than five or more than 25 girls from the senior class selected on the basis of service, scholarship, and leadership.

Maroon Key. The men's sophomore honorary-service society, composed of 25 students recognized for leadership abilities and University services.

Scrolls. Women's sophomore honorary-service society, composed of 20 students elected at the end of the freshman year.

Revelers. A group of upperclassmen chosen to promote and encourage freshman interest and participation in campus activities.

Alpha Phi Omega. A fraternity which renders various kinds of service to the University. The group is composed of former members of the Boy Scouts of America.

Fraternities and Sororities

Social fraternities on the campus include Alpha Epsilon Pi, Beta Kappa Phi, Alpha Sigma Phi, Kappa Sigma, Lambda Chi Alpha, Phi Mu Delta, Phi Sigma Delta, Phi Sigma Kappa, Q.T.V., Sigma Alpha Epsilon, Sigma Phi Epsilon, Tau Epsilon Phi, Tau Kappa Epsilon, Theta Chi, Zeta Nu. An Inter-Fraternity Council, consisting of representatives of these fraternities, has charge of rushing and all general matters dealing with fraternity life. A cooperative organization—The Fraternity Managers' Association—pools the fi-

Student Activities and Organizations

nancial resources of all fourteen fraternities for purposes of effecting orderly, economical purchasing and accounting procedures. A professional Fraternity Manager administers the Association's program.

Sororities include Alpha Chi Omega, Chi Omega, Iota Gamma Upsilon, Kappa Alpha Theta, Kappa Kappa Gamma, Lambda Delta Phi, Pi Beta Phi, Sigma Delta Tau, Sigma Kappa, and Sigma Sigma Sigma. The Panhellenic Council, made up of representatives from the sororities, supervises rushing and other sorority matters.

Intercollegiate and Intramural Athletics

The University believes there are educational advantages in a well-organized intercollegiate and intramural sports program. In intercollegiate athletics, the University is represented by teams in all the leading sports, including football, soccer, cross-country, basketball, swimming, wrestling, indoor and outdoor track, hockey, rifle and pistol, baseball, tennis, golf, lacrosse, gymnastics, skiing.

The University also supports a broad program of intramural activities, in which all students are encouraged to participate. The range of sports available each year includes the team sports of touch football, basketball, softball, volleyball. Individual activities include tennis, bowling, badminton and golf.

The University Intercollegiate Athletic Program is supervised by the University Athletic Council and is composed of the following members: five faculty members appointed by the President, three alumni representatives appointed by the Directors of the Alumni Association, the Executive Director of the Alumni Association, and ex officio, the Director of Athletics.

The University of Massachusetts is a member of the Yankee Conference, the National Collegiate Athletic Association, the Eastern College Athletic Conference, the Association of New England Colleges for Conference on Athletics, and the Intercollegiate Athletic Association.

Directory of Courses

COLLEGE OF AGRICULTURE

ARLESS A. SPIELMAN, *Dean*

The College of Agriculture offers a broad general education with scientific and technical training in a specialized area. Upon the completion of the requirements for graduation, the student will have devoted about one-quarter of his time to pure science, one-quarter to social and humanistic studies, and about one-half to applied science and technology.

A broad choice of electives within the required courses of each curriculum gives the student the opportunity to prepare for a career in research, industry, business, education, conservation, services, or farming.

Each department of the school has specific requirements for graduation which are included in the descriptive matter under the name of the department.

During the first semester of the freshman year, students interested in teaching vocational agriculture, extension work, or specializing in research work, should consult with the head of the department in which they plan to major.

Students may major in: Agricultural and Food Economics, Agricultural Engineering, Animal Sciences, Entomology, Food Management, Food Science and Technology, Forestry, Landscape Architecture, Plant and Soil Science, Pre-Veterinary, or Wildlife and Fisheries Biology.

Curricula in Agriculture

Students majoring in Agricultural Engineering follow the program outlined on Page 61. All other majors take the following curriculum during the first two years:

Directory of Courses

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1, Composition	2	English 2, Composition	2
Speech 3*	2	Speech 3*	2
Mathematics 1, 7 or 9 ¹	3	Mathematics 2, 9 or 10 ¹	3
Chemistry 1, General	3	Chemistry 2, General	3
Botany 1, General	3	Zoology 1, General	3
(Military or Air Science 11 (men) 1)	1	Elective	3
Agricultural and Food Economics 1 2	2	(Military or Air Science 12 (men) 1)	1
Physical Education 1a, b**	2	Physical Education 2a, b**	2

¹ Candidates for the Bachelor of Vocational Agriculture degree must take Mathematics 01 followed by an appropriate second course.

* May be taken either semester or during a later year.

** Not quality point credit.

SOPHOMORE YEAR

English 25 and 26 (Humane Letters), two courses from the Social Sciences, two courses from Mathematics or the Natural Sciences, Physical Education and electives. The Sophomore year in Landscape Architecture is described separately.

JUNIOR-SENIOR CURRICULA

At the end of the sophomore year each student selects one of the following curricula as his major to complete his collegiate training.

Agricultural and Food Economics

JOHN BLACKMORE, *Adviser*

This curriculum is designed (1) to prepare students for employment in executive positions with firms in agriculture and the food industry or for administrative positions with related government agencies and (2) to give the essential undergraduate preparation for a career as an economist, working in research, teaching, or consulting work in agriculture or the food industry. The course of study, which leads to the degree of Bachelor of Science, combines training in relevant technical agricultural subjects with courses in business management and economics. The resources of the College of Arts and Sciences and of the School of Business are used in addition to those of the College of Agriculture in order to provide a body of course work which gives the student thorough technical training within the framework of a liberal college education.

Students with a primary interest in Food Economics will elect Animal Science 58, Plant Science 73 and 74, and Food Technology 75. Students with a primary interest in the Economics of Agriculture will elect courses totaling 12 credit hours of technical agriculture suitable to their professional interests. All majors will take 9 credits in mathematics; Economics 25 and 73; Geography 55; Accounting 25; General Business 71; Statistics 79 and 80; and Agricultural and Food Economics 26, 58, 71, 75, either 55 or 65, and either

68 or 78. At least 24 semester credits in electives are available for courses to be selected in accordance with the particular professional interests of the student. A special list of suggested electives is available for students with an interest in regional planning and development.

Agricultural Engineering

R. W. KLEIS, *Adviser*

Agricultural engineering is concerned with the application of scientific engineering principles to agricultural industries. This professional field includes engineering activities related to the design, development and use of mechanical and electrical equipment; structures; and soil and water control systems for the production, processing and preservation of agricultural products and the improvement of rural living. Agricultural engineers are employed by a variety of agricultural industries and organizations for research, development, teaching, and promotional activities.

The program is designed to provide sound training for the agricultural engineering profession. The student majoring in this field will take his freshman and sophomore work at the University and then, under a cooperative agreement, complete his Bachelor of Science program at the University of Maine.

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Math. 6, Diff. Calculus	4
Math. 5, Analy. Geom.	4	Chem. 2 or 4, General	3
Chem. 1, General	3	Mech. Engin. 2, Drawing	3
Mech. Engin. 1, Drawing	2	Physics 6, General	3
Physics 5, General	3	(Military or Air Science 12	1)
(Military or Air Science 11	1)	Physical Ed. 2a, b*	2
Physical Ed. 1a, b*	2		

* Not quality point credit.

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25, Humane Letters	3	English 26, Humane Letters	3
Math. 31, Integ. Calculus	4	Math. 32, Diff. Equations	4
Physics 7, General	4	Psych. 1 or Soc. 25	3
Civil Engin. 31, Surveying	3	Agric. Elective	3
Mech. Engin. 35, Engin. Mat'l.	4	C. E. 34 Statics	3
(Military or Air Science 25	1)	(Military or Air Science 26	1)
Physical Ed. 31a, b*	2	Physical Ed. 32a, b*	2

* Not quality point credit.

JUNIOR AND SENIOR YEARS

At the University of Maine.

(Consult Agricultural Engineering Department for details.)

Directory of Courses

Animal Sciences

D. J. HANKINSON, *Animal Science Adviser*
T. W. Fox, *Poultry Science Adviser*

The curriculum in the animal sciences is designed to provide the student with fundamental training and knowledge in the comparative nutrition, physiology, breeding, selection and management of various classes of livestock and to understand the role of animal production in the national and world economy. To accomplish this objective, all students are expected to take Animal Science 21, 50, 58, 61, 64, 67, 68, 73, 74; Zoology 35 and 53; Bacteriology 31; and Veterinary Science 72.

The curriculum provides for an important degree of flexibility depending upon the students' interests and abilities. Options emphasizing commercial animal production are supported by electives in agricultural economics, agricultural engineering, and business administration. Students interested in graduate work in such specialized areas of the animal sciences as nutrition, physiology or genetics should elect programs with special emphasis on the basic sciences.

Suggested supporting courses and program organization for the various fields of specialization are available from the advisers.

Students in need of practical experience will be required to complete one summer of placement employment (in production agriculture, industry, or research as determined in consultation) before graduation.

Entomology

J. H. LILLY, *Adviser*

Courses in entomology acquaint students with all phases of insects and insect control, as well as beekeeping. Trained entomologists find positions in public service and industry, such as teaching at all levels; research, quarantine and regulatory work in State or Federal Service; various roles in public health and pest control activities; research, sales and public relations work in the agricultural chemicals industry; and apiculture.

Entomology majors are expected to take Entomology 26 and 35 and Agricultural and Food Economics 1 in the freshman or sophomore years, and Zoology 35 and Chemistry 27 or 33 in the sophomore year. In the junior and senior years Entomology 55, 56, 57, 81 and one elective from Entomology 60, 66, 72, 74, 79 and 80 are required, along with Zoology 53 and Statistics 77.

Electives in entomology and other fields are recommended by the student's adviser according to individual needs. For those anticipating research or teaching careers, requiring graduate study, electives should stress basic sciences and liberal arts courses: botany, chemistry, English, modern languages, zoology and statistics.

Students interested in medical entomology should include microbiology, parasitology and public health courses. For work in the fields of pest control, extension, quarantines, or agricultural chemicals, electives from agronomy, forestry, horticulture, plant pathology, speech and courses in applied entomology are recommended. A student should consult with his major department as early as possible in his college career.

Food Management

N. G. COURNOYER, *Adviser*

The curriculum in Food Management is offered by the Food Science and Technology Department. The program is designed to give the student a general well-rounded background of arts and sciences, coupled with training in subjects useful to the hotel, restaurant, and other food service industries. The nature of the food service industry requires persons with broad, general backgrounds of business training coupled with a scientific knowledge of foods.

In the sophomore year Food Management majors should take Accounting 25, Chemistry 33, and Food Management 33 the first semester and Accounting 26, Microbiology 31, and Home Economics 30 the second semester. In the junior and senior years Agricultural Engineering 53, Finance 65, Food Management 77, 78, 81, 82, 95 and 96, Food Science 75, General Business 71, Home Economics 54 and 92, and Public Health 63 are required plus elective courses selected with the guidance of the major adviser.

Food Science and Technology

W. B. ESSELEN, *Adviser*

The Department of Food Science and Technology offers two curricula: Food Management (page 92) and Food Science and Technology.

The curriculum in Food Science and Technology provides scientific and applied training in the principles concerned with the processing, preservation, and packaging of foods and food products. The student's background in chemistry, physics, and microbiology is applied to food technology problems and food analysis. Major fields open to graduates include: (1) technical and production work in the food industries; (2) quality control and analytical work related to food products; (3) government food inspection and grading; (4) technological work and research in government, industry, and education.

The selection of supporting courses depends upon the objective of the student, which should be determined as early as possible.

Food Science and Technology majors should take Physics 3 and 4 and Chemistry 29 and 32 in the sophomore year; also, if possible,

Directory of Courses

Microbiology 31. Students planning to take Physical Chemistry should complete Mathematics 29 and 30. In the junior and senior year Agricultural Engineering 81 and 82, Microbiology 51 and 82, Chemistry 51 and 52 and 65 or 79 and Food Science 51, 52, 61, 62, 91, 92, 95 and 96 are required plus elective courses selected with the guidance of the major adviser.

Forestry

A. D. RHODES, *Adviser*

The technical curriculum in forestry is concentrated in the field of forest production and management, and leads to the degree of Bachelor of Science. It has professional status, being accredited by the Society of American Foresters. Graduates are prepared for employment with Federal and State agencies and in private industry. The curriculum emphasizes the multiple-use concept of forest land management, and stresses the scientific and economic foundations of forestry rather than methods. The first two years are devoted largely to science, English, and other cultural-foundational subjects, the last two years mainly to professional subjects of the major.

Following the sophomore year students are encouraged to undertake summer work giving practical field experience in forestry.

Majors in forestry take Forestry 55, 78, and Civil Engineering 27 during nine weeks in the summer following the freshman year; Forestry 59, Physics 3 and 4, Economics 25, Entomology 26, Agronomy 22, and Geology 50, in the sophomore year; Forestry 25, 53, 54, 56, 59, 75, and 84, Botany 67, and Wildlife Management 61, plus social science and humanities requirements in the junior year; and Forestry 57, 71, and 80, Plant Pathology 69, and Entomology 72 in the senior year. Forestry 74, 82, and Agricultural Economics 78 are recommended electives.

Landscape Architecture

R. H. OTTO, *Adviser*

Students following this curriculum, which requires 125 credits for graduation, are prepared through a broad academic approach to take up work in the various phases of landscape architecture. This applied design profession is concerned with the development of land for human use and enjoyment.

In addition to the usual areas of interest, such as site planning for private, semi-public and public works of many types, considerable city and regional planning is now available for those interested.

Because of technical requirements, the basic curriculum in this majors differs considerably from the typical College of Agriculture program.

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1, Composition	2	English 2, Composition	2
Mathematics 7, Algebra and Trigonometry	3	Speech 3	2
Chemistry 1, General	3	Botany 1, General	3
Government 25, American	3	Sociology 25, Introductory	3
Art 33, Basic Drawing	3	Agronomy 22, Soils	3
(Military or Air Science 11)	1)	Land. Arch. 2, Drafting	3
Physical Ed. 1a, b*	2	(Military or Air Science 12)	1)
		Physical Ed. 2a, b*	2

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25, Literature	3	English 26, Literature	3
Geology 1 or 50, Physical	3	Entomology 26 or Horticulture 2	3
Civil Engin. 27, Plane Surveying	3	Land. Arch. 24, Construction	4
Land. Arch. 23, Survey of L. A.	3	Land. Arch. 28, Basic Design	3
Land. Arch. 25, Graphics	3	Land. Arch. 30, Plant Materials	3
(Military or Air Science 25)	1)	(Military or Air Science 26)	1)
Physical Ed. 31a, b*	2	Physical Ed. 32a, b*	2

* Not quality point credit.

During the junior and senior years, Landscape Architecture 53, 54, 55, 59, 67, 68, 71, 74, 81 and 82 are required, with some adjustments for students preferring city planning as a career. The program is completed with a second social science and suitable electives.

Plant and Soil Science

THE DEPARTMENTS OF HORTICULTURE, AGRONOMY AND PLANT PATHOLOGY. G. B. SNYDER, W. G. COLBY AND J. H. LILLY.

The major in Plant and Soil Science permits specialization in many areas of agronomy, soil science, horticulture and plant pathology. Emphasis is on basic sciences that will prepare students for a wide variety of careers in research, teaching, industry, business, marketing, sales, production, control and regulatory services with state and federal agencies.

The major in plant science will be required to take a basic core group of subjects related to the physical, biological, social sciences and humanities plus certain specified and free electives that relate to his or her major field of interest under the direction of the staff adviser—in Horticulture: G. B. Snyder; Agronomy and Soil Science: W. G. Colby, J. Troll; Plant Pathology; C. J. Gilgut.

SOPHOMORE YEAR

English 25 and 26; Entomology 35; Chemistry 27 or 33; Physics 3 and 4; a Humanity elective; Economics 25; Soil Science 22; a specialization elective; and Physical Education.

JUNIOR YEAR

Plant Pathology 51; Botany 67; Zoology 53; Agronomy 60; Horticulture 62; a Social Science; and four electives.

Directory of Courses

SENIOR YEAR

Botany 57; a Social Science; Plant and Soil Science 95 and 96; and eight electives.
Notes:

Students specializing in Horticultural Science will take Horticulture 31, 51, 59 and 65.

Students specializing in Soil Science will substitute Chemistry 32 for Chemistry 27 and an elective for Botany 57. Other recommended courses are Soil Science 57, 79 and 84; Mathematics 29 and 30; Chemistry 29, 51, 52, 65, 66, 67 and 68; and Geology 42.

Students interested in Turf Management should elect Soil Science 57 and Agricultural Engineering 55 and 57.

In Plant Pathology recommended courses are Botany 66, Microbiology 31, and Chemistry 27 and 33.

Veterinary Science G. A. SNOEYENBOS and R. E. SMITH, *Advisers*

The Department offers supporting courses to assist students who expect to enter the various fields of agriculture, wildlife management, public health, teaching and laboratory work in the biological sciences. Pre-veterinary students are registered with the pre-medical advisory committee and are counselled in the Department of Veterinary Science.

Wildlife and Fisheries Biology

FREDERICK GREELEY and
EARL E. DEUBLER, JR., *Advisers*

Wildlife and fisheries biology are concerned with the acquiring and application of knowledge concerning terrestrial and aquatic animal populations which are of recreational or commercial value. This knowledge includes the dynamics of animal populations, and their responses to changes in environmental conditions, including changes incurred by land use and direct exploitation by man. A broad understanding of geology, forestry, soils, agriculture, botany, and zoology is required.

The activities of state and federal conservation agencies within the state provide study material and field demonstrations. The Massachusetts Cooperative Wildlife Research Unit and the Massachusetts Division of Fisheries and Game provide numerous opportunities for students to participate in and observe management and research activities.

Graduates in this field find employment primarily in state and federal conservation agencies. Depending on degree of training, individuals may also find careers in teaching in public schools or higher institutions of learning.

During the first two years basic courses in liberal arts, Botany 26 or Forestry 26, and Food Economics 1 are taken. Students interested in Wildlife Biology take Wildlife Biology 61, Zoology 81, Agronomy 22 (or Wildlife Biology 64), Zoology 35, Zoology 80, and

English 51 during the sophomore year. Juniors and seniors take Zoology 25, 71, 72, and 82, Fisheries Biology 68, Geology 1 or 50, Wildlife Biology 62, 63, and 64 (or Agronomy 22), Botany 81 or Forestry 53, Botany 80, and Agricultural Economics 77.

Students interested in Fisheries Biology take Zoology 35, 81, and 86, Wildlife Biology 61, and English 51 during the sophomore year. Juniors and seniors take Zoology 25, 71, 72, and 74, Botany 80 and Botany 81 or Forestry 53, Geology 1 or Geology 50, Agronomy 22, Fisheries Biology 65, 66, and 68, and Agricultural Economics 77.

AGRICULTURAL AND FOOD ECONOMICS

Head of Department: PROFESSOR JOHN BLACKMORE. PROFESSORS BROWN, LEED; ASSOCIATE PROFESSORS BIRD, FITZPATRICK, RUSSELL; ASSISTANT PROFESSORS CALLAHAN, FOSTER, JARVESOO, MARION.

AGRICULTURAL AND FOOD ECONOMICS

1. (I) Food and Natural Resources

The world's agricultural and food industries; geography and economics of food and fiber production; problems in U.S. food policy; world, resource and food problems. 3 class hours. Credit, 3. Mr. Blackmore.

26. (II) Elements of Agricultural Economics

Application of basic economic analysis methods to principal problems of the farm and agricultural industry. Elementary applications of macro theory and theory of the farm. 3 class hours. Credit, 3. Mr. Fitzpatrick.

55. (I) Principles of Agricultural Marketing

The economic principles governing the marketing of agricultural and food products; structure of agricultural markets. Monopoly and imperfect competition. Government in marketing. 3 class hours. Credit, 3. Mr. Fitzpatrick.

58. (II) Agricultural Policy

Concepts of policy, economic foundations of policy problems, the policy making process, and policy considerations for producers, consumers and taxpayers; foreign agricultural policy. 3 lecture hours. Credit, 3. Mr. Bird.

65. (I) Food Merchandising

The principles of merchandising food products. Effects of store layout, product location, product mix, methods of display, turnover, pricing, ordering, inventory control, upon sales and profits. 3 class hours. Credit, 3. Mr. Marion.

68. (II) Food Distribution Economics

A critical analysis of the food industry, factors affecting sales, costs, profits. Application of economic principles to financing, site selection, and store management. 3 class hours. Credit, 3. Mr. Leed.

71. (I) Price Theory and Analysis

Elements of food and agricultural price making; demand and supply theory and methods of price analysis and forecasting; introduction to econometrics. 3 class hours. Credit, 3. Staff.

Agricultural Engineering

75. (I) Production Economics

Application to farms and food production enterprises of economic principles governing production processes. Enterprise, firm and industry considerations. Methods of economic analysis. 2 class hours, 1 2-hour laboratory period. Credit, 3. Staff.

78. (II) Resource and Conservation Economics

Economic and institutional factors affecting land and water use. Land use planning, elements of conservation economics, recreation economics, water and watershed management. 3 class hours. Credit, 3. Mr. Foster, Mr. Blackmore.

97. (I) 98. (II) Special Problems in Agricultural and Food Economics

Credits, 2-3. Staff.

STATISTICS

77. (I) Biometrics

An introduction to concepts and methods used in describing reliability and significance of "Statistics." Confidence limits of proportions and means, "chi square," "t" and "F" tests of significance and simple regression and correlation are the subjects covered. Students electing Statistics 77 may not take Statistics 79. 5 class hours. Credit, 3. Staff.

79. (I) and (II) Elementary Economics Statistics

An introduction to measures of central tendency; dispersion; regression and correlation; trend, seasonal and cycle; and index numbers and an introduction to chance error in sampling as it applies to confidence limits, tests of significance and quality control. Students electing Statistics 79 may not take Statistics 77. 3 class hours. Credit, 3. Staff.

80. (II) Advanced Statistical Method

Multiple regression and correlation, "chi-square," "t" and "F" tests of significance. Prerequisite, Statistics 79. 4 class hours. Credit, 3. Staff.

AGRICULTURAL ENGINEERING

Head of Department: PROFESSOR R. W. KLEIS. PROFESSORS CLAYTON, FITZGERALD; ASSOCIATE PROFESSORS C. JOHNSON, NORTON, PERRY, ZAHRADNIK; ASSISTANT PROFESSORS PIRA, WHITNEY, COLLINS, LIGHT, E. JOHNSON.

51. (I) House Planning

Space arrangement, construction materials, construction problems and discussions, utilities, financing, maintenance and remodeling. Particular emphasis on planning and evaluation procedures and factors. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. C. Johnson.

53. (I) Food Service Facilities Planning

Space organization and equipment layouts; discussions and planning relative to facilities, utilities and materials handling. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. E. Johnson.

55. (I) Farm Shop

Instruction and practice in use of tools and power equipment; carpentry, welding, sheet metal forming, and concrete work; materials, skills, practices and safety consideration. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Pira.

72. (II) Drainage and Irrigation

The engineering factors of drainage and irrigation; study of various system types and design of systems; problems of flow and run-off. 1 class hour, 1 2-hour laboratory period. Credit, 2. Mr. E. Johnson.

75. (I) Farm Structures and Related Equipment

Fundamental aspects of planning modern farm structures with emphasis on functional design, environmental control and integration of mechanical equipment. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Clayton.

76. (II) Mechanization in Crop Production

Principles of operation, maintenance, and selection of farm tractors and field machinery; also of irrigation and drainage systems and equipment. Emphasis on management practices and discussions. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Whitney.

81. (I) Elements of Food Process Engineering I

Study of fundamental principles involved in the application of unit operations to food processing including selection, management and operation of processing units and instrumentation. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Zahradnik.

82. (II) Elements of Food Process Engineering II

Continuation of Agricultural Engineering 81; a study of the processing of raw materials, including mixing, heating, cooling, evaporating, distilling, dehydration and drying. Prerequisite, Agricultural Engineering 81. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Zahradnik.

THE ANIMAL SCIENCES

Animal Science: Head of Department: D. J. HANKINSON. PROFESSORS W. BLACK, FOLEY; ASSISTANT PROFESSORS D. BLACK, BRUCE, BUCK, MACFADDEN.

Poultry Science: Head of Department: THOMAS W. FOX. PROFESSORS MELLEN, SMYTH; ASSOCIATE PROFESSOR ANDERSON; ASSISTANT PROFESSOR GROVER; MR. SMITH.

21. (I) Introductory Animal Science

Modern Animal and Poultry Science and its role in national and world economics. 3 class hours. Credit, 3. Staff.

50. (II) Animal Physiology

A comparative study of the physiology of mammals and birds, with emphasis on those aspects most pertinent to animal science. Prerequisite, Zoology 35. 3 class hours, 1 3-hour laboratory. Credit, 4. Mr. D. Black.

56. (II) Livestock Production

Beef, sheep and swine production in New England and the United States. Field trips cost approximately \$5.00. 3 class hours, 1 2-hour laboratory. Credit, 4. Mr. Bruce.

The Animal Sciences

58. (II) Animal Products

Preparation, processing, packaging and marketing of animal products. Field trips cost \$5.00-\$10.00. 1 class hour, 1 4-hour laboratory period. Credit, 3. Mr. Buck, Mr. Smith.

61. (I) Principles of Animal Nutrition

Scientific principles of nutrition in both ruminants and non-ruminants. 3 class hours. Credit, 3. Mr. Anderson.

64. (II) Applied Animal Nutrition

Application of scientific principles of nutrition to practical feed formulation and feeding systems for poultry and livestock. Prerequisite, Animal Science 61. 1 class hour, 2 2-hour laboratories. Credit, 3. Mr. McFadden.

67. (I) Physiology of Reproduction

Comparative aspects of anatomy, embryology, endocrinology and physiology of reproduction and lactation. 3 class hours, 1 2-hour laboratory. Credit, 4. Mr. W. Black.

68. (II) Comparative Animal Genetics

The mechanisms of heredity and variation in livestock and poultry; the role of selection and breeding systems in genetic improvement and their evaluation. Prerequisite, Zoology 53. 3 class hours. Credit, 3. Mr. Fox.

73. (I) Poultry Management

Principles of poultry business management. Designed to give the student a comprehensive view of all phases of the poultry industry. Field trips cost \$10.00-\$15.00. 3 class hours. Credit, 3. Mr. Grover.

74. (II) Dairy Herd Management

Dairy cattle and milk production in New England and the United States, including a study of managerial problems concerned with successful dairying. Field trips cost \$10.00-\$15.00. 2 class hours, 2 2-hour laboratories. Credit, 4. Mr. Foley.

79. (I) Light Horse Management

Breeds and adaptations; feeding, training and management; tack and its care; brief introduction to equitation. Field trips cost \$5.00-\$10.00. Open to all University students. 1 class hour, 1 2-hour laboratory. Credit, 2. Mr. Bruce.

95. (I) 96. (II) Seminar. Review of Current Literature in Animal Science

Credit, 1 each semester.

97. (I) 98. (II) Special Problems

Independent study for qualified seniors in specific subject areas, involving either extensive literature review or an experimental approach to a research problem. Credit, 1-3 each semester.

DAIRY TECHNOLOGY

65. (I) Unit Operations

A study of the technical principles involved in the handling and processing of milk and dairy products. 2 class hours, 1 4-hour laboratory period. Credit, 4. Mr. Potter.

66. (II) Quality Control and Standards

The relationship of composition, handling, processing, storage and market regulations to the chemical and bacteriological quality of milk and its products. 2 class hours, 2 2-hour laboratory periods. Credit, 4. Mr. Evans.

97. (I) 98. (II) Special Problems in Dairy Technology

Problem work under staff supervision, intended to introduce qualified seniors to research methods in some phase of Dairy Technology. Credit, 1-3. Staff.

ENTOMOLOGY AND PLANT PATHOLOGY

Head of Department: PROFESSOR J. H. LILLY. PROFESSORS SHAW, SWEETMAN, WHEELER; ASSOCIATE PROFESSOR HANSON; ASSISTANT PROFESSORS BANFIELD, SMITH, ROHDE, WAVE.

26. (I) (II) General Entomology

A brief survey of the entire field of entomology: structure, development, classification, biology, and control of insects. Formation of an insect collection. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Lilly, Miss Smith.

35. (I) Principles of Applied Entomology

A broad basic applied course for both majors and non-majors. General principles of pest control are stressed instead of "how-to-do-it" details. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Wheeler.

55. (I) 56. (II) Classification of Insects (1963-64)

The identification of insects, including immature stages. First semester: Orthoptera, Hemiptera, Coleoptera; second semester: other orders. Either semester may be elected independently. Given in alternate years. Prerequisite, Entomology 26. 3 2-hour laboratory periods. Credit, 3. Miss Smith.

57. (I) Insect Morphology (1964-65)

The external and internal anatomy of the major orders, with stress on phylogenetic relationships, as background for subsequent work in taxonomy and physiology. Given in alternate years. Prerequisite, Entomology 26. 1 class hour, 3 2-hour laboratory periods. Credit, 4. Mr. Hanson.

60. (II) Structural Pest Control

Identification, biology and specific control measures of arthropod and rodent pests in structures, foods, fabrics, and miscellaneous products during transportation and in homes. Prerequisite, Zoology 1; Entomology 26 desirable. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Sweetman.

72. (II) Forest and Shade Tree Insects

The principles and methods of controlling insects which attack trees and forest products. A study of important species, their identification, biology, and specific control measures. 1 class hour, 3 2-hour laboratory periods. Credit, 4 (3 for students who have had Entomology 26). Mr. Hanson.

74. (II) Medical and Veterinary Entomology (1963-64)

Relationships of insects and their allies to the health of man and animals. The classification, biology and control of these pests. Given in alternate years. Prerequisite, Entomology 26. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Shaw.

Entomology and Plant Pathology

79. (I) Animal Ecology

Relations of animals to their physical and biotic environment, with observations and quantitative measurement of these factors and responses in the field and laboratory. Prerequisite, Entomology 26 or Zoology 1. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Sweetman.

80. (II) Insect Control (1964-65)

The science of pest control: chemical, biological, ecological, mechanical and legislative. The need, application, economics, effectiveness and hazards from insecticides and biological control are emphasized. Given in alternate years. Prerequisites, Entomology 53, 55, 57 or equivalent; 79 and 81 desirable. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Sweetman.

81. (I) Insect Physiology

Detailed consideration is given to the organ systems, showing the functions such as nutrition, respiration, and growth, and the relationship of physiology to behavior. Prerequisites, Entomology 26 and Zoology 35; Entomology 55, 56, and 57 desirable. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Sweetman.

90. (I) (II) Evolution

The course and dynamics of both inorganic and organic evolution are treated, as are the implications of evolutionary concept on human philosophy, behavior and welfare. 3 class hours. Credit, 3. Mr. Hanson.

97. (I) 98. (II) Special Problems in Entomology

Supervised problem work in entomology or beekeeping for qualified students. Prerequisites, Entomology 26 and permission of staff. Credit, 1-3. Staff.

APICULTURE

66. (II) Beekeeping (1964-65)

Honeybees and their relatives, structure and biology of bees, methods of management, diseases, pollination, queen rearing, honey production, and history of beekeeping are included. Given in alternate years. Prerequisite, Entomology 26 or Zoology 1. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Shaw.

PLANT PATHOLOGY

51. (I) General Plant Pathology

A basic course in plant pathology dealing with the nature, cause and control of plant diseases; epidemiology, diagnosis and control receive special attention. Prerequisite, a course in Botany. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Banfield.

69. (I) Forest and Shade Tree Pathology

The nature, cause and control of the principal types of disease in trees, including decay of forest products, and of standing and structural timbers. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Banfield.

78. (II) Nematology

Anatomy, morphology and classification of plant-parasitic and other soil-inhabiting nematodes. Parasitic relationships with plants and current control measures will be stressed. Prerequisite, a year of biological science. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Rohde.

90. (II) Insect Transmission of Plant Diseases

The interrelationships between insects, plants, microorganisms and environment are considered in relation to the development of plant diseases, emphasizing various roles played by arthropods. Prerequisite, a year of biological science. 3 class hours. Credit, 3. Mr. Banfield.

97. (I) 98. (II) Special Problems in Plant Pathology

Supervised problem work in plant pathology, including nematology, for qualified students. Prerequisites, Plant Pathology 51 and permission of staff. Credit, 1-3. Staff.

FOOD SCIENCE AND TECHNOLOGY

Head of Department: PROFESSOR WILLIAM B. ESSELEN. PROFESSORS FAGERSON, FRANCIS, LEVINE; ASSOCIATE PROFESSORS EL-BISI, HAYES, SAWYER; ASSISTANT PROFESSORS COURNOYER, HULTIN, NAWAR, WRISLEY; MR. HUNTING.

51. (I) Introductory Food Science

A basic course, primarily for department majors, covering food manufacture, processing, distribution and spoilage problems. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Hultin.

52. (II) Food Products

The composition of food products. Changes that occur in the chemistry of foods during storage and processing. Enzymes in the food industry. Prerequisite, Food Science 51. 2 class hours, 1 4-hour laboratory period alternate weeks. Credit, 3. Mr. Hultin.

61. (I) Industrial Technology

A survey of commercial practices in the manufacture and preservation of food products. Prerequisites, Food Science 52; Agric. Eng. 81. 1 class hour, 1 4-hour laboratory period. Credit, 3. Mr. Levine.

62. (II) Industrial Technology

A continuation of Course 61. Includes senior research problems. Prerequisite, Food Science 61. 1 class hour, 1 4-hour laboratory period. Credit, 3. Mr. Levine.

75. (I) and (II) Principles of Food Technology

For students not majoring in food science and technology. The important food products, with emphasis on raw materials used, processing methods and examination of packaged foods. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Hultin.

91. (I) Analysis of Food Products

Physical, chemical, microbiological and microscopical methods will be employed. Prerequisites, Food Science 52; Bacteriology 31; Chemistry 30. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Hunting.

92. (II) Objective Analytical Methods and Instrumentation

A continuation of Course 91. Prerequisite, Food Science 91. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Hunting.

Forestry and Wildlife Management

94. (II) Sensory Evaluation Methods

An introduction to sensory measurements in the evaluation and acceptance of foods. Panel tests and their statistical interpretation; taste, odor, color, and texture measurements. For seniors only. 1 class hour, 1 2-hour laboratory period. Credit, 2. Mr. Sawyer.

95. (I) 96. (II) Food Science Literature

For seniors who specialize in food science and technology. 2 class hours. Credit, 2. Staff.

FOOD MANAGEMENT

33. (I) Introductory Food Management

An introductory course in restaurant and hotel operations. 3 class hours. Credit, 3. Mr. Wrisley.

77. (I) Food Service Practices

Functional study of personnel. Advertising and promotion methods. Labor procurement and policies. Job training and evaluation. Cost controls. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Cournoyer.

78. (II) Stewarding

A study of practices used by the food service industry pertaining to purchasing, receiving, and issuing food, beverages, and other supplies. Principles of food and beverage cost control. 3 class hours. Credit, 3. Mr. Wrisley.

81. (I) Hotel Practice

Elements of hotel management. 3 class hours. Credit, 3. Mr. Wrisley.

82. (II) Laws of Innkeeping (Institution Law)

Law as applied to hotels and food service establishments; includes a consideration of bailments, torts, regulations, insurance, and sanitation. Prerequisite, General Business 71. 3 class hours. Credit, 3. Mr. Cournoyer.

95. (I) 96. (II) Food Management Seminar

Survey of current food service literature and reports. Outside speakers on selected professional topics. 2 class hours. Credit, 2. Staff.

FORESTRY AND WILDLIFE MANAGEMENT

Head of Department: PROFESSOR ARNOLD D. RHODES. PROFESSOR GATSLICK; ASSOCIATE PROFESSORS DEUBLER, GREELEY, MACCONNELL, MADER; ASSISTANT PROFESSORS ABBOTT, BOND, HOADLEY; MESSRS. FOSTER, MAWSON.*

FORESTRY

25. (I) Wood Anatomy and Identification

A basic anatomical study of wood elements, their various structural characteristics and function; practice in identification. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Hoadley.

26. (II) Dendrology

The taxonomic features, silvical characteristics, and distribution of the principal tree species of temperate North America; a description of the forests where they occur. Prerequisite, Botany 1. 2 class hours, 2 2-hour laboratory periods. Credit, 3. Mr. Abbott.

52. (II) Properties of Wood

The physical and chemical characteristics of woods in relation to its use; the influence of growth upon wood properties; methods of testing. 3 class hours. Credit, 3. Mr. Hoadley.

53. (I) Silvics

Forest ecology as a foundation for silviculture; environmental factors and their effect upon vegetation; development and classification of trees and forest communities; forest influences. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Mader.

54. (II) Forest Soils

Effects of soil properties on tree growth; relationship of soils to silviculture, harvesting, watersheds, wildlife, and range management; forest soil description, classification and mapping. Prerequisite, Agronomy 22. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Mader.

55. (I) (1963-64) and (Summer) The Elements of Forest Mensuration

The measurement of trees, stands, and forest products; field and office practice in timber estimating and log scaling; collection and compilation of forest inventory data. 2 class hours, 1 4-hour laboratory period. Credit, 3. Summer course, 3 44-hour weeks. Mr. Foster, Mr. MacConnell.

56. (II) The Principles of Silviculture

Establishment and culture of forests for the production of wood crops; regeneration and intermediate cuttings, chemical silvicides, prescribed burning, site treatment, slash disposal. Prerequisite, Forestry 53 recommended. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Rhodes.

57. (I) Forest Economics and Policy

Development of land use and legislation affecting forest policy in the U. S. Timber resources distribution, consumption and demand, taxation, credit, and social-economic factors. 3 class hours. Credit, 3. Mr. Bond.

59. (I) Forest Protection

Principles of protecting forests from fire, insects, diseases, domestic animals, wildlife, and atmospheric agencies with special emphasis on the prevention and control of forest fires. 3 class hours. Credit, 3. Mr. Abbott.

71. (I) Aerial Photogrammetry

Principles of photogrammetry in forest management, wildlife biology, and other fields concerned with large land surfaces. Photographic interpretation and map making from aerial photographs. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. MacConnell.

* On Leave of Absence.

Forestry and Wildlife Management

74. (II) Lumber Manufacture and Distribution

The lumber industry; milling and processing, log and lumber grading, lumber storage and distribution. 3 class hours. Credit, 3. Mr. Hoadley.

75. (I) Forest Products

A survey of the principal forest products, their manufacture and distribution. 3 class hours. Credit, 3. Mr. Gatslick.

78. (Summer) Harvesting of Forest Products

Basic concepts of harvesting methods with emphasis on supervision. Field exercises in harvesting techniques followed by a week's trip visiting industrial forest operations. 3 44-hour weeks. Credit, 3. Mr. Foster, Mr. MacConnell.

80. (II) Principles of Forest Management

Multiple-use management of forest land, organization of the forest for sustained-yield management. Preparation of a management plan for a 10,000-acre forest. Prerequisite for the laboratory, Forestry 55. 3 class hours, 1 4-hour laboratory period. Laboratory period optional for non-forestry majors. Credit, 5 or 3. Mr. MacConnell.

82. (II) Artificial Propagation of Forests, and Forest Tree Improvement

Reproductive characteristics of trees; artificial propagation of forest stands by direct seeding and planting; nursery management; and forest tree improvement through provenance tests, selection and hybridization. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Abbott.

84. (II) Advanced Forest Mensuration

The analysis of growth and yield in forest stands; construction of standard volume tables and yield tables; plotless cruising and continuous forest inventory. Prerequisite, Forestry 55. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Foster.

85. (I) Wood Seasoning and Preservation

Properties of wood in relation to drying and preservation; theory and practice of air seasoning, kiln drying, and preservative treatment. 3 class hours. Credit, 3. Mr. Gatslick.

95. (I) 96. (II) Seminar

Specialized study in a selected area of forestry or wood technology. For seniors only. 3 class hours. Credit, 3.

97. (I) 98. (II) Selected Problems

Individual work on an assigned problem or project in forest management or wood utilization. For qualified juniors and seniors. Total credits for two semesters not to exceed six. Credit, 2-4. Staff.

WILDLIFE BIOLOGY

27. (I) Conservation of Natural Resources

Natural resources of the United States including soil, water, forests, wildlife, and the important minerals; conservation problems in relation to national prosperity. 3 class hours. Credit, 3. Staff.

61. (I) Principles of Wildlife Management

Fundamental ecology and principles of wildlife management with emphasis on population characteristics and responses. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Greeley.

62. (II) Techniques of Wildlife Management

Methods of collecting and interpreting data in wildlife management with emphasis on field and laboratory experience in census methods and criteria for determining sex, age and other characteristics of wild birds and mammals. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Greeley.

63. (I) Management of Wetland Wildlife (1964-65)

Life histories, identification, and habitat requirements of waterfowl and marshland furbearing animals; management of wetland habitats. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Greeley.

64. (II) Management of Upland Wildlife (1963-64)

Life histories, identification, and habitat requirements of upland game birds, game mammals, and furbearers; management of upland habitats. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Greeley.

97. (I) 98. (II) Special Problems in Wildlife Management

Qualified seniors who have completed most of the wildlife courses may arrange for work on a special problem in a selected phase of wildlife management. Total credits for two semesters may not exceed 6. Credit, 2-4. Mr. Greeley, Mr. Sheldon.

FISHERIES BIOLOGY

65. (I) Techniques of Fisheries Management

Principles and techniques of fishery management, stressing population growth dynamics, and field procedures. Prerequisite, Zoology 86. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Deubler.

66. (II) Physiology of Fishes

Study of physiological functions relative to the environment of fishes. The adaptation of local species to particular habitats will be studied in the field. Prerequisite, Zoology 86. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Deubler.

68. (II) Survey of Fisheries Resources

Review of the sport and commercial fisheries of the United States, with special emphasis on crustaceans, molluscs and fishes. Coastal field trips by arrangement. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Deubler.

97. (I) 98. (II) Special Problems in Fisheries Biology

Individual work for qualified seniors on an assigned problem or project in the field of fisheries biology.

LANDSCAPE ARCHITECTURE

Head of Department: PROFESSOR RAYMOND H. OTTO. PROFESSOR PROCOPPIO; ASSOCIATE PROFESSORS BACON, KING, MOSHER; ASSISTANT PROFESSORS CAVEN, HAMILTON, KANTIANIS, KENT.

2. (II) Landscape Drafting

The mechanical aspects of the designer-draftsman, including the simple projections—orthographic, perspective, and isometric. 3 2-hour laboratory periods. Credit, 3. Mr. Procopio.

23. (I) Survey of Landscape Architecture

The history and literature of landscape architecture and allied fields, including an examination of traditional styles of gardens. 3 class hours. Credit, 3. Mr. Otto.

24. (II) Topography and Construction

Contour interpolation, grading and drainage, drive design, profiles and sections, computation of earthwork. Application of surveying to landscape construction. Prerequisites, Civil Engineering 27; Landscape Architecture 2. 1 class hour, 3 2-hour laboratory periods. Credit, 4. Mr. Caven.

25. (I) Graphics

Special techniques and symbols for landscape plans, sections and pictorial elevations, and the use of perspective charts and color in various media. 2 3-hour laboratory periods. Credit, 3. Mr. Kent.

28. (II) Basic Design

The elements and principles of design, the analysis of composition, and the application in design of forms and motifs, drawn from nature. Prerequisites, Landscape Architecture 2 and 23, or permission of instructor. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Otto.

30. (II) Plant Materials

Detailed study of deciduous and evergreen trees, with special reference to mature form and character, means of identification, natural associations, and uses in landscape work. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Hamilton.

51. (I) Principles of Arboriculture

Maintenance of shade and ornamental trees. Development of municipal and private shade tree programs. Prerequisite, a year of biological science. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. King.

53. (I) Intermediate Design

Projects involving the fundamentals of landscape design integrating theory, analysis, research, application and graphics. Prerequisites, Landscape Architecture 2, 28. 1 class hour, 3 2-hour laboratory periods. Credit, 4. Mr. Kent.

54. (II) Intermediate Design

Spatial organization, intuitive aspects of design, and perceptual studies within comprehensive projects. Field trip required, approximate cost \$40.00. Prerequisites, Landscape Architecture 24, 53. 1 class hour, 3 2-hour laboratory periods. Credit, 4. Mr. Kent.

55. (I) Construction Details

A series of problems in architectural garden features as walks, steps, walls, fences, pools and small structures. Prerequisite, Landscape Architecture 24. 1 class hour, 3 2-hour laboratory periods. Credit, 4. Mr. Procopio.

59. (I) Plant Materials

Detailed study of shrubs and woody vines, and their identification, with special emphasis given to their adaptability to landscape uses, methods of handling, and care. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Hamilton.

67. (I) Architecture

Architectural development, including styles and forms in architecture, especially as affected by materials and methods of construction. 3 class hours. Credit, 3. Mr. Kantianis.

68. (II) Architectural Design

The relations between exterior and interior spaces and structures as a primary element in design and construction. A series of problems integrating theory, design analysis, and graphics. Prerequisite, Landscape Architecture 67. 1 class hour, 2 3-hour laboratory periods. Credit, 4. Mr. Kantianis.

71. (I) Planting Design

The utilization of plant materials in combination as applied to the many conditions and demands of landscape work. Prerequisites, Landscape Architecture 30, 59. 2 3-hour laboratory periods. Credit, 3. Mr. Caven.

73. (I) 74. (II) City Planning

The historical and legal aspects of land use and regional development, and a critical examination of planning techniques used in guiding the physical growth of communities. 3 class hours. Credit, 3. Mr. Bacon.

75. (I) 76. (II) Projects in Planning

An application of the principles of modern civic development through a series of problems on the design of various types of urban land areas. Prerequisites, Landscape Architecture 73, 74, or permission of instructor. 3 2-hour laboratory periods. Credit, 3.

77. (I) 78. (II) Urban Problems

Housing, industrial location and development, decentralization, arterial systems, civic and metropolitan design, and regional planning. Open to non-majors. Prerequisites, Landscaping Architecture 73, 74, or permission of the instructor. 3 class hours. Credit, 3. Mr. Bacon.

81. (I) 82. (II) Advanced Design

Comprehensive site planning projects covering the major areas of landscape and urban design, plus Exchange Problems whenever applicable. Field trip required, approximate cost \$40.00. Prerequisites, Landscape Architecture 53, 54. 1 class hour, 3 2-hour laboratory periods. Credit, 4. Mr. Procopio.

84. (II) Presentation

Preparation and rendering of landscape and architectural plans, elevations, perspectives, etc. 2 2-hour laboratory periods. Credit, 2. Mr. Kent.

Plant and Soil Science

96. (II) Professional Practice

A seminar on the methods and procedures of the professional office. Prerequisite, Landscape Architecture 81, or permission of instructor. 1 class hour. Credit, 1. Mr. Otto.

97. (I) 98. (II) Special Problems

Supervised individual work on assigned projects for qualified seniors. Elected only on permission of adviser. Credit, 1-3. Staff.

PLANT AND SOIL SCIENCE

Agronomy: Head of Department: WILLIAM G. COLBY. PROFESSOR DRAKE; ASSISTANT PROFESSORS BAKER, MICHELSON, SOUTHWICK, TROLL, VENGRIS, ZAK; MR. WADDINGTON.

Horticulture: Acting Head of Department: G. B. SNYDER. PROFESSORS BOICOURT, LACHMAN, SOUTHWICK; ASSOCIATE PROFESSOR WEEKS; ASSISTANT PROFESSORS JESTER, TUTTLE; MESSRS. ANDERSON, GODDARD, MAYNARD.

Plant Pathology: ASSISTANT PROFESSORS AFRIOS, BANFIELD, ROHDE.

AGRONOMY

52. (II) Forage and Field Crops

Analysis of the principles involved in the establishment, fertilization and harvest management of forage and field crops. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Colby.

53. (I) Agrostology

The establishment and maintenance of turf grasses used on lawns, athletic fields, highways, airports and cemeteries. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Troll.

60. (II) Soil-Plant Mineral Nutrition

Study of mineral nutrients in the growth of plants; use of fertilizers and other soil amendments; soil reaction; mineral deficiencies and toxicities. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Drake.

65. (I) Ecology and Control of Weeds

Identification and ecology of common weeds; principles of weed control with special emphasis on the use of chemical herbicides. 3 class hours. Credit, 3. Mr. Vengris.

HORTICULTURAL SCIENCE

2. (II) Basic Plant Science

An introduction to structural and physiological characteristics as these relate to the environmental adaptation of plants. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. F. W. Southwick, Mr. Anderson.

31. (I) Plant Propagation (1963-64)

The principles of plant propagation by seed and vegetative means. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Goddard.

51. (I) Deciduous Orchard Management (1963-64)

Scientific and technological developments in relation to the management of deciduous orchards. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Anderson.

53. (I) Small Fruit Technology (1964-65)

Application of basic principles and recent technological developments to the establishment and operation of small fruit plantings. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Anderson.

54. (II) Herbaceous Plants (1963-64)

Identifying characteristics, technology, and use of herbaceous annuals, perennials and biennials. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Boicourt.

55. (I) 56. (II) Retail Flower Design

Basic principles of design as applied to commercial retail flower arrangement. 2 2-hour laboratory periods. Credit, 2. Mr. Jester.

58. (II) Applied Floriculture

For non-majors. The course stresses garden flowers and their use, foliage and flowering plants for indoor use—and their propagation, and flower arrangement. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Goddard, Mr. Jester.

61. (I) Greenhouse Management (1964-65)

Fundamentals of the artificial environmental complex of greenhouses, and their relationship to major crops with respect to vegetative growth and flowering. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Goddard.

62. (II) Plant Breeding Methods

Advanced study of plant breeding topics, including methods and techniques. Prerequisite, Zoology 53. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Lachman.

65. (I) Principles of Olericulture (1964-65)

Physiological and nutritional factors influencing the growth and culture of vegetable plants. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Maynard.

73. (I) Produce Marketing Practices

Methods and techniques relative to post-harvest handling, quality control and pre-cooling practices; marketing standards; and inspection services. 3 class hours. Credit, 3. Mr. Snyder.

74. (II) Merchandising of Perishables

Methods, techniques, and materials for pre-packaging perishable produce, market outlets, handlers, methods of sale, marketing regulations, brands, and promotion practices. 3 class hours. Credit, 3. Mr. Snyder.

PLANT PATHOLOGY

51. (I) General. Plant Pathology

A basic course dealing with the nature, causes and control of plant disease; epidemiology, diagnosis and control receive special attention. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Banfield.

Veterinary Service

69. (I) Forest and Shade Tree Pathology

Nature, cause and control of the principal types of diseases of trees, including decay of forest products, and of standing and structural timbers. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Banfield.

78. (II) Nematology

Anatomy, morphology and classification of plant parasitic and other soil-inhabiting nematodes. Parasitic relationships with plants and current control measures will be stressed. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Rohde.

90. (II) Insect Transmission of Plant Diseases

The interrelationships between insects, plants, microorganisms and environment are considered in relation to the development of plant diseases with emphasis on the various roles of arthropods. 3 class hours. Credit, 3. Mr. Banfield.

SOIL SCIENCE

22. (II) Soils

Fundamentals of soil science covering development, properties and management of soils and the interrelationship of soils to plant growth. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Zak.

57. (I) Soil Formation

The development of soils as related to physical, chemical, biological, climatic and geological factors. 3 class hours. Credit, 3. Mr. R. A. Southwick.

79. (I) Soil Physics (1964-65)

Physical properties of soil, including textural, water, air and temperature relationships; their measurement, evaluation and influence in the soil system. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Waddington.

84. (II) Soil Chemistry (1963-64)

Inorganic and organic chemical reactions related to the nutrient supply in the soils and soil nutrition of plants including colloidal aspects. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Baker.

PLANT AND SOIL SCIENCE

95. (I) 96. (II) Seminar

Credit, 1-2. Staff.

97. (I) 98. (II) Special Problems

Credit, 1-3. Staff.

VETERINARY SERVICE

Head of Department: PROFESSOR GLENN H. SNOEYENBOS. PROFESSOR SMITH.

72. Introduction to the Study of Diseases

The causes, development, transmission and control, with application to diseases of animals which are of economic and/or public health importance. Prerequisites, Microbiology 1 or Zoology 35. 3 class hours. Credit, 3.

COLLEGE OF ARTS AND SCIENCES

I. MOYER HUNSBERGER, *Dean*

The College of Arts and Sciences offers instruction in the fine arts, the humanities, the social sciences, the natural sciences, and mathematics both for students enrolled in the College and for those in other undergraduate divisions of the University. The program provides for the breadth of intellectual development essential to a liberal education and for concentration which is the necessary foundation for competence in a selected discipline.

The Bachelor of Arts degree may be earned by students majoring in any division of the College. The Bachelor of Science degree may be earned by students in the natural sciences, mathematics, or psychology.

The graduation requirements of the College of Arts and Sciences are:

- I. The successful completion of a least 120 credits (required physical activity not included in the computation).
- II. BASIC REQUIREMENTS—are normally completed in the first two years and consist of:
 1. English 1, 2, 25, 26, and Speech 3.
 2. Intermediate proficiency in a foreign language, as determined by the successful completion of the second year course at the college level or by examination. The latter may be taken during the summer orientation period prior to the freshman year, or during subsequent language study subject to the approval of the department concerned.
 3. One semester course in each of two social sciences.
 4. Two of the following: (a) a year in one physical science, (b) a year of biological science which may be in one or in two biological science departments, (c) a year of mathematics or a semester of mathematics and a semester of logic; students who major in natural science or mathematics must complete all three.
 5.
 - a. Candidates for the degree of Bachelor of Arts must complete History 5 and 6.
 - b. The Bachelor of Science degree may be earned only by students majoring in Mathematics, Psychology, or a Natural Science who complete at least 60 credits in courses distributed over Mathematics, Psychology and Natural Science.

Directory of Courses

III. DISTRIBUTION REQUIREMENT—six credits earned in courses of at least two credits in both of the divisions in which the student is not majoring.

In the humanities division, most courses may be offered to meet this requirement; the exceptions* are (a) specialized courses deemed to have a strong pre-professional emphasis and (b) courses which might be offered to meet a basic requirement, but History 5 and 6 may be offered by candidates for the Bachelor of Science degree.

In the social science division, all courses except Economics 12 and 25, Government 25, Psychology 1, 5, and 6, and Sociology 25 may be offered to meet this requirement.

In the division of natural science and mathematics, the courses offered to meet the combined basic and distribution requirement must include: (a) a year in one physical science, (b) a year of biological science and (c) a third year which may be (1) a year of mathematics, (2) a semester of mathematics and a semester of logic, or (3) two courses in natural science except Chemistry 80, Geography 35, 50, 55, and 81, and Zoology 51, (Entomology 26 may be chosen).

For distribution purposes the following groupings have been approved:

- | | |
|---------------------------------|---|
| a. The Humanities and Fine Arts | c. The Natural Sciences and Mathematics |
| English | 1. Physical |
| Foreign Languages | Astronomy |
| History | Chemistry |
| Art | Geology |
| Music | Physics |
| Philosophy | 2. Biological |
| Speech | Botany |
| b. The Social Sciences | Microbiology |
| Economics | Zoology |
| Government | 3. Mathematics |
| Psychology | |
| Sociology | |

IV. MAJOR REQUIREMENTS:

Each student must complete the requirements of one of the major programs described under Junior-Senior Curricula; these programs include at least twenty-four (24) semester hours of credit in some one department, of which at least fifteen (15) must be in courses numbered 50 or above. No student may present for graduation more than thirty (30) junior-

* The list of exceptions will be available to each student at pre-registration time.

senior hours in any one department, exclusive of honors work. A student for whom any basic requirements are waived by examination may use the time thus saved to augment his work in the major by a maximum of six semester hours.

V. SPECIAL PROGRAMS:

Any student who at the end of the first semester of his junior year presents a quality point average of 3.0 or higher, and is recommended by his major department for release from formal requirements, may, with the approval of his adviser and the Dean, work out a special program of study for his senior year. This program can consist of any approved combination of course work and independent research or creative effort.

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1	2	English 2	2
Speech 3*	2	Speech 3*	2
Mathematics or Natural Science ¹	3	Mathematics or Natural Science ¹	3
Natural Science or History 5 ²	3	Natural Science or History 6 ²	3
Foreign Language ³	3	Foreign Language ³	3
Elective ⁴	3	Elective ⁴	4
(Military or Air Science 11 (men))	1)	(Military or Air Science 12 (men))	1)
Physical Education 1a, b**	2	Physical Education 2a, b**	2

¹ Candidates for the B.S. degree take Mathematics. Those planning to major in chemistry or physics should, if possible, elect Mathematics 5 and 6.

² Candidates for the B.S. degree take natural science; candidates for the B.A. degree take History 5 and 6.

³ Subject to exemption on basis of proficiency examination.

⁴ Candidates for the B.S. degree take science.

* May be taken either semester.

** Not quality point credit.

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25	3	English 26	3
Foreign Language ¹	3	Foreign Language ¹	3
Social Science ²	3	Social Science ²	3
Natural Science or Mathematics ³	3-4	Natural Science or Mathematics ³	3-4
Elective ²	3-4	Elective ²	3-4
(Military or Air Science 25 (men))	1)	(Military or Air Science 26 (men))	1)
Physical Education 31a, b*	2	Physical Education 32a, b*	2

¹ Subject to exemption on basis of proficiency examination.

² In selecting the social science courses and electives, students should be guided by the recommendations for sophomore work given under the descriptions of junior-senior curricula that follow.

³ The courses in natural science or mathematics should be selected to fulfill the basic requirements (see under "II" above) in this division.

* Not quality point credit.

JUNIOR-SENIOR CURRICULA

Major work is available in the following areas.

Art

P. F. NORTON, *Adviser*

The department of art is interested in providing two kinds of training: first, to give each student a good general historical and aesthetic knowledge of the arts; second, to give each student an opportunity to develop his creative ability in the several media of the arts. Majors will have specialized sufficiently to allow them to enroll in a professional art school at an advanced level, or to take jobs upon graduation in business or cultural organizations where some facility in the arts is required.

By arrangement with the School of Education, courses can be so arranged that an art major will secure the necessary credits in education to allow him to teach art in the public schools.

All majors should take Art 14, and either Basic Drawing or Basic Design during their first two years; and in the junior and senior years a sequence of advanced courses as advised by the department.

Astronomy

R. H. KOCH, E. C. OLSON, *Advisers*

A Department of Astronomy conducted jointly with Amherst, Mount Holyoke, and Smith Colleges provides instruction in this field. All advanced courses are given on a joint basis for students from the four participating institutions.

The Department of Astronomy offers courses which furnish (1) specialization for those planning a career in astronomy and (2) a background for students in other departments who are interested in astronomy for its cultural or scientific value.

Students majoring in astronomy should plan to finish Astronomy 2, Physics 4 or 7, and Mathematics 30 by the end of the sophomore year.

During the junior and senior years the following courses should be taken: Astronomy 51, 52, 65, 66, 75 and 76; Physics 55, 56; Mathematics 91, 92. Students who plan to go on to graduate school should substitute Physics 61 for Astronomy 52; Mathematics 63 and 83 for Astronomy 75 and 76. These students should also obtain a good reading knowledge of German and French (or Russian).

Botany

R. B. LIVINGSTON, *Adviser*

Programs in botany prepare students for teaching and research in biological sciences in high schools, universities, industry, and experimental stations.

Students majoring in botany who do not plan to teach in secondary schools should complete the following courses prior to their

junior year: Botany 1, 25, 26, Chemistry 1, 2, Zoology 1, and Physics 3, 4.

Students interested in plant morphology, anatomy or systematics will take the following prescribed courses: Botany 57, 67, 81, and Zoology 53. and a minimum of 3 courses will be required from the following: Botany 59, 60, 61, 62, 66 and 89. Majors planning a pre-professional course in plant physiology and plant ecology will be required to take Botany 57, 67, 81, Chemistry 33 and Zoology 53 with additional courses as determined by the major adviser.

Botany majors planning to teach in secondary schools must complete Botany 1, 25, 26, Zoology 1, and 35, and Chemistry 1 and 2 prior to the junior year. Psychology 56 and Education 51 should be completed in the junior year and Education 52, 85, and 88 must be completed in one semester of the senior year. required courses in botany will include a selection of at least 5 courses from the following: Botany 57, 61, 62, 66, 67, 81 and 89; some additional courses in related disciplines will be prescribed by the department adviser.

Chemistry

W. E. McEWEN, *Adviser*

The prime purpose of the Department of Chemistry is to offer sound preparation for graduate study in chemistry. Accordingly, emphasis is placed upon intellectual accomplishment and broad understanding rather than on terminal training for specific chemical tasks. The program designed for this purpose also affords sound preparation for direct entry into chemical industry, chemical institutes, or governmental laboratories. A slightly modified program permits preparation for secondary school teaching.

Effective with the Class of 1966, students planning to major in chemistry should take Chemistry 3, 4; German 1, 2 (or Russian 1, 2); Mathematics 5, 6 (or 9, 10); Botany 1, and Zoology 1 (Microbiology 31 or Entomology 26 may be substituted for ONE of these) in the freshman year. The sophomore year should include Chemistry 51, 52, 53, 54; Mathematics 31, 32 (or 25, 26); Physics 3, 4 (or 5, 6); German 25, and a science section of German 26 (or Russian 5, 6 in a science section, if possible).

An advanced chemistry program is available to students selected by examination prior to freshman registration. These students take Chemistry 25, 26 in the freshman year, replacing 3, 4, and 32.

The junior chemistry major takes Chemistry 32 and 65 during the first semester; and 55, 66, and 67, second semester. Chemistry 68 is to be taken during the first semester of the senior year.

To complete requirements for the B.S. degree with a major in Chemistry, the student must take FOUR of the courses listed below. One of these must be a laboratory course, and two different groups must be represented by the selection.

Directory of Courses

- (1) Physical Group: 77, 98, Honors (and certain advanced physics and math courses by approval of the Head of the Department).
- (2) Inorganic, Analytical, and Radiochemistry Group: 83, 84, 85, 86, 87, 98, Honors.
- (3) Organic and Biochemistry Group: 81, 82, 93, 94, 98, Honors. Students in secondary education may use the Education Block to substitute for two of the non-laboratory courses in the above groups. Students may satisfy requirements for the B.A. degree by completing the following:

Chemistry 3, 4 (or 1, 2, 29), 32, 51, 52, 53, 54, 65, 66, 67, and 6 credits in chemistry courses numbered higher than 50, one of which must be a laboratory course. The same supporting courses are required as listed for the B.S. curriculum, except that German (or Russian) is not required. The B.A. degree requirements also include History 5 and 6.

Economics

P. L. GAMBLE, *Adviser*

In economics the aims are twofold: (1) to give the student an understanding of economic theory and of the application of economic principles to the organization of society; (2) to provide students with the elementary training necessary for further study and solution of economic and business problems.

The department requires that all majors irrespective of the career desired take the following courses: Economics 53, 73, Accounting 25, and Statistics 79 or Mathematics 63. In addition, each student must select an additional 15 credit hours of work from the Economics curriculum. No major student is permitted to take more than 36 junior-senior credit hours of economics, agricultural economics and business administration courses. In choosing elective courses students are urged to select courses in the humanities and preferably some from the allied fields of history, Philosophy, government, psychology, and sociology. Those intending to major in economics should elect Economics 26 in the sophomore year.

For the majors in economics, there are offered courses which may be combined to serve as preparation toward a number of different careers in business, government, and teaching. Possible fields include: Banking and finance, international trade, labor and personnel relations, market research, public utilities including transportation, social security, statistics.

English

G. S. KOEHLER, *Adviser*

The major in English affords the student opportunities to improve his knowledge of the English language and his ability to use it clearly, logically, and artistically; to increase his knowledge of

Western literature written in English or translated with distinction into English; to read and discuss a literary work with perception and understanding, and to form an independent estimate of it by valid critical standards. Apart from its value as liberal education, such a program is especially helpful to students whose interests lie in writing, editing, criticism, and teaching.

The Department of English offers courses in composition, literature, and language. Students majoring in English must (1) elect a semester of English history; (2) write a documented paper each semester during which a departmental elective in literature is being taken (except during summer session or the Education Block); (3) elect 30 hours (exclusive of honors work) in departmental electives, of which 15 must conform to the distribution requirements of the department; and (4) maintain a quality-point average of 2.0 or better in all departmental electives from the beginning of the junior year on.

Geology

H. T. U. SMITH, *Adviser*

For students considering geology as a career, the opportunities are many. Those interested primarily in basic science may look to positions in teaching, in museum work, on state and federal surveys, and in various research organizations. Those concerned mainly with applied science may direct their efforts toward work in mining geology, petroleum geology, engineering geology, and ground-water geology, and industrial mineralogy.

For a major in geology leading to the Bachelor of Science degree, requirements are: one year each of chemistry, physics, and biologic science; mathematics through calculus; 33 credits in geology including courses 1 (or 50), 2, 33, 42, 56, 63, 74, 78, and an approved summer field course; and at least 15 additional hours in mathematics, engineering, geology, or other sciences, elected on consultation with the departmental adviser. German and Russian are recommended for the foreign language.

The Bachelor of Arts degree in geology is admirably suited for those planning to teach general science in secondary schools, and may be useful for those planning to be executives in technical industries. Although the Bachelor of Science degree is intended for those considering a professional career in geology, the Bachelor of Arts degree is also adequate, though less thorough, preparation for graduate work in geology.

For a major leading to the Bachelor of Arts degree, requirements are: one year of each of chemistry and physics; one semester of zoology; mathematics through trigonometry and analytic geometry; and 30 credits in geology, including courses 1, 2, 33, 42, 56, 72, and 74. Strongly recommended also is additional work in related sciences

Directory of Courses

and mathematics, together with a summer field course (which may be substituted for course 72).

All students majoring in the department are required to maintain a quality point average of at least 2.0 for advanced courses in geology. Students planning to teach science in secondary schools, or interested in combining geologic and engineering training, may consult the department head for special provisions relating to their programs.

German

F. C. ELLERT, *Adviser*

The elementary and intermediate courses in German are intended to serve as a foundation for a practical knowledge of the language aiming toward wider reading in literature, toward mature oral communication and as an aid to research in the various other disciplines. The German major then examines the full range of German literature and culture and comes to grips with the history of the German language and its development within the framework of the Indo-European languages, and, therefore, in terms also of the close relationship between German and English.

To fulfill an undergraduate major in German, a student must complete 30 credits in the department's junior-senior courses. German 59 is required of all major students; also German 79 and 80 (or their equivalent).

For students planning to go on to graduate work, German 57, 77 and 78 and also History 66 are strongly recommended. Moreover, students are strongly urged to supplement the courses taken here at the University with at least one summer session at an approved school of German.

Government

J. S. HARRIS, *Adviser*

The courses offered by the department of government are designed to aid the student in gaining a knowledge of the nature, functions, and problems of government, and of the place of government in the modern world. Political theory, constitutional law, international relations, comparative governments (including the governments of non-Western nations), American politics and public administration are the principal areas covered.

Students taking work in government may prepare themselves for (1) graduate study in political science and government (2) careers in public administration at federal, state, and municipal levels, (3) research concerning governmental problems, (4) the study of law, (5) entrance into foreign service or international organizations, (6) teaching government and social science courses in secondary schools.

Majors in the field should elect Government 25 and 26 in their freshman or sophomore years. In the junior and senior years a

minimum of eight additional courses in government is recommended. In addition, supporting courses in the fields of history, economics, sociology, psychology or philosophy are suggested.

History

H. H. QUINT, *Adviser*

Courses in history are designed to provide an understanding of man through a study of patterns of development in the past. The study should also give the student an introduction to major problems in world affairs.

A major in history has value to the general student as a humanistic discipline. It has application as preparation for careers in fields of teaching, law, government, journalism, ministry, library and business.

Majors must take as basic required courses History 5, 6, 25, and 26 in their freshman and sophomore years, History 90 in their junior year, and History 95 or 96 in their senior year. The History major will select one of three areas of specialization (European, American, or Latin American History) and take within it a minimum of 15 or a maximum of 18 hours of upper-level course work. Students specializing in European History will be required to include in their program at least 3 hours of coursework in Ancient or Medieval History and an additional 3 hours of coursework in the Early Modern period (from the Renaissance through the 18th century).

Journalism

A. B. MUSGRAVE, *Adviser*

The journalism program is concerned with (1) the study of writing and of communication problems relevant to the media of mass communication, and (2) the best utilization of the University's liberal education resources by students who plan careers in newspaper work, communications research, public relations, magazine and radio journalism, or some other field of communications.

The courses may have special value also for students who plan to go into government service, law, education, and similar fields in which knowledge of the process and effects of communication is particularly useful.

To provide students who have a professional interest in journalism with the broadest and most liberal training, an interdepartmental major is available. These majors take 15 credit hours in journalism, 15 hours of junior-senior courses in one other liberal arts area, and an integrated program of elective courses. Journalism courses taught in other departments, such as Advanced Expository Writing (English 51) and Creative Writing (English 53 and 54), are acceptable in meeting the requirement of 15 credit hours in journalism.

Directory of Courses

Mathematics

A. E. ANDERSEN, *Adviser*

The department offers courses of various types: courses designed to furnish a strong foundation for graduate work in Mathematics as well as courses to develop the understanding and techniques of mathematics needed in fields such as business and social sciences, chemistry and physics, engineering, industrial mathematics, insurance, statistics, and teaching.

Majors should consult the department for a statement of required and recommended courses. All majors are required to take History 5 and 6, Mathematics 26, 32 or 91, Mathematics 53 and 54, Mathematics 61, or 85, and a total of at least eight approved mathematics courses of junior-senior level.

Microbiology

C. D. Cox, *Adviser*

The major program in microbiology is designed to offer students sound preparation for more intensive graduate study and research in microbiology, as well as basic preparation for a wide variety of positions as microbiologists in research and non-research laboratories. In either event microbiology majors should immediately begin preparation in chemistry. Microbiology majors are required to have broad training in collateral sciences, and minimum requirements include chemistry through quantitative analysis and organic, and one year each of introductory biological science, physics, and mathematics. Those students contemplating graduate study will be advised to emphasize stronger training in these collateral sciences, which is basic and essential for understanding and mastery of advanced graduate courses in microbiology. All students majoring in microbiology are required to take courses, Microbiology 51, 54, 55, 66, 95, and 96, and one other course in microbiology.

Courses in microbiology are designed to offer fundamental training in the basic core areas and disciplines of this field.

Music

D. ALVIANI, *Adviser*

The undergraduate major program in music is pre-professional, so that courses, music organizations, and private study are the means used to prepare each student. Other undergraduates may minor in music, or follow a sequence of courses for continuing study.

Each major must concentrate on one of the following areas. (1) Music History and Literature, (2) Music Theory, (3) Applied Music (vocal and/or instrumental performance).

A core program of courses for all music majors includes Music Theory 3, 4, 5, 6, (71 or 72), Music History 55, 57, (59 or 62 or 64), Applied Music 13-20.

Three additional credits will be required of each major in music

in Theory, or Music History, or Applied Music, depending on the area of concentration.

Students in applied music will prepare a recital program and perform it during the senior year.

Candidates for Certification as teachers of music in elementary and secondary schools need Education 51, 52, 85; Psychology 56; Music 81, 82, 83, 87, and some study in conducting.

The applied music requirements in the core program of courses are to increase or give competence in playing a piano keyboard, and to improve proficiency with the singing voice and/or the playing of an instrument.

Each major must perform a minimum of four semesters with a musical organization, participating in one each of the instrumental, choral, or musical theatre groups.

Majors will be expected to register for as many courses as possible in philosophy, art, theatre, literature (not exclusively English), psychology, religion, and recreation.

Philosophy

C. SHUTE, *Adviser*

Philosophy seeks a comprehensive understanding of the various areas of man's experience in their interrelatedness. In the context of the historically important theories, the courses concentrate on methods of inquiry into the persisting questions of philosophy, standards of thought, clarification of ethical and aesthetic values, and the basis of criticism.

Students majoring in philosophy will complete a minimum of 30 semester hours of credit in courses offered by the department, exclusive of honors work. Normally there should be included 25, 31, 42, 51-51, and a least one course from 53, 55, 95, 96.

Philosophy is closely related to many other academic disciplines, for which reason it is advisable for every student majoring in this field to carry his study of one other area to a depth sufficient for the exploration of its relations with philosophy. When desirable for this purpose, the minimum of 30 credits in philosophy may be reduced, with departmental approval, to 24.

Within the limits of the desirable concentration suggested above, a wide range of supplementary courses is advised among which the following are suggested as typical: Anthropology 63; Art (historical courses); Chemistry 88; Education 51; English 63, 64, 72; French 51; German 56, 57; Government 66, 71, 72; Mathematics 53, 54; Music (historical courses); Psychology 61, 90; Sociology 82.

Physics

J. D. TRIMMER, *Adviser*

Courses are designed to accommodate students who desire specialized training in physics, and also to provide required or elected

Directory of Courses

courses for students majoring in engineering, mathematics, chemistry, or other fields.

Majors should take Mathematics 9, 10, 25, 26, beginning if possible at the start of the freshman year. The preferred start in physics is in Physics 8, 9 a restricted enrollment course for physics majors, beginning with the second semester of the freshman year. In some cases the (first freshman semester, or later) choice of Physics 5, 6, 7 or of Physics 3, 4 may be advisable or acceptable. Selection of the first physics course should be made in consultation with an adviser from the Physics Department. The freshman year should include Chemistry 1, 2 or, for students who may wish to include considerable chemistry in their later studies, Chemistry 3, 4. (For B.A. degree candidates, this means that the History 5, 6 requirement must be met later.) Required upper-division courses are Physics 51, 52, 55, 56, 85, 86. Mathematics courses should include advanced calculus, differential equations, and vector analysis.

Pre-Medical and Pre-Dental Curriculum L. BARTLETT, *Chairman*

Pre-medical and pre-dental students are assigned to faculty advisers for their freshman year. At the end of their second semester, they will be assigned to a member of the Upperclass Committee who will be their adviser for the remainder of the course of study.

Pre-veterinary students may register in the College of Agriculture or College of Arts and Sciences. In the latter case, they will be assigned to advisers in the same manner as the other pre-professional students.

Medical schools do not look with favor on over-specialization in any field. They stress the importance of a broad general education. Since the University requires that every student who graduates must have selected at least 15 credits of junior-senior courses in some one department, the pre-professional student should include courses beyond the introductory level in all fields, especially in the humanities and social sciences. The student decides on his electives only with the advice and consent of his adviser.

Psychology

C. C. NEET, *Adviser*

The courses in the Psychology Department are planned (1) to impart an understanding of the basic principles, methods and data of psychology as a science and the application of this knowledge to problems of human adjustment; (2) to prepare some majors for graduate study which may lead to a professional career in psychology; and (3) to help prepare others for non-professional careers. In carrying out these aims, majors are urged to elect, with the help of a departmental adviser, a broad program of courses.

Careers open to psychology majors include: guidance and counseling, psychometrics, child welfare, clinical psychology, school psychology, social work, statistical analysis, opinion polling, personnel and industrial work, engineering psychology, college and university teaching and research, and research in federal and state agencies. Graduate training is required for certain of these careers.

Majors must elect Psychology 5 and 6 in the freshman year and any two of Psychology 51, 52, 53 and 63 in the sophomore year. Statistics 77 in the sophomore year, and Psychology 90 in the senior year are required. In addition, one course must be elected from each of three of the following groups: (1) Psychology 61, 62, 65, 66, 67; (2) Psychology 72, 75; (3) Psychology 79, 81, 82, 83, 92; (4) Psychology 56, 85, 86, 87, 88. Each major must elect a minimum of 24 and a maximum of 30 sophomore-junior-senior credits in psychology. Students taking Psychology 1 who then decide to major in psychology go directly into Psychology 5 or 6.

Romance Languages

R. B. JOHNSON, MISS CLARKE, MISS JAEGER, *French Advisers*
J. M. FERRIGNO, S. F. WEXLER, *Spanish Advisers*

Two majors are offered: French and Spanish. The courses of these two curricula are intended to give (1) a thorough training in the language skills, (2) an appreciation of the aesthetic and intellectual qualities of the literatures, and (3) a serious insight into the cultures of the nations concerned.

Students majoring in French or Spanish are required to complete 30 approved junior-senior credits, six of which may be in English literature above 25-26 or in the original literature of another foreign language, or in other courses approved by the Department. All majors must satisfy the Distribution Requirements of the College of Arts and Sciences, and are required to take French or Spanish 27-28, French 75 or Spanish 64 and French or Spanish 95.

Majors should also be guided by the appropriate Departmental document: *Requirements for the Major in French (Spanish)*.

Russian

LASZLO TIKOS, *Adviser*

Students choosing Russian as their field of major concentration will receive training in reading, writing, speaking and understanding the language, and a knowledge of Russian literature. Russian majors will also acquire the background in Russian history, government and economy necessary for an understanding of the literature and culture of the Russian people.

Russian majors will be prepared to continue their education on the graduate level in the fields of Russian, Slavic Languages and Literatures, or Russian Area Studies.

Directory of Courses

Russian majors who choose to become teachers or translators will have the necessary preparation and background in the history of the language, or experience in translating scientific, technical and academic material.

Prerequisite is the successful completion of four semester courses in the language (12 credits): Russian 1, 2, 7, 8 or the equivalent.

Requirements for a major in Russian are the successful completion of:

- (a) Four semester courses of language study at the junior-senior level (12 credits): Russian 61, 62, 71 and either 63 or 64.
- (b) Five semester courses of Russian literature study at the junior-senior level (15 credits): Russian 51, 52, 53, 54, and one of 56, 57, 58.
- (c) Seminar course Russian 97.
- (d) Two semester courses in Russian History: History 55, 56.

Sociology and Anthropology

J. H. KORSON, *Adviser*

The courses in sociology and anthropology are planned with two aims in view: to give the student an understanding of the factors which influence men in their activities and interests as members of society, and to help prepare students for a wide variety of occupational outlets.

Students interested in teaching at the elementary or high school level should take a minor in the School of Education and at least 6 credits in American history with as many credits in American government as can be arranged.

Of the many opportunities in the field of social work, some are available to college graduates, while others require graduate training in a school of social work.

Aside from opportunities in the business world, many federal agencies and private research organizations seek people who are trained in the research techniques of sociology.

All majors must elect Sociology 25 and 26; Mathematics 1 and 2, or Mathematics 1 and Philosophy 31; and two of the following: Economics 25, Government 25, or Psychology 1; a minimum of 24 and a maximum of 30 Junior-Senior credits in Sociology and Anthropology, of which the following should be taken in the Junior year: Anthropology 63, Sociology 82, and 95. Students who plan to enter the research field or continue their training in sociology or anthropology at the graduate school level, are advised to elect Statistics 77 in the Junior or Senior year and to begin to develop a reading knowledge of French and German.

Students majoring in this department must maintain a minimum quality point average of 2.0 (C grade) or better in Sociology and Anthropology courses.

Social Work

J. H. KORSON, *Adviser*

The American Association of Schools of Social Work indicates that the pre-professional subjects most closely related to professional work in this field are economics, political science, psychology, and sociology. The Association recommends that prospective students of social work or social administration take not fewer than 12 semester hours in one of these subjects while taking less in others. It also recognizes the value of courses in biology, history, English, as well as other subjects contributing to a broad cultural background for the student.

Speech

A. E. NIEDECK, *Adviser*

An undergraduate major in speech may be earned by completing thirty semester hours of course work in the department. Psychology 1 should be elected as a basic requirement. The student must select an area of concentration in (1) Rhetoric and Public Address, (2) Theatre, (3) Radio and Television, (4) Speech Education, (5) Speech and Hearing Therapy. Students concentrating in Speech and Hearing Therapy may fulfill all the certification requirements of the American Speech and Hearing Association and the Massachusetts State Department of Education. Students interested in preparation as public school therapists should plan to minor in the School of Education. For those interested in work in a rehabilitation or hospital setting, a minor in psychology should be planned.

Zoology

DONALD FAIRBAIRN, *Adviser*

Major aims served by courses of instruction in Zoology are:

- (1) To present biological principles insofar as these contribute to a liberal education (Zoology 1, 25, 35),
- (2) To satisfy the need for specialized training of students majoring in other departments or schools (Zoology 37, 38, 54), and
- (3) To provide the fundamentals of professional training for Zoologists, and also for those who plan to qualify professionally in medicine, dentistry, and veterinary science.

Students electing Zoology as their major subject must complete the following courses or their equivalent: Mathematics 7, 9; Physics 3, 4; Chemistry 1, 2, 27, 33; Botany 1; Zoology 1, 53, 70, 71, 72, 83. Those who wish to acquire a high degree of competence in the experimental aspects of the subject should try to complete as many as possible of the following: Mathematics 10; Chemistry 3, 4, 29, 32, 51, 52, 93, 94. All students majoring in the department are encouraged to elect according to their interests additional courses of instruction in mathematics, physics, chemistry, zoology, botany,

Art

entomology, microbiology, geology, wildlife management, and statistics.

The following courses are required of Zoology majors planning to teach in high school: Zoology 1, 25, 35; Botany 1, 25, 26; Chemistry 1, 2, 33; Physics 3, 4; Education 51 (junior year); concentrated semester block, Education 52, 85, 88 (senior year); Psychology 56; any fifteen junior-senior credits in Zoology as recommended by the special departmental adviser (especially recommended: Zoology 53, 54, 70, 74, 80, and 81); additional science credits, if desired, recommended from: Entomology 26, Microbiology 31, Geology 28, Wildlife Management 27, Botany 81, Entomology 79, 90.

ART

Head of Department: PROFESSOR PAUL F. NORTON. ASSOCIATE PROFESSOR MATHESON; ASSISTANT PROFESSOR KAMYS; MISS DAMM, MESSRS. COUGHLIN, GOODYEAR.

14. (I) and (II) Introduction to Art

An introduction to great works of art studied in historical sequence, including techniques and aesthetic principles. 3 class hours. Credit, 3.

31. (I) and (II) Basic Design

Introduction to the elements and principles of design and their imaginative application to visual presentation. 6 studio hours. Credit, 3.

32. (I) and (II) Basic Design

Continuation of Art 31. With more attention given to three-dimensional design. Prerequisite, Art 31. 6 studio hours. Credit, 3.

33. (I) and (II) Basic Drawing

Introduction to drawing in black and white, applying pencil, crayon, charcoal techniques to representation in line and tone, emphasizing sound observation and effective presentation. 6 studio hours. Credit, 3.

34. (I) and (II) Advanced Drawing

Continuation of Art 33. Investigation and development of various techniques and media with special emphasis on figure drawing. Prerequisite, Art 33. 6 studio hours. Credit, 3.

51. (I) and (II) Water Color

Initial concentration on transparent water color, emphasizing control of techniques and mastery of color relationships. Further experience with opaque water color, such as gouache, casein. Prerequisites, Art 31, 33. 6 studio hours, Credit, 3.

52. (I) and (II) Water Color

Continuation of Art 51. Prerequisite, Art 51. 6 studio hours. Credit, 3.

53. (I) and (II) Oil Painting

Easel painting in oil and related media, based on elementary understanding of physical properties of medium, and encouraging individual directions within limitations of sound composition. Prerequisites, Art 31, 33. 6 studio hours. Credit, 3.

54. (I) and (II) Oil Painting

Continuation of Art 53. Prerequisite, Art 53. 6 studio hours. Credit, 3.

57. (I) and (II) Printmaking

Basic study of materials, techniques, aesthetic considerations peculiar to graphic media of lithography and intaglio (etching, aquatint, etc.), permitting students to print their own work. Prerequisites, Art 31, 34, or permission of instructor. 6 studio hours. Credit, 3.

58. (I) and (II) Printmaking

Continuation of Art 57. Prerequisite, Art 57. 6 studio hours. Credit, 3.

60. (I) and (II) Sculpture

Experimentation with materials. Investigation into the nature of 3-dimensional form. The development of 3-dimensional order. Individual projects. Prerequisites, Art 31, 33. 6 studio hours. Credit, 3.

61. (I) and (II) Sculpture

Continuation of Art 60. Prerequisite, Art 60. 6 studio hours. Credit, 3.

65. (I) Ceramics

The designing and making pottery with the potter's wheel and related tools. A student should have taken one or more basic courses in creative art before this course. 3 class hours. Credit, 3.

71. (I) Ancient Art & Archaeology

The art of early cultures, mainly in the European region, including Greek and Roman sculpture and painting. Students are encouraged to take Art 14 before this course. 3 class hours. Credit, 3.

73. (I) Mediaeval Art

Earliest phases of Christian art in catacombs, barbaric influences of northern Europe, Byzantine developments in the East, and the Romanesque and Gothic in the West. Students are encouraged to take Art 14 before this course. 3 class hours. Credit, 3.

75. (II) Renaissance Art

Painting, sculpture, architecture, with particular attention given to Italian Art. Emphasizes social and historical importance of arts, and changes in style and aesthetic theory. 3 class hours. Credit, 3.

76. (II) Baroque Art

The Art of the 17th and early 18th centuries in Italy, Spain, Germany, France and the Low Countries. It is advisable for students to take Art 14 before this course. 3 class hours. Credit, 3.

Astronomy

77. (I) American Art

Study of the earliest Colonial art and architecture, the impact of later European influences; regional art of the late 19th and 20th centuries, and contemporary phases of abstract art. 3 class hours. Credit, 3.

79. (II) Modern Painting and Sculpture

Origin of modern movements in art, and an analysis of contemporary techniques and styles as they relate to society. 3 class hours. Credit, 3.

81. (I) Modern Architecture

History of the changes in style, technical advances, and aesthetic principles during the past two hundred years. 3 class hours. Credit, 3.

97. (I) 98. (II) Special Problems in Art

For qualified senior art majors who wish to specialize further in a particular aspect of art. Arrangements must be made with members of the department. Credit, 1-3.

ASTRONOMY

Astronomy is a Joint Department of the four colleges: Amherst, Mount Holyoke, Smith, and the University. ASTFC means "Astronomy Four-Colleges."

Head of Department: PROFESSOR ALBERT P. LINNELL. ASSOCIATE PROFESSOR YOSS;
ASSISTANT PROFESSORS FRANKLIN, KOCH, OLSON.

1. (I) Elementary Astronomy (ASTFC 1)

The solar system, systems of coordinates, laws of motion, planets and satellites, the sun. Supplemented by occasional hours of evening observation. Prerequisite, high school trigonometry. 3 class hours. Credit, 3.

2. (II) Elementary Astronomy (ASTFC 1)

The astronomical universe. Stellar distances and motions, star clusters and nebulae. Supplemented by occasional hours of evening observation. Prerequisite, Astronomy 1. 3 class hours. Credit, 3.

51. (I) Statistical Astronomy (ASTFC 31)

Stellar motions as derived from trigonometric, spectroscopic, and statistical parallaxes, proper motions, and radial velocities. Stellar luminosity functions, and related topics. Prerequisites, Astronomy 2; Physics 7; Mathematics 25 previously or concurrently. 3 class hours. Credit, 3. Mr. Yoss.

52. (II) Galactic Structure (ASTFC 32)

Properties of the galactic system revealed by star clusters, the general distribution of stellar types, and the interstellar medium. Kinematics and dynamics of galactic motion. Recent results from the field of radio astronomy. Prerequisites, Astronomy 2; Physics 7; Mathematics 26 previously or concurrently. 3 class hours. Credit, 3. Mr. Yoss.

55. (I) **Astronomical Observation, Reduction, and Analysis (ASTFC 37)**

Fundamental astronomical catalogues and their uses; theory of the transit telescope; visual observation with the equatorial telescope and the transit; photography with the equatorial telescope; photographic photometry. Prerequisite, Astronomy 2. Required of all astronomy majors and registration restricted to these students. 3 class hours. Some classroom hours will be replaced by observing sessions to be arranged. Credit, 3. Staff.

56. (II) **Astronomical Observation, Reduction, and Analysis (ASTFC 38)**

Astronomical spectroscopy including line identification, plate calibration and radial velocity determination; photography of objective grating spectra; photoelectric photometry including determination of atmospheric extinction and extrapolation to stellar color indices and magnitudes outside the atmosphere; photoelectric light curves of variable stars. Prerequisite, Astronomy 2. Required of all astronomy majors and registration restricted to these students. 3 class hours. Some classroom hours will be replaced by observing sessions to be arranged. Credit, 3. Staff.

63. (I) **Mathematical Astronomy I (ASTFC 43)**

Basic topics in astronomy. The restricted three body problem; advanced concepts in mechanics applicable to astronomical problems; stellar motions and stellar statistics. Prerequisites, Astronomy 2; one year of differential and integral calculus; concurrent enrollment in Physics 55. 4 class hours. Credit, 4.

64. (II) **Mathematical Astronomy II (ASTFC 44)**

Basic topics in astronomy and astrophysics. Astronomical topics in atomic spectroscopy. Physics of radiation and radiative transfer. Basic considerations in the treatment of stellar interiors and atmospheres. Prerequisites, Astronomy 63, or permission of the department. 4 class hours. Credit, 4.

65. (I) **Celestial Mechanics (ASTFC 33)**

Development of the two body problem and the restricted three body problem as applied to the solar system and stellar systems. Prerequisites, Astronomy 2; Mathematics 26; Physics 7. 3 class hours. Credit, 3. Mr. Koch.

66. (II) **Double Stars (ASTFC 34)**

Analysis of the orbits of double stars and discussion of their physical characteristics. Prerequisites, Astronomy 2; Mathematics 26; Physics 7. 3 class hours. Credit, 3. Mr. Koch.

75. (I) **Astrophysics (ASTFC 41)**

Gas laws and nuclear reactions as applied to the structure of stellar interiors. Evolution of stars. Prerequisites, Physics 7; Mathematics 26. 3 class hours. Credit, 3. Mr. Linnell.

76. (II) **Astrophysics (ASTFC 42)**

Study of the emitting and absorbing properties of stellar atmospheres; approximate solutions of the equation of transfer for continuum and line radiation; determination of the physical properties of stellar atmospheres with special emphasis on the sun; determination of atmospheric abundances of elements. Prerequisites, Physics 7; Mathematics 26. 3 class hours. Credit, 3. Mr. Olson.

Botany

95. (I) 96. (II) Seminar

An individual research project approved by the department. Prerequisite, consent of the department. Credit, 3.

BOTANY

Acting Head of Department: PROFESSOR R. B. LIVINGSTON. PROFESSOR SCHUSTER; ASSOCIATE PROFESSORS BIGELOW, DAVIS, GENTILE; ASSISTANT PROFESSORS PUTALA, ROWLEY, WILCE; MRS. BIGELOW.

1. (I) and (II) Introductory Botany

Structure, function and reproduction of plants, dealing primarily with the flowering plants. Basic biological principles are emphasized. 2 class hours, 1 3-hour laboratory period. Credit, 3. Staff.

25. (I) The Plant Kingdom

A general survey of the morphology, reproduction, distribution and importance of the slime molds, bacteria, algae, fungi, lichens, liverworts, mosses, ferns and seed plants. Prerequisite, Botany 1. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Davis.

26. (II) New England Flora

Identification of tracheate plants (lycophods, horsetails, ferns, gymnosperms, angiosperms) and the families they represent. Prerequisite, Botany 1, Botany 25 recommended. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Rowley.

57. (I) Plant Anatomy and Histological Methods

Study of origin and structure of vegetative and reproductive organs of seed plants coordinated with exercises in preparation of stained slides for microscopic studies. Prerequisite, Botany 25, or permission of instructor. 2 class hours, 2 2-hour laboratory periods. Credit, 4. Mr. Putala.

59. (I) The Angiosperms

The evolution and systematics of flowering plants, emphasizing families and their relationships. Prerequisite, Botany 25 or 26. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Schuster.

60. (II) Morphogenesis

The development of plant form and structure at the level of cells and organs. Illustrations drawn from controlled experiments on the contribution of internal and external factors. Prerequisite, Botany 25. 2 class hours, 1 2-hour laboratory-discussion period. Credit, 3. Mr. Davis.

61. (I) Phycology

The phylogeny, taxonomy, morphology and ecology of the major groups of the marine and fresh water algae. Field work in marine and fresh water environments. Prerequisite, Botany 25. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Wilce.

62. (II) The Archegoniatates

The morphology, evolution and systematics of bryophytes, ferns and their allies. Prerequisite, Botany 25. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Schuster

66. (II) General Mycology

Survey of the various fungi, their life history and distribution, their significance in disease, their utilization by man. Prerequisite, Botany 25, or permission of instructor. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Bigelow.

67. (I) Introductory Plant Physiology

Plant processes and their relation to the complex of activity constituting plant growth. Topics include water relations, photosynthesis, fat and protein synthesis, digestion, translocation and respiration. Prerequisites, Botany 1, Chemistry 1 and 2. Recommended, Chemistry 33 or equivalent. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Gentile.

68. (II) Plant Metabolism

A study of the chemical operation of plants, emphasizing the enzymatic processes involved in the synthesis and breakdown of the more important chemical constituents of plants. Offered in alternate years. Prerequisites, Botany 67, Chemistry 33 or equivalent. 2 class hours, 1 4-hour laboratory period. Credit, 4. Mr. Gentile.

80. (I) Aquatic Vascular Plants

Systematics, ecology and fundamental importance of aquatic plants. A course designed for majors in Botany, Zoology, and Wildlife. Prerequisites, Botany 1, 26. 2 3-hour class-laboratory periods. Credit, 3. Mr. Wilce.

81. (I) Plant Ecology

Interrelationships between plants and their environment, with special emphasis on the structure and development of plant communities. Prerequisite, Botany 1; Botany 26 and 67 recommended. 2 3-hour class-laboratory periods. Credit, 3. Mr. Livingston.

82. (II) Plant Geography

Principles governing the development and natural distribution of plants and plant communities with special consideration of the vegetation of North America. Prerequisite, Botany 81. Botany 59 recommended. 3 class hours. Credit, 3. Mr. Livingston.

84. (I) Autecology

Plant behavior in relation to the physical and biological environment, with emphasis on the ecology of individual plants. Prerequisites, Botany 67 and 81. 2 3-hour laboratory-discussion periods. Credit, 3. Mr. Livingston.

89. (I) Developmental Plant Cytology

Emphasis on development of plant cell walls, plastids and mitochondria; introduction to fine structure of cytoplasmic and nuclear components and ontogenetic and phylogenetic development of plant cell structures. Prerequisite, Botany 25, or permission of instructor. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Rowley.

97. (I) 98. (II) Special Problems

Supervised problem work for qualified students. Hours by arrangement. Credit, 1-3. Staff.

CHEMISTRY

Head of Department: PROFESSOR WILLIAM E. McEWEN. PROFESSORS CANNON, HUNSBERGER, LITTLE, SMITH, STEIN; ASSOCIATE PROFESSORS CARPINO, RICHASON, ROBERTS; ASSISTANT PROFESSORS BRANDTS, CHANDLER, GEORGE, McWHORTER, MORTENSEN, OBERLANDER, OLVER, ROBINSON, ROWELL, STENGLE, STIDHAM, WILLIAMS, ZAJICEK; MRS. FESSENDEN, MRS. PARKINSON, MR. WYNNE.

1. (I) 2. (II) General Chemistry

A study of the fundamental chemical laws and theories, with the object of giving the student a sound scientific training through a course in chemistry. 2 class hours; 1 quiz hour; 1 2-hour laboratory period. Credit, 3. Mr. Richason and Staff.

3. (I) 4. (II) General Inorganic Chemistry

A study of the fundamental chemical laws and theories, and including the elements of qualitative analysis. For students planning to major in chemistry and others for whom the course is a departmental requirement. 2 class hours; 2 3-hour laboratory periods. Credit, 4. Mr. Richason and Staff.

25. (I) 26. (II) Principles of Chemistry

For students who qualify by examination. A study of fundamental laws and theories including the theory and practice of qualitative and quantitative methods of analysis. 2 class hours, 6 laboratory hours. Credit, 4. Mr. Richason and Staff.

27. (I) Analytical Chemistry

A broad look at the principles of analytical chemistry, for students not majoring in chemistry. Basic laboratory techniques and operations of quantitative analysis. Not acceptable for major credits except by special arrangement. Prerequisite, Chemistry 2 or 4. 2 lectures, 2 3-hour laboratory periods. Credit, 4. Analytical Staff.

29. (I) and (II) Qualitative Analysis

The fundamental principles of ionic equilibria and the chemistry of important cations and anions, with particular reference to semimicro qualitative analysis. Prerequisite, Chemistry 2. 2 class hours, 6 laboratory hours. Credit, 4. Mr. Smith, Mr. Wynne.

32. (II) Quantitative Chemical Analysis

A detailed study of the principles and practices of titrimetric and gravimetric analysis; separation methods; introduction to physical methods. Primarily for chemistry majors and others needing a more detailed treatment than is given in Chemistry 27. Prerequisite, Chemistry 4 or 29. 2 lectures, 2 4-hour laboratory periods. Credit, 4. Analytical Staff.

33. (I) and (II) Organic Chemistry

A short course intended to satisfy the requirements in this field for all students who do not specialize in chemistry. Prerequisites, Chemistry 2. 3 class hours, 1 3-hour laboratory period. Credit, 4. Organic Staff.

51. (I) 52. (II) Organic Chemistry

Introduction to the chemistry of carbon compounds. Survey of the principal classes of organic compounds and their reactions with emphasis on the relation between structure and reactivity. Prerequisite, Chemistry 4, 26, 27 or 29. Concurrent enrollment in Chemistry 53, 54 is required. 3 class hours. Credit, 3. Organic Staff.

53. (I) 54. (II) Organic Chemistry Laboratory

Application of the experimental techniques of organic chemistry to the preparation, purification and analysis of organic compounds. Prerequisite, concurrent enrollment in Chemistry 51, 52. 1 3-hour laboratory period. Credit, 1, Organic Staff.

55. (II) Organic Chemistry Laboratory

Continuation of Chemistry 54. Study of preparations involving special techniques and use of the literature of organic chemistry. Prerequisite, Chemistry 52, 54. Limited to Chemistry majors. 2 3-hour laboratory periods. Credit, 2. Organic Staff.

65. (I) 66. (II) Physical Chemistry

A study of the fundamental theories and laws of physical chemistry. Prerequisites, Chemistry 32 or 27; Mathematics 30; Physics 4. 3 class hours. Credit, 3. Physical Staff.

67. (I) 68. (II) Physical Chemistry Laboratory

Experience in modern physico-chemical techniques. Prerequisites, Chemistry 32; Mathematics 30; Physics 4; or permission of instructor. Concurrent enrollment in Chemistry 65, 66. 1 3-hour laboratory period. Credit, 1. Physical Staff.

77. (I) Advanced Physical Chemistry

Topics such as chemical thermodynamics, statistical mechanics, introductory quantum chemistry and theories of gases, liquids and solids. Prerequisites, Chemistry 65 and 66. 3 class hours. Credit, 3. Mr. Stein, Mr. Stidham, Mr. Stengle.

79. (I) Elementary Biochemistry

The more important facts relating to biological materials and processes. Designed primarily for students not eligible for courses 93 or 94. Not open to chemistry majors. Prerequisite, Chemistry 33 or 51. 3 class hours, 1 3-hour laboratory period. Credit, 4. Mr. Robinson.

80. (II) Clinical Chemistry

Collection and preparation of samples for analysis; standardization of glassware and the preparation of reagents; description of colorimeters and the determination of certain significant compounds. 1 class hour, 1 3-hour laboratory period. Credit, 2. Mr. Robinson.

81. (I) Organic Chemistry

An intensive survey of aliphatic and aromatic chemistry with emphasis on scope and limitations of reactions, mechanisms, and recent developments. Admission by permission of instructor. Prerequisite, one year of Organic Chemistry. 3 class hours. Credit, 3. Organic Staff.

Chemistry

82. (I) Qualitative Organic Chemistry

Identification of unknowns, both single and mixtures of organic compounds, by physical properties, reactions and preparation of derivatives. Admission by permission of instructor. Prerequisite, one year of Organic Chemistry. 2 class hours, 2 3-hour laboratory periods. Credit, 4. Mr. Cannon.

83. (I) Advanced Analytical Chemistry (Instrumental Analysis)

The theory and technique of colorimetry, spectrography, potentiometry, microscopy, polarography, chromatography and other special analytical methods. Prerequisites, Chemistry 32, 66. 2 class hours. 1 3-hour laboratory period. Credit, 3. Analytical Staff.

84. (II) Radiochemistry

The character of atomic nuclei, nuclear reactions, radiation and its detection, and techniques for the study and utilization of radionuclides. Prerequisite, Chemistry 27 or 32, or permission of instructor. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Richason.

85. (II) Theory of Analytical Processes

A detailed consideration of analytical topics, as chemical equilibrium, precipitate formation, chelating agents, multistage separation, etc., having general applicability in chemical investigations. Prerequisites, Chemistry 52 and 66. 3 class hours. Credit, 3. (Laboratory optional, 1 extra credit.) Analytical Staff.

86. (II) Theoretical Inorganic Chemistry

A theoretical survey of inorganic chemistry based on periodic relationships. Topics include: atomic structure, nuclear chemistry, valence concepts, coordination compounds, and acid-base theory. Prerequisite, Chemistry 65. 3 class hours. Credit, 3. Mr. Smith.

87. (I) Inorganic Chemistry of the Common Elements

A systematic consideration of the common elements and their compounds, based on the periodic relationships and modern concepts of structure and bonding. An optional two-credit laboratory will provide an introduction to inorganic laboratory techniques and practices. Prerequisite, Chemistry 86, or permission. 3 class hours (6 laboratory hours optional). Credit, 3 (or 5). Inorganic Staff.

88. (II) History of Chemistry

An historical and biographical survey of chemistry and chemists through a study of the development of new ideas and the establishment of new theories and laws. 2 class hours. Credit, 2. Mr. Robinson.

91. (I) Chemical Literature

Intended to give facility in the location of information of a chemical nature. Prerequisites, Chemistry 52, 66, and a reading knowledge of German, or permission of instructor. 1 class hour. Credit, 1. Mr. Oberlander.

93. (I) 94. (II) General Biochemistry

A broad introduction to the general field of biochemistry for students majoring in chemistry or in the biological sciences, and a background for more advanced or specialized study in this field. Prerequisites, Chemistry 51 and 52 or their equivalent. 3 class hours, 1 3-hour laboratory period. Credit, 4. Mr. Little.

98. (II) Introduction to Research

Admission only by permission of the department. To each student is assigned some special subject or problem in one of the several fields of chemistry. Hours by arrangement. 10 laboratory hours. Credit, 5. Staff.

THE CLASSICS

Instructors in the Department of Romance Languages.

GREEK**1. (I) 2. (II) Elementary Greek (1963-64)**

For students with no previous creditable study of Greek. Elements of the language and readings in prose and poetry. Given in alternate years. 3 class hours. Credit, 3. Mr. Greenfield.

7. (I) 8. (II) Intermediate Greek (1964-65)

For students with one year of college Greek or its equivalent. Intensive grammar review. Readings in Homer, Plato, and others. Given in alternate years. Prerequisites, Greek 1, 2, or equivalent. 3 class hours. Credit, 3. Mr. Temple.

LATIN**1. (I) 2. (II) Elementary Latin**

For students with no previous creditable study of Latin. Elements of the language and introductory reading. 3 class hours. Credit, 3. Mr. Temple.

7. (I) 8. (II) Intermediate Latin

For students with one year of college Latin or its equivalent. Intensive grammar review. Introduction to Latin Literature: Cicero, Virgil, Ovid, Horace, Livy and others. Prerequisites, Latin 1, 2, or equivalent. 3 class hours. Credit, 3. Mr. Aliberti.

ECONOMICS

Head of Department: PROFESSOR PHILIP L. GAMBLE. PROFESSORS MORRIS, SCHOEFFLER, HOWARD; ASSOCIATE PROFESSOR BLACKMAN; ASSISTANT PROFESSORS MARTIN AND WICKMAN; MESSRS. CHAUDHRY, MILLER, F. SMITH, R. SMITH.

12. (II) Economic History of the United States

Important aspects of the evolution of our modern economic system; social, technological, and other changes which have affected economic institutions; public policy problems involved. 3 class hours. Credit, 3. Mr. F. Smith.

25. (I) and (II) Elements of Economics

Definitions, principles of production, exchange, the distributing methods of allocation of income and revenue. 3 class hours. Credit, 3. Mr. Gamble and Staff.

26. (II) Problems of the National Economy

A continuation of Course 25. Current problems, including international economic planning in peace and war. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Martin and Staff.

Economics

53. (I) Money, Banking and Credit

The development and operation of the monetary and banking systems of the United States; problems of achieving full employment and price stability through monetary controls. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Gamble.

54. (II) Money, Income and Monetary Policy

The relationship between money, income and monetary policy. An examination of the relationships between individuals, banks, money markets, governments and central banks. Prerequisites, Economics 25 and either Economics 53 or Finance 55. 3 class hours. Credit, 3. Mr. Gamble.

55. (I) Economics of Consumption and Personal Finance

Patterns of consumption, standards of living and the sources and expenditure of individual and family incomes. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Morris.

56. (II) Business Fluctuations and Forecasting

Nature and causes of business fluctuations; methods of forecasting; government policy for stability; utility of available statistical data as guides to private and public policy. Prerequisites, Economics 25, 53 or Finance 55. 3 class hours. Credit, 3. Messrs. Howard and Miller.

70. (II) The Structure of American Industry

Business enterprise, market competition, and economic development in American industries. The social effectiveness of industries analyzed through measures of industrial structure and market performance. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Howard.

73. (I) Modern Economic Theory and Analysis

Micro-economic analysis: types of markets: applications of linear programming, theory of games and other techniques for rational business planning; balancing forces in free-enterprise economy. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Schoeffler.

75. Mathematical Methods in Economics

The applications of various mathematical concepts and techniques in macro-economic and micro-economic analysis. Special emphasis is placed on the design and interpretation of mathematical models of economic phenomena. Prerequisites, Economics 25, 26; Mathematics 1, 2 or 4, or consent of the instructor. 3 class hours. Credit, 3. Mr. Chaudhry.

77. (I) Economics of International Trade

Policies, principles, and practices of international trade. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Miller.

78. (II) Public Finance

Principles of public revenues and expenditures; systems and problems of taxation; use of taxes, expenditures, debt policy to provide full employment, economic growth and price stability. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Gamble.

79. (I) Labor Problems

Background of the labor movement and problems involved in the management-labor relationship and the efforts of management, unions and government to solve them. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Morris, Mr. Blackman.

80. (II) Labor Law and Legislation

Economics effects and historical survey of Federal and state laws and an analysis of important court decisions. Prerequisites, Economics 25, 79, or consent of the instructor. 3 class hours. Credit, 3. Mr. Blackman.

81. European Economic Evolution

Evolution of economic organization in agriculture, industry and commerce; the surrounding social and institutional life. Prerequisites, Economics 25, History 5 and 6, or consent of the instructor. 3 class hours. Credit, 3. Mr. Blackman.

82. (II) Economic Development

Economic problems of underdeveloped countries and the policies necessary to induce growth. Individual projects will be required. Prerequisites, Economics 25, 26. 3 class hours. Credit, 3. Mr. Morris.

83. (I) Social Control of Business

The formal and informal methods and efforts to maintain, supplement and moderate competition, and the substitution of regulation or public enterprises for competition. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Howard.

84. (I) Comparative Economic Systems

The structure, operation, and underlying ideology of the major contemporary forms of social-economic organization. Emphasis on the Soviet Union and the United States. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Schoeffler.

86. (II) Doctrinal Backgrounds of Contemporary Theory

Foundations of classical theory from physiocracy through Mill; neoclassicism and its chief variants, the Lausanne, Austrian and English schools; dissenters Marx, German historical school, Veblen. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Martin.

88. Financial Aspects of Economics

The application of modern flow-of-funds analysis to the financial behaviour of the various sectors of the economy. Special emphasis is placed on the financial aspects of business units and the business sector. Prerequisites, Economics 25 and Accounting 25, or consent of the instructor. 3 class hours. Credit, 3. Mr. Martin.

95. (I) 96. (II) Seminar

Research in economic theory; problems of labor, commerce, and industry. If desirable, some other economic study may be substituted. Prerequisites, Economics 25 and 26. 1 or 2 2-hour conferences. Credit, 1 to 3.

English

ENGLISH

Head of Department: PROFESSOR HOWARD O. BROGAN. PROFESSORS COPELAND, HELMING, KAPLAN, KOEHLER, LANGLAND, MUSGRAVE, O'DONNELL, VARLEY; ASSOCIATE PROFESSORS CLARK, GOLDEN, MITCHELL, PAGE, A. WILLIAMS; ASSISTANT PROFESSORS BARRON, CHAMETZKY,¹ ² COLLINS,¹ ² DUCKERT, GOZZI, HAVEN, HICKS, HOGAN, HERRIGAN, MCCARTHY, RATNER, RUDIN, SILVER, TUCKER, WESTON; MRS. BOAS, MRS. DUBOIS, MRS. GALVIN, MRS. GRAHAME, MRS. HINCKLEY, MRS. LEININGER, MRS. MICHELMAN, MRS. REID, MRS. ROWE,¹ MRS. WRIGHT, MISS DUNN,* MESSRS. KAIN,* LESSER,* SKELTON.*² MESSRS. KENSETH, KNIGHT, LABRANCHE, MADEIRA, PORTER, SHEPARDSON, SMITH,¹ ² STONE, SWEENEY, R. WILLIAMS, WOLF.

1. 2. English Composition

Training in effective composition; readings. 2 class hours. Credit, 2.

F. (I) (II) English for Foreign Students

Drill in English grammar and idiom; individual conferences on particular difficulties; introduction to contemporary American literature. Students having to meet the English 1, 2 requirement, who show proficiency in this course may, upon recommendation of the instructor, continue with English 2 on completion of this course. 2 class hours, 1 laboratory period. Credit, 0.

3. (I) Special Freshman Composition

Exemption from English 1. 2 class hours. Credit, 2.

25. (I) 26. (I) (II) Masterpieces of Western Literature

A study of selected masterpieces. The course aims to enrich the student's appreciation of literary values and develop his understanding of abiding human issues. Prerequisite, English 2 or 3; English 25 or 28 is prerequisite to English 26 and to elective courses in the Department. An elective course may, however, be taken concurrently with English 26 or 29; for prospective majors, this elective should be English 61. 3 class hours. Credit, 3.

28. (II) 29. (I) Special Course in Masterpieces of Western Literature

A study of the texts read in English 25-26 with additional outside readings. Freshmen who have achieved grades of A in English 2 or B in English 3 may substitute English 28-29 for English 25-26; a grade of B in English 28 is required for admission to English 29. English 25 or 28 is prerequisite to elective courses in the Department. An elective course may, however, be taken concurrently with English 26 or 28; for prospective majors, this elective should be English 61. 3 class hours. Credit, 3.

50. (I) (II) Technical Writing

For majors in engineering. A course in factual and inductive exposition with special emphasis upon process reports and theses. 2 class hours. Credit, 2.

51. (I) Advanced Expository Writing

The writing of informative prose in the forms expected in the students' major fields: reports, articles, essays. Prerequisite, permission of instructor. 3 class hours. Credit, 3.

¹ On leave first semester of 1962-63.

² On leave second semester of 1962-63.

* Visiting Lecturers.

52. (II) Advanced Technical Writing

Case studies in engineering and industrial reporting, advertising and promotional literature, scientific journalism, and graphic techniques. Given in alternate years. Prerequisite, permission of the instructor. 3 class hours. Credit, 3.

53. (I) (II) Creative Writing

Intensive practice in writing prose fiction, with some attention to other forms, supplemented by discussion of ideas and techniques in contemporary literature. Prerequisite, permission of the instructor. 3 class hours. Credit, 3.

54. (I) (II) Creative Writing

A continuation of English 53, allowing choice of emphasis upon short stories, poetry, drama, or novel. Prerequisite, permission of the instructor. 3 class hours. Credit, 3.

55. (I) Early American Literature

Significant American writing during the Colonial, Revolutionary, and early Federalist periods. Given in alternate years. 3 class hours. Credit, 3.

56. (II) American Poetry

American poetry from 1800 to the emergence of a modern style early in the twentieth century. 3 class hours. Credit, 3.

57. (I) Major American Writers

Selected major American writers of the nineteenth and twentieth centuries, including Emerson, Hawthorne, Longfellow, Lowell, James, Adams, Fitzgerald, and Hemingway. 3 class hours. Credit, 3.

58. (II) Major American Writers

Selected major American writers of the nineteenth and twentieth centuries, including Cooper, Poe, Melville, Thoreau, Whitman, Twain, Crane, Dreiser, Wolfe, and Faulkner. 3 class hours. Credit, 3.

60. (II) History of the English Language

The development of English, including a study of vocabulary and usage levels, grammars, and dictionaries. Special attention to matters crucial to the teaching of English in secondary schools. 3 class hours. Credit, 3.

61. (I) (II) History of English Literature

A study of the major phases of English literary history. Representative writers from Chaucer to Dryden will be examined. English majors are expected to include English 61 among their first Departmental electives; it may be taken concurrently with English 26 or 29. 3 class hours. Credit, 3.

62. (II) History of English Literature

A study of representative English writers from the eighteenth century to the present. A continuation of English 61 but may be elected independently. 3 class hours. Credit, 3.

63. (I) Literary Criticism

An introduction to the history of literary criticism. Chief emphasis given to the major philosophical critics, from Plato and Aristotle to the nineteenth century. 3 class hours. Credit, 3.

English

64. (II) Literary Criticism

An examination and application of techniques of criticism, with special consideration of the twentieth century. 3 class hours. Credit, 3.

66. (II) Chaucer

The major works, especially *Troilus* and selected *Canterbury Tales*, as combinations of medieval art and thought with pre-Renaissance motifs and Chaucer's genius for realism. 3 class hours. Credit, 3.

67. (I) Shakespeare

The dramatic art of Shakespeare as revealed in a study of approximately twenty plays. 3 class hours. Credit, 3.

68. (II) Shakespeare

An intensive study of six plays, directed toward a scholarly appreciation of Shakespeare as a dramatic artist. Prerequisite, English 67. Admission by consent of instructor. 3 class hours. Credit, 3.

69. (I) The Renaissance in England

The non-dramatic literature of Tudor and Jacobean England in terms of emergent forms and literary ideas. Special attention to More, Spenser, Bacon, and Thomas Browne. 3 class hours. Credit, 3.

70. (II) Elizabethan and Jacobean Dramatics

Non-Shakespearean dramatists of the English Renaissance. A study of the major plays of Marlowe, Jonson, Beaumont, Fletcher, Tourneur, Webster, and Ford. 3 class hours. Credit, 3.

72. (II) Greek Classics (in translation)

Homer, lyric poetry, the major dramatists, selected dialogues of Plato, Thucydides, and their relations to the classical tradition in English literature. 3 class hours. Credit, 3.

73. (I) Seventeenth-Century Poetry, 1600-1660

A study of such representative poets as Donne, Jonson, Herrick, Lovelace, Suckling, Herbert, Vaughan, Crashaw, Traherne, and Marvel, with emphasis upon the Metaphysical Tradition. 3 class hours. Credit, 3.

74. (I) Milton

Development of the mind and art of Milton as a figure of the English Reformation and the late Renaissance, with emphasis on *Paradise Lost*. 3 class hours. Credit, 3.

75. (I) English Literature of the Restoration

Intellectual, moral, and literary values of the Restoration period from 1660 to 1700. Emphasis on Dryden's satire, the Restoration theater, and Congreve's comedy of manners. 3 class hours. Credit, 3.

77. (I) English Literature of the Eighteenth Century

The literature of the Augustan Age, with special emphasis on the writings of Swift and Pope. 3 class hours. Credit, 3.

78. (II) English Literature of the Eighteenth Century

The literature of the later eighteenth century with special emphasis on the Johnson Circle. A continuation of English 77 but may be elected independently. 3 class hours. Credit, 3.

79. (I) The Romantic Poets

A study of the Romantic Movement as revealed in the poetry and prose of Wordsworth, Coleridge, and the other early Romantics. 3 class hours. Credit, 3.

80. (II) The Romantic Poets

A further study of the Romantic Movement, with particular attention to Byron, Shelley, and Keats. 3 class hours. Credit, 3.

81. (I) English Prose of the Nineteenth Century

A study of the techniques and ideas of the chief prose writers, including Wordsworth, Coleridge, Lamb, Hazlitt, DeQuincey, Carlyle, and Ruskin. 3 class hours. Credit, 3.

82. (II) English Prose of the Nineteenth Century

The chief Victorian prose writers, including Macaulay, Newman, Arnold, Mill, Huxley, Pater, and Stevenson. A continuation of English 81 but may be elected independently. 3 class hours. Credit, 3.

83. (I) The Development of the English Novel

The reading and discussion of eight or nine great English novels from Defoe through the Victorians. 3 class hours. Credit, 3.

84. (II) Victorian Poetry

An exploration of the range and diversity of Victorian poetry, with special attention to Tennyson, Browning, Arnold, and the Pre-Raphaelite Movement. 3 class hours. Credit, 3.

85. (I) Modern European Drama (in translation)

Major modern dramatists beginning with Ibsen and including Chekhov, Pirandello, Strindberg, Giraudoux, Shaw, and others. Emphasis on comparative currents in various European nations. 3 class hours. Credit, 3.

87. (I) Modern Novel: 1890-1920

The expanding form of the novel and increasing interest in social causes as exhibited in some twelve novels. 3 class hours. Credit, 3.

88. (II) Modern Novel: 1920-1950

An analytical presentation of some twelve novels. A continuation of English 87 but may be elected independently; no English major may, however, elect both English 87 and 88. 3 class hours. Credit, 3.

89. (I) Modern Poetry

An analysis of twentieth-century poetry developing from such authors as Hardy, Hopkins, Whitman, and Emily Dickinson to those of the present. 3 class hours. Credit, 3.

Geology

90. (II) Modern British and American Drama

A study of representative dramatists since the late nineteenth century, including Shaw, Fry, O'Casey, O'Neill, Williams, and others. Emphasis on changing trends in twentieth-century dramatic art. 3 class hours. Credit, 3.

95. (I) Seminar in English Literature or Comparative Literature in Translation

For English majors, but open to others. Prerequisite, permission of instructor. 3 class hours. Credit, 3.

96. (II) Seminar in American Literature

For majors but open to others. Prerequisite, permission of instructor. 3 class hours. Credit, 3.

GEOLOGY

Head of Department: PROFESSOR H. T. U. SMITH. PROFESSOR FARQUHAR; ASSOCIATE PROFESSOR MOTTS; ASSISTANT PROFESSORS BURKE, JOHANSSON, MCGILL, NELSON, WEBB; MESSRS. RICE, ROBINSON.

1. (I) (II) Physical Geology

The nature and origin of the landscape features of the earth, and their underlying rocks and structures; including the work of rivers, waves and currents, wind, and glaciers; and the role of earthquakes, volcanoes, and the processes of mountain-building. 2 class hours, 1 3-hour laboratory period, and field trips. Credit, 3. Staff.

2. (I) (II) Historical Geology

Origin and age of the earth; interpretation of the geologic time scale; development on continents and oceanic basins and their relief features; evolution of life. Prerequisite, Geology 1. 2 class hours, 1 3-hour laboratory period and field trip. Credit, 3.

33. (II) Structural Geology

Principles of deformation of the earth's crust; occurrence and recognition of rock structures; graphic solution of structural problems; field observations. Prerequisite, Geology 1. 1 class hour, 2 2-hour laboratory periods and field trips. Credit, 3. Mr. Farquhar.

42. (I) Mineralogy

Chemical composition, physical properties, crystal form, occurrence, and identification of common minerals. Prerequisites, Chemistry 1 and 2. 2 class hours, 2 2-hour laboratory periods. Credit, 4. Mr. Nelson.

50. (I) Engineering Geology

Not open to geology majors. Materials and surface features of the earth with emphasis on engineering problems; map reading as related to the phenomena of physical geology. 2 class hours, 1 3-hour laboratory period or field trip. Credit, 3. Mr. Farquhar.

56. (II) Lithology

Study of the classes of rocks with reference to manner of origin, modes of occurrence, structural features and chemical and petrographic distinction within each group. Prerequisites, Geology 1, 42. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Nelson.

63. (I) Invertebrate Paleontology

A study of the history, development and identification of invertebrate animal fossils. Field trips by arrangement. Prerequisites, Geology 2; Zoology 1. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Johansson.

64. (II) Plant Paleontology

A study of the history, development, and identification of plant fossils. Field trips by arrangement. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Johansson.

72. (I) Geologic Field Mapping

An introduction to the instruments and techniques used in field mapping, and their application to the geologic mapping of selected areas. Prerequisites, Geology 33, 56. 8 field hours. Credit, 3. Mr. McGill.

74. (II) Sedimentology

A study of the composition, classification, and origin of sedimentary rocks, including discussion of source area, mode of transportation and deposition, and diagenesis. Prerequisites, Geology 1, 2, 42. 2 class hours and laboratory period. Credit, 2. Mr. Motts.

78. (I) Principles of Stratigraphy

The principles of stratigraphic correlation and their application to the problems of the major rock units, primarily of the United States. Prerequisites, Geology 1, 2. Course 33 and 74 recommended. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Webb.

89. (I) Geomorphology

Origin and development of landforms in relation to geological processes, climatic environment, and tectonic history. Application of geomorphic methods to interpretation of Cenozoic geologic history. Prerequisites, Geology 1, 2, 33. 2 class hours, 1 2-hour laboratory period. Credit, 3.

91. (II) Photogeology

A laboratory study of the instruments and methods employed in making measurements and preparing base maps and geologic maps from vertical and oblique aerial photos. Prerequisites, Geology 33, 72. 2 2-hour periods. Credit, 3. Mr. Smith.

94. (II) Pleistocene Geology

Geochronology of Pleistocene time as related to climatic changes and their influence on glaciology, landforms, sedimentary deposits, sea level, and the paleontological record. Prerequisite, Geology 2, or permission of the instructor. Course 89 recommended. 2 class hours; field trips by arrangement. Credit, 3. Mr. Motts.

96. (II) Seminar

Review of current literature or discussion of selected topics. Credit, 1.

German and Russian

97. (I) 98. (II) Special Problems

For seniors specializing in geology. Total credit may not exceed 6. Prerequisite, 21 hours of geology, or permission of department. Credit, 1-6. The Department.

GEOGRAPHY

35. (I) (II) Fundamentals of Geography

A systematic introduction to the study of physiography, climate, mineral resources, and man's use of his natural environment. 2 class hours, 1 2-hour laboratory period, and field trips. Credit, 3. Mr. Burke.

50. (II) Geography of North America

A regional approach to the study of the physical geography of the continent and its development by man. 3 class hours. Credit, 3. Mr. Burke.

55. (I) Economic Geography

The distribution, production and utilization of the natural resources and commodities on which man's livelihood depends and the problems which they pose. 3 class hours. Credit, 3. Mr. Burke.

81. (II) World Political Geography

The human and physical environments in which states exist and the problems which these environments pose in their current and likely future behavior. 3 class hours. Credit, 3. Mr. Burke.

GERMAN AND RUSSIAN

Head of the Department: PROFESSOR FREDERICK C. ELLERT. PROFESSORS HELLER, WEIGAND; ASSISTANT PROFESSORS HAUSER, LEA, MISS SCHIFFER, TIKOS; MRS. GLADIR, MESSRS. DAVIS, SCHAEFER, STAWIECKI, WEEKS.

1. (I) 2. (II) Elementary German

Conversation, reading, grammar, and composition. 3 class hours, 1 laboratory hour. Credit, 3.

7. (I) 8. (II) Intermediate German

Reading, conversation, composition. Grammar review. Prerequisites, German 1 and 2. 3 class hours, 1 laboratory hour. Credit, 3.

51. (I) Nineteenth Century Prose

The *Novelle* from early realism to naturalism. Emphasis on literary and social forces in Heine, Stifter, Keller, Storm, C. F. Meyer. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Heller.

52. (II) Poetry and Drama of the Nineteenth Century

Plays of Kleist, Grillparzer, Büchner, Hebbel, Hauptmann. The poetry of Mörike, Lenau, Droste-Hülthoff, Nietzsche. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Hauser.

53. (I) Twentieth Century Prose

Main literary currents from Nietzsche to Hesse. Particular attention to the works of Thomas Mann, Kafka, and Werfel. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Heller.

54. (II) Poetry and Drama of the Twentieth Century

Poetry of Hofmannsthal, George and Rilke. Plays of Hauptmann, Kaiser, Brecht and others. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Lea.

55. (I) Storm and Stress

Eighteenth century Titanism in German literature centering in the early Goethe. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Ellert.

56. (II) Romanticism

Poetry and prose of the romantic period from Hölderlin to Heine. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Miss Schiffer.

57. (I) Goethe's Faust

Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Heller.

59. (I) The Germanic Languages

Introduction to general and Germanic philology. Historical development particularly of German and English and their relationship to other languages of the Indo-European family. 3 class hours. Credit, 3. Mr. Schaefer.

60. (II) The Classical Period

Representative works of Lessing, Goethe, and Schiller. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Weigand.

67. (I) German Masterpieces in Translation

Literary works ranging from the Middle Ages to the present. Admission by permission of department. 3 class hours. Credit, 3. Mr. Heller.

70. (II) Scientific German

Expository prose. Prerequisites, German 25, 26, or equivalent. 3 class hours. Credit, 3. Mr. Stawiecki.

77. (I) Survey of German Literature I

German literature from the Middle Ages to the Age of Enlightenment. Prerequisites, German 25, 26, or equivalent. 3 class hours. Credit, 3.

78. (II) Survey of German Literature II

German literature from 1770 to the present. Prerequisites, German 25, 26, or equivalent. 3 class hours. Credit, 3.

79. (I) 80. (II) German Conversation and Composition

Practice in the oral and written language. Prerequisites, German 25 and 26, or permission of instructor. 4 class hours. Credit, 3. Miss Schiffer.

97. (I) 98. (II) Special Problems

Guided reading and research in areas of specialization. For qualified seniors. Credit, 3.

RUSSIAN

1. (I) 2. (II) Elementary Russian

Grammar, exercises in composition and conversation, selected readings. Prerequisite, previous language training. 3 class hours, 1 laboratory hour. Credit, 3.

7. (I) 8. (II) Intermediate Russian

A review of fundamentals of grammar followed by more advanced study of grammatical structure and idiom. Composition, conversation, and readings in Russian fiction. Prerequisites, Russian 1 and 2. 3 class hours, 1 laboratory hour. Credit, 3.

51. (I) 52. (II) Introduction to Russian Literature

Survey course in Russian prose. Written reports. Conducted in English. Readings in English, research in Russian for majors. Prerequisite, junior standing. 3 class hours. Credit, 3. Mr. Tikos.

52. (I) 54. (II) Dostoevsky and Tolstoy in their European Setting

Historical and literary background. Close text analyses. Student reports. Reading of selected works in the original required of Russian majors. Prerequisite, junior standing. 3 class hours. Credit, 3. Mr. Tikos.

55. (I) Masterpieces of Russian Literature in Translation

A selection from classics of Russian romanticism and realism, culminating in novels of Dostoevsky and Tolstoy. Majors are required to read some texts in Russian. Prerequisite, junior standing. 3 class hours. Credit, 3.

56. (I) Russian Drama

Russian Drama in the originals, from the beginnings to the establishment of a Russian national repertoire and theatre. Plays of Ostrovskij, Chekhov, and Gorky. Prerequisites, Russian 6, or the equivalent. 3 class hours. Credit, 3.

57. (I) Soviet Literature

Beginnings and development of Soviet prose, drama, criticism from Gorki to Sholoklov and Pasternak. Conducted in English; no knowledge of Russian required. Majors are required to do research in Russian. Prerequisite, junior standing. 3 class hours. Credit, 3. Mrs. Gladir.

58. (I) Russian Poetry

Russian poetry in the originals: 19th century to the present: Classical Heritage, Golden Age, Utilitarian poetry, Proletarian verse, Modernism, Symbolism, Mysticism, Acmeism, Fururism, Imagism, Constructivism. Prerequisites, Russian 6, or the equivalent. 3 class hours. Credit, 3.

61. (I) 62. (II) Advanced Russian

Building vocabulary and improving reading ability through selections from the Classical and Soviet Periods. Compositions and classroom discussions in Russian on reading material are required. Prerequisites, Russian 5 and 6. 3 class hours, 1 laboratory hour. Credit, 3. Mr. Davis.

63. (I) Scientific Russian

Intensive experience in translating scientific exposition, academic and journalistic prose. Prerequisites, Russian 6, or the equivalent. 3 class hours. Credit, 3.

64. (I) The History of the Russian Language

Historical development of the Russian language, its relation to other languages, changes in sound, form and vocabulary from the earliest period to the present. Prerequisites, Russian 61 and 62. Junior or senior standing. 3 class hours. Credit, 3. Mr. Davis.

71. (I) Russian Conversation

A semester course devoted to developing fluency in speaking Russian and a conversational vocabulary. Prerequisites, Russian 61 and 62. 3 class hours, 1 laboratory hour. Credit, 3.

97. (I) Problems in Russian Language and Literature

A semester involving intensive and independent work on special problems in Russian Language and Literature, with results to be presented in written form. Required of majors. Prerequisites, Advanced Russian 61 and 62 and senior standing. Credits, 1-3.

GOVERNMENT

Head of Department: PROFESSOR JOHN S. HARRIS. UNIVERSITY DISTINGUISHED PROFESSORS IN PUBLIC AFFAIRS (1962-63): MR. MEADE ALCORN, GOVERNOR MICHAEL DiSALLE; PROFESSORS BETH, FENTON, OPPENHEIM, VALI; ASSOCIATE PROFESSORS BRAUNTHAL, TINDER; ASSISTANT PROFESSORS ALLEN, HEALY, MAINZER; VISITING PROFESSORS GWENDOLEN M. CARTER AND JAMES MOOSE, JR.

25. (I) (II) American Government

A study of the principles, machinery, dynamics, and problems of government in the United States. 3 class hours. Credit, 3.

26. (II) European Government

A survey of the politics and governmental institutions of Great Britain, France, U.S.S.R., and other European countries. 3 class hours. Credit, 3.

51. (I) Municipal Government

A survey of the governmental structure and function of American municipalities. 3 class hours. Credit, 3. Mr. O'Hare.

52. (II) American Foreign Policy

An analysis of the principles of American foreign policy. Constitutional, political, and administrative considerations which influence the formulation and execution of American foreign policy. 3 class hours. Credit, 3. Mr. Vali, Mr. Braunthal.

53. (I) International Relations

The nation-state system and conceptions of national interest in modern world politics. Forms and distribution of power. Making of foreign policy and adjusting international conflict. 3 class hours. Credit, 3. Mr. Braunthal, Mr. Vali.

54. (II) State Government

A study of state politics, organization and functions, with emphasis on the role of the state in our Federal system. 3 class hours. Credit, 3. Mr. Healy, Mr. Fenton.

55. (Summer) The Presidency in American Government

Constitutional and political aspects of the presidency in legislation, administration and conduct of foreign and military affairs. The president as party leader. Prerequisite, Government 25. Credit, 3. Mr. Fenton.

Government

56. (II) The Legislative Process

The functions of national and state legislatures, legislative procedures, and the role played by political parties and pressure groups in the legislative process. 3 class hours. Credit, 3. Mr. Healy, Mr. Fenton.

57. (I) The Government and Politics of Russia

Organization and functioning of the Communist party; the administrative process; terror as a system of power; Soviet foreign policy, its formation and execution. 3 class hours. Credit, 3. Mr. Harris, Mr. Vali.

61. (I) Public Administration

A study of organization and management in modern government, with emphasis on the bureaucracy's role in public policy formation. 3 class hours. Credit, 3. Mr. Mainzer, Mr. Harris.

61. (II) Administrative Law

A study of governmental activities in the regulation of industry, agriculture, and labor, with emphasis on the legal framework within which these activities operate. 3 class hours. Credit, 3. Mr. Mainzer.

63. (I) Political Parties and Elections

A study of the American political process, with emphasis on parties, pressure groups, and public opinion. 3 class hours. Credit, 3. Mr. Fenton, Mr. Healy.

64. (II) The Law and Practice of Civil Liberties

Development in American Constitutional Law of the concept of civil liberty, including free speech and religion, fair trial, and race discrimination. Prerequisite, Government 25. 3 class hours. Credit, 3. Mr. Beth.

65. (I) Constitutional Law

An historical study of the United States Constitution as interpreted by decisions of the Supreme Court. 3 class hours. Credit, 3. Mr. Beth.

66. (II) American Political Thought

A study of the development of American political thought from colonial times to the present. 3 class hours. Credit, 3. Mr. Oppenheim.

68. (II) International Law

A study of the origin, character, and function of international law. 3 class hours. Credit, 3. Mr. Allen, Mr. Vali.

70. (II) International Organization

A study of international organization in the twentieth century, with emphasis upon the United Nations and regional organizations. 3 class hours. Credit, 3. Mr. Braunthal, Mr. Vali.

71. (I) Ancient and Medieval Political Thought

A study of the development of political thought and its relation to cultural and institutional growth from the time of the Greeks to the end of the Middle Ages. 3 class hours. Credit, 3. Mr. Tinder, Mr. Oppenheim.

72. (II) Modern Political Thought

A study of the development of political thought and its relation to cultural and institutional growth from the rise of the modern state to the present. 3 class hours. Credit, 3. Mr. Tinder, Mr. Oppenheim.

76. (II) Public Opinion in Politics

A study of opinion and communication as aspects of the political process with emphasis upon communication through mass media. 3 class hours. Credit, 3. Mr. Fenton.

78. (II) Municipal Administration

Administrative management in American municipalities based on descriptive literature, case materials, and personal observation, with particular attention to Massachusetts cities and towns. 3 class hours. Credit, 3. Mr. O'Hare, Mr. Mainzer.

80. (II) Municipal Law

A study of the legal problems encountered in the creation and operation of local government, with special reference to Massachusetts cities, towns, and counties. 3 class hours. Credit, 3. Mr. O'Hare.

83. (I) Public Personnel Administration

Theory, practice, and organization of the personnel functions in governmental administration, including recruitment, testing, classification, compensation, promotions, training, and employee relations. Prerequisites, Government 25, 61, or permission of instructor. 3 class hours. Credit, 3. Mr. Mainzer, Mr. Harris.

84. (II) Governmental Financial Administration

Theory, practice, and organization, including budgeting, revenues, debt operations, records administration, purchasing, audits, and financial reporting. Prerequisites, Government 25, 61, or permission of instructor. 3 class hours. Credit, 3. Mr. Harris, Mr. O'Hare.

91. (I) Scope and Methods of Political Science

Critical examination of the scope and unity of political science and the significant methodological positions and research techniques. Prerequisite, Government 25. 3 class hours. Credit, 3. Mr. Mainzer, Mr. Fenton.

93. (I) (II) The Practice of American Politics

A course in practical American politics, given by a prominent political leader under the University Distinguished Professorship in Public Affairs. Prerequisite, Government 25. Credit, 3.

95. (I) 96. (II) Seminar

A study of special problems in the field of government. 3 class hours. Credit, 3.

HISTORY

Head of Department: PROFESSOR HOWARD H. QUINT. PROFESSORS CALDWELL, CARY, GORDON, POTASH; ASSOCIATE PROFESSORS DAVIS, GREENBAUM, ILARDI, WILLIAMS; ASSISTANT PROFESSORS BERNHARD, CODY, DE PILLIS, GAGNON, VAN STEENBERG, WICKWIRE; INSTRUCTORS MRS. GORDON, MRS. WICKWIRE, MISS GUIMOND, MESSRS. GEBHARD, RUSSO, SONNINO.

5. (I) 6. (II) Modern European Civilization

The historical development of the western European countries, their ideas and institutions. Either semester may be elected independently. 3 class hours. Credit, 3.

History

25. (I) 26. (II) The Development of American Civilization

A survey of the American national growth. Either semester may be elected independently. 3 class hours. Credit, 3.

31. (I) 32. (II) English History

Emphasis on economic, social, and cultural influences, as well as on constitutional development. Either semester may be elected independently. 3 class hours. Credit, 3. Mr. Caldwell, Mr. Wickwire.

51. (I) Ancient History

The development of civilization in the Ancient World. 3 class hours. Credit, 3. Mr. Williams.

53. (I) 54. (II) History of Far Eastern Civilization

A general historical introduction to the civilization and contemporary problems of the Far East. Either semester may be elected independently. 3 class hours. Credit, 3. Mr. Cody.

55. (I) 56. (II) A History of Russia

A survey of the political, economic, social and intellectual development of Russia. The first semester will treat the Tsarist era, the second, the origins of Russian Marxism and the Soviet period. Either semester may be elected independently. Prerequisites, History 5 and 6. 3 class hours. Credit, 3.

57. (I) Colonial Latin America

A study of Spanish and Portuguese expansion into the New World, the Indian cultures, the development of political, social, and economic institutions, and the growth of the independence movement to 1810. 3 class hours. Credit, 3. Mr. Potash.

58. (II) Argentina and Brazil since Independence

The emergence of the major South American states. Particular attention will be paid to the themes of political organization and economic change; and in the contemporary period to the growth of nationalism and mass-based political movements. 3 class hours. Credit, 3. Mr. Potash.

59. (I) The History of Mexico

A study of Mexico from the end of the eighteenth Century to the present. Emphasis will be given to political, economic, and social developments. 3 class hours. Credit, 3. Mr. Potash.

62. (II) Medieval History

European history from the collapse of Rome to the Renaissance. 3 class hours. Credit, 3. Mr. Williams.

63. (I) 64. (II) History of American Thought and Culture

The basic strands of American thought and their reflection in American culture. First semester deals with the period before 1865. Either semester may be elected independently. 3 class hours. Credit, 3. Mr. Quint.

66. (II) The History of Modern Germany

The evolution and development of Germany since the accession of Frederick the Great with emphasis upon diplomatic, political, military and social-economic trends and problems. 3 class hours. Credit, 3. Mr. Gordon.

69. (I) Europe, 1870-1918

Internal developments of the principal countries; a detailed study of conditions and diplomacy which led to the World War; and military and diplomatic history of the war years. Prerequisite, History 6. 3 class hours. Credit, 3. Mr. van Steenberg.

70. (II) Europe since 1918

Major developments in the internal and international affairs of the European states since World War I. 3 class hours. Credit, 3. Mr. Caldwell.

72. (II) History of American Westward Expansion, 1763-1893

Advance of settlement from the Appalachians to the Pacific and the influence of the frontier upon social, economic, and political conditions. Prerequisite, History 25, or permission of instructor. 3 class hours. Credit, 3. Mr. Davis, Mr. De Pillis.

73. (I) 74. (II) The Age of the Renaissance and Reformation, 1300-1600

A study of the changes in European thought and institutions during the development of Humanism and the Protestant and Catholic Reformations. Either semester may be elected independently. 3 class hours. Credit, 3. Mr. Iardi.

75. (I) Europe in the Enlightenment, 1685-1789

Civilization of Western Europe in the eighteenth century, its social milieu, intellectual setting, institutional forces, religious tendencies, aesthetic contributions, and the growth of revolutionary spirit. 3 class hours. Credit, 3. Mr. Greenbaum.

77. (I) Modern Britain

A study of selected topics on the political, social, and intellectual development of Britain in the nineteenth and twentieth centuries. 3 class hours. Credit, 3. Mr. Caldwell.

78. (II) France since 1789

A study of selected, formative political crises from 1789 to the present, and their settings in the economic, social, and intellectual life of modern France. 3 class hours. Credit, 3. Mr. Gagnon.

79. (Summer) New England to 1860

A study of the colonial and early national periods, with emphasis on the political, social and economic aspects of life in this region. Credit, 3. Mr. Cary.

81. (I) 82. (II) Diplomatic History of the United States

The development of American foreign relations, 1776 to the present. Either semester may be elected independently. Prerequisites, History 25, 26, or permission of the instructor. 3 class hours. Credit, 3. Mr. Cary.

Journalism

83. (I) The Progressive Age (1900-1920)

A study of the political response to the changing economic and social conditions in American life. 3 class hours. Credit, 3.

84. (II) Conservatism and Reform (1920-1945)

American political, economic and intellectual life between the two World Wars. 3 class hours. Credit, 3.

90. (I) (II) Historiography and Historical Method

Training in location, appraisal, and handling of source materials. Critical evaluation of technique and ideas of representative historians from Thucydides to Toynbee. 3 class hours. Credit, 3. Mr. Greenbaum, Mr. Gordon.

95. (I) (II) Seminar in European History

A problems course intended to give training in historical research and writing. The field of study will vary from semester to semester. Prerequisites, History 5 and 6. 3 class hours. Credit, 3.

96. (I) (II) Seminar in American History

Similar to History 95, but dealing with fields of American history. Prerequisites, History 25 and 26. 3 class hours. Credit, 3.

JOURNALISM

PROFESSOR MUSGRAVE

51. (I) Introduction to Mass Communication

Problems of communication media, including the communications revolution, freedom of the press, the communication process, methods of reporting and writing, communication theory and research. 3 class hours. Credit, 3. Mr. Musgrave.

52. (II) Language and Mass Communication

Analysis of major approaches to language problems as they relate to mass communication media and the student's skill in communication. 3 class hours. Credit, 3. Mr. Musgrave.

62. (II) Article Writing

A study of magazine journalism combined with instruction in the writing of feature or magazine articles. 3 class hours. Credit, 3. Mr. Musgrave.

95. (I) Seminar

Writing for publication and training in copy editing. University student publications and town newspapers are used as laboratories. 2 class hours, 1 laboratory period. Credit, 3. Mr. Musgrave.

96. (II) Freedom of the Press

Seminar in freedom of the press: (1) its history, (2) major theories, (3) key cases in Anglo-American law, and (4) recent trends toward its redefinition. 3 class hours. Credit, 3. Mr. Musgrave.

MATHEMATICS

Head of Department: PROFESSOR ALLEN E. ANDERSEN. PROFESSORS AZPEITIA, JACOB, WAGNER; ASSOCIATE PROFESSORS ARCHER,* BOUTELLE, CULLEN, DICKINSON; ASSISTANT PROFESSORS ALLEN, BARR,* BLOOM, DORMONT, JONES, KERTZNER, KILLAM, LAVALLEE, MCHAFFEY, NORVIG, STOCKTON; MRS. COOK, MRS. EPSTEIN, MRS. RATAY, MRS. RICE, MESSRS. BUNUEL, BUSSEL, CALL, D'ALARCAO, HALM, MENTO, NAYLOR, SEMBER; GRADUATE ASSISTANTS ABBE, BRITTIAN, BUCUZZO, CONNORS, HEBERT, PARENT, PURINTON, THURASAMY, TILLMAN, WHITSON, WRIGHT.

01. (I) Elementary College Algebra

Intended for those students who offer only one unit of algebra for entrance. A review of elementary algebra and a more thorough study of such topics as quadratic equations, exponents and radicals, and progressions. No college credit is given for this course. 3 class hours. Credit, 0.

07. Essentials of Analytic Trigonometry

General definitions of trigonometric functions. Use of tables, graphs, identities, equations, inverse functions. For students who are deficient in Analytic Trigonometry. One hour per week. Prerequisite, Placement Scoring. No credit.

1. (I) (II) Introductory Mathematics I

Basic set-theoretic and axiomatic concepts, number systems and equations. A study of elementary functions, algebraically and by the methods of analytic geometry. 3 class hours. Credit, 3.

2. (I) (II) Introductory Mathematics II

A terminal course intended for students whose curriculum calls for just one year of mathematics. A continuation of Mathematics I, including topics from the calculus, statistics, and mathematics of finance. Prerequisite, Mathematics I. 3 class hours. Credit, 3.

4. (I) (II) Introductory Mathematics IV

A continuation of Mathematics I for those students intending to take further courses in mathematics. Trigonometry, introduction to analytic geometry and calculus. Prerequisite, Mathematics I. Credit, 3.

5. (I) (II) Introductory Engineering Mathematics

Introduction to analytic geometry and calculus. 4 class hours. Credit, 4.

6. (I) (II) Introductory Calculus for Engineering

Continuation of Mathematics 5. Prerequisite, Mathematics 5. 4 class hours. Credit, 4.

7. (I) (II) Algebra and Trigonometry

Fractions, quadratic equations, exponents, logarithms, variation, determinants of the second and third orders, and plane trigonometry. 3 class hours. Credit, 3.

The sequence 1, 4, 29, 30, 91 will gradually be replaced by the new sequence 7, 9, 10, 25, 26.

* On leave of absence, 1962-63.

Mathematics

9. Analytic Geometry and Calculus I

Logic, sets, topics from algebra, introduction to analytic geometry, functions, limits and derivatives, differentiation of algebraic functions, tangent and normal lines. Prerequisite, Mathematics 7, 07, or high school trigonometry, or Mathematics 07 concurrently. 3 class hours. Credit, 3.

10. Analytic Geometry and Calculus II

Applications of the derivative, conic sections and other algebraic curves, the definite integral and some of its applications, differentiation of transcendental functions. Prerequisites, Mathematics 9 and Trigonometry. 3 class hours. Credit, 3.

12. (I) (II) Functional Mathematics

For freshmen in home economics, nursing, and physical education. Fractions, percentage, linear and quadratic equations with applications, exponents, logarithms, slide rule, proportion, graphs, statistics, progressions, and the elements of mathematics of investments. 3 class hours. Credit, 3.

25. Analytic Geometry and Calculus III

Techniques of integration, further applications of calculus, basic properties of continuous and differentiable functions, parametric equations, polar coordinates, infinite series. Prerequisite, Mathematics 10. 3 class hours. Credit, 3.

26. Analytic Geometry and Calculus IV

Solid analytic geometry, partial differentiation, multiple integrals with applications, introduction to differential equations. Prerequisite, Mathematics 25. 3 class hours. Credit, 3.

29. (I) (II) Calculus

Further basic ideas and methods of analytic geometry and calculus. Prerequisite, Mathematics 4. 3 class hours. Credit, 3.

30. (I) (II) Calculus

A continuation of Mathematics 29 with special emphasis on applications. Prerequisite, Mathematics 29. 3 class hours. Credit, 3.

31. (I) (II) Applied Calculus for Engineers

Parametric equations, vectors, determinates, partial differentiation, multiple integrals. Prerequisite, Mathematics 6. 4 class hours. Credit, 4.

32. (I) (II) Applied Calculus for Engineers

Infinite series, expansion of functions, hyperbolic functions, differential equations. Prerequisite, Mathematics 31. 4 class hours. Credit, 4.

52. (I) (II) Introduction to Vector Spaces and Groups

The last two-thirds of Mathematics 54. Finite dimensional vector spaces, linear transformations, elementary theory of matrices and determinants. Prerequisite, Mathematics 4 or 10, or permission of the department head. 3 class hours for the last two-thirds of a semester. Credit, 2.

The sequence 1, 4, 29, 30, 91 will gradually be replaced by the new sequence 7, 9, 10, 25, 26.

53. (I) (II) Introduction to Modern Algebra

Basic concepts, groups, rings, the real and complex fields. Prerequisites, Mathematics 26, 30 or 31. 3 class hours. Credit, 3.

54. (I) (II) Continuation of Mathematics 53

Polynomials, cyclic groups, finite dimensional vector spaces, linear transformations, elementary theory of matrices and determinants. Prerequisite, Mathematics 53. 3 class hours. Credit, 3.

55. (I) Mathematics of Finance

The mathematical principles of simple and compound interest, annuities, depreciation, valuation of bonds, and insurance. May not be counted for Mathematics major credit. Prerequisites, Mathematics 1, 5, 7 or 9. 3 class hours. Credit, 3.

57. (I) Linear Programming and Theory of Games

Topics include sets, probability, vectors, matrices, and an introduction to linear programming and theory of games. Prerequisites, Mathematics 2, 4 or 9. 3 class hours. Credit, 3.

58. (II) Introduction to Digital Computers

The basic digital computing system, introduction to Boolean Algebra, logical design of computers, programming, coding, utility programs, criteria for evaluation of computers. Prerequisite, Mathematics 26 or 30, or permission of instructor. 3 class hours. Credit, 3.

61. Projective Geometry

A study, from both the synthetic and analytic viewpoints, of properties invariant under projection, with emphasis on the real plane. Equivalence of Desarguesian and coordinate projective geometries. Prerequisite, Mathematics 53. 3 class hours. Credit, 3.

62. Higher Geometry

A study along the lines of Klein's *Erlanger Programm* of various geometries and their groups of transformations, emphasizing Projective, Affine, and Euclidean. Prerequisites, Mathematics 54 and 61, or permission of instructor. 3 class hours. Credit, 3.

63. (I) Probability

A postulational study of probability including counting methods, random variables, moments, and the binomial, Poisson, and normal distributions. Prerequisite, Mathematics 10 or 29, previously or concurrently. 3 class hours. Credit, 3.

64. (II) Mathematical Statistics

Estimation of parameters, testing hypotheses, use of the chi-squared, t-, F-, and other distributions. Prerequisite, Mathematics 63. 3 class hours. Credit, 3.

68. (I) Linear Algebra

Row equivalence, Linear transformations and matrices. Similarity Invariant subspaces, canonical forms. Inner product spaces, linear functionals, the spectral theorem. Bilinear forms. Prerequisite, Mathematics 54 or 52. 3 class hours. Credit, 3.

Mathematics

69. (II) Theory of Groups and Group Representations

Axioms systems, Lagrange theorem, generators, relations. Conjugate classes, normal subgroups, quotient groups. Sylow theorems. Abelian groups. Unitary and irreducible representations. Characters, orthogonality relations. Prerequisite, Mathematics 68. 3 class hours. Credit, 3.

71. (I) Vector Analysis

The Algebra and Calculus of vectors. Applications to Physics and other fields will be considered. Prerequisite, Physics 4 or 6; corequisites, Mathematics 26, 31 or 91. 3 class hours. Credit, 3.

74. (II) Theory of Numbers

Euclid's Algorithm, theory of prime numbers, aliquot parts, congruences, further topics in number theory. Prerequisite, Mathematics 53. 3 class hours. Credit, 3.

75. (I) Survey of Advanced Mathematics for Engineers

Series solution of differential equations boundary value problems, functions of several variables, partial differential equations, numerical analysis and the Laplace transform. Not available for majors in Mathematics. Prerequisite, Mathematics 92 or 32. 3 class hours. Credit, 3.

76. (I) Survey of Advanced Mathematics for Engineers

Vectors and vector spaces, vector field theory, complex analysis. Not available for majors in Mathematics. Prerequisite, Mathematics 92 or 32. 3 class hours. Credit, 3.

81. (I) Complex Analysis

The algebra of complex numbers, the elementary functions and their mappings, differentiation, integration, Taylors series, and residues. Prerequisite, Mathematics 92 or 32. 3 class hours. Credit, 3.

83. (I) Numerical Analysis

Approximation and error evaluation; finite differences; approximation by polynomials using finite difference methods and minimal criteria; special reference to sets of orthogonal polynomials. Prerequisites, Mathematics 26, 32 or 91; and Computer Science 21 previously or concurrently. 3 class hours. Credit, 3.

84. (II) Numerical Analysis

Evaluation of definite integrals; solution of differential equations, polynomial equations, other conditional equations, and systems of linear equations with related matrix manipulations. Prerequisites, Mathematics 32 or 92, and 83. 3 class hours. Credit, 3.

85. Introductory Modern Analysis I

Real and complex numbers. Basic Topology of the real number system. Limit concept and continuity. Differentiation. Partial differentiation. Prerequisite, Mathematics 26 or 91. 3 class hours. Credit, 3.

86. Introductory Modern Analysis II

Bounded variation. Riemann-Stieltjes integration. Multiple integrals. Line integrals. Infinite series. Sequences of functions. Improper Riemann-Stieltjes integrals. Prerequisite, Mathematics 85. 3 class hours. Credit, 3.

88. Sets and Ordered Structures

Basic properties of sets. Ordered sets. Complete ordered sets. Well-ordered sets. Cardinal and ordinal numbers. Axiom of choice, well-ordering theorem, Zorn's Lemma and other forms of the axiom of choice. Cardinal arithmetic. Prerequisite, Mathematics 85, or permission of instructor. 3 class hours. Credit, 3.

91. Intermediate Calculus

Series, expansion of functions, partial differentiation, and multiple integrals. Prerequisite, Mathematics 30. 3 class hours. Credit, 3.

92. Differential Equations

Prerequisite, Mathematics 91. 3 class hours. Credit, 3.

93. (I) Fourier Series and Orthogonal Functions

Solutions of boundary value problems by Fourier series, Bessel functions, Legendre polynomials; convergence of representations by orthogonal functions. Prerequisite, Mathematics 92 or 32. 3 class hours. Credit, 3.

97. (I) 98. (II) Advanced Topics

Several topics intended for individuals or small groups of students. Admission by permission of the Head of the Department. Credit, 1, 2, or 3 each semester.

MICROBIOLOGY

Head of Department: PROFESSOR C. D. COX. ASSISTANT PROFESSORS CZARNECKI, MANDEL; MISS BOGGS.

1. (I) and (II) Introductory Microbiology

General and broad considerations of microorganisms, their activities, and their significance to human and animal health. Not for major credit. 2 class hours, 2 2-hour laboratory periods. Credit, 3.

51. (I) General Microbiology

General considerations of microbial structure, growth, and physiology and the reactions of microorganisms to their physical, chemical and biological environments. Designed for students intending to take more advanced courses in microbiology and other science majors. Prerequisites, at least one year of chemistry, one year of biological science. 2 class hours, 2 3-hour laboratory periods. Credit, 4.

54. (II) Pathogenic Bacteriology

Correlation of physiologic and metabolic properties and processes of bacteria with the pathogenesis of disease. Prerequisite, Microbiology 51. 2 class hours, 2 3-hour laboratory periods. Credit, 4.

55. (I) Immunology

Fundamental study of the nature of antigens and antibodies, their interactions and significance in resistance and hypersensitivity. Prerequisite, Microbiology 51. 2 class hours. 2 3-hour laboratory periods. Credit, 4.

57. (I) Virology

The structure, and the chemical, physical and biological properties of viruses, with emphasis on the bacterial viruses. Prerequisite, Microbiology 51. 2 class hours, 2 3-hour laboratory periods. Credit, 4.

Music

64. (II) Determinative Microbiology

General considerations of microbial taxonomy and ecology, with emphasis on the higher bacteria. Prerequisite, Microbiology 51. 2 class hours, 2 3-hour laboratory periods. Credit, 4.

66. (II) Microbial Physiology

Fundamental study of the growth, nutrition, metabolism and respiration of microorganisms. Prerequisites, Microbiology 51 and courses in organic and/or biochemistry. 2 class hours, 2 3-hour laboratory periods. Credit, 4.

95, 96. (I) and (II) Seminar. Prerequisite, Microbiology 51. Credit, 1

97, 98. (I) and (II) Special Problems. Prerequisite, Microbiology 51

4 additional credits, and departmental permission. Credit, 2-4.

MUSIC

Head of Department: PROFESSOR DORIC ALVIANI. PROFESSOR KING; ASSISTANT PROFESSOR CONTINO; MR. SCHWARTZ.

1. (I) (II) Music Appreciation—Introduction to Music

Open to all students not majoring in music. Previous musical training is not required. Basic music materials, principles of design, and the cultural significance of representative works from the ninth Century to the present are studied and discussed. 3 class hours. Credit, 3.

3. (I) 4. (II) Elementary Music Theory

A study of diatonic harmony, and the development of skills in sight singing, ear training, and analysis of musical forms. Prerequisites: Ability to read music, elementary skill at playing the piano, or permission of the instructor. Music 3 prerequisite to Music 4. Credit, 3.

5. (I) 6. (II) Intermediate Music Theory

Chromatic harmony, including further studies in sight singing and ear training. Counterpoint in both 16th Century and 18th Century styles. Further analysis of musical forms, including contrapuntal forms. Introduction to orchestration, and practice in writing original compositions for instrumental ensembles. Prerequisite, Music 4 or its equivalent. Music 5 prerequisite to Music 6. Credit, 3.

12. (I) (II) Applied Music—Individual Instruction

The study of piano, voice, or an instrument to gain proficiency. The course may be repeated several times until credit level is achieved. A grade is recorded. 7½ hours or its equivalent. Credit, 0.

13. (I) 14. (II) Applied Music—Individual Instruction

A study of literature and instrumental technique or voice production. Prerequisite, intermediate level of proficiency as determined by examination. 7½ hours or its equivalent. Credit, 1.

15. (I) 16. (II) Applied Music—Individual Instruction

Further study of literature and instrumental technique or voice production. Prerequisites, Music 13, 14. 7½ hours or its equivalent. Credit, 1.

17. (I) 18. (II) Applied Music—Individual Instruction

Advanced study of literature and instrumental technique or voice production. Prerequisites, Music 15, 16. 7½ hours or its equivalent. Credit, 1 each semester.

19. (I) 20. (II) Applied Music—Individual Instruction

Advanced study of literature and instrumental technique or voice production. Prerequisites, Music 17, 18. 7½ hours or its equivalent. Credit, 1 each semester.

21. (I) (II) 22. (I) (II) Applied Music—Instrumental Ensemble

Study and preparation for performance of compositions of instrumental music written in many styles and in various media. One credit recorded on completion of 21, 22. The sequence 21, 22 may be repeated. Credit, 1 for each two semesters. Mr. Contino.

23. (I) (II) 24. (I) (II) Applied Music—Vocal Ensemble

Preparation of various choral works to concert standard. Additional opportunities for instrumental accompanists and vocal soloists. 1 credit recorded on completion of 23, 24. The sequence 23, 24 may be repeated. Music 23 prerequisite to Music 24. Admission only by permission of instructor. Credit, 1 for each two semesters. Mr. King.

53. (I) 54. (II) Music History—Historical Survey of Music

History and literature of music: Music 53, from early religious chant through Bach and Handel; Music 54, from 1750 through vocal and instrumental music of the 20th Century. Prerequisite, Music 1. 3 class hours. Credit, 3.

55. (I) Music History—Music from Monteverdi to Bach

The Baroque and Rococo periods, including the music of such composers as Monteverdi, Schutz, Lully, Purcell, Corelli, Couperin, Rameau, the Scarlattis, Bach, Handel. 3 class hours. Credit, 3. Prerequisite, Music 54.

57. (I) Music History—Gothic and Renaissance Music

Chant and organum through Renaissance motet and madrigal. Reading, listening, score study, analysis. Prerequisite, Music 55. 3 class hours. Credit, 3.

59. (I) (II) Music History—Music of the 20th Century

A study of music, both European and American, written since 1900, including Stravinsky, Bartok, Hindemith, Copland, jazz, electronic music. Prerequisite, Music 1. 3 class hours. Credit, 3.

62. (II) Music History—Haydn, Mozart and Beethoven

Reading, listening, score study. 3 class hours. Credit, 3. Prerequisite, Music 1.

64. (II) Music History—Music from Schubert to Debussy

An historical study of 19th Century romantic music in small and large forms, and various media including Lieder, chamber music, symphony, opera. Reading, listening, score study. Prerequisite, Music 54. 3 class hours. Credit, 3.

Music

71. (I) 72. (II) Music Theory—Form, Analysis, and Composition

Analysis by score and sound, of textures and forms of various styles. Music 72 includes practice in original composition in various forms and media. Prerequisite, Music 6 or equivalent. Music 71 prerequisite to Music 72. 3 class hours. Credit, 3.

73. (I) 74. (II) Music Theory—Harmonic and Contrapuntal Techniques

A continuation of Music 72. Systematic study of chromatic harmony; use of various contrapuntal procedures. Some study of 20th Century styles and opportunities for free composition. Playing and score reading. Prerequisite, Music 72 or equivalent. Music 73 prerequisite to Music 74. 3 class hours. Credit, 3.

81. (I) Music Education—Basic Instrumental Music—Woodwinds

Tone production, technical dexterity, acoustical principles of the woodwind family with emphasis given to the clarinet, flute, oboe, bassoon. Literature and materials studied and evaluated. Prerequisite, Music 4. 3 class hours. Credit, 2.

82. (II) Music Education—Basic Instrumental Music—Brasswinds and Percussion

Tone production, technical dexterity, acoustical principles of the brasswind and percussion groups with emphasis given to the cornet, French horn, trombone, and tuba. Literature and materials studied and evaluated. Prerequisite, Music 4. 3 class hours. Credit, 2.

83. (I) Music Education—Basic Instrumental Music—Strings

Tone production, technical dexterity, acoustical principles of the string family with emphasis on the violin, viola, and cello. Literature and materials studied and evaluated. Prerequisite, Music 4. 3 class hours. Credit, 2.

85. (I) (II) Music Education—Music for Elementary Teachers

For the classroom teacher having little or no formal training in music. Principles of musical development with particular emphasis on classroom presentation. Rote and reading songs examined; processes of presentation evaluated. 3 class hours. Credit, 3.

87. (I) (II) Music Education—Music Curriculum

Organization and administration of the music program and curriculum in the elementary and secondary school. Observation of area schools. Admission by permission of instructor. 3 class hours. Credit, 3.

89. (I) Music Education—Score Reading and Conducting

Open and closed scores are studied, analyzed, and played at the keyboard. Basic conducting techniques are applied to the material studied. Prerequisite, Music 4. 3 class hours. Credit, 3.

90. (II) Music Education—Score Reading and Conducting

Band, orchestral, and choral scores are studied, analyzed and conducted. As scheduling permits, choral and instrumental organizations are utilized for actual conducting. Prerequisite, Music 4. 3 class hours. Credit, 3.

PHILOSOPHY

Head of Department: PROFESSOR CLARENCE SHUTE. PROFESSORS MOORE, OPPENHIEM (GOVERNMENT), ASSISTANT PROFESSORS EHRLICH, SWANSON; MESSRS. BRENTLINGER, CLAY.

For an introduction to the field as a whole, freshman-sophomore students are advised to elect Philosophy 25, junior-senior students, Philosophy 51 and/or 52.

25. (I) and (II) Introduction to Philosophy

An introduction to some of the most important of the general questions, ideas, theories and methods of inquiry which have given direction to Western thought. 3 class hours. Credit, 3. Messrs. Brentlinger, Clay, Ehrlich.

31. (I) and (II) Introduction to Logic

An inquiry into the nature of critical thinking, including (1) the functions of language, (2) the structure of deductive arguments, (3) a glimpse at inductive methods. 3 class hours. Credit, 3. Messrs. Swanson, Clay.

42. (I) and (II) Ethics

An examination of classical and contemporary theories concerning policy formation and the justification of personal decision and ways of life. 3 class hours. Credit, 3. Mr. Ehrlich.

51. (I) History of Philosophy—Ancient and Medieval

The development of Western thought from its earliest beginnings to the flowering of medieval scholasticism. Emphasis on the contribution of important movements and great thinkers. 3 class hours. Credit, 3. Mr. Brentlinger.

52. (II) History of Philosophy—Modern

Continuation of Philosophy 51 from the Renaissance and the rise of modern science to 19th century idealism, positivism and voluntarism. 3 class hours. Credit, 3. Mr. Brentlinger.

53. (I) The Philosophy of Plato (1963-64)

A study of the later dialogues for their analysis and resolution of major philosophical problems and for their influence on contemporary thought. Given in alternate years. Prerequisite, Philosophy 25 or 51. 3 class hours. Credit, 3. Mr. Brentlinger.

55. (I) The Philosophy of Aristotle (1964-65)

Selections from the works of Aristotle are studied for an understanding of their systematic analysis and theory in the major fields of philosophy. Given in alternate years. Prerequisite, Philosophy 25 or 51. 3 class hours. Credit, 3. Mr. Brentlinger.

58. (II) Philosophy in the Age of Enlightenment

A study of texts by representative thinkers from Descartes and Locke to Kant. The relation of these thinkers to modern science and contemporary thought. Prerequisite, Philosophy 25 and permission of instructor, or 52. 3 class hours. Credit, 3. Mr. Ehrlich.

61. (I) Contemporary Philosophies

A survey of the diverse philosophical directions representing the intense activity of contemporary American and European thinking. Prerequisite, Philosophy 25 and permission of instructor, or 52, or 58. 3 class hours. Credit, 3. Mr. Clay.

Philosophy

64. (II) Existential Philosophies

Examination by means of a study of selected original texts, of the main problems peculiar to this movement as a whole and to its main exponents individually. Prerequisites, Philosophy 25 and permission of instructor, or 51 or 52. 3 class hours. Credit, 3. Mr. Ehrlich.

67. (I) American Philosophy

Examination, by means of a study of selected original texts by the outstanding civilization. Prerequisite, Philosophy 25 or 51, or 52. 3 class hours. Credit, 3. Mr. Moore.

68. (II) Oriental Philosophies

The leading philosophies of Asia with emphasis on India and the bearing of philosophical differences between East and West on the problem of mutual understanding. Prerequisite, Philosophy 25 or 51, or 52. 3 class hours. Credit, 3. Mr. Shute.

72. (II) Philosophy of Science

A critical analysis of the structure of scientific method and the language of science. the respective roles of induction and deduction in science, and the status of theoretical terms. 3 class hours. Credit, 3. Mr. Swanson.

75. (I) Symbolic Logic

An introduction to such topics as the nature of a decision procedure, completeness of quantification theory, definition of cardinal numbers via sets, object-languages and meta-languages. Prerequisite, Philosophy 31 or consent of the instructor. 3 class hours. Credit, 3. Mr. Swanson.

76. (II) Mathematical Logic

Theory of formal systems: equivalence, completeness, incompleteness, decision procedure, formal syntax and semantics, recursive function theory, formal number theory, "reduction" of mathematics to logic. Prerequisite, Philosophy 75, its equivalent, or the instructor's approval. 3 class hours. Credit, 3. Mr. Clay.

81. (I) Philosophy of Religion

Readings in contrasting religious philosophies followed by analysis of concepts involved in understanding religion as coherently related to the other aspects of experience. 3 class hours. Credit, 3. Mr. Shute.

82. (II) Aesthetics

Leading theories of the nature of art, the analysis of aesthetic experience, the distinctive function of art in culture and personality, and the principles of criticism. 3 class hours. Credit, 3. Mr. Shute.

84. (II) Political Philosophy

An attempt to develop critically the moral basis of organized societal living on all levels, with special reference to contemporary problems of sovereignty and nationalism. Prerequisites, two semester courses in philosophy, or the approval of the instructor on the basis of studies in political thought. 3 class hours. Credit, 3. Mr. Oppenheim.

95. (I) 96. (II) Seminar

In each term a study is made of one major philosopher or of one narrowly restricted subject in a special field of philosophical inquiry. Prerequisite, four semester courses in philosophy or the instructor's approval. 3 class hours. Credit, 3.

PHYSICS

Head of Department: PROFESSOR JOHN D. TRIMMER. PROFESSORS ROSEN, ROSS; ASSOCIATE PROFESSORS JONES, LEWIS, SOLTYSIK; ASSISTANT PROFESSORS FOLAND, MATHIESON, PATTEN; MESSRS. BANGS, CROOKER, GRAY, HAYS, MISS STAUTBERG.

3. (I) 4. (II) Introductory Physics

Mechanics, sound, heat; electricity, magnetism, light and modern physics, using trigonometry and algebra, but not calculus. Intended for premedical, pre dental, preveterinary, and some science major students. Prerequisites, Mathematics 4 previously or concurrently for Physics 3; Physics 3 for Physics 4. 3 class hours, 1 2-hour laboratory period. Credit, 4.

5. (I) General Physics

Mechanics. For students primarily interested in physics, engineering, chemistry, or mathematics, who, in general, have had high school physics. Prerequisite, Mathematics 5 previously or concurrently. 2 class hours, 1 2-hour laboratory period. Credit, 3.

6. (II) General Physics

Heat, electricity, and magnetism. Prerequisites, Mathematics 5; Physics 5; Mathematics 6 concurrently. 2 class hours, 1 2-hour laboratory period. Credit, 3.

7. (I) (II) General Physics

Electromagnetic radiation, atomic and nuclear physics. Prerequisites, Mathematics 6; Physics 6. 3 class hours, 1 2-hour laboratory period. Credit, 4.

8. (II) 9. (I) Advanced Introductory Physics for Physics Majors

A limited-enrollment course for Physics majors or others interested in an introductory course at an advanced level. Prerequisites, Mathematics 4 or 5 or 29, and consent of Physics Department. 3 class hours, 1 2-hour laboratory period. Credit, 4.

51. (I) 52. (II) Electricity and Magnetism

The basic phenomena and laws of electricity and magnetism. Measurement, with an introduction to circuitry and electronics. Prerequisites, Physics 4, and Mathematics 30 or 31 for Course 51; Course 51 for Course 52. 2 class hours, 1 2-hour laboratory period. Credit, 3.

54. (II) Meteorology

Theoretical treatment of various atmospheric phenomena, with correlation of observation and theory. Weather observations, preparation of weather charts, and weather forecasting. Prerequisites, Physics 4 or 6; Mathematics 30 or 31. 3 class hours. Credit, 3.

55. (I) 56. (II) Mechanics

Development of the fundamental concepts of dynamics with applications to particles and rigid bodies in translation and rotation. Prerequisites, Physics 4 or 6; Mathematics 30 or 31. 3 class hours. Credit, 3.

60. (II) Sound and Acoustics

Vibrations, coupled systems, sound structure, and acoustic properties; principles and applications. Prerequisites, Physics 4 or 7; Mathematics 30 or 31. 3 class hours. Credit, 3.

Psychology

61. (II) Heat and Thermodynamics

Heat exchanges and related energy changes in systems of matter. Prerequisites, Physics 4 or 6; Mathematics 30 or 31. 3 class hours. Credit, 3.

63. (II) Optics

An intermediate course in geometrical and physical optics. Prerequisites, Physics 4 or 7; Mathematics 30 or 31. 2 class hours, 1 2-hour laboratory period. Credit, 3.

66. (I) Kinetic Theory

Classical kinetic theory of gases, with an introduction to phenomena in the non-uniform gas. Prerequisite, Physics 55. 3 class hours. Credit, 3.

67. (II) Statistical Mechanics and Information Theory

A study of the concepts of entropy, information, and order. Prerequisite, Physics 61. 3 class hours. Credit, 3.

85. (I) 86. (II) Modern Physics

Twentieth-century physics, the first semester devoted principally to atomic aspects, the second to nuclear. Prerequisites, Physics 52 and six other credits in junior-senior physics. 3 class hours. Credit, 3.

88. (II) Solid State Physics

An introduction to theoretical and experimental physics of the solid state. Prerequisite, permission of the instructor. 3 class hours. Credit, 3.

91. (II) Gaseous Electronics

Electrical conduction in gases, interactions of space charge and electro-magnetic waves, plasmas. Prerequisite, Physics 52. 3 class hours. Credit, 3.

97. (I) 98. (II) Advanced Experimental Work

Selected experiments and projects are investigated, according to the needs of the individual student. Prerequisites, Physics 51 or 55. 3 2-hour laboratory periods. Credit, 1 to 3.

PSYCHOLOGY

Head of Department: PROFESSOR CLAUDE C. NEET. PROFESSORS EPSTEIN, FELDMAN, FIELD, GOSS, KATES, SOUTHWORTH, TEICHNER; ASSOCIATE PROFESSORS BERENSON, MYERS; ASSISTANT PROFESSORS BUDOFF, DZENDOLET, HARRISON, LEWIT, MOORE, PRICE, SCHUMER; MR. WAGNER; RESEARCH ASSOCIATE MRS. MYERS; VISITING LECTURERS CANN, SIMON, TREHUB.

1. (I) (II) General Psychology

An introduction to the principles and study of behavior. Topics considered include development of behavior, sensation, learning, thinking, motivation, intelligence, attitudes, and personality. 3 class hours. Credit, 3.

5. (I) General Psychology I

Introduction to basic concepts and methods of psychology. Topics include neural mechanisms, sensation, perception, emotion and motivation, learning and thinking, and problem solving. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Dzenolet and Mr. Wagner.

6. (II) General Psychology II

A continuation of Psychology 5. Topics include intelligence, human development, attitudes, conflict, personality, group processes, and personality change. Prerequisite, Psychology 1 or 5. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Epstein and Mr. Wagner.

28. (II) Psychology of Adjustment

Problems of personality development and adjustment are emphasized. Psychological nature of man, conflict, fantasy and thinking, and adjustment. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Kates.

51. (I) Sensation and Perception

A study of the data, theories and methods of studying sensation and perception. Prerequisites, any two of Psychology 1, 5, 6; or 1 or 5 and consent of instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Dzenolet.

52. (II) Learning and Thinking

A consideration of the effects of practice and conditions of practice on acquisition, generalization, discrimination, transfer, retention and extinction phenomena. Prerequisites, any two of Psychology 1, 5, 6; or 1 or 5 and consent of instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Moore.

53. (II) Motivation

The data, theories and the methods of investigating motivation. Topics include primary drives, emotions, frustration and conflict, and learned drives. Prerequisites, any two of Psychology 1, 5, 6; or 1 or 5 and consent of instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Wagner.

56. (I) (II) Educational Psychology

Psychological facts and principles of development, learning and measurement as applied to educational situations. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Schumer.

61. (I) Social Psychology I

Development, interrelationships, and functions of attitudes. Emphasis upon religions and political behavior, psychoanalytic and behavioristic theories of prejudice, attitude measurement, propaganda, group persuasion. Survey project. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Lewit.

62. (II) Social Psychology II

Individual behavior in groups. Interpersonal perception and communication. Norms, power, leadership, and coalition formation. Individual motivation and group problem-solving. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Lewit.

63. (I) Physiological Psychology

The neurophysiological bases of behavior. The structural and functional relationships among the nervous system, sense organs and drives. Prerequisites, Psychology 1 or 5; Zoology 35. 3 class hours. Credit, 3. Mr. Feldman.

65. (I) (II) Child Psychology

The psychological development of the child including maturation and development of behavior, language, emotions, intelligence, social behavior, motivation and personality. Nursery school observation and practice. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Price.

66. (I) Psychology of Adolescence

A consideration of the development, and emotional, social and intellectual adjustment of the individual during the adolescent years. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Price.

67. (I) Introduction to the Study of Exceptional Children

Emphasis is on the etiology, diagnosis, characteristics, education and prognosis of deviations in mental, physical and socio-emotional development. Prerequisites, Psychology 1 or 5, 65, or consent of the instructor. 3 class hours. Credit, 3. Mr. Schumer.

72. (II) Advanced Experimental Psychology

The literature, techniques, and apparatus of experimental psychology. Selected projects carried out individually by the members of the class. Prerequisites, Psychology 51 or 52, or 53; Zoology 35. 1 class hours, 2 2-hour laboratory periods. Credit, 3. Mr. Dzendolet.

75. (I) Statistics in Psychology

The application of statistical procedures to the analysis of psychological data and to problems of measurement in psychology and related fields. Prerequisites, Psychology 1 or 5; Statistics 77 or Mathematics 64. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Myers.

79. (I) Personality

An introduction to the scientific study of personality. Topics include psychoanalytic and cognitive approaches, the influence of social-cultural conditions, personality types and learning. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Kates.

81. (I) Psychological Tests

Survey of tests of intelligence, aptitude, interest, personality and adjustment. Test rationale, construction, characteristics, uses and evaluation are emphasized. Prerequisite, Psychology 1 or 5. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Schumer.

82. (I) and (II) Psychological Tests

A study of theories of intelligence and of individual intelligence tests. Prerequisite, Psychology 1 or 5. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Harrison.

83. (I) Abnormal Psychology

The etiology, symptoms and therapy of behavior abnormalities including the neuroses, psychoses, epilepsies, speech disorders and mental deficiency. Hospital trips and clinics. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Neet.

85. (I) Industrial Psychology I

Psychological principles underlying personnel selection and training, communication and decision-making in industry. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Teichner.

86. (II) Industrial Psychology II

Principles and applications of human factors data related to the analysis, design, evaluation and use of man-machine systems and equipment. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Teichner.

87. (I) Psychology of Occupations

A study of interests, abilities and attitudes related to occupational selection, proficiency, and satisfaction. Psychological techniques fundamental to occupational research are emphasized. Prerequisite Psychology 81. 3 class hours. Credit, 3. Mr. Field.

88. (II) Theories and Techniques of Counseling and Guidance

The theories, techniques and tests necessary in counseling and guidance. Practice in organizing and evaluating relevant data in the analysis of illustrative cases. Prerequisite, Psychology 81, or permission of the instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Berenson.

90. (II) Contemporary Psychologies

A logical, historical, and systematic analysis of contemporary psychological theories, including structuralism, functionalism. Gestalt and organismic psychologies, psychoanalysis, and behaviorisms. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Goss.

92. (II) Clinical Psychology

An introduction to the theoretical approach and methods used in understanding and treating the psychologically-disturbed individual. Prerequisite, Psychology 83 or consent of the instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Epstein.

97. (I) 98. (II) Problems in Psychology

For qualified seniors. Independent work on special problems or in certain fields of psychological interest. By arrangement with the members of the department. Credit, 1-3.

ROMANCE LANGUAGES

Head of Department: PROFESSOR STOWELL C. GODING. PROFESSORS CLARKE, FER-
RIGNO; ASSOCIATE PROFESSORS GREENFIELD, JOHNSON, ROTHBERG, STABLER, WEX-
LER; ASSISTANT PROFESSORS ARAUJO, BOUDREAU, JAEGER, RAYMOND, SMITH,
STAIS; MLE. ABADIE, MRS. BRADFORD, MRS. HERSH, MISS MILLER, MRS. MILLER,
MRS. SWANEY, MR. ALIBERTI, MR. MACCOMBIE, MR. HALL, MR. NIEDZIELSKI,
MR. ROBINSON, MR. SYLVIA, MR. TEMPLE.

FRENCH**1. (I) 2. (II) Elementary French**

For those who have had no previous creditable training in French. Intensive practice in the four language skills. Sequence: French 1, 2, 7, 8. 3 class hours, 2 laboratory periods. Credit, 3.

5. (I) 6. (II) Intermediate French

For those who have had some French but are not prepared to take French 7. A review and continued study of the language skills. Readings in modern French literature. Sequence: French 5, 6, 8. 3 class hours, 1 laboratory hours. Credit, 3.

7. (I) Intermediate French; French Life and Culture

An intensive review and study of the language. Readings in modern French literature. Sequence: French 7, 8. Prerequisite, French 2 or equivalent. 3 class hours, laboratory. Credit, 3.

Romance Languages

8. (I) and (II) Intermediate French; French Life and Culture

A study of some important literary works of the 19th and 20th centuries. Compositions. Prerequisite, French 6 or 7. 3 class hours. Credit, 3.

25. (I) 26. (II) Great Works in French Literature

A study of selected complete works of several periods. 3 class hours, 1 laboratory hour. Credit, 3.

27. (I) 28. (II) Oral Practice

An advanced-level course designed to bring students to an accurate and mature grasp of French thought and expression. 3 class hours, 2 laboratory hours. Credit, 3. Mr. Smith, Mr. MacCombie.

51. (I) French Literature of the Eighteenth Century (1964-65)

Development of the ideas of the French Enlightenment. Given in alternate years. 3 class hours. Credit, 3. Mrs. Raymond.

53. (I) The French Theater of the Twentieth Century (1964-65)

A critical study of the French theater from Scribe to the present. Given in alternate years. 3 class hours. Credit, 3. Miss Clarke.

54. (II) The French Novel of the Twentieth Century (1964-65)

A critical study of the contemporary French novel from Proust to the present. Given in alternate years. 3 class hours. Credit, 3. Miss Clarke.

55. (I) French Literature of the Seventeenth Century (1963-64)

A study of the major works of pre-classicism, classicism and the transition, except the theater. Given in alternate years. 3 class hours. Credit, 3. Mr. Johnson.

56. (II) French Literature of the Seventeenth Century (1963-64)

A study of French drama in the seventeenth century. Given in alternate years. 3 class hours. Credit, 3. Mr. Johnson.

57. (I) French Romanticism (1964-65)

A study of the Romantic period. Given in alternate years. 3 class hours. Credit, 3. Mr. Goding.

58. (II) French Literature of the Nineteenth Century (1964-65)

A study of the main genres, schools and movements after the Romantic period. Given in alternate years. 3 class hours. Credit, 3. Mr. Goding.

65. (I) Masterpieces in Translation

The vision of man in French literature from the Renaissance to the XXth century. Not open to French majors or to students who have completed either French 25 or French 26. 3 class hours. Credit, 3. Miss Jaeger, Mr. Smith.

77. (I) The French Renaissance (1963-64)

A study of the major writers of the XVIth century with appropriate attention to important humanistic and artistic developments. 2 class hours. Credit, 2.

78. (II) Advanced French Studies

A special study of a French author or literary genre. Subject to be announced at the end of the preceding academic year. 2 class hours. Credit, 2. Staff.

79. (I) French Civilization (1963-64)

A course designed for an intelligent understanding of France's life and culture. Given in alternate years. 3 class hours. Credit, 3. Mr. Goding.

80. (II) Advanced Language Study

A thorough examination of professional requirements and needs for the teaching of French in the U. S. 3 class hours. Credit, 3. Mr. Goding.

96. (II) Senior Seminar

Required for seniors majoring in French. Independent work under guidance on special problems or in certain areas of interest, including research and bibliographical techniques. Credit, 1-2. Staff.

ITALIAN

1. (I) 2. (II) Elementary Italian

For students with no previous creditable training in Italian. Intensive practice in the language skills. 3 class hours, 2 laboratory sessions. Credit, 3. Mr. Aliberti.

7. (I) 8. (II) Intermediate Italian

For students with one year of college Italian or equivalent. Training in the language skills; emphasis on speaking and understanding; readings in cultural and literary texts. 3 class hours, 2 laboratory sessions. Credit, 3. Mr. Aliberti.

25. (I) 26. (II) Introduction to Italian Literature

Selected masterpieces of Italian literature presented integrally, in literary-historical perspective. Conducted in Italian. Either semester may be elected independently. Prerequisites, Italian 5, 6, or permission of the department. 3 class hours. Credit, 3. Mr. Aliberti.

27. (I) 28. (II) Oral Italian

The oral aspect of the language; pronunciation, vocabulary building, speeches, discussions, debates. Prerequisites, Italian 5, 6, or permission of the department. 3 class hours, laboratory. Credit, 3. Mr. Aliberti.

PORTUGUESE

1. (I) 2. (II) Elementary Portuguese

For students with no previous creditable training in Portuguese. Intensive practice in the language skills. 3 class hours, laboratory. Credit, 3. Mr. Araujo.

7. (I) 8. (II) Intermediate Portuguese

For students with one year of college Portuguese or equivalent. Training in the language skills; emphasis on speaking and understanding; readings in cultural and literary texts. 3 class hours, laboratory. Credit, 3. Mr. Araujo.

Romance Languages

25. (I) 26. (II) Introduction to Portuguese Literature

Selected masterpieces of Portuguese literature presented integrally, in literary-historical perspective. Conducted in Portuguese. Either semester may be elected independently. Prerequisites, Portuguese 5, 6, or permission of the department. 3 class hours. Credit, 3. Mr. Araujo.

SPANISH

1. (I) 2. (II) Elementary Spanish

For students with no previous creditable training in Spanish. Intensive practice in the language skills. To fulfill the language requirement. Upon completion of this course most students are required to continue by taking Spanish 7 and 8. 3 class hours, 2 laboratory sessions. Credit, 3.

5. (I) 6. (II) Intermediate Spanish

For those incoming freshmen and transfer students who, upon placement examination, do not qualify for Spanish 7. Training in the language skills; readings in cultural and literary texts. All students in the College of Arts and Sciences who complete Spanish 6 are then required to take Spanish 8 to fulfill the language requirements. 3 class hours, 1 laboratory session. Credit, 3.

7. (I) 8. (II) Intermediate Spanish: Hispanic Culture

For upperclassmen who have completed Spanish 1-2, and those freshmen and transfer students who are found qualified by placement examination. Training in the language skills, with emphasis on speaking and understanding; readings in cultural and literary texts. Students completing Spanish 8 fulfill the language requirement. 3 class hours, 1 laboratory session. Credit, 3.

25. (I) 26. (II) Introduction to Spanish Literature

Selected great works of Spanish literature studied in complete text in literary-historical perspective. Conducted in Spanish. Either semester may be elected independently. Prerequisites, Spanish 8, or permission of the department. 3 class hours, discussion hour. Credit, 3. Messrs. Rothberg, Boudreau.

27. (I) 28. (II) Oral Spanish

The oral aspects of the language; pronunciation, vocabulary building, speeches, discussions, debates. Grammatical elements required for correct and fluent use of American and Peninsular Spanish. Prerequisites, Spanish 8, or permission of the department. 3 class hours, discussion hour. Credit, 3. Mr. Wexler.

64. (II) Advanced Composition and Syntax

Syntax and idioms, and those more advanced difficult elements which constitute stylistics. Required of juniors majoring in Spanish and open to other qualified students by permission of the department. 3 class hours, laboratory. Credit, 3. Mr. Ferrigno.

66. (II) Spanish Masterpieces in Translation

A detailed study of select masterpieces of Spanish literature from the Middle Ages to the present. Not open to majors in Spanish nor to students who have taken or plan to take Spanish 25-26. 3 class hours. Credit, 3.

**79. (I) Spanish Literature of the Nineteenth Century
(1963-64)**

A detailed study of the major writers and literary movements of this period. Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25-26, or permission of the department. 3 class hours, discussion hour. Credit, 3. Mr. Greenfield.

80. (II) Spanish-American Literature to 1900 (1963-64)

Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25 or 26, or permission of the department. 3 class hours, discussion hour. Credit, 3.

81. (I) Twentieth Century Spanish Literature (1964-65)

Major writers of Spain in the late nineteenth and twentieth centuries. Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25 or 26, or permission of the department. 3 class hours, discussion hour. Credit, 3. Mr. Greenfield.

**82. (II) Twentieth Century Spanish-American Literature
(1964-65)**

Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25 or 26, or permission of the department. 3 class hours, discussion hour. Credit, 3.

83. (I) Prose and Poetry of the Sixteenth Century (1964-65)

Masterpieces of Spanish prose of the 16th Century; development of poetry in the major poets from Garcilaso to Herrera. Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25 or 26, or permission of the department. 3 class hours, discussion hour. Credit, 3.

84. (II) Cervantes (1964-65)

Intensive reading of *Don Quijote*. Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25 or 26, or permission of the department. 3 class hours, discussion hour. Credit, 3.

85. (I) Drama of the Golden Age (1963-64)

Deals primarily with the *comedia* during the period of maximum creation, 1556-1681. Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25 and 26, or permission of the department. 3 class hours, discussion hour. Credit, 3. Mr. Wexler.

**86. (II) Prose and Poetry of the Seventeenth Century
(1963-64)**

Masterpieces of Spanish prose of the 17th Century, excluding the *Quijote*; Góngora and the Baroque poets. Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25 or 26, or permission of the department. 3 class hours, discussion hour. Credit, 3.

95. (I) Senior Seminar

Independent work under guidance on special problems in certain areas of interest, including research and bibliographical techniques. A senior course for Spanish majors. Credit, 3.

SOCIOLOGY & ANTHROPOLOGY

Head of Department: PROFESSOR J. HENRY KORSON; PROFESSORS GORDON, KING; ASSOCIATE PROFESSORS DRIVER, SUSSMANN, WILKINSON; ASSISTANT PROFESSORS FORTIER, FRASER, LOPREATO,* MANFREDI, O'ROURKE, PARK; VISITING LECTURERS GOLDEN, ROSE.

25. (I) and (II) Introduction to Sociology

A study of the social order, and of the individual considered as a member of his various groups. 3 class hours. Credit, 3. The Department.

26. (II) Principles of Sociology

The theoretical development of major sociological concepts with emphasis on American sociologists. Analysis of monographs utilizing the sociological frame of references for selected areas. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. O'Rourke.

51. (I) Urban Sociology

A study of urban American social conditions with reference to population, ecology, health, and the classically defined institutional complexes and their problems of adjustment. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Manfredi.

52. (II) Rural Sociology

A study of rural society from the standpoint of its population, institutions, standards of living and their relation to urban society. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Manfredi.

56. (II) Race Relations

The social, economic and political aspects of racial and ethnic problems in the United States, plus briefer consideration of similar problems in Africa and Asia. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Gordon.

57. (I) and (II) The Family

The development of the customs of courtship and marriage of the contemporary American family. The basic causes of changes and trends of the family. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. King, Mr. Korson.

59. (I) Social Stratification

The factors which make for institutionalized inequality in social life. A consideration of castes and classes in American society. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Lopreato, Miss Sussmann.

61. (I) Population Problems

An analytical study of population composition, focusing upon the causes and consequences of changes in the basic demographic variables: fertility, mortality, and migration. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Wilkinson.

68. (II) Industrial Sociology

The role, status, and function of the worker in the industrial community. A consideration of changing technology and the adjustment made in the industrial community. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Korson.

* On Leave, 1961-62.

70. Social Structure of India

The origins, distribution, and cultural traits of the major groups in India. Special attention given to marriage, family, case patterns, and positions in the economic and political system. 3 class hours. Credit, 3. Mr. Driver.

72. (II) Social Change

A consideration of changes arising from culture contact, social reform, and technical inventions. Planned and unplanned change, particularly with respect to underdeveloped countries. Prerequisites, Sociology 25. 3 class hours. Credit, 3. Mr. King.

75. (I) Social Problems

The incidence, distribution and interrelations among the major types of social tensions in human societies. Various theories of causation. Research projects and field trips. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Driver.

78. (II) Criminology

The nature of crimes and the factors underlying criminal behavior. The machinery of justice; the law, courts, police systems, and correctional institutions. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Driver, Mr. O'Rourke.

82. (II) Sociological Theory

An examination of contributions of European and American writers who have concerned themselves with theories of the origin, growth, and development of human social organization. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Manfredi.

92. (II) Introduction to Social Welfare

Methods of caring for adult and child dependents and defectives. Public and private agency administration and techniques. Federal, state, and local community programs. Prerequisites, Sociology 25. 3 class hours. Credit, 3.

95. (I) and (II) 96. (II) Seminar, Research Methods

A consideration of research methods and techniques employed in sociology. Each student is required to design and complete a research project of limited scope. Prerequisite, Sociology 25. Credit, 3. Mr. Park.

ANTHROPOLOGY

63. and (II) Introductory Anthropology

An introduction to the fields of anthropology: human evolution and race; pre-history; variations among societies in kinship, economic, political and religious organizations. 3 class hours. Credit, 3. Mr. Fortier, Mr. Fraser.

64. (II) Problems in Anthropology

Examination of selected problems in social structure: economic organization, kinship systems, political forms and religion of non-literate peoples. Prerequisite, Anthropology 63. 3 class hours. Credit, 3. Mr. Fraser.

65. (I) Ethnographic Survey of Non-Literate Peoples

The study of selected societies of Africa, Oceania, the Americas and Asia. Problems of comparing societies, especially with regard to their environmental contexts. Prerequisite, Anthropology 63. 3 class hours. Credit, 3. Mr. Fraser.

Speech

66. (II) The Individual and His Society

Selected approaches to the interrelations of individual behavior and social patterns, with consideration of data on "Western" and "non-Western" societies. Prerequisite, Anthropology 63. 3 class hours. Credit, 3. Mr. Fortier.

67. (I) Ethnology of Africa

A limited consideration of the history, physical types, social organization and culture of Africa south of the Sahara with special consideration of several diverse cultures. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Fraser.

SPEECH

Head of Department: PROFESSOR ARTHUR E. NIEDECK. ASSOCIATE PROFESSORS HEGARTY, LARSON; ASSISTANT PROFESSORS ABRAMSON, ANGELL, CATALANO, HARPER, MAHNKEN, PEIRCE, SAVEREID; MISSES HANIFAN, LABELLE, MESSRS. SARNO, STROMGREN, WELLS.

3. (I) and (II) Oral Communication

Introductory instruction and practice in oral self-expression: literary interpretation and public speaking. 2 class hours. Credit, 2. The Department.

50. (I) and (II) Voice and Diction and Oral Interpretation

Training and drill in the correct production of speech, practice in the fundamentals of vocal interpretation of literature. 3 class hours. Credit, 3. Miss Abramson, Mr. Catalano.

51. (I) and (II) Public Speaking

The study and application of principles governing the composition and delivery of public speeches. 3 class hours. Credit, 3. The Department.

52. (II) Discussion

The study of the principles of group discussion and their application to major contemporary problems. 3 class hours. Credit, 3. Mr. Saveroid.

53. (I) Argumentation and Debate

The study and application of reasoning and evidence as it is used in public deliberation. Prerequisite, Speech 91, or permission of instructor. 3 class hours. Credit, 3. Mr. Angell.

54. (II) Persuasion

Advanced study and practice in appeals to beliefs and action through extemporaneous speech. Prerequisite, Speech 91, or permission of instructor. 3 class hours. Credit, 3. Mr. Saveroid.

55. (I) History of Rhetorical Theory

A study of rhetorical theory from Plato and Aristotle to the present with particular emphasis on the Greeks and Romans. Prerequisite, Speech 50, or permission of instructor. 3 class hours. Credit, 3. Mr. Saveroid.

57. (I) American Public Address

Reading and analysis of speeches taken from the American political platform, academic platform, pulpit, courtroom, and ceremonial platform. Lectures, discussions, written reports, and listening to contemporary addresses over the radio or on tape. Prerequisite, Junior standing, or permission of instructor. 3 class hours. Credit, 3. Mr. Angell.

58. (II) Advanced Rhetorical Composition

An intensive study of the departments of invention, disposition, and style. Practice in the application of principles studied in classical and modern treatises by the preparation and revision of outlines and manuscripts for speeches. Prerequisite, Speech 50. 3 class hours. Credit, 3. Mr. Angell.

61. (I) (II) Broadcasting in America

An intensive analysis of broadcasting in America emphasizing its evolution, economic structure, nature of the programming, and its impact on the American society. 3 class hours. Credit, 3. Mr. Harper.

62. (II) Radio Production

A laboratory course which emphasizes practical experience in all aspects of radio production and includes all the basic formats of radio programs. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Harper, Mr. Sarno.

63. (I) Television Production-Direction

A laboratory course emphasizing TV studio procedure and technique. Practical experience is provided in all studio crew assignments other than those involving electronics. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Harper.

64. (II) Advanced Television Production-Direction

An advanced laboratory course which builds on the basic skills and techniques developed in the basic production course. Prerequisite, Speech 63. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Harper.

70. (I) (II) Fundamentals of Play Production

A study of the methodology and techniques of play production through lectures, demonstrations and practical laboratory work. The responsibilities and contributions of all participating artists will be examined in detail through an intensive study of every aspect of production from script to stage. 3 class hours. Credit, 3. Mr. Niedeck.

71. (I) (II) Scene Design and Construction

Theories and designs in the modern theatre with assignments in developing stage settings from sketches to working drawing; from scenery construction to painting. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Wells.

73. (I) (II) Introduction to Theatre

An introduction to the art of the theatre: A survey of its aesthetics, elements, forms and contributing artists; its influences and place in the culture of our society. 3 class hours, 10 laboratory hours per semester by arrangement. Credit, 3. Mr. Larson.

75. (I) (II) Acting and Make-up

The study of emotion and imagination in acting, reading lines, rehearsing, diction, and bodily action; the study and application of the principles of stage make-up. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Mahnken.

76. (II) Stage Direction

Basic elements of play structure and the director's role: choosing scripts, organizing production staff, casting, coaching, planning rehearsals and performance. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Mahnken.

Speech

78. (II) Stage Lighting

Introduction to lighting a stage. Analysis of basic types of equipment and their application in artistic productions. Simple wiring and installations. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Wells.

81. (I) (II) Phonetics

A scientific study of the sounds of English; descriptive analysis of individual vowels and consonants. Study of the International Phonetic Alphabet; training in auditory discrimination. 3 class hours. Credit, 3. Misses Hanifan, Labelle.

82. (I) (II) Introduction to Clinical Practice

Training in basic diagnostic and therapeutic techniques for various speech handicaps; emphasis on articulation defects, delayed speech and stuttering. Supervised practice required. Prerequisites, Speech 81, 85. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss Hanifan.

83. (I) Anatomy and Physiology of the Speech and Hearing Mechanism

A study of the anatomy and physiology of the speech and hearing mechanism; consideration of phonation, resonance, articulation and audition. Prerequisites, Zoology 37, 38. 3 class hours. Credit, 3. Miss Hegarty.

84. (II) Audiology

A study of the symptoms and causes of hearing loss; special attention to diagnostic test procedures. Supervised practice in audiometric testing. Observation; field trips. Prerequisite, Speech 85. 3 class hours. Credit, 3. Miss Hegarty.

85. (I) Introduction to Speech Pathology

A study of the causes, functional and organic, of speech problems among children and adults; principles of diagnosis and therapy. Observation; field trips. Prerequisite, Psychology 1. 3 class hours. Credit, 3. Miss Hegarty.

86. (II) Rehabilitation of the Acoustically Handicapped

Training in the techniques of speech therapy, auditory training, and speech reading for children and adults with hearing impairments. Laboratory practice under supervision. Prerequisite, Speech 84. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss Hanifan.

88. (II) Advanced Clinical Practice

Advanced training in clinical practice under supervision; special consideration of organic speech disorders. Opportunity for supervised clinical practice at Lemuel Shattuck Hospital. Prerequisite, Speech 82. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss Hegarty.

96. (II) Seminar in Speech Pathology

Individual student reports on selected topics in the field of speech pathology. Prerequisite, Speech 85. 3 class hours. Credit, 3. Miss Hegarty.

97. (I) (98.) (II) Independent Study and Research

For qualified seniors, independent study and research on selected problems in the various major areas of study. Credit, 1-3.

ZOOLOGY

Head of Department: PROFESSOR DONALD FAIRBAIRN. PROFESSORS ANDERSON, BARTLETT, HONIGBERG, RAUCH, SNEDECOR, TRAVER; ASSOCIATE PROFESSORS HARVEY, NUTTING, ROBERTS, ROLLASON, SWENSON; ASSISTANT PROFESSORS ANDREWS, MONER, SNYDER; MRS. WHITE.

1. (I) (II) Introductory Zoology

Introduction to the principles of biology with special reference to the cell and its metabolism and to the anatomy, physiology and evolution of the major groups of the animal kingdom. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Rollason and staff.

25. (I) Survey of the Animal Kingdom

Emphasis on such topics as adaptation, symbiosis, ecology, and evolution, and a consideration of major animal phyla which best illustrate these topics. Several field trips. Prerequisite, Zoology 1. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Nutting.

35. (I) (II) Vertebrate Physiology

Includes consideration of circulation, respiration, digestion, metabolism, excretion, chemical and nervous coordination, muscular activity, and reproduction. Prerequisite, Zoology 1. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Snedecor.

37. (I) 38. (II) Anatomy and Physiology

An introduction to human anatomy and physiology. The subject matter will include skeletal, nervous, muscular, cardiovascular, respiratory, digestive, excretory, endocrine, and reproductive systems. Prerequisite, Zoology 1; 37 prerequisite for 38. 3 class hours, 1 3-hour laboratory period. Credit, 4. Mrs. White.

50. (II) Histology of the Vertebrates

Study of the cell, tissues, and microscopic anatomy with emphasis on the mammal. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Rollason.

51. (II) Microtechnic of Animal Tissues

A series of practical exercises employing the basic methods of preparation of tissue for microscopic examination; consideration of the principles involved in the various methods. Prerequisite, Zoology 1. 2 2-hour laboratory periods. Credit, 2. Mr. Honigberg.

53. (I) Principles of Genetics

Mechanisms of heredity in plants and animals including man, emphasizing transmission and action of genes, population genetics and evolution. Prerequisite, Zoology 1. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Rauch.

54. (II) Natural History

Designed to orient the student to features of sky, climate, and terrain, of importance to the teaching naturalist. Methods of identification, collecting data, etc. Prerequisites, Botany 1; Zoology 1. 1 class hour, 1 4-hour laboratory period. Credit, 3. Mr. Nutting.

Zoology

64. (II) Biology of Protozoa (1963-64)

Morphology and physiology of Protozoa, with emphasis on the contributions made to the basic problems of biology through the study of these organisms. Given in alternate years. Prerequisites, Zoology 1 and permission of instructor. 1 class hour, 1 2-hour and 1 3-hour laboratory periods. Credit, 3. Mr. Honigberg.

69. (I) General Parasitology

Morphology, life cycles, and physiology of primarily protozoan and helminth parasites, with emphasis on broad aspects of parasitism. Prerequisites, Introductory College Zoology and Chemistry. 2 hour lectures, 2 2-hour laboratory periods. Credit, 4. Mr. Honigberg.

70. (II) Invertebrate Zoology

Survey of the phyla of invertebrate animals from evolutionary ecological and phylogentic aspects. For each phylum, representatives of the principal classes are studied. Prerequisite, Zoology 1. 1 class hour, 2 3-hour laboratory periods. Credit, 3. Mr. Nutting.

71. (I) Comparative Vertebrate Anatomy

A systematic approach, stressing adaptation, functional specializations and evolution. Laboratory study primarily on fish and mammals. Prerequisite, Zoology 1. 2 class hours, 2 3-hour laboratory periods. Credit, 4. Mr. Bartlett, Mr. Snyder.

72. (II) Embryology

Description of the development of amphibian, bird, and mammal. Introduction to experimental embryology stressing biochemical studies of ontogeny. Prerequisite, Zoology 71. 2 class hours, 2 3-hour laboratory periods. Credit, 4. Mr. Harvey.

74. (II) Limnology (1963-64)

Study of inland waters from geological, physical, chemical and biological aspects. Given in alternate years. Prerequisites, Botany 1; Zoology 1; Chemistry, and permission to register. 2 class hours, 2 3-hour laboratory periods. Credit, 4. Mr. Andrews, in cooperation with the departments of Botany, Entomology, Public Health, Geology, and Zoology.

78. (II) Population Genetics

Principles of population genetics emphasizing this approach to the study of species formation. Enrollment limited to ten. Prerequisites, Zoology 53 and permission of the instructor. 1 2-hour lecture discussion period. Credit, 2. Mr. Rauch.

80. (II) Ornithology

An introduction to avian biology emphasizing the correlation of structure function and behavior; identification. Prerequisite, Zoology 1. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Bartlett, Mr. Nutting.

81. (I) Vertebrate Zoology

An introduction to the vertebrates, their classification and ecology, with particular emphasis on the fishes. Field trips for the study of local fauna. Prerequisite, Zoology 1. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Andrews.

82. (II) Mammalogy

Evolution, distribution, classification, and ecology of mammals. Laboratory will include field trips, preparation of study material, and identification of local fauna. Enrollment limited to 15. Prerequisites, Zoology 1 and permission of instructor. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Snyder.

83. (I) General and Cellular Physiology

The fundamental processes common to all cells. Emphasis on the physics and chemistry of single cells. Prerequisites, 1 year of Biology; Organic Chemistry. 3 class hours, 1 3-hour laboratory period. Credit, 4. Mr. Swenson, Mr. Moner.

84. (II) Comparative Physiology

Physiological principles involved with the evolution of the adaptations in animals to their environments. Prerequisite, Zoology 83, or the consent of the instructor. 3 class hours, 1 3-hour laboratory period. Credit, 4. Mr. Roberts.

86. (II) Fishery Biology

Theory in the practice of regulating freshwater fisheries; the physical and biological conditions of the environment and their influence on fish population. Prerequisites, Zoology 81 and permission of instructor. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Andrews.

87. (I) Endocrinology

The importance of the endocrines in their control over normal functions (growth, metabolism, reproduction, etc.), in a variety of animals. Prerequisite, Zoology 1. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Snedecor.

97. (I) 98. (II) Special Problems in Zoology

Qualified students who have met departmental requirements for specialization in the field of zoology may arrange for work on a special problem in zoology. Credit, 1-3.

Invertebrate Zoology, Marine Biological Laboratory, Woods Hole, Massachusetts. Credit, 3.

Invertebrate Embryology, Marine Biological Laboratory, Woods Hole, Massachusetts. Credit, 3.

INTERDEPARTMENTAL COURSES

Comparative Literature 91. (I) Anglo-German Literary Relationships since 1750

Study of subjects and problems common to English and German literature since the middle of the eighteenth century with some attention to German-American literary relationships. By permission may be counted for major credit in English and German. 3 class hours. Credit, 3. Mr. Heller, Mr. Page.

Linguistics 93. (I) Linguistics

A basic course combining comprehensive treatment of the field with special attention to recent contributions, particularly in structural linguistics, to the study of language and literature. By permission may be counted for major credit in English, German, and Romance Languages. Prerequisites, English 25, 26. 3 class hours. Credit, 3.

Interdepartmental Courses

Social Science 60. (II) Africa, South of the Sahara

An introductory study of recent political, economic, and social developments in the principal countries of Africa, south of the Sahara. By permission may be counted for major credit in government and sociology. Prerequisites, at least two semester courses in one or more of the following fields: economics, government, sociology. 3 class hours. Credit, 3. Miss Carter.

Social Science 69. (I) India and South Asia

An introductory study of recent political, economic, and social developments in India and the countries of South and Southeast Asia. By permission may be counted for major credit in government and sociology. Prerequisites, at least two semester courses in one or more of the following fields: economics, government, sociology. 3 class hours. Credit, 3. Mr. Driver.

Computer Science 21. (I) (II) Introduction to Automatic Computation

An introduction to the programming of digital computers. Topics included are basic programming systems, compiler languages, and the logic of programming and compilation. Prerequisite, Mathematics 2 or 4. 1 class hour. Credit, 1. Mr. Rowell.

Elementary Japanese 1. (I) 2. (II)

For those who have had no previous training in Japanese. Intensive practice in the language skills. No degree credit granted until the completion of Japanese 2, except upon special recommendation from the Provost. 3 class hours. Credit, 3.

Elementary Hindi 1. (I) 2. (II)

For those who have had no previous training in Hindi. Intensive practice in the language skills. No degree credit granted until the completion of Hindi 2, except upon special recommendations from the Provost. 3 class hours. Credit, 3.

SCHOOL OF BUSINESS ADMINISTRATION

H. B. KIRSHEN, *Dean*

The Faculty of the School of Business Administration is keenly aware of the dynamic changes taking place in our Economy, the extensive shifts in occupations and professions and the consequent need for intelligent and well educated businessmen. The continuing advancement of technology, science and the behavioral sciences has placed upon Schools of Business Administration the necessity, not only to probe into the developments of its own areas of education but also into the relationships that exist among other areas such as Mathematics, Economics, Psychology, Sociology and Government.

The School of Business Administration prepares students to take advantage of important economic opportunities and eventually to assume positions of responsibility in business. The School's educational program is directed toward the broad aspects of business, encouraging high standards of ethical conduct, broad social responsibilities and the development of competence in particular courses of study of the student's own interest, aptitude and choice.

The first two years emphasize general education by providing fundamental courses in the humanities, mathematics, science and social science. In addition, basic courses in accounting and economics prepare the student for further work in the School of Business Administration.

The junior and senior years emphasize a greater degree of specialization and provide for this in the programs indicated below. But even in these last two years all students need to view business as a whole in so far as a "core" of courses can do this. This "core" of courses is listed below under the junior-senior curricula and is required of all students.

Elective courses, whether in the freshman-sophomore years or in the junior-senior years require the consent of a student's faculty adviser.

A total of at least 120 credit hours is required for graduation exclusive of credit received in the required physical education courses.

Each course of study leads to the degree of Bachelor of Business Administration.

Beginning with the class of 1962, the passing of a comprehensive examination is a requirement for a degree for majors in the department of accounting. Comprehensive examinations may also be required by other departments of the School.

Beginning with the class of 1964 all students in the School of Business Administration must attain, as a graduation requirement, a 2.0 average in Accounting 25 and 26, Elementary Economic Statistics 21, and the junior "core" courses: Finance 55, Financial

Directory of Courses

Institutions; Finance 65, Corporation Finance; General Business 71, Business Law I; Management 61, Principles of Management; and Marketing 53, Principles of Marketing. The "core" must be completed by the end of the junior year unless a student, on recommendation of his department chairman, has received permission from the Dean to postpone any such course to the senior year.

Students transferring to the School of Business Administration from any School or College within the University shall receive junior and senior elective credit only for those courses passed with a grade of C or better.

The School of Business Administration is a member of the American Association of Collegiate Schools of Business.

FRESHMAN YEAR

In each subject a one year sequence is required

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1	2	English 2	2
Speech 3*	2	Speech 3*	2
Mathematics	3-4	Mathematics	3-4
Hist. 5, 25, or Govt. 25	3	Hist. 6, 26, or Govt. 26	3
Science: elect one	3	Science: continue 1st sem. sci.	3
Chemistry 1		Chemistry 2	
Physics 3		Physics 4	
Botany 1		Botany 25	
Geology 1		Geology 2	
Zoology 1		Zoology 25 or 35 or Botany 1	
Elective†	3	Elective†	3
(Military or Air Science 11	1)	(Military or Air Science 12	1)
Physical Ed. 1a, b**	2	Physical Ed. 2a, b**	2

** Not quality point credit.

* May be taken either semester.

† If a language is elected the student must complete the intermediate year to meet the basic School requirement.

If a language is not elected:

Where Government has been elected the student shall elect one of the following: History 5, 6, 25, 26, Economics 12.

Where History has been elected the student shall elect Government 25.

The student shall select, with the help of an adviser, a one-semester elective.

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25, Humane Letters	3	English 26, Humane Letters	3
Economics 25, Elements	3	Economics 26, Prob. of Nat'l	
Accounting 25 or 27:		Economy	3
Introduction	3-5	Accounting 26, Introduction II	3
Psychology 1, General	3	Sociology 25, Introduction to	3
Statistics 21*	3	Mathematics 22*	3
(Military or Air Science 25	1)	(Military or Air Science 26	1)
Physical Ed. 31a, b†	2	Physical Ed. 32a, b†	2

* Statistics or Mathematics may be taken either semester.

† Not quality point credit.

JUNIOR-SENIOR CURRICULA

Courses and major programs are listed under four departments in the School of Business Administration: Accounting, General Business and Finance, Management, and Marketing. Irrespective of any major selected a certain "core" of courses is required of all students.

<i>Required Core Courses</i>	<i>Credits</i>
Fin. 55, Financial Institutions	3
Fin. 65, Corporation Finance	3
Gen. Bus. 71, Business Law	3
Mgt. 61, Principles of Management	3
Mkt. 53, Marketing Principles	3

Elective courses shown in major programs are selected with the aid and consent of the student's adviser.

Accounting

J. W. ANDERSON, *Chairman*

The accounting program is designed to prepare students for public accounting and for positions as accountants in business, industry and government.

	<i>Credits</i>
Required "core" courses	15
Required courses in the major:	20
Acct. 61, Intermediate Accounting	
Acct. 62, Intermediate Accounting	
Acct. 63, Cost Accounting	
Acct. 65, Advanced Accounting	
Acct. 73, Federal Income Tax Procedures	
Gen. Bus. 72, Business Law II or Gen. Bus. 73, Business Law III	
One elective course in Accounting	3
Four elective courses	12
Four elective courses outside Business Administration	12

General Business and Finance

J. B. LUDTKE, *Chairman*

The department offers four formal programs of study and specially designed programs for those students who wish to combine business administration with one or more related fields of study. The special programs are mutually determined by the department chairman and the student at the beginning of the junior year.

Directory of Courses

<i>Curriculum in Finance</i>	<i>Credits</i>
Required "core" courses	15
Other required courses:	18
Fin. 75, Principles of Insurance, or	
Fin. 76, Life Insurance	
Fin. 81 and 82, Problems in Business Finance I and II	
Fin. 83, Investments	
Acct. 61, Intermediate Accounting, or	
Acct. 63, Cost Accounting	
Econ. 73, Modern Economic Theory and Analysis	
Electives in area of concentration, with a minimum of 9 credit hours in Business Administration and Economics	15
Electives outside of Business Administration and Economics	12
 <i>Curriculum in General Business</i>	
Required "core" courses	15
Other required courses:	6
Gen. Bus. 72 or 73, Business Law	
Fin. 81, Problems in Business Finance I, or	
Mgt. 92, Problems in Management, or	
Mkt. 80, Problems in Marketing, or	
Gen. Bus. 78, Administrative Statistics	
Electives in Business Administration	12
Electives in Economics	6
Electives outside Business Administration and Economics with a minimum of 9 credit hrs. in Government, Sociology, and/or Psychology	21
 <i>Curriculum in Business Administration and Economics</i>	
Required "core" courses	15
Other required courses:	9
Mgt. 67, Management-Union Relations I	
Econ. 56, Business Fluctuations and Forecasting	
Econ. 73, Modern Economic Theory and Analysis	
Electives in Business Administration and Economics, with a minimum of 12 credit hours in Economics	24
Electives outside of Business Administration and Economics	12

School of Business Administration

Curriculum in Business Administration with an area of concentration in Urban and Regional Studies Credits

Required "core" courses	15
Other required courses:	6
Gen. Bus. 67, Public Utilities	
Gen. Bus. 68, Real Estate	
Electives in Business Administration and Economics	15
Electives in Government, Sociology, Agricultural Economics, Civil Engineering, Landscape Architecture	15
Electives outside Business Administration, Economics, and an area of concentration	9

Management

S. CLAUNCH, *Acting Chairman*

Industry and business offer qualified students an opportunity to find careers in General Management, Production Management, and in Personnel Management and Industrial Relations. Course programs are offered in each of these fields and provide the student both a specialized and a comprehensive understanding of the managerial process in industrial enterprises.

Credits

Required "core" courses	15
Required courses in the three major programs:	12
Mgt. 64, Personnel Management	
Mgt. 81, Theory of Business Administration	
Mgt. 85, Management of Production	
Mgt. 92, Problems of Management	
Seven elective courses from a recommended list	21
Four elective courses outside Business Administration	12

Marketing

H. E. HARDY, *Chairman*

Students in marketing prepare for a variety of positions in wholesale and retail enterprises and in the sales activities of manufacturers. The program includes specialized study of basic types of market operations such as advertising, sales management and retailing.

Business Administration

<i>Curriculum in Marketing</i>	<i>Credits</i>
Required "core" courses	15
Required courses in the major:	12
Mkt. 54, Sales and Sales Management	
Mkt. 62, Marketing Research	
Mkt. 71, Retailing Principles	
Mkt. 73, Advertising	
Four elective courses from a recommended list	12
Three elective courses	9
Four elective courses outside Business Administration	12
 <i>Curriculum in Retailing</i>	
Required "core" courses	15
Required courses in the major:	15
Art 14, Introduction to Art	
Mkt. 62, Marketing Research	
Mkt. 71, Retailing Principles	
Mkt. 73, Advertising	
Mkt. 79, Wholesaling	
Three elective courses from a recommended list	9
Three elective courses	9
Four elective courses outside Business Administration	12

BUSINESS ADMINISTRATION

ACCOUNTING

Chairman of Department: ASSOCIATE PROFESSOR JOHN W. ANDERSON. PROFESSOR SINGER; ASSOCIATE PROFESSOR LENTILHON; ASSISTANT PROFESSORS FITZGERALD, KRZYSTOFIK, STANHOPE; * MR. SULLIVAN.

25. (I) and (II) Introduction to Accounting I

An introduction to the principles underlying the collection, recording, and interpretation of accounting data. 3 class hours. Credit, 3. Staff.

26. (I) and (II) Introduction to Accounting II

A continuation of Accounting 25 with major emphasis on accounting for corporations, partnerships and manufacturers. Prerequisite, Accounting 25. 3 class hours. Credit, 3. Staff.

* On leave of absence.

27. (I) Introduction to Accounting

A one semester course to combine the coverage of Accounting 25 and 26. 5 class hours. Credit, 5. (Not offered, 1963-64.) Staff.

61. (I) (II) 62. (I) (II) Intermediate Accounting

A two semester course developed to meet the needs of two groups of students: (1) the general business student for whom the intermediate course may be the final course in accounting; (2) the accounting major for whom the intermediate course is a foundation for further specialized courses. In the first semester, the fundamental process of recording, summarizing and reporting are studied with particular reference to basic concepts applicable to the measurement of income and presentation of financial condition. An intensive examination of the theoretical support for practice and procedures of asset accounting is made. The second semester is devoted to the study of the presentation of equity-claims against assets of a corporation. A thorough background of financial statement analysis is developed with particular reference to the flow of funds statement. A critical appraisal of publications of the American Accounting Association, the American Institute of Certified Public Accountants and various house organizations is an important part of this course. Prerequisite, Accounting 26 or 27. 4 class hours. Credit, 4. Mr. Fitzgerald, Mr. Sullivan.

63. (I) and (II) Cost Accounting

Basic principles of cost accounting with emphasis on the determination and control of unit costs for materials, labor and overhead under the Job Order and Process cost systems. Prerequisite, Accounting 26. 3 class hours. Credit, 3. Mr. Krzystofik, Mr. Lentilhon.

64. (II) Advanced Cost Accounting

A continuation of Accounting 63 with emphasis on budgetary control; standard, estimated and direct costs; and cost analyses for control and decision-making. Prerequisite, Accounting 63. 3 class hours. Credit, 3. Mr. Lentilhon, Mr. Krzystofik.

65. (I) Advanced Accounting

A course designed to give the accounting major a thorough grounding in partnership accounting, installment sales, consignment sales and preparation of consolidated financial statements. Prerequisite, Accounting 62. 4 class hours. Credit, 3. Mr. Fitzgerald.

67. Governmental Accounting

Special features of budgetary and fund accounting as applied to municipalities, other governmental units and institutions, such as hospitals and schools. Prerequisite, Accounting 25. Credit, 2. Mr. Anderson.

73. (I) and (II) Federal Income Tax Procedure

A study of federal income tax laws and regulations as they affect individuals; the preparation of tax returns. Prerequisite, Accounting 25 or 27. 3 class hours. Credit, 3. Staff.

74. (II) C.P.A. Problems

Extensive practice in solution of problems from C.P.A. examinations. Topics covered include governmental and institutional accounting, estates, trusts, receiverships, liquidations and consolidations. Prerequisite, Accounting 62. 3 class hours. Credit, 3. Mr. Anderson.

General Business and Finance

77. Auditing and Internal Control

Basic principles of auditing with emphasis on theory, types of audits, duties and responsibilities of the auditor, audit programs and methods of internal control. A complete audit is developed through the use of an audit case. Prerequisites, Accounting 62 and 63. 3 class hours. Credit, 3. Mr. Krzystofik.

78. (II) Advanced Federal Tax Procedures

A continuation of Accounting 73 emphasizing corporations, partnerships, estates and trusts, gifts and estate taxes. Prerequisite, Accounting 73. 3 class hours. Credit, 3. Mr. Anderson, Mr. Lentilhon.

97. (I) 98. (II) Independent Study and Research

For qualified seniors, independent study and research on selected problems in Business Administration. With permission of the Chairman of the Department. Credit, 1-3. Staff.

GENERAL BUSINESS AND FINANCE

Chairman of Department: PROFESSOR JAMES B. LUTKE. PROFESSOR CHENG; ASSOCIATE PROFESSORS KYLER, RIVERS, SMART; ASSISTANT PROFESSOR BURAK.

GENERAL BUSINESS

65. (I) Principles of Transportation

The development and growth of transportation as a function of production and distribution of goods; rate structures and transportation laws as they affect the relationships between carriers and shippers. 3 class hours. Credit, 3. Mr. Rivers.

66. (II) Traffic Management

The relationships and responsibilities among carriers, regulatory authorities and users of transportation services. Prerequisites, Gen. Bus. 65 and consent of instructor. 3 class hours. Credit, 3. Mr. Rivers.

67. (I) Public Utilities

The nature, organization and administration of regulated industries; aspects of public regulation at Federal, State and Local levels as they affect service operations. 3 class hours. Credit, 3. Mr. Rivers.

68. (II) Real Estate

A comprehensive survey of real estate principles and practices; the mechanics of the real estate market and the economic and legal factors that influence it. 3 class hours. Credit, 3. Mr. Burak.

71. (I) and (II) Business Law I

The law of contract and sales. 3 class hours. Credit, 3. Mr. Burak, Mr. Smart.

72. (II) Business Law II

The law of agency and negotiable instrument and time permitting, bankruptcy and wills. Prerequisite, Gen. Bus. 71. 3 class hours. Credit, 3. Mr. Smart.

73. (I) Business Law III

The law of partnerships, corporations and property. Prerequisite, Gen. Bus. 71. 3 class hours. Credit, 3. Mr. Smart.

78. (II) Administrative Statistics

Probability and statistical distributions applied to business management problems. Application of Bayes' theorem to sampling for business decision-making under uncertainty. 3 class hours. Credit, 3. Mr. Cheng.

97. (I) 98. (II) Independent Study and Research

For qualified seniors, independent study and research on selected problems in Business Administration. With permission of the Chairman of the Department. Credit, 1-3. Staff.

FINANCE

55. (I) and (II) Financial Institutions

The American financial system and the functional relationships between financial institutions and the economic activities of households, business firms and governmental units. Prerequisites, Economics 25 and Accounting 25 or consent of Instructor. 3 class hours. Credit, 3. Staff.

65. (I) and (II) Corporation Finance

Social significance or corporate financial behavior, internal administration and control, expansion, capital-re-adjustment, and social control. Prerequisite, Accounting 25 or consent of instructor. 3 class hours. Credit, 3. Mr. Cheng, Mr. Rivers.

75. (I) Principles of Insurance

Risks encountered by individuals and business firms and the methods and institutions which have been established to insure against financial losses. The various forms of insurance are studied primarily from the buyers' point of view. 3 class hours. Credit, 3. Mr. Kyler.

76. (II) Life Insurance

The application of life insurance to the problems of family security, business security, investments, and estate protection. 3 class hours. Credit, 3. Mr. Kyler.

81. (I) Problems of Business Finance I

Short and intermediate-term financing; decision-making under uncertainty regarding needs and sources of funds. Prerequisite, Finance 65. 3 class hours. Credit, 3. Mr. Cheng.

82. (II) Problems in Business Finance II

Long term financing, capital budgeting, reserves and dividend policy, pensions, company expansion, merger and consolidation, reorganization. Prerequisite, Finance 65. 3 class hours. Credit, 3. Mr. Cheng.

83. (I) Investments

The development of a general theory of investment management and its application to individual and institutional investors including Computer Portfolio Management. Prerequisites, Finance 55, and Finance 65 or consent of instructor. 3 class hours. Credit, 3. Mr. Cheng.

84. (II) Security Analysis

Examination of factors affecting investment values of securities and the methods used in their analysis. Prerequisite, Finance 83. 3 class hours. Credit, 3. Mr. Ludtke.

Management

MANAGEMENT

Acting Chairman of Department: ASSOCIATE PROFESSOR SIDNEY CLAUNCH. PROFESSOR O'DONNELL; ASSOCIATE PROFESSOR CONLON; ASSISTANT PROFESSOR T. JOHNSON; MR. ELKINS.

61. (I) and (II) Principles of Management

The basic course dealing with the fundamental principles and practices of the managerial process in business enterprises. 3 class hours. Credit, 3. Mr. Claunch, Mr. T. Johnson.

64. (I) and (II) Personnel Management

The principles and policies followed by management in the procurement, development, direction and control of personnel. 3 class hours. Credit, 3. Mr. Conlon, Mr. T. Johnson.

67. (I) Management-Union Relations I

A comparison of union-management objectives, functions and structures, including the scope and impact of union penetration into areas of managerial authority. Prerequisites, Management 61, 64, or Economics 79. 3 class hours. Credit, 3. Mr. Conlon.

68. (II) Management-Union Relations II

The problems involved in the interpretation and administration of collective bargaining agreements are studied by use of the case method of analysis. Prerequisite, Management 67, or consent of instructor. 3 class hours. Credit, 3. Mr. Conlon.

69. (I) Wage and Salary Administration

A study of the objectives, procedures and problems involved in the establishment and administration of operative and executive compensation plans. Prerequisite, Management 64. 3 class hours. Credit, 3. Mr. Johnson.

81. (I) Theory of Business Administration

Principles of administration; modern organization theories; specialization, functionalization, coordination, planning, and control; authority, status, leadership, decision-making, communication, and power-structuring. Prerequisite, Management 61. 3 class hours. Credit, 3. Mr. O'Donnell, Mr. Elkins.

85. (I) Management of Production I

The basic principles of production management. The use of statistical, mathematical, and simulation methods in the production aspect of an organization's activities. Prerequisite, Management 61. 3 class hours. Credit, 3. Mr. Claunch.

86. (II) Management of Production II

The application of principles and analytical techniques to the design and operation of production systems. Automation, quality control, inventory and production control. Prerequisite, Management 85. 3 class hours. Credit, 3. Mr. Claunch.

89. (I) Management Decision Simulation

A course involving participation in the management of a firm in a simulated industry. Students, organized into management teams, apply their knowledge of business administration and economics in a competitive struggle for profit and market positions. Prerequisite, Senior Standing. 2 class hours. Credit, 2. Mr. Claunch.

92. (II) Problems of Management

An integrating course dealing with the problems of management embracing the organic management functions, using cases for analysis and systematic decision-making practice. Prerequisites, Management 61, 81, 85. 3 class hours. Credit, 3. Mr. O'Donnell, Mr. Elkins.

95. (I) 96. (II) Seminar in Management

The first semester is devoted to advanced study in the theory and practice of administrative organization and behavior. The second semester involves a critical analysis of selected problems in the field of production management. Either semester may be elected independently. Prerequisite, Senior Class Standing and permission of the instructor. 3 class hours. Credit, 3. Staff.

97. (I) 98. (II) Independent Study and Research

For qualified seniors, independent study and research on selected problems in Business Administration. With permission of the Chairman of the Department. Credit, 1-3. Staff.

MARKETING

Chairman of Department: PROFESSOR HAROLD E. HARDY. ASSISTANT PROFESSORS
DREW-BEAR, JOHNSON, ZANE.

53. (I) Marketing Principles

The problems involved in the distribution of industrial and consumer goods including wholesaling, retailing and sales promotional activities. 3 class hours. Credit, 3. Staff.

54. (II) Salesmanship and Sales Management

The principles and practices of selling; the management of sales personnel and the control of sales operations. 3 class hours. Credit, 3. Mr. Johnson.

62. (II) Marketing Research

The aims, sources and fact-gathering methods of marketing research activities. Individual case study and research projects. 3 class hours. Credit, 3. Mr. Drew-Bear.

71. (I) Retailing Principles

Basic concepts of retailing with case studies of retail management problems. 3 class hours. Credit, 3. Mr. Drew-Bear.

73. (I) Advertising

The techniques and media of advertising, its services to business and the organization and economic functions of the advertising industry. 3 class hours. Credit, 3. Mr. Hardy.

74. (II) New England Markets

Individual and group study of New England Markets and the marketing problems of New England industrial enterprises. 3 class hours. Credit, 3. Mr. Zane.

75. (I) Credits and Collections

The principles and practices of mercantile and retail credit management including the sources and analysis of credit information, collections procedures and control and the rights of creditors. 3 class hours. Credit, 3. Mr. Johnson.

Marketing

76. (II) Purchasing

The purchasing organization and practices of industrial enterprises. 3 class hours. Credit, 3. Mr. Zane.

79. (I) Wholesaling

A study of wholesale marketing with emphasis on the marketing activities of manufacturers and wholesale middlemen in the industrial goods area. 3 class hours. Prerequisite, Marketing 53, or equivalent. Credit, 3. Mr. Zane.

80. (II) Problems in Marketing

The interrelations between research planning and the execution of sales programs with case studies showing the effects of various marketing policies upon individual firms. Prerequisite, Marketing 53. 3 class hours. Credit, 3. Mr. Hardy.

84. (II) Problems in Advertising

Application of basic marketing knowledge in planning and analyzing advertising campaigns, research appropriations, the determination of the advertising budget and the choice of media and the subsequent measurement of effectiveness. Prerequisites, Marketing 53 and 73. 3 class hours. Credit, 3. Mr. Hardy.

86. (II) Problems in Retailing

Case analysis and decision covering pricing; merchandise management; buying and selling policies; store systems; personnel; accounting control; plant operation. Prerequisites, Marketing 53 and 71. 3 class hours. Credit, 3. Mr. Drew-Bear.

97. (I) 98. (II) Independent Study and Research

For qualified seniors, independent study and research on selected problems in Business Administration. With permission of the Chairman of the Department. Credit, 1-3. Staff.

SCHOOL OF EDUCATION

A. W. PURVIS, *Dean*

The School of Education through its undergraduate program seeks to utilize the forces of the University to prepare teachers for elementary and secondary schools and through its graduate offering to prepare administrators and specialists in public education. Its program is based upon the assumption that teachers and other school personnel should have a broad liberal education, considerable mastery of at least one field, and professional courses which should lead to a knowledge of the persons to be taught, familiarity with the problems to be met, and practice in the best techniques of teaching and supervision. In all of this the School of Education takes the position that teacher education is a University function and that success will come only if the School is successful in maintaining the closest possible relationships with other schools and departments that contribute to the program.

All students who contemplate teaching as a career should register early, in their freshman year if possible, with the School of Education although their courses in education do not begin until the junior year. In general, students are admitted without question to the various service courses of the junior and senior years, but admission to the teacher-training program of the concentrated semester block is determined by a composite rating based on scholarship as shown by University grades (a three-year average at least as high as the University median is desired), success in the beginning courses in education, recommendations of University teachers in general education fields, and personality ratings by members of the staff.

Elementary School Teaching

Candidates for this program major in elementary education. In certain cases, with the approval of the Dean of the School of Education, the student may be permitted to major in some department of the College of Arts and Sciences where the general education program is deemed the equivalent of that designed for elementary education majors. This permission should be requested in freshman year. Such students will satisfy the requirements of their major department so far as the first two years are concerned but they should utilize their electives to take such courses as Government 25, Zoology 54, History 25, 26 and Art or Music which are recommended by the School of Education. They should take Education 9, 39, 59. The core program for elementary education majors including Education 51 and 64, and Psychology 65 or Home Eco-

Directory of Courses

nomics HD70, and the Elementary Education Block should be taken in the junior and senior years.

Students with a major in Elementary Education take the following courses:

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1	2	English 2	2
Speech 3*	2	Speech 3*	2
Math. 1 or Chem. 1	3	Math. 2 or 4 Chem. 2	3
Zool. 1 or Bot. 1	3	Bot. 1 or Zool. 1	3
Foreign Lang.**	3	Foreign Lang.**	3
History 5	3	History 6	3
Education 9†		Education 9†	
(Military or Air Science 11 (men))	1)	(Military or Air Science 12 (men))	1)
Physical Ed. 1a, b‡	2	Physical Ed. 2a, b‡	2

* May be taken either semester.

** Intermediate Proficiency Required.

† To be completed in a school year.

‡ Not quality point credit.

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25	3	English 26	3
Psychology 1	3	Sociology 25 or Econ. 25	3
Science*	3 or 4	Zool. 54	3
Government 25	3	Music 1 or Art 14	3
History 25	3	History 26	3
Education 39†		Education 39†	
(Military or Air Science (men))	1)	(Military or Air Science (men))	1)
Physical Ed. 31a, b‡	2	Physical Ed. 32a, b‡	2

* To be chosen from sophomore courses in the College of Arts and Sciences.

† To be completed in a school year.

‡ Not quality point credit.

JUNIOR AND SENIOR YEARS

During the junior year the student takes Education 51, 59, 64, Psychology 65 or Home Economics HD70. Music 85 and Geography 35 are required. One semester of senior year is devoted to the concentrated Elementary Education Block (Ed. 60, 61, 62, 85). The student must utilize his junior-senior electives to take at least 30 credits in the College of Arts and Sciences, of which at least 15 credits should be concentrated in a minor.

Secondary School Teaching

All candidates for secondary school teaching will major in the subject field to be taught and minor in education. A maximum of eighteen hours should be taken in this minor. Education 51 and Psychology 56 are required during junior year and Education 52, 88, 85 (called the secondary block) in one semester of senior year. Since the concentrated semester block in secondary school teacher-training carries only twelve credits students should consult with their major adviser regarding means of making up the extra three

credits, and of meeting all their major requirements in the three semesters of junior and senior years. Carrying an extra course during the secondary block semester is not permitted.

Special Field Programs for Prospective Teachers

In Vocational Agriculture (R. C. Jones, adviser). This program is based on a cooperative agreement between the University and the Vocational Division of the State Department of Education which provides supervisors and consultants in conducting the program. Students otherwise qualified may prepare to teach vocational agriculture by the satisfactory completion of Education 72, 73, and 75. Education 52 is also recommended. To insure a desirable range of preparation, students who contemplate vocational teaching should consult, early in the freshman year if possible, Professor Jones and Mr. McGarr.¹ A vocational teacher-training certificate is awarded by the Vocational Division to those who fully qualify.

In Home Economics (Mrs. Sullivan, adviser). These students will major in physical education and minor in education. They should elect Education 51, Psychology 56, Home Economics Education 82 and the concentrated semester block (Education 52, 85).

In Teacher Coaching (S. W. Kauffman, adviser). These students will major in physical education and minor in education. They should elect Psychology 56 and the concentrated semester block (Education 52, 88, 85). They should elect a minor teaching field from the College of Arts and Sciences consisting of a minimum of eighteen hours.

In Music (D. Alviani, adviser). These students will major in music and minor in education. They should elect Education 51, Psychology 56, Music 87, and the concentrated semester block (Education 52, 85).

¹ Mr. McGarr is State Supervisor for Agricultural Teacher-Training representing the Vocational Division of the State Department of Education in the administration of vocational agricultural acts.

EDUCATION

Dean: PROFESSOR ALBERT W. PURVIS. PROFESSORS ANTHONY, OLIVER, WYMAN; ASSOCIATE PROFESSORS KORNEGAY, O'LEARY, PIPPERT; ASSISTANT PROFESSORS BARFIELD, BENZ, BYRNE, CLEGG, COHEN, EDDY, FREDRICKSON, FREISEM, HALL, JONES, McMANAMY, ROSEMIER, THELEN, WELLMAN; MESSRS. MASTROIANNI, SLEEMAN.

9. (I) (II) Directed Observation

Twelve hours in the Laboratory School in the freshman year. Prerequisite to the Elementary Education Block. Credit, 0.

39. (I) (II) Directed Observation

Fifteen hours in the Laboratory School in the sophomore year. Prerequisite to the Elementary Education Block. Credit, 0.

51. (I) (II) History of Education

Educational movements are traced from early Greece to the present with the aim of better understanding of modern problems. 3 class hours. Credit, 3. Mr. Eddy, Mr. Cohen, Mr. Wellman.

52. (I) (II) Principles and Methods of Teaching

By means of discussion, case studies, and current educational literature, teaching ideals and procedures are set up and applied to the major teaching fields. 3 class hours. Credit, 3. Mr. Anthony, Mr. Thelen.

53. (I) (II) Educational Tests and Measurements

The most serviceable tests for measuring achievement are considered; test construction, administration, scoring, and interpretation of results are studied and applied to the classroom. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Rosemier.

59. (I) (II) Directed Observation

Twenty hours in the Laboratory School in the junior year. Prerequisite to the Elementary Education Block. Credit, 0.

60. (I) (II) Elementary School Curriculum

The elementary school curriculum from the standpoint of content and methodology. Emphasis placed on the unit method and the activity programs. 3 class hours. Credit, 3. Mr. Clegg.

61. (I) (II) Teaching of Elementary Reading and Language Arts

Discussions and demonstrations of principles and effective practices in the teaching of all phases of the language arts. 3 class hours. Credit, 3. Miss O'Leary, Mr. Benz, Mr. Byrne.

62. (I) (II) Teaching of Elementary Arithmetic

Accepted methods and materials in the teaching of arithmetic in the elementary grades will be studied and demonstrated. 3 class hours. Credit, 3. Mr. Hall.

64. (I) (II) Principles of Elementary Education

The aim, organization, program, pupil population, of the elementary school and the relationship between elementary and secondary school are the areas of concentration. 3 class hours. Credit, 3. Miss McManamy.

66. (I) (II) Preparation and Use of Audio-Visual Materials

Study is made of available machines, materials and techniques for teaching groups of students. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Wyman, Mr. Mastroianni, Mr. Sleeman.

72. (I) Vocational Education in Agriculture

A survey of vocational agricultural education and an introduction to teaching of vocational agriculture at the secondary level. Admission by permission of instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Jones.

73. (I) (II) Apprentice Teaching in Agriculture

A full year in absentia normally following the junior year, teaching agriculture, horticulture, and related subjects under a supervising teacher in selected schools. Prerequisites, Education 72 and 75. Credit, 6. Mr. Jones.

75. (II) Technique of Teaching Vocational Agriculture

The materials, methods, policies, and special requirements of Massachusetts for teaching vocational agriculture and related subjects in high schools and in special county agricultural schools. Prerequisite, Education 72, or permission of the instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Jones.

77. (I) (II) Principles of School Guidance

The need for guidance in the schools, the nature of guidance, and an overview of an adequate guidance service for a school system. 3 class hours. Credit, 3. Mr. Pippert.

85. (I) (II) Observation and Student Teaching

In cooperating schools within commuting distance of the University, under staff supervision. Given only in the elementary and secondary concentrated blocks. Prerequisites for secondary block: Education 51 and Psychology 56; for elementary block; Education 9, 39, 51, 59, 64; Psychology 65 or Home Economics HD 70. Credit, 6. Mr. Freisem and Staff.

88. (I) (II) Secondary School Curriculum

Learning materials and activities and their organization in various teaching fields. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Barfield, Mr. Kornegay.

SCHOOL OF ENGINEERING

G. A. MARSTON, *Dean*

The departments of Chemical Engineering, Civil Engineering, Mechanical Engineering and Electrical Engineering comprise the School of Engineering. Each department offers a curriculum leading to a Bachelor of Science degree in that particular branch. A Bachelor of Science curriculum in Industrial Engineering is offered in the Mechanical Engineering department.

All curricula are accredited by the Engineers Council for Professional Development.

Engineering can be defined as the combination of science and art by which materials and power are made useful to mankind. An engineer requires intensive technical training but at the same time he should acquire the broad education that distinguishes the professional man from the technician. His education does not end with formal schooling but continues throughout his life as he accumulates experience.

The curricula in engineering have been carefully prepared to offer each student the opportunity to acquire the sound training in mathematics and the basic sciences of chemistry and physics upon which is built the work in the engineering sciences. In the senior year courses are offered which enable the student to use his previous training for engineering analysis, design and engineering systems in his particular field of interest. About twenty per cent of his time is devoted to studies in the social science and humanistic area. Some opportunity is provided to elect courses from both the technical and humanistic-social fields.

The curriculum of the freshman year is the same for all. Specialization to a limited extent begins in the sophomore year.

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Math. 6 Introd. Calculus	4
Math. 5, Introd. Eng. Math.	4	Chem. 2 or 4, General*	3 or 4
Chem. 1 or 3 General*	3 or 4	M. E. 2, Desc. Geom.	3
M. E. 1, Graphics	2	Physics 6, General	3
Physics 5, General	3	(Military or Air Science 12	1)
(Military or Air Science 11	1)	Physical Ed. 2a, b†	2
Physical Ed. 1a, b†	2		

* It is recommended that Chemical Engineering majors take Chemistry 3 and 4 in place of Chemistry 1 and 2.

† Not quality point credit.

SOPHOMORE-JUNIOR-SENIOR CURRICULA

Majors in Engineering will select one of the following curricula.

Chemical Engineering

J. W. ELDRIDGE, *Adviser*

Chemical engineering is concerned with the development of manufacturing processes in which chemical or certain physical changes of materials are involved. These are resolved into a coordinated series of unit operations (physical changes) and unit processes (chemical changes). The work of the chemical engineer is primarily concerned with the design, construction, and operation of equipment and plants in which these are applied. Chemistry, physics, and mathematics are the underlying sciences of chemical engineering, and economics is its guide in practice.

Chemical engineers are employed not only in industry manufacturing chemicals but in many others, such as petroleum refining, coal processing, refractories and clay products, cement, waste treatment, pulp and paper, rayon and textiles, paint and varnish, natural and synthetic rubber, foods, leather, plastics, soap, penicillin and other antibiotics. Much of the work of the atomic energy program is chemical engineering. The types of work done by chemical engineers include: design, construction, research, development, production, financial and patent appraisal, management, and sales.

Directory of Courses

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Ch. E. 25, Fundamentals I	3	Ch. E. 26, Fundamentals II	3
Chem. 51, Organic	3	Chem. 52, Organic	3
Chem. 53, Organic Lab.	1	Chem. 54, Organic Lab.	1
Physics 7, General	4	Economics 25, Elements	3
Math. 31, Appl. Calculus Engrs.	4	Math. 32, Appl. Calculus Engrs.	4
English 25, Mastp. West. Lit.	3	English 26, Mastp. West. Lit.	3
(Military or Air Science 25	1)	(Military or Air Science 26	1)
Physical Ed. 31a, b*	2	Physical Ed. 32a, b*	2

* Not quality point credit.

JUNIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Ch. E. 55, Unit Opera. I	4	Ch. E. 56, Unit Opera. II	4
Ch. E. 75, Instrumentation	3	Ch. E. 80, Kinetics	2
Chem. 32, Quant. Analysis	4	Chem. 66, Physical	3
Chem. 65, Physical	3	C. E. 52, Dynamics	3
C. E. 34, Statics	3	Electives*	5 or 6

SUMMER (3 Weeks)

Ch. E. 88, Chem. Engr. Lab.	2
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SENIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Ch. E. 81, Heat-Energy Relations	3	Ch. E. 82, Ind. Equil.	3
Ch. E. 93, Comprehensive Problems I	3	Ch. E. 94, Comprehensive Problems II	3
Ch. E. 95, Seminar	1	Ch. E. 96, Seminar	1
Ch. E. 97, Lab. Projects I	1	Ch. E. 98, Lab. Project II	2
E. E. 61, Fundamentals	4	Ch. E. 76, Automatic Control	3
Chem. 67, Phys. Chem. Lab.	1	Electives*	6
Electives*	5-6		

* Six credits must be taken in the social sciences and 3 in the humanities. The remainder may be in technical or scientific courses or in advanced military.

All elective courses listed must be satisfied.

Civil Engineering

M. P. WHITE, *Adviser*

Civil engineering is concerned with structures, transportation, movement of fluids, use and storage of water, sanitation, and surveying and mapping. A civil engineer may be engaged in research, in planning and designing, in construction, or in maintenance and operation.

The curriculum gives a thorough training in the fundamental physical sciences and at the same time prepares a student for work in any branch of civil engineering, allowing him to specialize to some extent in whatever branch is most interesting to him—sanitation, mechanics and structures, hydraulics, foundation engineering, highway engineering.

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25, Masterpieces of Western Literature	3	English 26, Masterpieces of Western Literature	3
Math. 31, Applied Calculus for Engineers	4	Physics 7, General	4
Econ. 25, Elem.	3	Math. 32, Applied Calculus for Engineers	4
C. E. 31, Surveying I	3	C. E. 32, Surveying II	3
C. E. 34, Statics	3	C. E. 52, Dynamics	3
(Military or Air Science 25)	1)	(Military or Air Science 26)	1)
Physical Ed. 31a, b*	2	Physical Ed. 32a, b*	2

* Not quality point credit.

SUMMER

Either C. E. 28 and 30, Surveying Practice, or approved engineering employment.

JUNIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
C. E. 53, Strength of Mat. I	3	C. E. 70, Theory of Struct. I	3
C. E. 55, Transport. Engr. I	3	C. E. 77, Sanitary Engr. I	3
C. E. 75, Fluid Mechanics	3	C. E. 80, Soil Mechanics I	3
M. E. 63, Engr. Thermo. I	3	Humanities Elective	3
Geol. 50, Engr. Geol.	3	English 50, Tech. Writing†	2
Soc. Sci. Elective	3	Soc. Sci. Elective	3
C. E. 76, Fluid Mechanics Lab.	1		

SENIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
C. E. 71, Structural Design	3	C. E. 62, Engr. Materials	3
C. E. 78, Sanitary Engr. II	3	C. E. 73, Reinforced Concrete	3
E. E. 61, Fundamentals of E. E.	4	C. E. 90, Contracts and Spec.*	3
Technical Electives**	6	C. E. 96, Professional Sem.	1
Non-Technical Electives	3	Technical Electives**	6
		Elective	3

† May be replaced by M. E. 64.

* May be replaced by E. E. 62.

** Technical electives must be approved by the adviser.

All elective courses listed must be satisfied.

Students taking advanced ROTC or AFROTC courses follow a somewhat different program.

Electrical Engineering

G. D. SHECKELS, *Adviser*

Electrical engineering deals with the engineering applications of electricity. Because of its unusual amount of diversity, it is usually convenient to separate it into such main divisions as power, communications, electronics and control, and others.

The undergraduate curriculum is designed to prepare the student for work in any of these fields and to serve as a basis for further specialization. Courses in liberal arts and in engineering courses outside of the department give the student an understanding of the broader aspects of engineering and other fields.

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25, Mastp. West. Lit.	3	English 26, Mastp. West. Lit.	3
Math. 31, Appl. Calculus Engrs.	4	Math. 32	4
Physics 7, General	4	C. E. 34, Statics	3
E. E. 41, Circuit Anal. I	4	E. E. 42, Circuit Anal. II	4
Humanities Elective	3	Social Sci. Elect.	3
(Military or Air Science 25	1)	(Military or Air Science 26	1)
Physical Ed. 31a, b*	2	Physical Ed. 32a, b*	2

* Not quality point credit.

SUMMER (Following Sophomore Year)

E. E. 85, Electrical Measurements, 3 credit hours.

M. E. 23, Materials Processing Laboratory, 3 credit hours.

JUNIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
E. E. 51, Circuit Anal. III	4	E. E. 52, Circuit Anal. IV	3
E. E. 55, Electronics I	4	E. E. 53, Energy Conversion Systems I	4
E. E. 57, Electromagnetic Fields	3	E. E. 56, Electronics II	4
M. E. Engr. Thermo. I	3	M. E. 64, Engr. Thermo. II	3
C. E. 52, Dynamics	3	C. E. 53, Strength of Materials	3
English 50, Technical Writing	2	Economics 25, Elem.	3

SENIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
E. E. 54, Energy Conversion Systems II	4	E. E. 96, Professional Seminar	1
C. E. 75, Fluid Mechanics or M. E. 82, Heat Transfer	3	M. E. 88, Sc. of Engr. Mat'ls.	3
Major Tech. Elective	4	Major Tech. Electives	8
Humanities or Social Science Elective	3	Social Science Elective	3
Elective	2 or 3	Elective	3
Elective	3		

All elective courses listed must be satisfied.

All electives to be approved by adviser.

Humanities: art, English, foreign-language literature, music, philosophy.

Social Sciences: economics, history, government, psychology, sociology.

Six credits of advanced military or air science may be substituted for six credits of electives.

Mechanical Engineering

W. H. WEAVER, *Adviser*

Mechanical engineering is that branch of the profession which, broadly speaking, covers the fields of heat, power, design of machinery, industrial management and manufacturing problems.

Building upon a foundation of mathematics, physics, and chemistry, the department of mechanical engineering undertakes to show the student how fundamental physical laws apply to this field and to give him thorough training in the basic principles so that particular application can be mastered in professional practice. Therefore, no attempt is made to give highly specialized instruction.

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25, Mastp. West. Lit.	3	English 26, Mastp. West. Lit.	3
Math. 31, Applied Calculus for Engineers	4	Math. 32, Applied Calculus for Engineers	4
C. E. 34, Statics	3	Physics 7, General	4
M. E. 35, Engin. Mat'l. & Proc.	4	M. E. 46, Metallurgy	3
Social Sci. Elect.	3	C. E. 53, Strength of Materials	3
(Military or Air Science 25)	1)	(Military or Air Science 26)	1)
Physical Ed. 31a, b*	2	Physical Ed. 32a, b*	2

* Not quality point credit.

SUMMER (Following Sophomore Year)

- M. E. 25, Materials Processing Laboratory II
- M. E. 26, Materials Processing Laboratory III

JUNIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
C. E. 52, Dynamics	3	C. E. 75, Fluid Mech.	3
M. E. 63, Engr. Thermodynamics I	3	C. E. 76, Fluid Mech. Lab.	1
M. E. 67, Mech. Instr. Lab.	1	M. E. 68, Kinematics	3
E. E. 61, Fundamentals	4	M. E. 64, Engr. Thermodynamics II	3
Humanities Elect.	3	E. E. 62, Applications	4
Econ. 25, Elem.	3	Engl. 50, Tech. Writ.	2

SENIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
M. E. 87, Engr. Thermodynamics III	3	M. E. 80, Mech. Engr. Lab.	2
M. E. 79, Mech. Eng. Lab.	1	M. E. 82, Heat Transfer or M. E. 84, Basic Engr. Analysis	3
M. E. 83, Machine Design	3	M. E. 86, Adv. Machine Des.	3
M. E. 85, Dynamics of Mach.	4	Technical Elect. †	3
M. E. 95, Seminar	1	Non-Tech. Elect.	6
Technical Elect. †	3		
Soc. Sci. Elect.	3		

Advanced military students will be allowed up to 6 credits substitution according to Department requirements.

† Technical electives: M. E. 74, 75, 76, 77, 82, 84, 90, 97, 98; I. E. 54, 86; C. E. 88. Humanities elective: art, English, foreign-language, literature, music, philosophy. Social Science electives: history, government, sociology, psychology, economics. All elective courses listed must be satisfied.

Directory of Courses

Industrial Engineering

W. H. WEAVER, *Adviser*

Industrial engineering is concerned with the engineering aspects of the organization, operation and management of manufacturing plants. Consequently, the industrial engineering curriculum is built on a foundation of mechanical engineering. To the technical knowledge and scientific attitude developed through the study of engineering is added the study of certain courses in the humanities, in economics, and in management.

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25, Mastp. West. Lit.	3	English 26, Mastp. West. Lit.	3
C. E. 34, Statics	3	Physics 7, General Physics	4
Math. 31, Applied Calculus for Engrs.	4	Math. 32, Applied Calculus for Engrs.	4
I. E. 51, Basic Industrial Engineering	3	I. E. 56, Data Processing	3
M. E. 35, Engr. Materials & Processes	4	M. E. 46, Metallurgy	3
(Military or Air Science 25)	1)	(Military or Air Science 26)	1)
Physical Education 31a, b*	2	Physical Education 32a, b*	2

* Not quality point credit.

SUMMER (Following Sophomore Year)

- M. E. 25, Materials Processing Laboratory II, 2 credits.
 M. E. 26, Materials Processing Laboratory III, 2 credits.

JUNIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 50, Technical Writing	2	M. E. 63, Engr. Thermodynamics I	3
I. E. 53, Methods & Standards Engr.	4	I. E. 72, Prin. of Engr. Statistics	3
Stat. 77, Elem. Exp. Statistics	3	C. E. 53, Strength of Materials	3
Social Science Elective	3	Social Science Elective	3
Econ. 25, Elements of Economics	3	Humanities Elective	3
C. E. 52, Dynamics	3	M. E. 68, Kinematics	3

Approved engineering summer employment or 3 credits from approved courses in Economics, Mathematics, Psychology or Sociology.

SENIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
E. E. 61, Principles of Elec. Engr.	4	E. E. 62, Principles of Elec. Engr.	4
M. E. 83, Machine Design	3	I. E. 54, Engineering Economy	3
C. E. 75, Fluid Mechanics	3	I. E. 77, Manufacturing Control	3
I. E. 78, Plant Engineering	2	I. E. 80, Cost Control Engineering	3
I. E. 79, Ind. Engr. Problems	3	I. E. 96, Seminar	1
Non-technical Elective	3	Non-technical Elective	3

Advanced military students will be allowed up to 6 credits substitution according to Department requirements.

Humanities elective: art, English, foreign-language literature, music, philosophy.

Social Science electives: history, government, sociology, psychology, economics.

All elective courses listed must be satisfied.

Engineering Science Option*Departmental Advisers*

Engineering science is concerned with the application of the basic sciences to research and development in the engineering field. As such the curriculum contains extensive mathematics, physics, and other courses in the basic sciences designed to develop the student's skill in precise physical reasoning, analysis and synthesis. The student may elect the option from one of the four major departments at the end of his sophomore year provided he has completed his freshman and sophomore years with a quality point average of 2.80 or above or has achieved a cumulative average of 3.20 for the two preceding semesters.

The freshman year is the same for all students and the sophomore year corresponds to that major department in which the student is enrolled. Every student enrolled in the engineering science option must satisfy the following core curriculum:

<i>Course</i>	<i>Credits</i>
Chem. Eng. 77, Elements of Unit Operations	3
C. E. 34, Statics	3
C. E. 52, Dynamics	3
C. E. 75, Fluid Mechanics	3
E. E. 41, Circuit and Field Analysis I	4
E. E. 42, Circuit and Field Analysis II	4
M. E. 63, Engineering Thermodynamics I	3
M. E. 87, Engineering Thermodynamics III	3
M. E. 88, Science of Engineering Materials	3
Math. 75, Adv. Mathematics for Engineers I	3
Math. 76, Adv. Mathematics for Engineers II	3
Eng. Science Seminar (four semesters)	No credit

In addition to the above core curriculum students must satisfy certain other courses as are prescribed by the department in which he is enrolled. In the remainder of his courses required for graduation, exclusive of University and School of Engineering requirements, the student is allowed considerable flexibility, subject only to the approval of his departmental adviser. The degree received is the same as that offered by the department in which the student is enrolled.

Engineering

ENGINEERING

CHEMICAL ENGINEERING

Head of Department: PROFESSOR JOHN W. ELDRIDGE. PROFESSOR E. E. LINDSEY; ASSOCIATE PROFESSORS CASHIN, DUUS; ASSISTANT PROFESSOR KIM; VISITING LECTURERS CHAPPELAER, WELCH; MR. GODA.

25. (I) 26. (II) Fundamentals

An introduction to the nature and scope of chemical engineering through the study of selected chemical processes and of material and energy balances. Prerequisites, Chemistry 2 or 4; Physics 4 or 6 for Course 26. 3 class hours. Credit, 3.

55. (I) Unit Operations I

The unit operations of fluid flow, heat transfer and evaporation. The thermodynamic properties of matter. Prerequisites, Chemical Engineering 26; Mathematics 30 or 31. 3 class hours, 1 3-hour computation period. Credit, 4.

56. (II) Unit Operations II

A continuation of Course 55; including the additional unit operations of distillation, gas absorption, liquid extraction, crystallization, filtration, mixing, crushing and grinding. Prerequisite, Chemical Engineering 55. 3 class hours, 1 3-hour computation period. Credit, 4.

58. (II) Organic Chemical Technology

Some of the unit processes involved in the manufacture of organic chemicals. Includes nitration, amination, halogenation, oxidation and esterification. Prerequisite, Chemistry 51. 2 class hours, 1 3-hour laboratory period. Credit, 3.

59. (I) Introduction to Digital and Analog Computers

An introduction to the principles of machine computation processes. Emphasis is on practice in writing programs and running them on digital and analog computers. Necessary mathematical background for the machine computation, such as numerical analysis, will be included. This course is designed for any students interested in machine computation. Prerequisites, Mathematics 32, or permission of instructor. 3 class hours. Credit, 3.

61. (II) Chemical Engineering Analysis

A study of mathematical techniques with application to chemical engineering problems. Emphasis is on setting up ordinary differential equations corresponding to specific problems and on methods for their solution, including machine computation. Prerequisites, Chemical Engineering 56 and 59. 3 class hours. Credit, 3.

75. Instrumentation

A detailed study of the underlying principles and practices in indicating, recording and controlling instruments used on industrial process equipment. Prerequisite, Physics 4 or 6. 2 class hours, 1 3-hour laboratory period. Credit, 3.

76. (II) Automatic Process Control

A study of the theoretical and practical factors governing automatic control of industrial processes. Topics include: control systems, review of measurement devices, control modes, mathematical relationships and analysis of control systems. Prerequisites, Chemical Engineering 56 and 81; Mathematics 32. 2 class hours, 1 3-hour laboratory period. Credit, 3.

77. (I) Elements of Unit Operations

Primarily for engineering science students. Emphasis is on the scientific principles of the Unit Operations. Molecular and turbulent transport of heat, mass and momentum are considered in detail. Prerequisite, Engineering Science option, or permission of instructor. 3 class hours. Credit, 3.

78. (I) Advanced Unit Operations

A more detailed study of certain unit operations with emphasis on heat transfer. Prerequisite, Chemical Engineering 56. 2 class hours. Credit, 2.

80. (II) Kinetics

Principles underlying the rates at which chemical transformations take place. Review of differential equations governing reaction velocity; effect of temperature and catalysis; application to design of industrial chemical reactors. Prerequisite, Chemistry 65. 2 class hours. Credit, 2.

81. (I) Heat-energy Relations

Types of energy, energy balances, second law, thermodynamic functions, P-V-T relations of fluids, compression and expansion processes. Prerequisites, Chemistry 66; Chemical Engineering 56. 3 class hours. Credit, 3.

82. (II) Industrial Equilibria

Phase and chemical equilibria and rates of reaction in chemical processes from the industrial point of view. Prerequisites, Chemistry 66; Chemical Engineering 81. 3 class hours. Credit, 3.

83. (I) Survey of Nuclear Engineering (I)

An introduction to the principles of reactor physics and a survey of problems involved in the design and operation of nuclear reactors. Also problems in heat transfer, shielding, instrumentation and waste disposal. Prerequisites, Chemistry 2 or 4; Physics 4 or 6; Mathematics 30, or equivalent; and permission of the instructor. 2 class hours, 1 3-hour laboratory period. Credit, 3.

84. (II) Survey of Nuclear Engineering (II)

A continuation of Chemical Engineering 83 with emphasis on reactor physics. Prerequisite, Chemical Engineering 83. 2 class hours, 1 3-hour laboratory period. Credit, 3.

87. (I) Process Equipment Design

The design of process equipment for the chemical industries; riveted pressure vessels, welded pressure vessels, piping, attachments and closures, etc. Prerequisites, Chemical Engineering 55; Civil Engineering 52. 1 class hour, 1 3-hour laboratory period. Credit, 2.

88. Chemical Engineering Laboratory

Study of pilot plant size equipment illustrating some unit operations. Emphasis on the securing of accurate data, correct operating techniques, and on report writing. Prerequisite, Chemical Engineering 56. 2 3-hour laboratory periods. Credit, 2.

93. (I) 94. (II) Comprehensive Problems

The solution of comprehensive problems which requires the application and integration of a number of the principles studied in previous courses in chemistry and chemical engineering. Prerequisites, Chemical Engineering 56; Chemistry 66. 2 class hours, 1 3-hour computation period. Credit, 3.

Civil Engineering

95. (I) 96. (II) Seminar

Preparation and discussion of professional topics of interest to chemical engineers. 1 class hour. Credit, 1.

97. (I) Laboratory Projects

Investigation and report on an elementary chemical engineering problem. Prerequisites. Chemical Engineering 56, 88. 1 3-hour laboratory period. Credit, 1.

98. (II) Laboratory Projects

Investigation and report on an elementary chemical engineering problem. Prerequisites, Chemical Engineering 56, 88. 2 3-hour laboratory periods. Credit, 2.

CIVIL ENGINEERING

Head of Department: PROFESSOR MERIT P. WHITE. PROFESSORS CARVER, FENG, HENDRICKSON, MARCUS, MARSTON, OSGOOD; ASSOCIATE PROFESSORS BOYER, GROW, HIGGINS; ASSISTANT PROFESSORS BEMBEN, DZIALO, HARRIS, PECK.

27. (I) Plane Surveying

Elements of plane surveying: taping, transit, level, stadia, topographic surveying and mapping, care and adjustment of instruments. Prerequisite, Trigonometry. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Boyer.

28. (Summer) Surveying Practice I

Property surveys, topographic surveys by stadia and plane table, triangulation. Prerequisite, Civil Engineering 27 or 31. 3 40-hour weeks. Credit, 3. Mr. Boyer.

30. (Summer) Surveying Practice II

Preliminary route survey with plan, profile, cross sections, slope stakes, earthwork quantities. Prerequisite, Civil Engineering 32. 3 40-hour weeks. Credit, 3. Mr. Boyer.

31. (I) Surveying I

Theory of surveying. Use, care, and adjustment of tape, transit, and level; traverse computation; topographic surveying and mapping; property surveying. Prerequisite, Trigonometry. 2 class hours, 2 3-hour laboratory periods. Credit, 3. Mr. Boyer.

32. (II) Surveying II

Route surveys; centerline layout; simple, compound, reverse, parabolic, and spiral curves; construction surveys; earthwork computation; chainage equations; astronomical observations. Prerequisite, Civil Engineering 31. 2 class hours. 1 3-hour laboratory period. Credit, 3. Mr. Boyer.

34. (I) and (II) Statics

Topics considered: resultants of force systems, equilibrium of forces using algebraic and graphical methods; friction, first and second moments, center of gravity. Prerequisite, Integral Calculus, or concurrently. 3 class hours. Credit, 3.

52. (I) and (II) Dynamics

Motions of particles and rigid bodies and the force systems causing these motions. Prerequisite, Civil Engineering 34. 3 class hours. Credit, 3.

53. (I) and (II) Strength of Materials I

Simple and combined stresses and strains in tension, compression and shear; torsion; stresses and deflections in beams. Prerequisite, Civil Engineering 34. 3 class hours. Credit, 3.

55. (I) Transportation Engineering I

Major transportation systems with emphasis on geometric design of highways, transportation and traffic studies, and design and operation of railroads. Prerequisite, Civil Engineering 32. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Boyer.

62. (II) Engineering Materials

A study of engineering materials with particular emphasis on physical behavior. The correlation between experimental observations and theory. Prerequisite, Civil Engineering 53. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Peck.

70. (II) Theory of Structures I

An elementary treatment of statically determinate structures, especially buildings and bridges. Prerequisite, Civil Engineering 53. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Osgood.

71. (I) Structural Design

The choosing and proportioning of the elements and connections of metal structural frames of buildings and bridges. Designs are made. Prerequisite, Civil Engineering 70. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Osgood.

72. (I) Theory of Structures II

The analysis of statically indeterminate structures by several appropriate methods. Prerequisite, Civil Engineering 70. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Osgood.

73. (II) Reinforced Concrete

The analysis and design of reinforced concrete structures. Prerequisite, Civil Engineering 53. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Grow.

74. (II) Theory of Structures III

The analysis and design of complex or special structures in metal, concrete or wood. Prerequisites, Civil Engineering 71, 72; 73 concurrently. 3 class hours. Credit, 3. Mr. Osgood.

75. (I) and (II) Fluid Mechanics

A study of the properties and behavior of fluids, involving laws of hydrostatics, kinetics and dynamics. Flow measurement, hydraulic machinery, flow in pipes and open channels. Prerequisite, Civil Engineering 52. 3 class hours. Credit, 3. Mr. Carver, Mr. Higgins.

76. (I) and (II) Fluid Mechanics Laboratory

Applications of fluid mechanics theory. Flow measurement and behavior of fluids in pipes and open channels. Prerequisite, Civil Engineering 75, concurrently. 1 3-hour laboratory period. Credit, 1. Mr. Carver, Mr. Higgins.

Civil Engineering

77. (II) Sanitary Engineering I

Water demand and quantity of sewage, water collection and distribution, sewer systems, and pumping stations. Prerequisite, Civil Engineering 75, concurrently. 3 class hours. Credit, 3. Mr. Feng.

78. (I) Sanitary Engineering II

Water and sewage laboratory analysis, stream pollution, water and sewage treatment, industrial waste problems. Prerequisite, Civil Engineering 75, concurrently. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Feng.

79. (I) Principles of Sanitary Engineering

Designed for students in the Department of Public Health, covering phases of Civil Engineering 77 and 78 with consideration of the non-engineering background of the student. Admission by permission of the instructor. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Feng.

80. Soil Mechanics I

An elementary course in the engineering uses and properties of soils, including seepage, embankment stability, and consolidation. Prerequisite, Geology 50. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Hendrickson.

81. Soil Mechanics II

Foundations and earth structures. Interpretation of borings. Analysis and design of piles, footings, piers, abutments, and retaining walls. Prerequisite, Civil Engineering 80. 3 class hours. Credit, 3. Mr. Hendrickson.

82. Soil Testing

Sampling and testing of soils for engineering purposes. 1 class hour, 2 3-hour laboratory periods. Credit, 3. Mr. Hendrickson.

85. (I) Water and Wastewater Analysis

Analysis of water relative to its quality for various domestic and industrial uses and analysis of wastewater relative to its potentiality of pollution. Prerequisites, Chemistry 1, 2; Civil Engineering 78. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Feng.

86. (II) Sanitary Engineering III

The hydraulics and chemistry relating to water and sewage treatment plants, design criteria of treatment units. Prerequisites, Civil Engineering 77 and 78. 3 class hours. Credit, 3. Mr. Feng.

87. (I) Open Channel Flow

A study of steady flow in open channels including natural and artificial sections and elementary design of related hydraulic structures. Prerequisite, Civil Engineering 75. 3 class hours. Credit, 3. Mr. Higgins.

88. (II) Strength of Materials II

Determination of stresses and strains in elements of machines and structures. Prerequisite, Civil Engineering 53. 3 class hours. Credit, 3. Mr. White.

90. (II) Contracts and Specifications

Current practice and the legal aspects of preparing construction contracts, specifications and cost estimates. 3 class hours. Credit, 3. Mr. Grow.

91. (I) Surveying III

Elements of astronomical geodetic and photogrammetric surveying; coordinate systems and map projections. Prerequisite, Civil Engineering 32. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Boyer.

92. (I) Hydraulic Engineering

Hydrologic and structural considerations for hydraulic projects including studies of dams and appurtenances, hydraulic machinery, engineering economy, and the design of a typical hydroelectric development. Prerequisite, Civil Engineering 75. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Higgins.

93. (II) Introduction to Hydrodynamics

A mathematical treatment of the basic theorems of classical hydrodynamics including potential flow, conformal mapping, wave and vortex motion, Navier-Stokes equation and boundary layer theory. Prerequisite, Mathematics 32. 3 class hours. Credit, 3. Mr. Carver.

94. (II) Transportation Engineering II

The engineering aspects of traffic problems, geometric design of urban and rural highways including intersections, traffic signs and signals, and planning studies. Prerequisite, Civil Engineering 55. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Boyer.

96. (II) Professional Seminar

For senior civil engineering students. Current engineering projects and the professional aspect of the civil engineer's work are described by student reports. 1 class hour. Credit, 1.

97. (I) 98. (II) Civil Engineering Project

Investigation of a problem or completion of a project significant in civil engineering. Prerequisite, permission of department. Credit, 3.

ELECTRICAL ENGINEERING

Head of Department: PROFESSOR G. DALE SHECKELS. PROFESSORS LANGFORD, ROYS; ASSOCIATE PROFESSORS BETT, EDWARDS, FITZGERALD, LAESTADIUS, MOHN; ASSISTANT PROFESSORS HERCHENREDER, SCOTT; VISITING PROFESSORS LONGLEY, MAUNDER.

41. (I) 42. (II) Linear Circuit Analysis I and II

Analysis using differential relationships, free and forced responses, complex frequency, steps and impulses, poles and zeros and network theorems. Prerequisites, Mathematics 6 and Physics 6. 3 class hours, 1 3-hour computation and laboratory period. Credit, 4.

51. (I) Linear Circuit Analysis III

Polyphase circuits, coupled circuits, harmonics, Fourier series, and magnetic circuit. Prerequisite, E. E. 42. 3 class hours, 1 3-hour laboratory period. Credit, 4.

52. (II) Linear Circuit Analysis IV

The use of operational and transform methods for the solution of fundamental equations of electrical, mechanical and thermal systems, with a correlated study of functions of a complex variable. Prerequisite, E. E. 51. 3 class hours. Credit, 3.

Electrical Engineering

53. (I) 54. (II) Energy Conversion Systems I and II

Principles of operation and physical aspects of energy conversion systems with a detailed analysis of performance and control of transformers and rotating electrical machinery. Prerequisite, E. E. 51. 3 class hours. 1 3-hour laboratory period. Credit, 4.

55. (I) 56. (II) Electronics I and II

Physical phenomena of electronic conduction in solids, vacua, and gases. Applications include amplifiers, rectifiers, oscillators, inverse feedback systems, computers, and other basic circuits. Prerequisite, E. E. 42, or consent of instructor. 3 class hours, 1 3-hour laboratory period. Credit, 4.

57. (I) Electromagnetic Fields

Static and time varying electromagnetic fields using vector notation. Maxwell's equations, relations between field and circuit theory. Plane waves in dielectric and conducting media. Prerequisites, Physics 6 with Mathematics 32 concurrently. 3 class hours. Credit, 3.

61. (I) Fundamentals of Electrical Engineering

A study of basic laws of electrical science as they pertain to electric and magnetic circuits. Not open to electrical engineers. Prerequisites, Physics 6, Mathematics 31 or equal. 3 class hours. 1 3-hour laboratory period. Credit, 4.

62. (II) Basic Application of Electrical Engineering

A study of the general applications of the basic laws of electrical engineering in the fields of stationary and rotating electromechanical machinery and basic electronics. Not open to electrical engineers. Prerequisite, E. E. 61. 3 class hours, 1 3-hour laboratory period. Credit, 4.

65. (I) 66. (II) Electronics I and II

These courses are identical to the lecture portions of E. E. 55 and 56. They are not open to electrical engineers. Prerequisites, Physics 26 and Mathematics 31, or equivalents. 3 class hours. Credit, 3.

77. (I) Principles of Switching Circuits

Logical design of switching circuits with emphasis on the scientific methods available; the analysis and synthesis of switching systems using electromagnetic, electronic and solid state devices. Prerequisite, E. E. 56. 3 class hours, 1 3-hour laboratory period. Credit, 4.

78. (II) Principles of Switching Circuits II

Multiterminal and iterative circuits; circuit reliability; switching codes; alternative methods of sequential circuit design with emphasis on synchronous pulse circuits; trends in switching. Prerequisite, E. E. 77. 3 class hours. 1 3-hour laboratory period. Credit, 4.

79. (I) Communication Circuits

Theory of lumped circuits and lines including matrices, positive real functions, and synthesis methods of Foster and Cauer. Prerequisite, E. E. 52. 3 class hours, 1 3-hour laboratory period. Credit, 4.

80. (II) Electronics III

Active circuits and communication theory covering tube and semi-conductor circuitry with emphasis on aspects pertaining to information transmission. Prerequisite, E. E. 56. 3 class hours, 1 3-hour laboratory period. Credit, 4.

81. (I) Advanced Electrical Machinery

Modern methods of analysis, including two reaction, symmetrical component, matrix, vector-dyadic and tensor formulations. Applications include d-c and a-c motors and generators and amplidyne. Prerequisite, E. E. 54. 3 class hours, 1 3-hour laboratory period. Credit, 4.

84. (II) Industrial Electronics and Control

Industrial electronic devices and their characteristics; basic circuits and their application to commercial equipment. Prerequisites, E. E. 55, or 62. 3 class hours, 1 3-hour laboratory period. Credit, 4.

85. (Summer) Electrical Measurements

Theory and practice of electric and magnetic measurements, accuracy, precision, maximum possible and probable errors, and limitations of measurements and devices. Prerequisite, E. E. 42. 3 40-hour weeks. Credit, 3.

86. (II) Power System Networks

Power transfer diagrams, voltage studies, system stability criteria, short-circuit calculations, and protective methods. Prerequisite, E. E. 52. 3 class hours, 1 3-hour laboratory period. Credit, 4.

88. (II) Pulse Circuits

Generation, transmission and processing of information by means of pulses, with applications to computers, communications, radar and television. Prerequisite, E. E. 56. 3 class hours, 1 3-hour laboratory period. Credit, 4.

90. (II) Feedback Control Systems I

Analysis and design of error-sensitive control systems. Analytical and graphical determination of steady state and transient performance; applications to electrical, mechanical, and hydraulic systems. Prerequisite, E. E. 52. 3 class hours. 1 3-hour laboratory period. Credit, 4.

92. (II) Principles of Electrical Design

The fundamentals of electric, dielectric, magnetic and heat-flow systems applied to the design, performance, rating and life of coils, transformers, machinery and other equipment. Prerequisite, E. E. 54. 2 class hours, 1 3-hour laboratory period. Credit, 3.

94. (II) Microwave Engineering

Fundamental principles of communications and electromagnetism and their application to the special problems of the generation, transmission, propagation and reception of microwaves. Prerequisite, E. E. 57. 3 class hours, 1 3-hour laboratory period. Credit, 4.

96. (II) Professional Seminar

Current engineering developments are discussed through student reports. Instruction is given in the preparation of papers for publication and their presentation before technical audiences. Prerequisite, senior standing. 1 class hour. Credit, 1.

97. (I) 98. (II) Special Problems

An individual investigation carried out under the supervision of an interested staff member, or a class study of recent advances and current problems in a specialized field of electrical engineering. Prerequisite, Consent of instructor. Credit, 1-4.

MECHANICAL ENGINEERING DEPARTMENT

Head of Department: PROFESSOR WILLIAM H. WEAVER. PROFESSORS BATES, DITTFACH, KEYSER, SWENSON; ASSOCIATE PROFESSORS DAY, O'BYRNE, PATTERSON, RISING, SOBALA, WEIDMANN; ASSISTANT PROFESSORS COSTA, HOPKINS, JUCKER, KRONER, TRISHMAN, TRUESWELL;* MESSRS. AMATANGELO, BISSEY, DEAN, KERAMATY.

1. (I) Graphics

The course purpose is to develop a working knowledge of orthographic projection including multi-view drawing, sections, dimensions, pictorial representations. Objectives are met through problem solution and creative work. 2 3-hour laboratory periods. Credit, 2.

2. (II) Descriptive Geometry

The theory of orthographic projection. Geometric concepts of lines, planes, solids; solution of engineering problems involving true sizes, angles and shapes by graphical methods. Prerequisite, Mechanical Engineering 1. 1 class hour, 2 3-hour laboratory periods. Credit, 3.

23. Materials Processing Laboratory I

A lecture and laboratory course to develop a basic understanding of metal working using cutting and joining processes. Not for Industrial or Mechanical engineers. Offered immediately previous to the fall semester. Prerequisite, Mechanical Engineering I. 3 40-hour weeks. Credit, 3.

25. Materials Processing Laboratory II

An understanding of the weldability of metals using manual and automatic processes applicable to machine design and industrial processes. Prerequisite, Mechanical Engineering I. 2½ 30-hour weeks. Credit, 2.

26. Materials Processing Laboratory III

An understanding of the machining of metals using standard machine tools applicable to machine design and industrial processes. Prerequisite, Mechanical Engineering I. 2½ 30-hour weeks. Credit, 2.

35. (I) Engineering Materials and Processes

Properties, production, fabrication, and uses of engineering materials. Laboratory work includes mechanical testing, motion pictures, and inspection trips. Prerequisites, Chemistry 2 or 4; Physics 3 or 5. 3 class hours, 1 3-hour laboratory period. Credit, 4.

46. (II) Fundamentals of Metallurgy

Physical metallurgy involving crystal structure, solid solutions, diffusion in the solid state, freezing of metals, metal hardening, annealing, equilibrium diagrams. Heat treating processes. Prerequisite, Mechanical Engineering 35 or Chemistry 66. 2 class hours, 1 3-hour laboratory period. Credit, 3.

63. (I) Engineering Thermodynamics I

The application of the laws of thermodynamics to various energy-transforming devices, including ideal and actual cycles of steam, internal combustion engines and air compressors. Prerequisites, Physics 5 and 6; Mathematics 30 or 31. 3 class hours. Credit, 3.

* On leave of absence.

64. (II) Engineering Thermodynamics II

A study of liquids and vapors, thermodynamic cycles, energy transformations, the transfer of heat plus appropriate problems. Prerequisite, Mechanical Engineering 63. 3 class hours. Credit, 3.

67. (II) Mechanical Instrumentation Laboratory

The calibration and application of instruments used in the testing of mechanical engineering apparatus. Prerequisite, Mechanical Engineering 63, taken previously or concurrently. 1 3-hour laboratory period. Credit, 1.

68. (II) Kinematics

Principles of mechanism, including velocity and acceleration diagrams, instant centers, gear teeth and gear trains, cams, and various speed transmissions. Prerequisites, Mechanical Engineering I; Civil Engineering 52. 2 class hours, 1 3-hour laboratory period. Credit, 3.

74. (I) and (II) Basic Aerodynamics

The basic concepts of applied aerodynamics, including properties of air, ideal fluid flow, airfoils and their properties, aircraft performance and stability. Prerequisite, Civil Engineering 76. 3 class hours. Credit, 3.

75. (I) Steam Power Plants

The steam power plant, including boilers, stokers, fuels, combustion, steam generation, prime movers, and auxiliary equipment, and engineering problems involved in design and operation. Prerequisite, Mechanical Engineering 64. 3 class hours. Credit, 3.

76. (II) Refrigeration and Air Conditioning

Fundamental principles of thermodynamics as applied to refrigeration in industrial processes and the control of temperature, humidity and motion of air in buildings. Prerequisite, Mechanical Engineering 64. 3 class hours. Credit, 3.

77. (I) Internal Combustion Engines

The thermodynamic and performance aspects of reciprocating gasoline and Diesel engines, steady flow gas turbines, turbo-jet engines and rockets. Prerequisite, Mechanical Engineering 64. 3 class hours. Credit, 3.

79. (I) Mechanical Engineering Laboratory I

Standard performance tests of steam, gasoline and Diesel engines, fans, turbines, compressors, and refrigeration systems. Process control instrumentation including digital and analog computer techniques. Prerequisite, Mechanical Engineering 67. 1 3-hour laboratory period. Credit, 1.

80. (II) Mechanical Engineering Laboratory II

Advanced project experimental work in all phases of Heat Power equipment. Prerequisite, Mechanical Engineering 79. 2 3-hour laboratory periods. Credit, 2.

82. (II) Heat Transfer

A study of the mechanisms of heat transfer: conduction, convection and radiation, with engineering applications. Prerequisites, Mechanical Engineering 63; Mathematics 32 or 92. 3 class hours. Credit, 3.

Mechanical Engineering

83. (I) Machine Design

Principles involved in the design of various machine parts. Related topics such as economy of manufacture, safety, styling, invention and creativity. Prerequisites, Civil Engineering 53; Mechanical Engineering 2, 27, 28, 68. 2 class hours, 1 3-hour laboratory period. Credit, 3.

84. (II) Basic Engineering Analysis

The application of mathematical solutions to problems in vibrations, elasticity, fluid mechanics and dynamics. The analysis of the problems and the derivation of the governing equations. Prerequisite, Mathematics 32 or 92. 3 class hours. Credit, 3.

85. (I) Dynamics of Machinery

Elements of vibration theory, vibration isolation, absorbers, instrumentation, analysis of equivalent masses and shaft systems. Dynamic balancing. Prerequisites, Civil Engineering 52; Mechanical Engineering 68. 3 class hours, 1 3-hour laboratory period. Credit, 4.

86. (II) Advanced Machine Design

Continuation of Course 83. Additional elementary parts are analyzed and some complete machines studied. Emphasis on invention and creativity. Prerequisite, Mechanical Engineering 83. 2 class hours, 1 3-hour laboratory period. Credit, 3.

87. (I) Engineering Thermodynamics III

Topics investigated include steam turbines, steam power plants, refrigeration, high-velocity flow, and shock phenomena. Prerequisite, Mechanical Engineering 64. 3 class hours. Credit, 3.

88. (II) Science of Engineering Materials

A physical explanation of the mechanical, electrical, magnetic and thermal properties of engineering materials. Prerequisites, Chemistry 2 or 4, Physics 5 and 6 or 25 and 26, or their equivalents. 3 class hours. Credit, 3.

89. (I) Instrumentation

A study of mechanical instrumentation with mechanical-electrical transducers emphasized. A few heat power experiments included. For electrical engineering majors or permission of instructor. Prerequisite, Mechanical Engineering 64. 1 class hour, 1 3-hour laboratory period. Credit, 2.

90. (II) Advanced Metallurgy

Advanced topics in engineering metallurgy, including X-ray diffraction and X-ray fluorescent analysis. Prerequisite, Mechanical Engineering 46. 2 class hours, 1 3-hour laboratory period. Credit, 3.

93. (I) Nomography

The construction of functional scales, alignment charts and proportional charts. The use of determinants in the construction of alignment charts. Prerequisite, Mathematics 2, 6 or 29. 1 class hour, 1 3-hour laboratory period. Credit, 2.

95. (I) Professional Seminar

Presentation of papers on important subjects and recent development in the field of mechanical engineering. Prerequisite, Senior standing. 1 class hour. Credit, 1.

97. (I) 98. (II) Experimental Mechanical Engineering

Special work in mechanical engineering for a senior thesis. Admission by permission of instructor. Credit, 3.

INDUSTRIAL ENGINEERING

51. (I) Basic Industrial Engineering

The principles of organization and management and their application to the problems of the industrial plant. For industrial engineering majors. 3 class hours. Credit, 3.

53. (I) Methods and Standards Engineering

The principles involved in the simplification of the work pattern, the design of the work place, and in the establishment of production standards. Prerequisite, Statistics 77, previously or concurrently. 3 class hours, 1 3-hour laboratory period. Credit, 4.

54. (II) Engineering Economy

A study of the bases for comparison of alternatives in engineering projects, break-even and minimum cost points, evaluation of proposals, the economic selection and replacement of structures and machines. Prerequisites, Economics 25; Mathematics 6. 3 class hours. Credit, 3.

56. (II) Data Processing

Principles and applications of data processing and electronic computer systems for use in management for control and decision making. Prerequisite, Industrial Engineering 51 or approval of instructor. 3 class hours. Credit, 3.

72. (I) Principles of Engineering Statistics

A study of statistical principles as applied to engineering problems including: analysis of variance, design of experiments, sampling plans, statistical quality control, industrial problem solutions. Prerequisite, Statistics 77. 3 class hours. Credit, 3.

77. (I) Manufacturing Control

The principles applying to the determination and development of the physical relationship between plant, equipment and operators considering the economy and effectiveness of operation. Prerequisites, Mechanical Engineering 2; Industrial Engineering 79 previously or concurrently. 1 class hour, 1 3-hour laboratory period. Credit, 2.

78. (II) Production Control

A study of the principles used to regulate production activities in keeping with the manufacturing plan. Prerequisites, Industrial Engineering 51; Industrial Engineering 79 concurrently. 3 class hours. Credit, 3.

79. (I) Industrial Engineering Problems

The theory of probability, the principles of mathematical programming applied to the solution of problems in inventory control, production control, quality control, production standards, work measurement. Prerequisites, Industrial Engineering 53; Statistics 77. 3 class hours. Credit, 3.

Mechanical Engineering

80. (II) Cost Control Engineering

The principles for pre-determining expenses for the factors of production, the comparison of results with estimates to determine and deal with the causes of expense variations. Prerequisites, Industrial Engineering 51 and 79. 3 class hours. Credit, 3.

86. (II) Industrial Engineering Principles

Industrial engineering principles as applied to organization, plant location, plant layout, industrial costs, production control, production standards, incentives. For engineering students other than industrial engineering majors. Prerequisite, Junior standing. 3 class hours. Credit, 3.

88. (II) Motion and Time Study

The combined fields of motion study and time study. For junior and senior students outside the industrial engineering field. Prerequisite, Junior standing. 2 class hours, 1 3-hour laboratory period. Credit, 3.

96. (II) Professional Seminar

Presentation of papers on important subjects and recent development in the field of industrial engineering. Prerequisite, Senior standing. 1 class hour. Credit, 1.

97. (I) 98. (II) Industrial Engineering Projects

Special work in industrial engineering for a senior thesis or an honors program. Admission by permission of the instructor. Credit, 1-3.

SCHOOL OF HOME ECONOMICS

MARION A. NIEDERPRUEM, *Dean*

The School of Home Economics encompasses an area of study which applies the principles and concepts of the fundamental arts and sciences to the physiological, psychological, social, and economic environmental needs of man.

The curricula of the school have been designed to provide a liberal education with depth in specialized areas of Food and Nutrition, Textiles, Clothing and Related Arts, and Home Economics Education to insure professional competence. The transitional continuing relationships between liberal and professional education seek to develop in the student a disciplined mind, mental curiosity, and professional aspirations.

The five major curricula offered are unique to Home Economics. They are Dietetic and Institutional Administration, Food and Nutrition in Business, Fashion in Retailing and Business, Secondary Education and Extension and Nursery School Education. These are found under the specialized areas of Food and Nutrition, (FN); Textiles, Clothing and Related Arts, (TCRA); and Home Economics Education, (HEEd.). The subject matter areas of Management and Family Economics (MFE), and Human Development (HD), are supportive to the majors. The letters in parenthesis are area codes. Prerequisites of appropriate arts and science courses allow for application of fundamental knowledge to the content of courses in specialized areas. Course content is based on research in Home Economics as well as in the physical and biological sciences, social sciences, arts and humanities.

These curricula, providing a minimum of sixty credits of liberal education, conform to the university requirements for a B.S. degree, and include a School of Home Economics core of nine credit hours, a core for each major area and a range from 120 to 128 credit hours for graduation.

Professional Home Economists are college and university graduates with bachelor degrees in Home Economics. They serve individuals, families and communities through schools and colleges, extension programs, business organizations of many kinds all over the world, community and government organizations and agencies, newspapers, magazines, radio and television. Representative types of activities that Home Economists participate in include teaching, research, writing, dietetics, extension work, interior decoration, fashion merchandising, food consulting, food service management and product development. Experience and advanced study in areas of specialization lead to positions of great responsibility.

FOOD AND NUTRITION

Food and Nutrition offers curricula which provide a strong foundation in the arts and sciences to support basic courses in foods and nutrition under two options: Dietetic and Institutional Administration and Food and Nutrition in Business.

Dietetic and Institutional Administration

The curriculum prepares the graduate for positions as staff and administrative dietitians in various types of food service; nutritionists with schools, Public Health and social welfare agencies and teaching and research dietitians. The sequence offers opportunities for further work at the graduate level for the student interested in college teaching, positions with extension and other government services, research in institutions of higher learning, medical centers and industry. This program is planned to meet the basic requirements of the American Dietetic Association for admission to approved dietetic internships or other on-the-job training programs.

Major in Dietetic and Institutional Administration

	<i>Credits</i>		<i>Credits</i>
General Education	60	Professional	25
Home Economics Core	9	Electives	15
Semi-Professional (incl. Gen. Ed.)	15	Physical Education	8
Credits 124			

I. General Education

	<i>Credits</i>
English 1 and 2, Composition	4
English 25 and 26, Masterpieces of Western Literature	6
Speech 3, Oral Communication	2
Economics 25, Elements of	3
Sociology 25, Introductory	3
Psychology I, General	3
History 5, 6, 25, or 26, <i>or</i> Government 25, 26, 51, 52, 61, 62, or 66	3
Chemistry 1 and 2, General	6
Chemistry 33, Organic	4
Chemistry 79, Elementary Biochemistry	4
Zoology 1, Introductory	3
Zoology 35, Vertebrate Physiology	3
Microbiology 31, Introductory	4
Mathematics 1, Introductory	3
Accounting 25, Introduction to Accounting	3
Limited Electives—to be selected from the following areas: Music, Art, Speech, Anthropology, Philosophy, or Language	6

School of Home Economics

II. Home Economics Core	
FN 27, Man and Nutrition	3
Select two from remaining three core courses:	
TCRA 21, Man and Clothing	
TCRA 23, Art for Living	
MFE 50, Family Management and Decision Making	6
III. Semi-Professional	
FN 30, Food Science and Preparation	3
HEEd. 81, Adult Education in Home Economics	3
Limited Electives—to be selected from the following sequence:	
MFE 74, Consumer Attitude and Demand	
MFE 77, Theory and Application of Management	
Public Health 61 or 62, General & Community Sanitation	
Economics 79, Labor Problems	
Horticulture 74, Merchandising of Perishables, <i>or</i> Honors	9 6
Research Problems	3
IV. Professional	
FN 51, Meal Management	3
FN 91, 92, Institutional Administration	8
FN 52, Advanced Nutrition and Dietetics	3
FN 89, Nutrition in Disease	3
FN 94, Experimental Foods	3
Management 64, Personnel Management	3
FN 95, Seminar in Institutional Administration <i>or</i> Foods	1 1
FN 96, Seminar in Nutrition	1
<i>Electives</i>	15

Food and Nutrition in Business

This curriculum is based on professional training in Food and Nutrition combined with selected courses in the humanities, social sciences and business. The program is designed for the student who is oriented to the business world, and leads directly into product development, research or consumer services with food, equipment, and utility industries. Positions are open in the field of communications for the student who combines her knowledge of Food and Nutrition with Journalism, English, Public Speaking, Television and Radio. Graduates with a major in this sequence are also placed in advertising and public relations agencies or with consulting firms. This curriculum allows students to pursue graduate study.

Directory of Courses

Major in Food and Nutrition in Business

	<i>Credits</i>		<i>Credits</i>
General Education	65	Professional	23
Home Economics Core	9	Electives	15
Semi-Professional (incl. Gen. Ed.)	16	Physical Education Credits	8
		128	

<i>I. General Education</i>	<i>Credits</i>
English 1 and 2, Composition	4
English 25 and 26, Masterpieces of Western Literature	6
Speech 3, Oral Communication	2
Speech 50, Voice and Diction and Oral Interpretation	3
Philosophy 25, Introductory <i>or</i>	
31, Intro. Logic and Scientific Method <i>or</i>	
42, Ethics <i>or</i> 82, Aesthetics	3
Journalism 51, Intro. to Mass. Communications	3
Psychology I, General	3
Economics 25, Elements of	3
Food Economics 75, Food Merchandising	3
Food Economics 78, Food Marketing	3
Sociology 25, Introductory	3
Government 25, American <i>or</i>	
Government 66, American Political Thought	3
Chemistry 1 and 2, General	6
Chemistry 33, Organic	4
Mathematics I, Introductory	3
Zoology 1, Introductory	3
Zoology 35, Vertebrate Physiology	3
Microbiology 31, Introductory	4
Art 31, Basic Design	3
<i>II. Home Economics Core</i>	
FN 27, Man and Nutrition	3
TCRA 23, Art for Living	3
MFE 50, Family Management and Decision Making	3
<i>III. Semi-Professional</i>	
MFE 75, Personal and Family Economics	3
MFE 77, Theory and Application of Management	3
Marketing 53, Marketing Principles	3
Marketing 62, Marketing Research	3
Chemistry 79, Elementary Biochemistry*	4
* Those interested in Utility work substitute Marketing 54, Salesmanship & Sales Management.	
<i>IV. Professional</i>	
FN 30, Food Science and Preparation	3
FN 51, Meal Management	3
FN 52, Advanced Nutrition and Dietetics*	3
HEEd. 61, Communication by Demonstration Methods	3
FN 92, Quantity Food Preparation	4
FN 94, Experimental Foods	3
MFE 74, Consumer Attitudes and Demand	3
FN 95, Seminar in Foods	1
<i>Electives</i>	15
* Substitute FN 73, Nutrition During Growth and Development for Utility work.	

Textiles, Clothing and Related Arts

A field of specialization in this area is entitled Fashion in Retailing and Business. The retailing and professional opportunities associated with clothing, textiles, home furnishings and related merchandise are limitless. They include positions with manufacturers, producers, retailers, buying organizations, newspapers and magazines, radio and TV, consumer groups as well as educational institutions and social and government agencies. The student who is interested in the business field can get, by specializing in this area, a curriculum with a strong program of liberal arts with emphasis on the social sciences. Courses which build on this base toward professional business competency include fundamentals of clothing, textiles, fashion and related arts as well as courses in business, retailing and related subjects.

Major in Fashion in Retailing and Business

	<i>Credits</i>		<i>Credits</i>
General Education	60	Professional	24
Home Economics Core	9	Electives	12
Semi-Professional (including Gen. Ed.)	28	Physical Education	8

Credits 127

<i>I. General Education</i>	<i>Credits</i>
English 1 and 2, Composition	4
Speech 3, Oral Communication	2
English 25 and 26, Masterpieces of Western Literature	6
Foreign Language or Proficiency	12
Mathematics I, Introductory	3
Physical or Biological Science—3 Sciences or 2 Sciences and Math II	9
Sociology 25, Introductory	3
Psychology I, General	3
Economics 25, Elements of	3
Economics 55, Consumption and Personal Finance	3
Limited Electives, one from each following sequence:	12
Philosophy 25, 42, 82	
Government 25, 66	
Sociology 59	
Psychology 62, 79	

Directory of Courses

II. Home Economics Core

TCRA 21, Man and Clothing	3
TCRA 23, Art for Living	3
FN 27, Man and Nutrition or	
MFE 50, Family Management and Decision Making	3

III. Semi-Professional

TCRA 28, Fundamentals of Clothing Const. or	
TCRA 53, Advanced Clothing Construction	3
TCRA 24, Textiles I	3
TCRA 86, Textiles II	3
TCRA 65, Apparel Selection and Design	3
TCRA 66, Apparel & Home Furnishing Accessories	3
TCRA 76, History of Decorative Arts	3
TCRA 79, Interior Design	3
TCRA 85, Fashion Industries	4
HEEd. 61, Communication by Demonstration Methods	3

IV. Professional

TCRA 42, Fashion in Retailing and Business	3
Marketing 53, Principles	3
Marketing 71, Retail Merchandising	3
MFE 74, Consumer Attitudes and Demand	3
TCRA 93, Retailing Field Experience	6
TCRA 95, Seminar in Fashion in Retailing & Business	3
TCRA 97 or 98, Problems in Retailing	3
<i>Electives</i>	12

HOME ECONOMICS EDUCATION

Home Economics Education offers curricula which provide a broad cultural education and preparation for teaching under two options: Secondary Education and Extension; and Nursery School Education.

Secondary Education and Extension

The School of Home Economics, in cooperation with the School of Education, prepares students for teaching Home Economics in junior and senior high schools. Students interested in Home Economics Extension, with the aid of an extension adviser, select courses that prepare them for continuing education positions in extension in both adult and 4-H programs. This curriculum provides basic training for graduate work in the field of home economics teaching and extension.

School of Home Economics

Major in Secondary Education and Extension

	<i>Credits</i>		<i>Credits</i>
General Education	61	Professional	34
Home Economics Core	9	Electives	9
Semi-Professional (including Gen. Ed.)	15	Physical Education	8
		Credits 128	

I. *General Education*

	<i>Credits</i>
English 1 and 2, Composition	4
English 25 and 26, Masterpieces of Western Literature	6
Speech 3, Oral Communication	2
Speech 50, Voice & Diction & Oral Interpretation <i>or</i> English 51, Advanced Expository Writing	3
Sociology 25, Introductory	3
HD 80, Human Development in the Family <i>or</i> Sociology 57, The Family	3
Psychology I, General	3
Psychology 56, Educational	3
Psychology 66, Adolescent	3
History 25 and 26, American	6
Philosophy 25, 31, 42, or 51	3
Government 25, 52, 53, 56, 63, 66, or 72	3
Economics 25, Elements of	3
Chemistry 1 and 2, General	6
Chemistry 33, Organic	4
Mathematics I, Introductory	3
Sociology 51, 52, 59, 75 <i>or</i> Economics 26, 53, 55	3

II. *Home Economics*

FN 27, Man and Nutrition	3
TCRA 23, Art for Living	3
MFE 50, Family Management and Decision Making	3

III. *Semi-Professional*

Education 51, History of Education	3
Education 52, Principles and Methods of Teaching	3
FN 30, Food Science and Preparation	3
TCRA 24, Textiles I	3
TCRA 28, Fundamentals of Clothing Construction <i>or</i> TCRA 21, Man and Clothing	3

IV. *Professional*

HEEd. 82, Curriculum in Home Economics	3
Ed. 85, Observation and Student Teaching	6
FN 51, Meal Management	3
FN 73, Nutrition During Growth and Development	3
TCRA 53, Advanced Clothing Construction	3
TCRA 65, Apparel Selection and Design	3
TCRA 79, Interior Design	3
MFE 75, Personal and Family Economics	3
HEEd. 61, Communication by Demonstration Methods	3
MFE 77, Theory and Application of Management	3
HEEd. 95, Seminar in Home Economics Education	1
<i>Electives</i>	9

Nursery School Education

Students in this option participate in a program of academic studies which are interdisciplinary in nature. This program brings together knowledge from psychology, sociology, education, the arts, biology, anthropology, and relates it to the study of human development and early childhood education. Directed experience with the children of the laboratory nursery school and their families provides the necessary opportunity for students to develop a sound personal philosophy of early childhood education, and to achieve competence in implementing it. More intensive specialization for qualified students may be obtained through the election of a one-semester affiliation with: (1) Merrill-Palmer Institute in Detroit, Michigan, which specializes in the study of human development and family life; (2) the Eliot-Pearson School in Boston, Massachusetts, which specializes in the education of the three- to six-year-old child.

The nursery school education program prepares the student for work in various types of group programs serving children of three and four years, such as laboratory nursery schools, public and private nursery schools, specialized nursery schools associated with clinics for exceptional children, hospital recreation programs, and nursery school programs in children's residential institutions. In addition, the nursery school education curriculum provides a good background for graduate work in various other child-serving professions.

Major in Nursery School Education

	<i>Credits</i>		<i>Credits</i>
General Education	60	Professional	28
Home Economics Core	9	Electives	15
Semi-Professional	9	Physical Education	8
(including Gen. Ed.)		Credits 121	

I. *General Education*

	<i>Credits</i>
English 1 and 2, Composition	4
English 25 and 26, Masterpieces of Western Literature	6
Speech 3, Oral Communication	2
Zoology 1, Introductory	3
Zoology 37 and 38, Human Anatomy and Physiology	6
Sociology 25, Introductory	3
Psychology I or II, General	3
Economics 25, Elements of	3
Government 25, 52, 53, 56, 63, 66, or 72	3
Math. 1, Introductory	3
Philosophy 25, 31, 42, 51, 72, or 82	3

School of Home Economics

	<i>Credits</i>
English 51, or Speech 50, 91, 92, or 93	3
Foreign Language or proficiency	12
(if proficiency in language is accomplished before the completion of 12 credits, electives taken in place of the language are to be chosen from a selected list of courses from the following areas: Zoology, Psychology, Speech, Sociology and Anthropology, Recreation and Physical Education, Education, and Public Health)	
Limited Electives	6
To be chosen from the following areas: Anthropology, Art, Biological Sciences, Economics, Education, English or American Literature, History, Home Economics (core only), Music, Physical Sciences	
II. Home Economics Core	
FN 27, Man and Nutrition	3
TCRA 23, Art for Living	3
MFE 50, Family Management and Decision Making	3
III. Semi-Professional	
Anthropology 63, Social Anthropology	3
Statistics 77, Elementary Experimental Statistics	3
Limited Elective (from Psychology, Sociology, Zoology, Recreation, Physical Education, Education, Public Health, Speech)	3
IV. Professional	
HD 70, Child Development	3
HD 80, Human Development in the Family or Sociology 57, The Family	3
Music 85, Music Education—Music for the Elementary School Teacher	3
HEEd. 63, Art Activity in Recreation	3
HD 83, 84, Nursery School Management	6
FN 73, Nutrition During Growth and Development	3
Psychology 83, Abnormal Psychology	3
HD 95, 96, Seminar in Human Development	1
HD 97, 98, Problems in Nursery School Management	3
<i>Electives</i>	15

HOME ECONOMICS

Dean: PROFESSOR MARION A. NIEDERPRUEM. PROFESSOR BURROUGHS; ASSOCIATE PROFESSORS COOK, D. DAVIS, HAWES, MERRIAM; ASSISTANT PROFESSORS V. DAVIS, McCULLOUGH, MERCHANT; MRS. GREENBAUM, MRS. JARVESOO, MRS. JOHNSON, MRS. SULLIVAN, MISS WEAVER.

FOOD AND NUTRITION (FN)

27. (I) (II) Man and Nutrition

Fundamentals of the science of nutrition and its role in everyday life. Overview of the development of man's food habits encompassing psychological, social, economic and racial factors. 3 class hours. Credit, 3. Mrs. Cook.

30. (II) Food Science and Preparation

Fundamental scientific principles and comparative methods of food preparation. Prerequisite, Chemistry 33. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss D. Davis.

41. (I) Nutrition and Food Preparation

Combines the fundamentals of nutrition with food preparation and meal planning to meet nutritional requirements. For student nurses whose responsibility will be mostly with their patients. Registration by permission of the instructor. Prerequisites, Chemistry 1 and 2, Zoology 37. 2 class hours. 1 3-hour laboratory period. Credit, 3. Mrs. Cook, Mrs. Johnson.

51. (I) Meal Management

Consideration is given to money, time and energy expenditures and personal satisfactions in line with individual food requirements. The planning of meals according to the modern concepts of food preparation. Prerequisite, FN 30. 2 class hours, 1 3-hour laboratory period. Credit, 3. Miss D. Davis.

52. (II) Advanced Nutrition and Dietetics

Absorption, utilization and interrelationship of food nutrients. Evaluation of factors that influence nutrient requirements. Critique of methods of determining nutrient requirements. Prerequisites, FN 27, 51, Chemistry 79, Zoology 35. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mrs. Cook.

56. (I) and (II) Principles of Food Preparation and Meal Planning

A survey course designed for non-major men and women. Basic food principles, food preparation and meal planning are emphasized. Reference to consumer food buying problems is included. 2 class hours, 1 3-hour laboratory period. Credit, 3. Miss D. Davis, Mrs. McCullough.

72. (II) Quantity Food Purchasing

A study of food distribution processes as they influence the purchase of food (cereal, dairy and meat products, fruits and vegetables, and fish) at the quantity or institutional level. Prerequisites, Accounting 25 or equivalent, Economics 25. 3 class hours. Credit, 3. Mrs. McCullough, Coordinator, Messrs. Snyder, Buck, Evans and others.

73. (I) Nutrition During Growth and Development

Nutrition as it affects physical growth and development from prenatal through adolescence. Criteria for judging and studies of nutritional status of children. Opportunity for laboratory work in the Nursery School. Prerequisites, FN 27 or 52. 3 class hours. Credit, 3. Mrs. Cook.

89. (I) Nutrition in Disease

Physiological basis for the use of therapeutic diets in certain diseases. Current medical and nutrition literature used. Prerequisites, FN 52, Chemistry 79, Zoology 35 or equivalent. 3 class hours. Credit, 3. Mrs. Cook.

91. (I) Institutional Administration

Principles of organization, personnel management, sanitation, food service planning and equipment selection. Field trips in the area. Prerequisites, FN 51 or 56. 2 class hours, 1 4-hour laboratory period or field trip. Credit, 4. Mrs. McCullough.

92. (II) Quantity Food Preparation

Experience in use of large equipment and application of principles of quantity food preparation, service and cost control. University Dining Hall and Amherst School Lunch Program utilized. Prerequisites, FN 51 or Food Management 33, FN 30. 2 class hours, 1 4-hour laboratory period. Credit, 4. Mrs. McCullough.

94. (II) Experimental Foods

Investigation of experimental techniques and advanced knowledge related to the chemistry of food preparation. Original research projects included. For those interested in dietetics, food and nutrition in business or non-majors interested in foods. Prerequisites, FN 30 and 51; and/or Chemistry 33 or Chemistry 51 and 52, or permission of instructor. 2 class hours, 1 3-hour laboratory period. Credit, 3. Miss D. Davis.

95. (1) (I) Seminar in Foods

Readings and discussions of foods based on the scientific literature. Designed primarily as a Senior course for majors in Food and Nutrition. Prerequisites, FN 30 and 51, or permission of instructor. 1 class hour. Credit, 1. Miss D. Davis.

95. (2) (I) Seminar in Institutional Administration

1 class hour. Credit, 1. Mrs. McCullough.

96. (II) Seminar in Nutrition

Individual reports and discussion of current research in nutrition. To be taken Senior year. Prerequisites, FN 27 or 52. 1-2 class hours. Credit, 1. Mrs. Cook.

97. (I) 98. (II) Problems in Foods, Nutrition or Institutional Administration

An intensive study of some phase of foods, nutrition or institutional administration. By permission of the staff adviser. Credit, 1-3. Staff.

TEXTILES, CLOTHING AND RELATED ARTS (TCRA)

21. (I) Man and Clothing

The impact of clothing and textiles, its sociological, psychological and economic implications to the individual and society, seen in historic and contemporary perspective. Prerequisites, Sociology 25, Psychology 1, Economics 25, or by permission of instructor. 3 class hours. Credit, 3. V. Davis.

23. (I) Art for Living

Value identification and judgment through the study of design. Concepts basic to artistic expression. Illustrated lectures, field trips. 3 class hours. Credit, 3. Mrs. Jarvesoo.

Home Economics

24. (II) Textiles I

Introductory study of fibers, fabrics, finishes, quality, care and performance of textile products and their role in the economic and cultural development of society. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss Hawes.

28. (II) Fundamentals of Clothing Construction

Fundamental principles of garment construction as a form of artistic expression from grain perfection to quality product with emphasis on accuracy, fit and finishing. 2 class hours, 2 2-hour laboratory periods. Credit, 3. Miss Hawes.

42. (II) Fashion in Retailing and Business

A study of the retailing and professional opportunities associated with clothing, textiles, home furnishings and related merchandise. Analysis of the function of retailing, types of retail organizations and their internal organizations. Four field trips will be included on scheduled Saturdays. Prerequisite, Economics 25. 3 class hours. Credit, 3. Miss Niederpruem.

53. (I) Advanced Clothing Construction

Principles and practices of clothing construction. Emphasis on study of patterns and problems of fitting. Opportunities for students to create original designs. Prerequisite, TCRA 28. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mrs. Jarvesoo.

65. (I) Apparel Selection and Design

A comprehensive study of the development of individual expression and the attainment of satisfactions in men's, women's and children's apparel through an understanding and adaptation of basic knowledge of selection and design. Prerequisites, TCRA 23, or permission of instructor, Psychology 1 or Sociology 25. 3 class hours. Credit, 3. Miss Hawes.

66. (II) Apparel and Home Furnishings Accessories

Materials, manufacturing processes, resources and markets of apparel and home furnishing accessories. Quality differences and essential selling information in ceramics, glassware, metals, jewelry, leathers, furs, plastics and furniture. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss Hawes.

76. (II) History of Decorative Arts

A study of style periods in historic context—their aesthetic contributions. Emphasis on developments in western dress, furniture and furnishings. Illustrated lectures. Study tours. Prerequisite, TCRA 23, or by permission of instructor. 3 class hours. Credit, 3. Mrs. Jarvesoo.

78. (II) Applied Textile Design

A creative approach to textile art. Original designing which emphasizes principles of organization. Application to heighten the understanding in techniques and media. Prerequisites, TCRA 23, or Art 31, or by permission of the instructor. 1 class hour, 1 4-hour laboratory period. Credit, 3. Mrs. Jarvesoo.

79. (I) Interior Design

Principles in coordinating furnishings, backgrounds, accessories, color, lighting, etc. to interior designs. Prerequisite, TCRA 23. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mrs. Jarvesoo.

85. (I) Fashion Industries

Organization and structure of fashion industries in primary and regional markets producing ready-to-wear and apparel accessories. Factors affecting designing, production, distribution and consumption of clothing. Emphasis on the promotion process in fashion merchandising. Prerequisites, Marketing 71. 4 class hours. Credit, 4. Miss V. Davis.

86. (II) Textiles II

Concentrated study and evaluation of recent scientific and technical developments in fibers and finishes affecting appearance, performance, care and cost. Prerequisite, TCRA 24. 3 class hours. Credit, 3. Miss Hawes.

93. (I) Retailing Field Experience

A 7-8 weeks off-campus supervised and coordinated training-work program in a cooperating department store. Experience in selling supervision or merchandising followed by evaluation of training, work experience, leadership development and individual progress. Prerequisites, Marketing 71, TCRA 42, 24, 66, and 6-8 weeks selling experience; or permission of instructor. Credit, 6. (This course will be blocked in the same manner as the present student teaching course.) Miss Niederpruem.

95. (I) Seminar in Fashion in Retailing and Business

Planning, developing and executing a survey or study of special interest to the student in the areas of retail store operations or management, clothing consumption patterns, consumer clothing problems or related topics. Prerequisites, TCRA 42, Marketing 71. 3 class hours. Credit, 3. Miss Niederpruem.

97. (I) 98. (II) Problems in Fashion Retailing and Business

Credit, 1-3. Staff.

HOME ECONOMICS EDUCATION (HEEd)

61. (I) Communciation by Demonstration Methods

The developing and selling of an idea through the medium of demonstration as applied to education and promotional work. The building of individual confidence is stressed. Prerequisites, Speech 3, 6 credits in major area, or permission of instructor. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Miss D. Davis.

63. (I) Art Activity in Recreation

Stresses creative growth of the individual. Adapted for those working in schools, playgrounds, camps, in recreational leadership and occupational therapy. Prerequisite, Psychology 1. 2 class hours, 1 2-hour laboratory. Credit, 3. Mrs. Sullivan.

81. (I) Adult Education in Home Economics

Organization of material, selection, use and evaluation of teaching techniques suited to group work with adolescents and adults. Credit toward meeting state standards for teachers and A.D.A. requirement. Prerequisite, minimum 6 credits in major area. 2 class hours, 1 2-hour laboratory. Credit, 3. Mrs. Sullivan.

82. (II) Curriculum in Home Economics

Organization, scope and sequence of learning experiences in home economics education at secondary level. Philosophy and content of curriculum, development of resource units. Prerequisites, Psychology 56 and 66, Education 51. 2 class hours, 1 2-hour laboratory. Credit, 3. Mrs. Sullivan.

Home Economics

95. (I) Seminar in Home Economics Education

1 class hour. Credit, 1. Mrs. Sullivan.

97. (I) 98. (II) Problems in Home Economics Education

An intensive study of some phase of home economics education. Credit, 1-3. Staff.

MANAGEMENT AND FAMILY ECONOMICS (MFE)

50. (II) Family Management and Decision Making

Management and Decision Making in the Family. A presentation of the integrated nature of home management; concerns values and goals as reflected in decision making about family resources. 3 class hours. Credit, 3. Staff.

60. (II) Household Equipment

Physical principles, construction, materials and economic considerations underlying the selection, use and care of household equipment. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss Merriam.

74. (II) Consumer Attitudes and Demand

Study of the motives, attitudes and expectations of consumer behavior as influencing variables operating within and on the market. Prerequisites, Economics 25, Psychology 1, Sociology 25, or by permission of the instructor. 3 class hours. Credit, 3. Miss Merchant.

75. (I) Personal and Family Economics

Analysis of financial problems and alternatives available to individuals and families under changing conditions. Exploring aspects of financial institutions affecting people in our economic society. Prerequisite, Economics 25, or by special permission of instructor. 3 class hours. Credit, 3. Miss Merriam.

77. (I) (II) Theory and Application of Management

Theory and application of principles of effective home management. Residence provided. Problem-solving program applied to theoretical and practical situations. Prerequisites, MFE 50, FN 27 and 30 or 56. Three weeks residence and 11 weeks of: 1 class hour, 1 2-hour laboratory period. Credit, 3. Miss Merriam.

HUMAN DEVELOPMENT (HD)

70. (I) (II) Child Development

The study of the child from the developmental point of view. Emphasis is on interaction of heredity and environment on development, including material on cross-cultural child rearing patterns. Prerequisites, Sociology 25, Psychology 1. 3 class hours, 1 1-hour laboratory period. Credit, 3. Mrs. Greenbaum.

80. (II) Human Development in the Family

The family as the dynamic setting for the development of the human being from conception to senescence, with consideration of roles and relationships at the various developmental stages. Prerequisites, Psychology 1 and Sociology 25. 3 class hours. Credit, 3. Mr. Burroughs.

83. (I) Nursery School Management

Principles and methods of nursery school education. Directed experience in teaching and curriculum planning for three- and four-year-old children. Field trips. Prerequisites, HD 70 or equivalent. 2 class hours, 1 3-hour laboratory period. Credit, 3. Miss Weaver.

84. (II) Nursery School Management

Continuation of 83. Prerequisite, HD 83, or permission of instructor. 2 class hours, 1 3-hour laboratory period. Credit, 3. Miss Weaver.

95. (I) Seminar in Human Development

Prerequisite, HD 70 or 80. 1 class hour. Credit, 1. Staff.

97. (I) 98. (II) Problems in Nursery School Education

An intensive study of some phase of Nursery School Education. By permission of staff adviser. Credit, 1-3. Staff.

SCHOOL OF NURSING

MARY A. MAHER, *Dean*

The basic nursing program is designed to prepare the qualified high school graduate for a career in professional nursing, as well as for the responsibilities of family and community life.

The program aims to equip the graduate with those understandings and skills which are needed to function effectively in beginning positions in a variety of nursing situations. These include the ability to provide competent nursing care to patients and families in the hospital, home and community; to participate with allied professional and citizen groups for the improvement of total health services to individuals and communities; to participate in organizing, planning and directing the work of nursing auxiliary workers. A foundation is laid for advanced study, through which the nurse may prepare for positions in teaching, supervision, administration, consultation and research.

During the first two years, the student builds an educational foundation upon which to base the more specialized portion of the program. Courses in the humanities and in the sciences—biological, physical and behavioral—are taken with other students on the campus.

The clinical aspects of the program are developed in the next two years, when instruction and correlated clinical practice are given in selected cooperating agencies by the nursing faculty of the University and the allied professional staffs of the cooperating agencies. These agencies include: the Springfield Hospital; the Wesson Maternity Hospital, Springfield; the Northampton State Hospital; the Visiting Nurse Association of Springfield, the Springfield Health Department; and other community health, educational and welfare resources.

The Bachelor of Science degree, awarded upon successful completion of this program, qualifies the graduate for State Board Examinations in Nursing. If achievement in these examinations is satisfactory, the candidate receives legal status as a registered nurse within the state.

The program is fully accredited by the Accrediting Service of the National League for Nursing.

PROGRAM SEQUENCE

FIRST YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1, English Comp.	2	English 2, English Comp.	2
Chemistry 1, General	3	Chemistry 2, General	3
Zoology 1, Introductory	3	Psychology 1, General or Sociology 25, Introduction	3
Psychology 1, General or Sociology 25, Introduction	3	Elective*	3
Elective*	3	Speech 3**, Public Speaking	2
Speech 3**, Public Speaking	2	Nursing 1, Introduction	3
Physical Education 1a, b†	2	Physical Education 2a, b†	2

* Elective chosen from: History, Government, or Economics.

Students wishing to elect a foreign language may do so providing the basic requirement of six elective credits in the social sciences is fulfilled. If a language is elected, intermediate proficiency is required.

** May be taken either semester.

† Not quality point credit.

SECOND YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25, Masterpieces of Western Literature	3	English 26, Masterpieces of Western Literature	3
Microbiology 1, Introductory	3	Chemistry 33, Organic	4
Zoology 37, Human Anatomy & Physiology	4	Zoology 38, Human Anatomy & Physiology	4
Food & Nutrition 41, Nutrition & Food Preparation	3	Human Development 80, Human Development in the Family	3
Nursing 25, Fundamentals of Nursing I	3	Nursing 26, Fundamentals of Nursing II	3
Physical Education 31a, b†	2	Physical Education 32a, b†	2

† Not quality point credit.

THIRD YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Nursing 51, Medical and Surgical Nursing I	14	Nursing 60, Medical and Surgical Nursing II	14
Elective*	3	or	
		Nursing 57, Maternal and Child Nursing	14
		Elective*	3

* Elective: Chosen from Behavioral Sciences.

FOURTH YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Nursing 57, Maternal and Child Nursing	14	Nursing 60, Medical and Surgical Nursing II	14
or		or	
Nursing 54 and 58, Psychiatric Nursing and Public Health Nursing	14	Nursing 54 and 58, Psychiatric Nursing and Public Health Nursing	14
Nursing 95, Senior Nursing Seminar	2	Nursing 96, Senior Nursing Seminar	2
Elective*	3	Elective**	3

* Elective: Chosen from Art, English, Foreign-language Literature, Music, Philosophy.

** Elective: Student will be guided in her selection by her major advisor.

SCHOOL OF NURSING

Dean: MARY A. MAHER. PROFESSORS GILMORE, MACDONALD; ASSOCIATE PROFESSOR DIMAGGIO; ASSISTANT PROFESSORS BYRNE, CROWLEY, WALKER; INSTRUCTORS CONDRON, HALL, HOWARD.

1. (II) Introduction to Nursing

Designed to assist the individual student in her personal and professional adjustment to nursing. Enrollment limited to students of nursing. Credit, 3. Miss Crowley, Miss Macdonald.

25. (I) Fundamentals of Nursing I

Aims at the acquisition of beginning knowledge and skills considered basic to an effective nurse-patient relationship. Selected experiences in the care of the hospitalized adult and child and in the area of maternal care are provided. Prerequisite, Nursing 1. Credit, 3. Miss Macdonald and the Clinical Nursing Faculty.

26. (II) Fundamentals of Nursing II

A continuation of Nursing 25. Includes a unit on the ethical, legal and group relationships and responsibilities of the student of nursing. Prerequisite, Nursing 25. Credit, 3. Miss Macdonald and the Clinical Nursing Faculty.

51. (I) Medical and Surgical Nursing I

Through a study of major health problems of adults and clinical experience with patients in a general hospital, the student learns to minister total nursing care. Prerequisite, Nursing 26. 10 class hours, 16 clinical nursing laboratory periods. Credit, 14. Miss Gilmore, Miss Condron, Miss Howard, Miss Crowley, Miss Macdonald, Medical and Allied Professional Staffs of the Springfield Hospital and other Health Agencies.

54. (I) (II) Psychiatric Nursing

A study of the care of psychiatric patients with emphasis on the role of the nurse in treatment and prevention of mental illness in both the home and hospital. Concepts from the fields of psychiatry, psychology and sociology are integrated with those of psychiatric nursing. Taught concurrently with Public Health Nursing. Prerequisite, Nursing 51. 5 class hours, 6 clinical nursing laboratory periods. Credit, 7. Miss Hall, Psychiatric and Allied Professional Staffs of the Cooperating Hospitals and Agencies.

57. (I) (II) Maternal and Child Nursing

The first unit of the course is developed around the responsibilities of marriage and family living.

The second unit, concerned with the meaning of pregnancy to the mother, baby and family, provides an opportunity for planning and ministering nursing care throughout the maternity cycle.

In the third unit of the course, a developmental approach in studying the health needs of children is utilized and clinical experience in caring for sick children is provided. Prerequisite, Nursing 51. 10 class hours, 16 clinical nursing laboratory periods. Credit, 14. Miss DiMaggio, Miss Walker, Miss Crowley, Obstetrical, Pediatric and Allied Professional Staffs of Wesson Maternity Hospital, Springfield Hospital and other Health and Community Agencies.

58. (I) (II) Public Health Nursing

The philosophy, scope and purpose of public health and public health nursing. Principles and practices of public health nursing are taught concurrently with selected experiences in an official and non-official public health nursing service and with Psychiatric Nursing. Prerequisites, Nursing 51, 57. 5 class hours, 12 public health nursing practice periods. Credit, 7. Miss Byrne, Mr. Wisnieski, Professional Staffs of Visiting Nurse Association of Springfield, Springfield Health Department and other Health Agencies.

60. (II) Medical and Surgical Nursing II

A continuation of Nursing 51. Through study and clinical experience with patients with multiple health problems in a general hospital, the student learns to minister comprehensive nursing care. Separate sections for junior and senior students. Prerequisite, Nursing 51. 10 class hours, 16 clinical nursing laboratory periods. Credit, 14. Miss Gilmore, Miss Condron, Miss Howard, Miss Crowley, Medical and Allied Professional Staffs of the Springfield Hospital and other Health Agencies.

95. (I) Seminar

A seminar in which the principles of management as applied to the nursing care of patients are studied. Enrollment limited to senior students of nursing. 2 class hours. Credit, 2. Miss Macdonald.

96. (II) Seminar

A seminar on professional, social and historical foundations of nursing. Enrollment limited to senior students of nursing. 2 class hours. Credit, 2. Miss Macdonald.

97. (I) 98. (II) Special Problems

Guided reading and research in selected areas of nursing specialization. Includes introductory unit on role and process of research in nursing. For qualified juniors and seniors. Credit, 1-6. Staff.

SCHOOL OF PHYSICAL EDUCATION

W. P. MCGUIRK, *Dean*

The School of Physical Education includes the Departments of Physical Education for Men, Physical Education for Women, Recreational Leadership, and Athletics. It offers a major in Physical Education, and in Recreational Leadership.

PHYSICAL EDUCATION FOR MEN

General Program

Each male freshman and sophomore student, unless exempted under certain conditions, must successfully complete four semesters of physical education and demonstrate his ability to swim as a requirement for his degree. The physical education requirement does not apply to those students excused by the University physician, veterans of military service, and certain transfer students.

Students may receive credit for physical education, during the sport in season, by becoming squad members of any freshman or varsity team. Freshmen who elect an athletic team sport for physical education credit must rejoin their class sections at the termination of the seasonal sport. Students may not participate in a given sport for credit for more than two semesters.

To fulfill requirements, all students must participate in three team sports, four individual activities and aquatics.

Major Program

S. W. KAUFFMAN, *Adviser*

The major program leading to the degree of Bachelor of Science in physical education is designed to train the student for a career as a teacher of physical education. The curriculum combines both general and professional education and provides for full teacher certification for the student who has met the prescribed requirements of preparation. The program also provides for adequate training in a minor area of teaching, elected by the student, including the coaching of inter-school athletics.

School of Physical Education

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1	2	English 2	2
P. E. 23, Principles of Health Ed.	3	Speech 3	2
Mathematics 12	3	Social Science Elective	3
P. E. 21, Intro. to Phys. Ed.	3	P. E. 22, First Aid and Safety	3
(Military or Air Science 11	1)	(Military or Air Science 12	1)
P. E. 5, Skills and Techniques	1	P. E. 6, Skills and Techniques	1
(Lacrosse—Gymnastics)		(Gymnastics—Badminton)	
<i>Elect One</i>		<i>Elect One</i>	
Chemistry 1	3	Chemistry 2	3
Botany 1	3	Botany 1	3
Zoology	3	Zoology 1	3
	—		—
	16		15

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25	3	English 26	3
Zoology 35, Physiology	3	Microbiology 31	4
P. E. 41, Anatomy	3	P. E. 42, Kinesiology	3
Psych. 1, Gen. Psychology	3	Psych. 56, Educ. Psychology	3
P. E. 35, Skills and Techniques	1	(Aquatics)	
(Soccer—Wrestling)		(Military or Air Science 26	1)
(Military or Air Science 25	1)	Electives	3
Humanities Elective	3		—
	—		17
	17		

JUNIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Rec. Ed. 77, Org. and Adm. of		Psych. 65, Child Psych.	3
Comm. Recreation	3	P. H. 88, Epidemiology	3
P. E. 53, Phys. Ed. Elem. &		P. E. 54, Methods of Phys. Ed.	1
Second. Sch.	3	P. E. 58, Coaching Track	1
P. E. 57, Coaching Baseball	1	P. E. 60, Coaching Football	1
P. E. 61, Coaching Basketball	1	P. E. 74, Tests and Msmts. in	
P. E. 59, Adaptive Phys. Ed.	3	Phys. Ed.	3
P. E. 63, Skills and Techniques	1	P. E. 64, Skills and Techniques	1
(Baseball—Basketball)		(Game—Track)	
Minor Electives	3-6	Minor Electives	3-6
	—		—
	15-18		16-19

Directory of Courses

SENIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Ed. 52, Prin. and Meth. Teach.	3	Speech 51, Extempore Speech	3
Ed. 88, Sec. Sch. Curriculum	3	P. E. 55, Org. & Adm. of	
Ed. 85, Practice Teaching*	6	Phys. Ed.	3
P. E. 81, Adm. Intramural		P. E. 76, Philos. and Prin.	
Programs	1	Phys. Ed.	3
P. E. 83, Skills and Techniques	1	P. E. 78, Physiology of Exercise	3
(Golf—Tennis)		P. E. 62, Coaching Soccer	1
	—	P. E. 84, Skills and Techniques	1
	14	(Rhythms)	
		Minor Elective	3
			—
			17

* Ed. 85 taken during last 8 weeks of semester. All other courses listed will be accelerated during the first 7 weeks of the semester.

PHYSICAL EDUCATION FOR WOMEN

General Program

Physical Education is required of all women students during their freshman and sophomore years. The courses are planned to provide recreative activity, to improve individual skills, to develop body grace and efficiency and to increase health and vigor.

The first and second year women students are required to take three class hours a week for a total of eight credits, one for each quarter of satisfactory work.

Major Program

RUTH J. TOTMAN, *Adviser*

The major course in physical education is planned to prepare women students for professional careers. Especial attention is given to preparing teachers for elementary and secondary schools in both physical and health education. Other areas for which the graduate will qualify are teaching sports and dance in social agencies, industrial plants, civic centers and camps. A foundation will be laid for specialization in graduate study.

The curriculum gives a broad general background as well as the professional preparation. There is opportunity for individual selection in order to provide a minor.

Curriculum for Women's Physical Education

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1	2	English 2	2
History 5	3	Speech 3	2
Math. 12	3	History 6	3
W. P. E. 10, Health for Adults	2	Zoology 1	3
W. P. E. 1, Introduction to Physical Education	2	W. P. E. 2, Introduction to the Child through Physical Education	2
W. P. E. 11, Skills	1	W. P. E. 12, Skills	1
Select one	3	Select one	3

Chemistry 1 and 2 are required if students have not had chemistry in high school. Others may select from Chemistry, Physics, Microbiology or Foreign Language.

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25	3	English 26	3
Sociology 25	3	Psych. 26, General	3
P. E. 41, Anatomy	3	R. L. 26, Camp Counseling	3
P. E. 22, First Aid & Safety	3	P. E. 42, Kinesiology	3
W. P. E. 35, Skills	1	W. P. E. 30, Aquatics	2
Music 29 or Art 14	3	W. P. E. 36, Skills	1
		Elective	3

JUNIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
W. P. E. 73, History and Principles of Physical Education	3	P. E. 74, Tests and Measurements	3
Zoology 35	3	W. P. E. 70, Organization & Administration of Physical Education	3
W. P. E. 63, Analysis of Rhythm	3	Psych. 56, Educational	3
W. P. E. 53, Physical Education in Elementary Schools	3	W. P. E. 56, Methods & Principles of Health Education	3
W. P. E. 51, Skills & Teaching Methods	2	W. P. E. 52, Skills & Teaching Methods	2
Elective	3	Elective	3

Directory of Courses

SENIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Teaching Semester		Non-teaching Semester	
Ed. 52, Principles and Methods	3	W. P. E. 83, Adaptive Physical Education	3
Ed. 88, Secondary Schools	3	W. P. E. 96, Seminar	3
Ed. 85, Practice Teaching	6	P. E. 78, Physiology of Exercise	3
W. P. E. 61, Skills & Teaching Methods	2	W. P. E. 62, Skills & Teaching Methods	2
		Elective	6

RECREATION

Major Program

W. E. RANDALL, *Adviser*

The department seeks to prepare men and women for positions involving administrative, supervisory and program leadership responsibilities in municipal recreation agencies, voluntary and youth-serving agencies, hospitals, and industrial and institutional organizations.

The program is designed to provide opportunities for a general education, a knowledge and understanding of people and society, activity skills and resource knowledge, professional competency, and practical experience in various leadership situations.

In addition to completing the curriculum as described below, the student is required to:

1. attend a professional conference approved by the department;
2. participate in programming activities at the Student Union, with a scout troop, or in a similar setting approved by the department;
3. devote one summer (minimum of six weeks) to a recreation position, preferably with pay, in a camp, playground, or similar setting approved by the department.

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Math. 12, Functional Math.	3
Bot. 1, Intro. Botany	3	Zool. 1, Intro. Zool.	3
Govt. 25, American Govt.	3	Psych. 1, General Psych.	3
Hist. 5, Mod. Europ. Civ.	3	M. P. E. 22, First Aid & Safety	3
Rec. Lead. 1, Intro. to Rec. L.	3	Rec. Lead. 2, Social Rec.	2
P. Rec. 13, Skills & Tech.	1	P. Rec. 14, Skills & Tech.	1
(Military or Air Science 11 (men))	1)	(Military or Air Science 12 (men))	1)

School of Physical Education

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25, Humane Letters	3	English 26, Humane Letters	3
Art 14, Intro. to Art or		Zool. 54, Natural History	3
Music 1, Intro. to Music	3	Speech 76, Stage Direction	3
Rec. Lead. 24, Group Leadership	3	Soc. 25, Intro. to Soc.	3
H. E. Ed. 63, Art Activity in Rec.	3	Rec. Lead. 26, Camp Counseling	3
P. Rec. 39, Skills & Techniques	1	M. P. E. 36, Aquatics or	
(Military or Air Science 25 (men)	1)	W. P. E. 30, Aquatics	2
Elective	3	(Military or Air Science 26 (men)	1)

JUNIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
P. Health 61, Gen. & Com.		Rec. Lead. 56, Op. of Rec. Facil.	3
Sanit.	3	Psych. 62, Social Psych.	3
Soc. 51, Urban Soc. or		Ed. 66, Audio-visual Aids in Ed.	3
Soc. 52, Rural Soc.	3	English 51, Advanced Expository	
Soc. 75, Social Problems	3	Writing	3
P. Rec. 67, Skills & Techniques	1	P. Rec. 68, Skills & Tech.	1
Electives	6	Electives	3

SENIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Rec. Lead. 85, Practice Lead.	6	Rec. Lead. 96, Concepts in Rec.	3
Rec. Lead. 77, Comm. Rec.	3	Speech 51, Extempore Speech	3
Rec. Lead. 53, Nature Rec.	3	Electives	9
Music 3, Elem. Music Theory	3		

Department of Athletics

W. P. McGUIRK, *Director*; E. E. LORDEN, *Assistant Director*

The following men coach intercollegiate athletics and intramurals:

R. E. Bergquist, freshman coach of baseball and Stockbridge basketball; R. Bresciani, assistant director sports information; L. E. Briggs, coach of varsity soccer; J. L. Cobb, assistant coach of track and director of intramural athletics; J. J. Delaney, assistant coach of football; C. B. Demers, head athletic trainer; J. G. Douglas, coach of wrestling; W. Footrick, coach of track and cross country; V. H. Fusia, coach of football; R. F. Garber, coach of lacrosse; C. S. Gladchuk, assistant coach of football and coach of golf; F. J. Glatz, assistant coach of football; J. Gundersheim, freshman gymnastic coach; E. Kjeldsen, varsity coach of gymnastics; S. R. Kosakowski, director of Stockbridge athletics and coach of hockey and tennis; J. A. Leaman, Jr., freshman coach of basketball and soccer; E. E. Lorden, coach of baseball; R. W. O'Connell, financial manager of athletics; J. Orr, coach of basketball; R. H. Page, director of sports information; J. R. Rogers, Jr., coach of swimming; T. S. Schmitt, assistant football coach.

PHYSICAL EDUCATION FOR MEN

Head of Department: PROFESSOR S. W. KAUFFMAN. PROFESSOR BRIGGS; ASSOCIATE PROFESSORS BISCHOFF, GARBER, RICCI; ASSISTANT PROFESSORS COBB, JAMES; MESSRS. BERGQUIST, BROSKY, DOUGLAS, GUNDERSHEIM, KJELSDEN, ZUNIC.

The following courses with the exceptions of 1a, 1b, 2a, 2b, 31a, 31b, 32a and 32b are offered for majors in Physical Education.

Non-major admission is only by permission of the Department.

1a, 1b (I) 2a, 2b (II) Physical Education

Aim of the course is to inculcate in the student an adequate knowledge of, a sufficient technique in, and a wholesome attitude toward physical education activities through the medium of individual, dual, and team sports. 3 class hours. Credit, 2. Not quality point credit.

5. (I) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) lacrosse. (Unit 2) apparatus gymnastics. 60 clock hours per semester. Credit, 1.

6. (II) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) tumbling and trampolining. (Unit 2) badminton. 60 clock hours per semester. Credit, 1.

21. (I) Introduction to Physical Education

Origins of physical education, fundamental concepts, current status in education, qualifications and professional opportunities in the field. 3 class hours. Credit, 3.

22. (II) First Aid and Safety

Materials applicable to the immediate care of the injured, causes of accidents and procedures designed to develop desirable safety practices. 3 class hours. Credit, 3.

23. (I) Principles and Practices in Health Education

Principles of personal and community health, teaching techniques, materials and resources. 3 class hours. Credit, 3.

31a, 31b (I) 32a, 32b (II) Physical Education

A continuation of Physical Education 1a, 1b, 2a and 2b. 3 class hours. Credit, 2. Not quality point credit.

35. (I) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) soccer. (Unit 2) wrestling. 60 clock hours per semester. Credit, 1.

36. (II) Skills and Techniques

Fundamental skills in life saving and water safety. Certification as American Red Cross Water Safety Instructor. 60 clock hours per semester. Credit, 1.

41. (I) Human Anatomy

A study of the gross structure and function of the human body. 2 class hours, 1 2-hour laboratory period. Credit, 3.

42. (II) Kinesiology

A study of the anatomical application basis to a thorough understanding of the mechanical problems in motor skills. Prerequisite, Physical Education 41. 2 class hours, 1 2-hour laboratory period. Credit, 3.

43. (I) Officiating

Techniques and practice in officiating major sports. 2 class hours. Credit, 2.

53. (I) Physical Education in Elementary and Secondary Schools

Modern materials and methods of teaching physical education in elementary and secondary schools. 3 class hours. Credit, 3.

54. (II) Methods of Physical Education

Laboratory experience in teaching individual, dual and team activities. Credit, 1.

55. (I) Organization and Administration of Physical Education

A study of the basic problems in the organization and administration of physical education. 3 class hours. Credit, 3.

57. (I) Methods and Materials: Coaching Baseball

Development of individual skills and techniques of teaching and coaching baseball. 2 class hours. Credit, 1.

58. (II) Methods and Materials: Coaching Track

Development of individual skills and techniques of teaching and coaching track. 2 class hours. Credit, 1.

59. (I) Adapted Physical Education

Programs of developmental activities, suited to the interests and capacities of students with disabilities restricted from participation in activities of the general physical education program. Prerequisite, Physical Education 42. 3 class hours. Credit, 3.

60. (II) Methods and Materials: Coaching Football

Development of individual skills and techniques of teaching and coaching football. 2 class hours. Credit, 1.

61. (I) Methods and Materials: Coaching Basketball

Development of individual skills and techniques of teaching and coaching basketball. 2 class hours. Credit, 1.

62. (II) Methods and Materials: Coaching Soccer

Development of individual skills and techniques of teaching and coaching soccer. 2 class hours. Credit, 1.

63. (I) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) baseball. (Unit 2) basketball. 60 clock hours per semester. Credit, 1.

64. (II) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) high and low organization games. (Unit 2) track and field. 60 clock hours per semester. Credit, 1.

74. (II) Tests and Measurements

The statistical interpretation of data and the practical application of measurement to physical education. 3 class hours. Credit, 3.

Physical Education for Women

75. (I) Athletic Injuries—Prevention and Care

The medical examination, techniques in support methods, therapeutic aids, clinical use of physiotherapy equipment. Prerequisite, Physical Education 42. 2 class hours, 1 2-hour laboratory period. Credit, 2.

76. (II) Philosophy and Principles of Physical Education

Contemporary interpretations and critical analysis for the foundation of policies and program construction. 3 class hours. Credit, 3.

78. (II) Physiology of Exercise

Application of basic physiological concepts of the program of physical education, emphasizing the physiological effects and adjustments accruing from participation in physical activity. Prerequisite, Physical Education 42. 2 class hours, 1 2-hour laboratory period. Credit, 3.

80. (I) and (II) Driver Education Instructor Course

Driver education and driver training at the instructor's level. Leads to certification as instructor in driver education and driver training. 2 class hours, 1 2-hour laboratory period. Credit, 3.

81. (I) Administration of Intramural Programs

Objectives, tourney design, organization and administration of intramural programs. 2 class hours. Credit, 1.

83. (I) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) tennis. (Unit 2) golf. 60 clock hours per semester. Credit, 1.

84. (II) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) dance. (Unit 2) rhythms. 60 clock hours per semester. Credit, 1.

97. (I) 98. (II) Special Problems Course

Presentation and discussion of research work in physical education, health, or athletics. 3 class hours. Credit, 3.

PHYSICAL EDUCATION FOR WOMEN

Head of Department: PROFESSOR RUTH J. TOTMAN. ASSOCIATE PROFESSORS HUBBARD, RIGGS; ASSISTANT PROFESSORS OGILVIE, REID, RUPP, VENDIEN, WALLACE; MISSES PRATT, ROBY, WOOLLIAMS.

1a. (I) Physical Education

Students are required to pass a safety test in swimming. Except for this requirement all unrestricted students may select any activity which is offered. Fall season: archery, field hockey, folk dance, golf, lacrosse, life-saving, modern dance, swimming, tennis, volleyball. 3 class hours. Credit, 1.

1b. (I) Physical Education

Winter I season: badminton, ballroom dance, basketball, body mechanics, bowling, diving, fencing, folk dance, gymnastics, life-saving, modern dance, swimming, synchronized swimming, tap dance, trampoline, volleyball. 3 class hours. Credit, 1.

2a. (II) Physical Education

Winter II season: same as in course 1b. 3 class hours. Credit, 1.

2b. (II) Physical Education

Spring season: archery, folk dance, golf, lacrosse, life-saving, modern dance, softball, swimming, synchronized swimming, tennis, volleyball. 3 class hours. Credit, 1.

5. (I) Introduction to Physical Education for Women

A brief survey of the various areas of physical education for all ages; the trends and opportunities in today's program. 2 class hours, 1 2-hour laboratory period. Credit, 2. Miss Totman.

6. (II) Introduction to the Child Through Physical Education

A study of children as they take part in physical activities. 2 class hours, 1 2-hour laboratory period. Credit, 2. Miss Riggs.

10. (II) Health for Adults

Practical personal and community health problems for the consideration of young adults. 2 class hours. Credit, 2. Miss Totman.

11. (I) Skills

Field hockey, tennis, gymnastics, swimming. 6 class hours. Credit, 1.

12. (II) Skills

Folk dance, basketball, golf, softball. 6 class hours. Credit, 1.

30. (II) Aquatics

Techniques unique in the teaching of aquatics including the American Red Cross courses. 2 class hours, 1 2-hour laboratory period. Credit, 2. Miss Wallace.

31a, 31b. (I) 32a, 32b. (II) Physical Education

The seasonal activities for sophomores are the same as in Courses 1a and 1b, 2a and 2b, with emphasis on perfecting techniques rather than learning the elementary skills. 3 class hours. Credit, 1.

35. (I) Skills

Archery, swimming, basketball officiating, dance. 6 class hours. Credit, 1.

36. (II) Skills

Dance, gymnastics, lacrosse, volleyball. 6 class hours. Credit, 1.

51. (I) Skills and Teaching Techniques

Soccer, speedball, hockey, tap dance, basketball. The chief emphasis will be on teaching techniques; however, improvement in skill will be stressed. 6 class hours. Credit, 2.

52. (II) Skills and Teaching Techniques

Gymnastics, ballroom dance, body mechanics. 6 class hours. Credit, 2.

53. Physical Education for Elementary Schools

Modern methods and material for teaching physical education in elementary grades. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss Riggs.

Physical Recreation

56. (II) Methods and Principles of Health Education for Elementary and Secondary Schools

To prepare students to teach health and hygiene in elementary and secondary schools. 3 class hours. Credit, 3. Miss Totman.

61. (I) Skills and Teaching Techniques

Fencing, folk dance, badminton. 6 class hours. Credit, 2.

62. (II) Skills and Teaching Techniques

Dance, bowling, lacrosse. 6 class hours. Credit, 2.

63. (I) Analysis of Rhythm

The analysis of the rhythmic structure of music and its application to motor activity. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss Roby.

70. (II) Organization and Administration

The organization of the school system, the role of the teacher, the necessary facilities and the program in physical education. 3 class hours. Credit, 3. Miss Ogilvie.

73. (I) History and Principles of Physical Education

A study of the principal methods of physical education throughout the western world and of the philosophical and scientific bases of learning and teaching as applied to physical education. 3 class hours. Credit, 3. Miss Ogilvie.

83. (I) Adaptive Physical Education for Women

The problems of exercise for girls who are restricted physically. 3 class hours. Credit, 3. Miss Hubbard.

96. (II) Seminar

The opportunity for specialized study in a chosen area of physical education with emphasis on practical application. 3 class hours. Credit, 3. Miss Ogilvie.

PHYSICAL RECREATION

The following courses, taught jointly by the departments of Physical Education for men and Physical Education for women, are offered for majors in Recreation. Non-major admission is only by permission of the department.

13. (I) Skills and Techniques

Development of fundamental skills and methods of teaching and organizing groups for participation in badminton and basketball. 60 clock hours. Credit, 1.

14. (II) Skills and Techniques

Development of fundamental skills and methods of teaching and organizing groups for participation in games and archery. 60 clock hours. Credit, 1.

39. (I) Skills and Techniques

Development of fundamental skills and methods of teaching and organizing groups for participation in tennis and minor recreational sports. 60 clock hours. Credit, 1.

67. (I) 68. (II) Skills and Techniques

Development of fundamental skills and methods of teaching and organizing groups for participation in winter sports and the various dance forms including ethnic, social and modern. 60 clock hours. Credit, 1.

RECREATION

Head of Department: PROFESSOR WILLIAM E. RANDALL. ASSISTANT PROFESSOR HARLOW; MISS FRANK.

1. (I) Introduction to Recreation

Fundamental concepts, current status, and established principles of recreation as a social force. Field trip. 3 class hours. Credit, 3.

2. (II) Social Recreation

Organization, leadership, and activity skills for the planning and conducting of social recreation programs. 1 class hour, 1 2-hour laboratory period. Credit, 2.

25. (I) Group Leadership

Foundations and tools for leadership. Successful leadership techniques for large and small groups such as clubs and communities. Field trips. 2 class hours, 1 2-hour laboratory period. Credit, 3.

26. (II) Camp Counseling

Operating procedures and program of organized camps. Camper guidance, program skills, and practical leadership experience. Two night camping trips plus one day trip. 2 class hours, 1 2-hour laboratory period. Credit, 3.

53. (I) Nature Recreation

Contemporary programs, activity skills, and leadership techniques for recreation programs based upon the natural sciences. Prerequisite, Zoology 54, or consent of instructor. Field trips. 2 class hours, 1 2-hour laboratory period. Credit, 3.

56. (II) Operation of Recreation Facilities

Functions and methods for directors of various kinds of recreation facility. Field trip. 3 class hours. Credit, 3.

77. (I) Organization and Administration of Community Recreation

Functions and methods for supervisors and assistant superintendents of various types of recreation agency. Field trip. 3 class hours. Credit, 3.

85. (I) Practice Leadership

Professional field experience with an approved cooperating recreation agency appropriate to the student's career choice. Open only to majors in the concentrated senior block. Credit, 6.

96. (II) Concepts in Recreation

Critical consideration of basic concepts and of current controversies and problems. 2 class hours. Credit, 2.

97. (I) 98. (II) Special Problems

Individual intensive study of an aspect of recreation and the presentation of results in written form. Credit, 2-3.

DIVISION OF MILITARY AND AIR SCIENCE

The Division of Military and Air Science includes the Department of Military Science and the Department of Air Science. No major is offered in either Department. However, participation in either the Army or Air Force ROTC program for four years will qualify an individual for a Reserve officer's commission. In addition participants who qualify for and desire a military career may be offered a Regular officer's commission in the Army or Air Force depending upon the program he pursues.

Representatives of both services will be available on campus during each summer orientation period to answer questions.

Freshmen entering an ROTC program do not obligate themselves during the first 2 years beyond the semester in which they are enrolled. However, credits earned will apply toward graduation.

The time to make a decision concerning ROTC is before coming to the summer orientation so registration can be completed.

DEPARTMENT OF MILITARY SCIENCE (GMS)

ALBERT W. AYKROYD, Colonel, Armor, Head

Army Military Science courses prepare students for commissioning in the grade of Second Lieutenant in the Regular Army or in the U. S. Army Reserve.

The program of general military subjects taught in the University of Massachusetts qualifies graduates for a commission in any of the branches or services of the Army. Thus, regardless of the academic major study program an entering Freshman plans, he will find appropriate leadership opportunities open to him in the modern Army upon his graduation and attainment of a commission. Cadets designated as Distinguished Military Students by reason of their achievement in academic and military studies, may apply for commissions in the Regular Army. Students who intend to continue their education in a graduate field may be deferred, upon application, from active service for periods up to three years after graduation.

All Army ROTC students are furnished uniforms and military textbooks without cost.

The first two years of ROTC training are elective, the third and fourth years are both elective and selective in nature. The U. S. Army provides this latter group with a subsistence allowance and additional emoluments that amount to approximately \$700.00. All cadets are required to attend a six-weeks summer camp between their junior and senior years. For University of Massachusetts' cadets, this camp is usually held at Fort Devens, Mass.

Division of Military and Air Science

In addition, qualified students may apply for Army Flight training which can, in turn, qualify them for a private pilot's license. Extra curricular activities encompass Special Forces' training and rifle and pistol marksmanship teams for those interested students.

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
M. S. 11 Fundamentals of Leadership United States and National Security	1	M. S. 12 Fundamentals of Leadership National Defense Organization Familiarization with Military Weapons System	1

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
M. S. 25 Military History of the U. S. Fundamentals of Leadership	1	M. S. 26 Fundamentals of Land Navigation Introduction to Tactical Concepts Fundamentals of Leadership	1

*JUNIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
M. S. 51 Principles of Leadership Military Teaching Techniques	2	M. S. 52 Principles of Offensive and Defensive Combat Communications and Control Measures	2

SUMMER SESSION (6 Weeks)

A period of training which permits the practical application of the academic subjects presented at the university. Included also are subjects which are not practical to teach at the institution. Normally cadets from the University of Massachusetts complete this training at Fort Devens, Massachusetts.

*SENIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
M. S. 75 Military Law Army Administration	2	M. S. 76 U. S. Role in World Affairs Tactical Concepts	2

* Two academic subjects, selected from the following areas, must be completed by each student, one in his junior and one in his senior year.

- a. Effective Communication
- b. Science
- c. General Psychology
- d. Government

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
M. S. 97 Special Problems	1 or 2	M. S. 98 Special Problems	1 or 2

DEPARTMENT OF AIR SCIENCE

THOMAS M. CARHART, *Colonel, U. S. A. F., Head*

The mission of the department program is to develop in selected college students, through a permanent program of instruction, those qualities of leadership and other attributes essential to their progressive advancement to positions of increasing responsibility as commissioned officers in the United States Air Force. It is not expected that all so commissioned will select the U. S. A. F. as a career; nevertheless, the program does offer an excellent means to prepare for such a career.

The first two years of instruction, the basic course, give a foundation for leadership and air and space age citizenship. The program of the last two years, advanced Air Force ROTC and four weeks of summer training at the end of the junior year, is designed primarily to enhance the professional knowledge and leadership capabilities of those qualified and selected for officer training.

All students planning to take advanced Air Force ROTC in their junior and senior years should complete Psychology 1 or 5 (prerequisite to Psychology 62) prior to entering the second semester of their junior year. The following courses are required for completion of advanced Air Force ROTC:

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Air Science 11, Leadership Laboratory	1	Air Science 12, Foundations of Aerospace Power	1
And One of the following:*			
English 1 or 2	2		
Mathematics 1, 2, 4, 5, 6, or 7	3-4		
Speech 3	2		
Chemistry 1 or 3	3-4		
Psychology 1 or 5	3		

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Air Science 25, Fundamentals of Aerospace Weapons Systems	1	Air Science 26, Leadership Laboratory	1
		And One of the following:*	
		English 25 or 26	3
		Economics 25 or 26	3
		Sociology 25	3

JUNIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Air Science 51, The Military Justice System	1	Air Science 52, The Air Force Staff Officer	1
Speech 51, Extemporaneous Speaking	3	Psychology 62, Social Psychology	3

SUMMER (4 Weeks)

Summer Training Unit.

SENIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Either:		Air Science 76, The Air Force Officer	1
Air Science 75, Flight Instruction Program	1	Geography 81, World Political Geography	3
Air Science 77 or Principles and Problems of Military Leadership	1		
And either:			
Government 53, International Relations	3		
or			
History 67, Military History of Modern Europe	3		

* Other substitutions may be authorized by the Department of Air Science.

MILITARY SCIENCE

Head of Department: PROFESSOR (COLONEL) ALBERT W. AYKROYD. ASSISTANT PROFESSORS (LT. COL.) SACRA, (MAJOR) HUFF, (CAPTAIN) FOWLER, (CAPTAIN) HUGGINS, (CAPTAIN) KELIHER, (CAPTAIN) MCGINNIS, (CAPTAIN) NILSSON.

11. (I) Introductory Military Science

An introduction to National Defense, organization and officer procurement; a study of the research and development of military weapons and a familiarization of weapons fundamentals; fundamentals of leadership. 2 class hours, 1 laboratory period. Credit, 1.

12. (II) Introductory Military Science

A study of the evolution of U.S. military policy and the part the Army plays in the support of national policies; a continuation of the fundamentals of leadership. 2 class hours, 1 laboratory period. Credit, 1.

25. (I) Basic Military Science

A survey of American military history from the Revolutionary War to the Vietnamese War of 1962-1963, with emphasis on the principles of war, Civil War lessons in mobility, and the effect of guerilla tactics on present day warfare; leadership fundamentals. Prerequisites, Military Science 11 and 12, or equivalent credit as arranged by this department. 3 class hours, 1 laboratory period. Credit, 1.

26. (II) Basic Military Science

An introduction to the principles and fundamentals of contemporary military tactical concepts; a study of military land navigation and the application of the aerial photograph. Principles learned are applied in a series of practical exercises and classroom discussions; a continuation of leadership fundamentals. Prerequisite, MS 25. 3 class hours, 1 laboratory period. Credit, 1.

51. (I) Advanced Military Science

A study of the techniques of military instruction and the application of these techniques in classroom discussions and demonstrations; a study of the principles of military leadership and their application in the weekly laboratory period. Prerequisite, MS 26 or equivalent credit for previous military service or training. 3 class hours, 1 laboratory period. Credit, 2.

Air Science

52. (II) Advanced Military Science

The principles of offensive and defensive combat are studied and an understanding is developed of the application of these to units of the infantry division brigade in a series of map exercises; a portion of this period is devoted to military communications and control measures. Prerequisite, MS 51. 3 class hours, 1 laboratory period. Credit, 2.

75. (I) Advanced Military Science

A continuation of the study of military tactical concepts and its application through classroom discussion and demonstrations. An examination of the U.S. role in world affairs as considered in light of U.S. national power and policies. The geographic-industrial bases of Western Europe, the Far East and the Red Bloc are considered. Prerequisite, MS 52. 3 class hours, 1 laboratory period. Credit, 2.

76. (II) Advanced Military Science

A study of the fundamentals of military law, their application by the unit commander and their relationship to Civil Law; a survey of Army administrative procedures. Prerequisite, MS 75. 3 class hours, 1 laboratory period. Credit, 2.

97. (I) 98. (II) Special Problems

Problems in military science for qualified advanced ROTC students. Independent work on special problems or pertinent intensive studies in military science. Enrollment by arrangement with the Professor of Military Science. Total credit may not exceed 2. Credit, 1 or 2.

AIR SCIENCE

Head of Department: PROFESSOR (COLONEL) THOMAS M. CARHART. ASSISTANT PROFESSORS (LT. COLONEL) SIMMONS, (MAJOR) PERRY, (MAJOR) BAMBER, (CAPTAIN) GAILEY.

11. (I) Leadership Laboratory

A formalized phase of leadership training designed to provide experience in the application of leadership principles through group discussion, panels, and other suitable media. 2 laboratory periods. Credit, 1.

12. (II) Foundations of Aerospace Power

An introduction to the fundamentals of Air Power, including basic aeronautical science and the organization and operation of the military arm of the Federal Government. 2 class hours, 1 laboratory period. Credit, 1.

25. (I) Fundamentals of Aerospace Weapons Systems

A more advanced consideration of Air Power with emphasis on the basic concepts governing the employment of air forces, including operations in space. Prerequisites, Air Science 11, 12 or Military Science 11, 12 and permission of department. 2 class hours, 1 laboratory period. Credit, 1.

26. (II) Leadership Laboratory

A continuation of Air Science 11. 2 laboratory periods. Credit, 1.

51. (I) The Military Justice System

A study of the system by which military justice is administered; the relationship between military and civil law. Prerequisites, Air Science 25, 26 or Military Science 25, 26 and permission of department. 1 class hour, 1 laboratory period. Credit, 1.

52. (II) The Air Force Staff Officer

A study of staff organization and functions, and the application of management principles in the USAF. 2 class hours, 1 laboratory period. Credit, 1.

Summer Training Unit

An encampment of four weeks' duration designed to increase cadet proficiency in essential areas of junior officer training. Two encampments per summer are offered, normally at a United States Air Force Base. Either the first or second encampment may be designated.

75. (I) Flight Instruction Program

An aeronautics course offered those cadets eligible for and electing to serve as pilots in the United States Air Force. This course of instruction provides a total of 36½ hours of flight instruction in Cessna 150 type aircraft under the supervision of the Federal Aviation Agency and 30 hours of ground school instruction. Cadets enrolled in this course may be eligible to receive a private pilot's license. 2 class hours, 3 laboratory periods. Credit, 1.

76. (II) The Air Force Officer

A study of Air Force administrative procedures; the responsibilities and obligations of the Air Force officer; and rules of conduct of the armed services. 1 class hour, 1 laboratory period. Credit, 1.

77. (I) Principles and Problems of Military Leadership

Principles and techniques of leadership and management in the armed forces, with emphasis on the USAF. Prerequisites, Air Science 51, 52. 1 class hour, 1 laboratory period. Credit, 1.

DEPARTMENT OF PUBLIC HEALTH

ROBERT W. GAGE, *Chairman*

Students majoring in Public Health may select divisional classification in accordance with their special interests.

The Department of Public Health offers programs leading to the Bachelor of Science degree in Environmental Health and the Bachelor of Science degree in Medical Technology. The Master of Science degree in Environmental Health is also offered.

Public Health

The curriculum in public health is designed to prepare a student for a health career. Career opportunities are open in : (1) administration of health services; (2) in basic sciences related to health; (3) in environmental health services; (4) in food and drug protective services; (5) in health education; and (6) in health information and communications.

Students electing this major should complete the following courses during their sophomore year: Chemistry 27, Physics 3 and 4, Zoology 35 and Microbiology 31.

During junior and senior years the following courses should be completed: Chemistry 33, Public Health Bacteriology 81 and 90; Public Health 61, 62, 63, 84, and 88. Students planning graduate work in sanitary engineering must take Mathematics 29 and 30 before the end of their junior year. Supporting courses in other departments will be selected with the guidance of an adviser.

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1	2	English 2	2
Speech 3	2	Speech 3	2
Mathematics 1 or 2	3	Mathematics 4	3
Chemistry 1	3	Chemistry 2	3
Foreign language	3	Foreign language	3
Botany 1	3	Zoology 1	3
(Military or Air Science 11 (men)	1)	(Military or Air Science 12 (men)	1)
Phys. Ed. 1a, b†	2	Phys. Ed. 2a, b†	2

† Not quality point credit.

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25	3	English 26	3
Chemistry 27	3	Microbiology 31	4
Physics 3	4	Physics 4	4
Zoology 35	3	Humanities	3
Social Science	3	Social Science	3
(Military or Air Science 25 (men)	1)	(Military or Air Science 26 (men)	1)
Physical Ed. 31a, b†	2	Physical Ed. 32a, b†	2

† Not quality point credit.

Department of Public Health

JUNIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Public Health 61	3	Public Health 62	3
Chemistry 33	3	Public Health 84	3
3 Electives*	9	Public Health 86 (Biostat)	2
		2 Electives*	6

SENIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Public Health 63	3	Public Health 98	3
P. H. Bacteriology 81	3	P. H. Bacteriology 90	3
Public Health 97	3	Public Health 88	3
2 Electives*	6	2 Electives*	6

* Minimum of 9 credits in social sciences and minimum of 6 credits in humanities.

JUNIOR AND SENIOR YEARS

Other Electives

Food Science and Technology	Dairy Science
Public Administration	Planktology
Engineering Drawing	Industrial Mycology
Engineering Geology	Entomology
Calculus	Food Analysis
Animal Hygiene	Calculus
Elements of Meat Packing	Veterinary Science
Sanitary Engineering	Food Processing Engineering

Medical Technology

The curriculum in medical technology is recommended for young men and women as a profession offering a wide opportunity of occupational outlets. Medical technology graduates may be prepared for positions in medical laboratories, in federal, state and local health departments, and in commercial and research laboratories.

FRESHMAN YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 1, Composition	2	English 2, Composition	2
Speech 3, I or II	2	Speech 3, I or II	2
Chemistry 1, General	3	Chemistry 2, General	3
Botany 1 or Zoology 1	3	Botany 1 or Zoology 1	3
Foreign language	3	Foreign language	3
Mathematics 1, Intro.	3	Mathematics 4, Intro.	3
(Military (men))	1)	(Military (men))	1)
Phys. Ed. 1a, b†	2	Phys. Ed. 2a, b†	2

† Not quality point credit.

Directory of Courses

SOPHOMORE YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
English 25, Literature	3	English 26, Literature	3
Chemistry 27, Analytical	4	Microbiology 31, Intro.	4
Physics 3, Intro. (1)	4	Physics 4, Intro. (1)	4
(Military (men)	1)	(Military (men)	1)
Elective (2)	3	Elective (2)	3
Elective (2)	3	Elective (2)	3
Phys. Ed. 31a, b†	2	Phys. Ed. 32a, b†	2

(1) Strongly recommended.

(2) One semester course in each of two social sciences.

† Not quality point credit.

JUNIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Microbiology 51, Deter.	3	Microbiology 52, Path.	3
Zoology 37, Anatomy-Physiol. (1)	3	Zoology 38, Anatomy-Physiol. (1)	3
Chemistry 51, Organ. (2)	4	Chemistry 52, Organ. (2)	4
Elective*	3	Elective*	3
Elective*	3	Elective*	3

(1) Zoology 35 may be substituted.

(2) Chemistry 33 may be substituted.

SENIOR YEAR

<i>1st Semester</i>	<i>Credits</i>	<i>2nd Semester</i>	<i>Credits</i>
Microbiology 85, Immun.	3	P. H. Bacteriology 92, Clin. (1)	3
Zoology 69, Parasit.	3	Public Health 88, Epidem.	3
Chemistry 79, Elem. Bio.	3	Chemistry 80, Clin.	2
Elective (1)	3	Elective (1)	3
Elective*	3	Elective*	3

(1) Microbiology 97, 98—*independent work on special problems in microbiology—recommended.*

* During Junior-Senior years—*minimum of 9 credits in social sciences and minimum of 6 credits in humanities.*

Following graduation the student will be assisted in arranging for a 12-month internship in an approved hospital laboratory. The student must complete all of the requirements established by the American Society of Clinical Pathologists to qualify for the Registry of Medical Technology. The courses offered by the hospital staff of the accredited affiliated hospitals are:

	<i>Credits</i>
Clinical Medical Bacteriology and Mycology	3-6
Serology and Immunology	3
Medical Parasitology	2-3
Clinical Hematology	3-6
Blood Groups in Man	2-3
Biochemistry of Disease	4-8
Histopathology and Clinical Microscopy	3-6

Optional Program in Medical Technology

Students may elect an optional program some time during their freshman year which will permit completion of both the requirements for the Bachelor of Science degree and one year of hospital internship required by the Registry of Medical Technology in a total of four years. This can be accomplished by scheduling the required courses listed in the four-year academic program in three academic years plus summer school sessions. After successful completion of at least 120 credits and satisfying the requirements of the Department of Public Health a student will receive a Bachelor of Science degree.

PUBLIC HEALTH

Chairman: DR. ROBERT W. GAGE. ASSOCIATE PROFESSOR PERRIELLO, MR. WISNIESKI; ALSO MR. IANTOSCA AND MR. SNOW, DIVISION OF SANITARY ENGINEERING, MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH; MR. SHINO, AMHERST HEALTH DEPARTMENT.

61. (I) 62. (II) Environmental Health

The influence of health measures on community welfare with emphasis on all phases of environmental health. 3 class hours. Credit, 3. Mr. Wisnieski.

63. (I) Industrial Hygiene and Sanitation

The practices and principles of industrial processes involved in industrial health and sanitation. 3 class hours. Credit, 3. Mr. Perriello.

64. (II) Microscopy of Water

Microscopic forms of life exclusive of the bacteria. Counting and control of plankton in potable waters. Elements of limnology. Prerequisite, Microbiology 31. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Snow.

81. (I) Applied Public Health Bacteriology

Standard methods used in present day applied bacteriology. Subjects studied include: soils, dairy products, water and shellfish and air analysis. Prerequisite, Microbiology 31, or permission of the instructor. 2 class hours, 2 2-hour laboratory periods. Credit, 3. Mr. Perriello.

84. (II) Public Health Administration

The organization, function, and administration of governmental health agencies; including public health laws, regulations, and sanitary codes, their origin and enforcement. 3 class hours. Credit, 3. Mr. Perriello.

86. (II) Public Health Statistics

Evaluation of environmental health practices using graphical summaries and biostatistical methods. Prerequisites, Public Health 61 and 62. 1 class hour, 1 4-hour laboratory period. Credit, 2. Mr. Wisnieski.

Public Health

88. (I) (II) Epidemiology and Communicable Disease Control

The general principles of the spread of infections, supported through the study of the communicable diseases, grouped according to their modes of transmission. Prerequisite, Microbiology 1, or permission of instructor. 3 class hours. Credit, 3. Mr. Wisnieski.

90. (II) Sanitary Bacteriology

Public Health laboratory procedures including field collection of samples, stream pollution studies, food poisoning and infection, standard methods of food analysis. Prerequisite, Applied Public Health Bacteriology 81, or permission of instructor. 1 4-hour and 1 2-hour laboratory periods. Credit, 3. Mr. Perriello.

92. (Summer) Supervised Field Training

A thirteen-week field training program with an official agency under the supervision of the Staff. This is a prerequisite for professional placement. 13 weeks. Credit, 3-6.

94. (II) Clinical Bacteriology

A study of procedures used in clinical laboratory work. Prerequisites, Microbiology 85, Zoology 35 or Zoology 37, 38. 1 class hour. 1 3-hour and 1 2-hour laboratory periods. Credit, 3.

97. (I) 98. (II) Problems

Qualified seniors who have obtained permission from the department may arrange for independent work on special problems in Public Health. Credit, 3. Staff.

RELIGION

CHAPLAINS POWER, RUCHAMES, AND SPRINGER, *Advisers*

Although there is no department of religion at the University of Massachusetts, students interested in pursuing religion as an academic discipline have certain opportunities, both in curricular and co-curricular ways.

In the formal curriculum, courses are offered by several departments in the College of Arts and Sciences. Credit courses in history, such as those covering the ages of medieval civilization and of the Reformation, for example, afford systematic study into the religious institutions and movements of those periods. Similarly, those offered by the philosophy department in the Philosophy of Religion and in Oriental Philosophies provide a critical and constructive study of basic issues, in both the contemporary western world and Asia. Also, certain courses in other departments deal with matters of religion.

In addition to curricular work, students may learn from co-curricular programs of an academic nature offered by the Chaplains and the campus religious organizations. Each year classes (non-credit) are taught by the Chaplains and invited lecturers on topics such as Basic Beliefs and Practices of Judaism, Catholic Faith and Practices, Essentials of Protestant Christianity. Classes in Hebrew and Yiddish, study groups on various problems in campus living, and workshops on personal relations are also open to students.

The B'nai B'rith Hillel Foundation, the Christian Association, and the Newman Club frequently bring to the campus lecturers and scholars of national and international repute to speak at open meetings. Distinguished scientists, journalists, and government officials, as well as theologians and religious leaders, have come as guests of the religious organizations, and some provide leadership for large-scale events such as retreats, the Religious Embassy, and holy day observances. Lectures on religion are occasionally offered in a series of three or more under the leadership of well-known scholars and teachers. The educational and cultural programs of the campus religious organizations are open to all who are interested.

Appendix I

GENERAL SCHOLARSHIPS

Commonwealth Scholarships. The Commonwealth of Massachusetts annually provides 25 scholarships of not more than \$250 for members of each of the four undergraduate classes of the University. Upperclass students may obtain application forms from the Placement & Financial Aid Services. Entering freshmen may obtain application forms at the Registrar's Office.

Alpha Sigma Phi Scholarship for needy students.

Danforth Keyes Bangs Scholarship for the aid of industrious and deserving students.

Lucius Clapp Fund to provide scholarships and loans to deserving students.

Foreign Student Scholarships. A limited number of scholarships, involving waiver of tuition fees only, awarded on basis of merit and need. Applications should be addressed to the Adviser to Foreign Students.

Henry Gassett Scholarship for a worthy undergraduate student.

Charles A. Gleason Scholarships. General Scholarship for worthy students.

Whiting Street Scholarship. Scholarships of \$50 each for deserving students.

University Associate Alumni Scholarships. A limited number of scholarships awarded on the basis of leadership, need, scholarship and participation in extracurricular activities.

University Foundation Scholarships. A limited number awarded to needy scholars.

University Scholarships. Scholarships ranging in value from \$50 to \$500 awarded to needy scholars in all the colleges, schools, and divisions except Agriculture.

RESTRICTED SCHOLARSHIPS

George H. Barber Scholarship and Grant-in-Aid Awards. A limited number of scholarships or grants-in-aid based on evidence of outstanding athletic performance and good citizenship, need or high scholarship.

Class of 1882 Scholarship for the aid of a worthy student of the junior or senior class.

Frederick G. Crane Scholarships for the aid of worthy undergraduate students, preference given to residents of Berkshire County.

Stephen Davis Scholarship. Established by gift of Mr. and Mrs. Benjamin Davis of New York City in memory of their son, Stephen Davis, class of 1954, who lost his life while serving as an officer with the United States Air Force. For a male undergraduate majoring in Liberal Arts or Social Sciences who has participated in the athletic program. The selection of the recipient is made jointly by the Dean of the College of Arts and Sciences and by the Dean of the School of Physical Education. The student selected receives each year, not to exceed four years, the full income from the fund so long as he remains in good standing in the University and continues to major in Liberal Arts or the Social Sciences. Annual income is approximately \$800.

Interfraternity Council Scholarship. A \$100 scholarship awarded annually to a member of one of the social fraternities. The recipient must show evidence of need. In addition, he must have a record of participation in extracurricular activities and have at least a 2.5 quality point average.

National Food Brokers Association Scholarship. \$400 to be awarded to either an undergraduate or graduate student who is interested in making a career in the food industry.

Betsy C. Pinkerton Scholarships. Two general scholarships for graduates of the schools in the city of Worcester.

Sigma Xi Scholarship Award. The Massachusetts Chapter of the Society of the Sigma Xi makes an award of \$100 annually to an undergraduate student at the University in recognition of a developing research interest in the sciences or engineering.

Wilbur H. H. Ward Scholarships. Twenty-five scholarships of approximately \$100, known as the Wilbur H. H. Ward Scholarships. The Ward Fund is administered by a Board of Trustees independent of the University. Applicants for these scholarships write to Mrs. Marian R. Erush, Stockbridge Hall, University of Massachusetts, Amherst. They are available to Hampshire County men.

College of Agriculture

Alword. For students specializing in the study of Dairy Husbandry or Dairy Manufacturing with the intention of becoming an investigator, teacher, or special practitioner in the dairy industry. Restricted to students who do not use tobacco or fermented beverages.

O. G. Anderson Memorial Fund. For needy and worthy students majoring in pomology. To be used for the purchase of books and supplies. Granted only on the recommendation of the Department of Pomology.

Ascension Farm. For men students in the College of Agriculture. Residents of Berkshire County have preference, but awards may be made to students from Hampshire, Hampden, and Franklin Counties.

Berkshire County Farm Bureau Scholarship. The Berkshire County Farm Bureau is sponsor of a scholarship awarded yearly to a Berkshire County boy or girl as a means of assisting him or her to obtain a college education.

Boston Market Gardeners' Association. A \$100 scholarship for a Sophomore in agriculture. Applications should be made to the Secretary of the Boston Market Gardeners' Association, 240 Beaver Street, Waltham 54, Massachusetts.

Boston Stewards Club. Scholarships to students majoring in Food Management. Awards are made on basis of both financial need and scholastic attainment.

Buttrick. For junior, senior, or graduate students majoring in Dairy Industry or Food Science and Technology. Scholarships will range from \$100 to \$500 per year depending upon scholarship achievement and need.

H. B. Cantor Foundation Scholarship. A \$500 scholarship for students majoring in hotel and food management. Students must be recommended by the University Scholarship Committee. This scholarship may be awarded to either a four-year or a Stockbridge School of Agriculture student.

Charles M. Cox Trust Fund Scholarship of \$300 is awarded to a student or students in the College of Agriculture on the basis of need, character and scholarship ability. Preferably the scholarships will be awarded to undergraduate majors in dairy husbandry or poultry husbandry.

Scholarships

Lotta M. Crabtree. For students in the College of Agriculture. Based on scholarship and need.

J. W. D. French Fund. For students in dairy and forestry, and allied subjects.

Hampshire County Farm Bureau Scholarship. The Hampshire County Farm Bureau is sponsor of a scholarship awarded yearly to a Hampshire County boy or girl as a means of assisting him or her to obtain a college education.

Charles H. Hood Foundation. Awarded to two students in the College of Agriculture, with preference given to those studying the production of milk. Based on scholastic standing, character, industry, and personality.

Howard Johnson. A \$500 scholarship for a student majoring in Food Management. This scholarship is awarded in recognition of high academic performance and character.

Massachusetts Flower Growers' Association Scholarships. Two \$200 scholarships awarded to qualified juniors or seniors majoring in Floriculture.

Margaret Motley. For a woman student majoring in Floriculture or Landscape Gardening. Need, scholarship, and promise of success form the basis of the award which is provided by the Garden Club Federation of Massachusetts, Inc.

Porter L. Newton. For students majoring in Agriculture who are residents of Middlesex County.

Frank H. Plumb. For students majoring in the College of Agriculture.

Ralston Purina. A \$500 Scholarship for a student majoring in Animal Science or Poultry Science.

V. A. Rice Scholarship Fund. A \$100 scholarship for a worthy student majoring in Animal Husbandry.

Sears, Roebuck Foundation. Four scholarships for outstanding freshmen in the College of Agriculture, based on scholarship, leadership, personality, business ability, or special achievement. The outstanding freshman recipient is eligible for a special sophomore scholarship.

Springfield Garden Club. For students living in the vicinity of Springfield, Mass., and majoring in some phase of Horticulture.

Ellsworth Milton Statler Foundation Scholarships. Two \$500 scholarships for students majoring in Hotel and Food Management. Students must be recommended by the University Scholarship Committee and approved by a Committee of the Statler Foundation. These scholarships may be awarded to either four-year or Stockbridge students.

George Treadwell. A \$100 scholarship given by Worcester County Poultry Association to a needy and worthy student from Massachusetts who is majoring in Poultry Husbandry at the Stockbridge School of Agriculture.

School of Engineering Scholarships

Alumni Scholarships. Provided by annual contributions from graduates and friends of the School of Engineering to provide scholarships to deserving and well qualified students pursuing work in a major field of engineering. They are available to freshmen and upperclassmen.

Kollmorgen Optical Corporation Tuition Scholarship. Awarded annually to a junior or senior student majoring in mechanical engineering. Awarded on the basis of need and superior scholastic attainment.

Western Massachusetts Section, American Society of Mechanical Engineers. Awarded annually to a junior or senior mechanical engineering student who is a legal resident of the area represented by the section. Awarded on the basis of need and scholastic attainment.

Military Scholarships

United States Army ROTC Scholarship. The U. S. Army Reserve Officers Training Corps offers one or more scholarships to selected members of ROTC.

United States Air Force ROTC Scholarship. The U. S. Air Force Reserve Officers Training Corps offers one or more scholarships to selected members of AFROTC.

College of Arts and Sciences

Richard W. Fessenden Memorial Scholarship. An award made to undergraduate students majoring in chemistry upon the recommendation of the department of chemistry. This award is made possible by donations from friends and former students of Dr. Fessenden, former professor of chemistry at the University.

Massachusetts City Managers' Association Scholarship. Tuition scholarship awarded by committee composed of the President of the City Managers' Association, the head of the department of government and the Director of the Bureau of Government Research, to an undergraduate or graduate student majoring in government.

Public Health Scholarships

Massachusetts Department of Public Health Scholarship. A scholarship in the amount of \$300 made to an outstanding student in the field of bacteriology and public health.

Massachusetts Association of Sanitarians Scholarship. A scholarship in the amount of \$100 made to an outstanding student interested in the general field of public health.

Massachusetts Milk Inspectors' Association. One or more scholarships, each in the amount of \$100, made to outstanding students interested in the field of sanitation or milk sanitation.

Public Health Service Traineeship for graduates and undergraduates, one or more annually, complete expenses paid as a stipend.

William B. Palmer Scholarship for juniors and seniors majoring in Sanitary Science or Public Health, \$300 annually (The International Association of Milk and Food Sanitarians).

School of Home Economics

Berkshire County Women's Advisory Council Scholarship. For a student majoring in Home Economics who is a resident of Berkshire County. Preference may be given to applicants who have indicated an interest in Extension work as a career.

Minnie R. Dwight Scholarship. For a student majoring in Home Economics who is a resident of Hampden County. This scholarship is awarded for four years if scholarship is maintained.

Scholarships

Mrs. Clifton Johnson Scholarship. For one or more Home Economics students who are residents of Hampshire County. Preference may be given to applicants who have indicated an interest in Extension work as a career.

Helen Knowlton Award and Scholarships. The award is for the highest ranking senior Home Economics student. Scholarships are for other deserving Home Economics students.

Massachusetts Home Demonstration Council Scholarship. For a Home Economics student at Framingham State Teachers College or the University of Massachusetts.

Sears, Roebuck Scholarships. For two freshmen students entering the School of Home Economics from small town or rural high schools, and preferably those who have indicated an interest in Extension work.

Mildred Thomas Scholarship. For a student majoring in Home Economics at Regis, Simmons, State College in Framingham, or the University of Massachusetts. The applicant must be a resident of Worcester County and have completed the Freshman year.

Helen A. Whittier Award. For a senior Home Economics student selected on basis of scholarship, need, and character.

4-H Scholarships

Cotting Memorial Scholarship. All college expenses of freshman year—for a woman student. Recipient of this scholarship is selected by a committee of the New England Branch of the Farm and Garden Association from among candidates proposed by State Leaders of 4-H Club work in the New England states.

Esso Scholarship. This scholarship of \$800 is awarded to a freshman enrolled in the College of Agriculture. The recipient receives \$200 during each of the four years he is enrolled. Applications for this scholarship must be submitted to the State 4-H Club Leader.

George L. Farley Scholarships. The Massachusetts Society for Promoting Agriculture has established a scholarship in memory of George L. Farley. The income of approximately \$60 per semester is awarded to deserving 4-H Club members, men or women, recommended by the State Leader of 4-H Clubs from applications submitted by County 4-H Club Agents.

Scholarships for Women Students Only

Chi Omega Award. The local chapter of the Chi Omega Sorority offers an annual scholarship of \$25 to a woman student majoring in the department of economics or psychology who has the highest scholastic average at the end of the first semester of the senior year.

Greater Springfield Panhellenic Association Award. This award is given each spring for use in the sophomore, junior, or senior year to a woman student from Western Massachusetts. The award is based on scholarship and need, character and evidence of leadership in campus activities.

Polish Junior League Scholarship. An award by the Polish Junior League to a woman student of Polish descent, at the end of her junior year, paying full tuition for the senior year. The basis of this award is character and scholastic achievement.

Appendix II

HONORS, PRIZES, AWARDS

Scholastic Prizes

PHI KAPPA PHI AWARDS FOR SCHOLARSHIP. The University of Massachusetts chapter of Phi Kappa Phi, national all-university scholastic honor society, annually presents substantial monetary awards to the outstanding scholar or scholars of each of the three upper classes. These awards, based upon cumulative scholastic averages and character, are presented at the Honors Banquet in the spring.

THE BURNHAM PRIZES. These were made possible through the generosity of Mr. T. O. H. P. Burnham of Boston. Prizes of \$25 and \$15 are awarded through the Department of Speech to those students delivering the best and second best oral interpretation of literature in the Burnham Contest. Preliminary contests are open under certain conditions to freshmen and sophomores.

THE FLINT PRIZES. The Flint Speaking Contest was established in 1881 by a gift of the late Charles L. Flint, a former president of the College. After his death the prizes were continued by college appropriation. Awards of \$25 and \$15 are presented through the Department of Speech as first and second prizes respectively to those two upperclassmen delivering the best extemporaneous speeches in the contest.

HILLS BOTANICAL PRIZE. This is given through the generosity of Henry F. and Leonard M. Hills of Amherst for the first and second best herbaria. Competition is open to members of the senior, junior and sophomore classes. First prize is \$20, second prize \$15.

MASSACHUSETTS SOCIETY FOR PROMOTING AGRICULTURE PRIZES. Three prizes of \$25, \$15, and \$10 are awarded to those senior students who are judged to have made the best record in a speaking contest held early in March.

SIGMA XI SCHOLARSHIP AWARD. The Massachusetts Chapter of the Society of the Sigma Xi makes an award of \$100 annually to an undergraduate student at the University in recognition of a developing research interest in the sciences or engineering.

BETTY STEINBUGLER PRIZE IN ENGLISH. This prize was endowed by John L. Steinbugler, New York City, in honor of his daughter, Elizabeth Steinbugler Robertson, a graduate of this University in 1929. It is awarded to a woman in the junior or senior class who has written the best long paper on a subject of literary investigation in a course in English during the year.

L. R. WILSON AWARD IN GEOLOGY. This award, named in honor of the former head of the Geology Department, is conferred on the graduating senior with an outstanding academic record as a major in geology.

Athletic Awards

CHESTER F. BOWEN JR. MEMORIAL AWARD. The class of 1949 presented the Chester F. Bowen Jr. Memorial Award in track and cross-country to the University as

Honors, Prizes, Awards

its class gift. Members of the class felt that this gift would be the most appropriate which they could give the University, since it would be a fitting memorial to a former classmate and a worthy award for the outstanding athlete in varsity track and cross-country.

SAMUEL S. CROSSMAN MEMORIAL TROPHY. This award is made to the member of the senior class who must have received two varsity awards, had an above average academic record, and possessed qualities of enthusiasm, cooperation, leadership, and be recognized as the outstanding student-athlete on the campus. The trophy was established by the University Athletic Council. The award is dedicated to the memory of Samuel S. Crossman and consists of a trophy upon which the name of the student chosen is to be inscribed. A small replica will be presented for his permanent possession.

L. L. DERBY AWARD. This plaque is presented by the Alumni Varsity M Club each year at its Commencement meeting to that member of the track team who is considered to have been the most valuable member of the team during the past season.

EASTERN COLLEGE ATHLETIC CONFERENCE AWARD. This award is designed to signalize and honor the student whose combined record of academic and athletic activity at each Conference member college. The E.C.A.C. is composed of 114 colleges and universities located in the eastern section of the United States.

THE WILLIAM T. EVANS MEMORIAL TROPHY. This trophy is given each year to that member of the varsity football team who through his sportsmanship, football ability, character and personality, has exemplified the character and spirit of the person in whose memory this memorial trophy is dedicated. The trophy is dedicated to the memory of William T. Evans, a former member of the class of 1942, who died December 9, 1941. This trophy is presented annually by the class of 1942.

GOLF AWARD. Presented to the most valuable member of the Golf Team as chosen by the letter men of the squad.

GYMNASTICS CUP. Awarded to the most valuable member of the Gymnastics Team.

HOCKEY AWARD. This plaque shall be awarded annually at the Commencement meeting of the Varsity Club, to that member of the hockey team who is considered to have been the most valuable player to the team.

THE JOSEPH LOJKO MEMORIAL PLAQUE. This plaque is presented to a senior three sport letter man, having a satisfactory scholastic record and showing those qualities of enthusiasm and cooperation which make for leadership. It is awarded in honor of Joseph Lojko of the Class of 1934, outstanding athlete who died while a senior in the College.

MANAGER OF THE YEAR AWARD. The Athletic Association awards a gold plaque to that varsity sports manager who has demonstrated initiative and proficiency in managerial duties.

PISTOL MEDAL. Awarded on a point basis to a member of the varsity team.

THE ALLAN LEON POND MEMORIAL MEDAL. This medal is awarded for general excellence in football in memory of Allan Leon Pond of the class of 1920, who died February 26, 1920. He is described as "A congenial companion, a devoted lover of Alma Mater, a veteran of World War I, a fine all-around athlete and a true amateur. He would rather win than lose, but he would rather play

Honors, Prizes, Awards

fair than win." He has been characterized as a typical student of the University.

RIFLE AWARD. Awarded on a point basis to the outstanding member of the varsity rifle team.

PAUL SEARS PUTNAM MEMORIAL TENNIS TROPHY. This trophy is awarded to that member of the varsity tennis team who has displayed by his conscientious endeavor, clean play, good sportsmanship and all-around ability as an athlete and scholar, that he is a credit to his team and University, and shall have his name inscribed on the trophy. He shall also be presented with a suitable medal or watch charm. The trophy is established in memory of Paul Sears Putnam, '38, by the members of his family, in the hope that it will stimulate and encourage students to emulate his characteristics of whole-hearted enthusiasm and good sportsmanship, true cooperation and the constant endeavor to always give to the best of their ability in any project they may undertake.

GEORGE HENRY RICHARDS MEMORIAL CUP. This cup is awarded annually to the member of the basketball team who shows the greatest improvement in leadership, sportsmanship, and individual and team play during the year. It is in memory of George Henry Richards of the Class of 1921 who died suddenly while a student at the College.

SAMUEL B. SAMUELS BASKETBALL CUP. This cup is presented annually in the name of Samuel B. Samuels of the Class of 1925 who was an outstanding basketball player during the early years of basketball as a varsity sport at the University. The trophy is awarded to that letter man who is a regular member of the varsity team and who has performed with excellence during scheduled varsity games.

MAURICE SUHER SOCCER PLAQUE. This trophy is to be awarded annually to that letter man of the varsity team who is deemed to have been the most valuable member of the team. It is presented to the University by Maurice Suher of the class of 1930, who was one of the two students largely instrumental in having soccer recognized as a varsity sport at the University. He played on the first varsity soccer team at the University of Massachusetts, in the fall of 1929.

SPORTS DAD AWARD. The Sports Dad Association was formed in 1958 and consists of fathers of all varsity athletes. This association awards three trophies to outstanding athletes for scholastic achievement and athletic excellence.

SWIMMING TROPHY. Awarded to the most valuable member of the varsity swimming team.

E. JOSEPH THOMPSON MEMORIAL TROPHY. This baseball trophy is given by Thomas Thompson in memory of his brother, E. Joseph Thompson who graduated from Massachusetts State College in 1932. He was president of the Student Senate, a varsity letter man in football and baseball, and an outstanding campus citizen. The award goes to that member of the varsity baseball team who best exemplifies the most admirable characteristics of the sport each year.

WRESTLING TROPHY. Awarded to the most valuable member of the varsity wrestling team.

MILITARY AND AIR SCIENCE HONORS AND AWARDS

Leadership, scholarship, and proficiency in the work of the Military and Air Science departments are recognized by honors and awards announced at the Annual Spring Review in May.

Department of Military Science

DISTINGUISHED MILITARY STUDENTS. Each year the Professor of Military Science designates as distinguished military students those members of the first year advanced course who possess outstanding qualities of leadership, high moral character, and a definite aptitude for the military service. Students who are so designated must possess an academic standing in the upper half of their class or in the upper ten per cent of their class in military subjects. All distinguished military students are authorized to wear the distinguished military student badge.

DISTINGUISHED MILITARY GRADUATES. Each year the Professor of Military Science designates as distinguished military graduates those members of the graduating class who were previously designated as distinguished military students and have maintained the same high standards required for such designation and have successfully completed training at the Reserve Officers' Training Camp.

U. S. ARMOR ASSOCIATION SCROLL. Awarded by the U. S. Armor Association to the outstanding Armor cadet graduating from the senior ROTC class. An engraved scroll bearing the name of the winner is presented to the winning cadet to keep in his personal possession.

ARMED FORCES COMMUNICATIONS ASSOCIATION HONOR AWARD. Awarded by the Armed Forces Communications Association to the outstanding senior ROTC cadet majoring in electrical engineering. The winner is presented with an appropriately engraved gold medal and scroll.

MILITARY SCIENCE FACULTY AWARD. Awarded by the Military Science faculty to the Cadet Colonel of the Armor Brigade for outstanding leadership. The winner is presented a complete set of officers' insignia.

RESERVE OFFICERS ASSOCIATION AWARD. Awarded by the Reserve Officers Association of the United States, Massachusetts Department, to the Senior Armor cadet who is outstanding in military proficiency. The winner's name is engraved on a plaque and a medal, appropriately engraved, is given by the Massachusetts Department. A complete set of officers' insignia is given to the individual by the Amherst Chapter.

ELIZABETH L. MCNAMARA TROPHY. Awarded by Mrs. Elizabeth L. McNamara, a former trustee of the University of Massachusetts for many years, to the Armor cadet ranking first in scholarship in the second year basic course. The winner's name is engraved on a plaque and a sterling silver goblet, appropriately engraved, is given to the individual.

AMHERST LIONS CLUB AWARD. Awarded by the Amherst Lions Club to the Senior Armor cadet who has been most outstanding at the ROTC Summer Training Camp.

DEPARTMENT OF THE ARMY AWARDS. The Department of the Army awards annually the Superior Cadet Ribbon with certificate and lapel device, to one outstanding student in each academic class. The winner of the award must be in the upper one fourth of his academic class and be selected by the PMS and Dean of Men.

Honors, Prizes, Awards

THE JOHN C. HALL TROPHY. Awarded annually to the second year basic course student who ranks number one in military proficiency. The winner's name is engraved on a loving cup which is of permanent nature and maintained in the military offices. A cordial type sterling silver goblet appropriately engraved is presented to the winner.

ASSOCIATION OF THE UNITED STATES ARMY MEDAL AND CERTIFICATE. Awarded annually by the publishers of Army magazine to the Junior Cadet who has demonstrated outstanding qualities of leadership and efficiency.

CHICAGO TRIBUNE AWARDS. Awarded annually to two Military Science I and Military Science II Cadets. The recipients must be members of the Bay State Special Forces, who have demonstrated outstanding qualities of leadership and military proficiency.

SOCIETY OF AMERICAN MILITARY ENGINEERS AWARD. A gold medal is presented annually by the Society of American Military Engineers to the outstanding engineering student enrolled in advanced Military Science.

Department of Air Science

DISTINGUISHED AFROTC CADET. Each year the Professor of Air Science will select from the students who are completing the second year advanced course, AFROTC, those who possess outstanding qualities of character, leadership, and a definite aptitude for the military service for designation as Distinguished AFROTC Cadets.

DISTINGUISHED AFROTC GRADUATE. Each year the Professor of Air Science will designate the Distinguished AFROTC Graduates from those Distinguished AFROTC Cadets who have completed the advanced course, AFROTC, and who will receive their baccalaureate degree. The Distinguished AFROTC Graduates, with their consent, may compete for a regular Air Force Commission.

AIR SCIENCE TROPHY. Awarded by the Department of Air Science to the Air Science freshman cadet most outstanding in Military and Academic Scholarship. The trophy is a silver cup appropriately engraved.

CHICAGO TRIBUNE AWARDS. Awarded to two Air Science freshmen and sophomore cadets who have maintained the highest AFROTC grades and general academic excellence. The awards are engraved medals.

AS II GENERAL DYNAMICS AWARD. Awarded to the most outstanding Air Science sophomore cadet who has applied for the Advanced Course, is interested in and qualified for Flight Training. The award is an aircraft model.

AMHERST POST AMERICAN LEGION TROPHY. Awarded by the Amherst Post American Legion to the Air Science sophomore cadet who has demonstrated the most outstanding abilities in Military Drill and Scholarship. The trophy is an engraved silver cup.

AIR CADET SQUADRON TROPHY. Awarded by the Air Cadet Squadron to an Air Science sophomore cadet who has been an outstanding member of the Air Cadet Squadron and Drill Team. A silver cup appropriately engraved with the individual's name is presented to the winner.

THE SOCIETY OF AMERICAN MILITARY ENGINEERS ROTC AWARD. Awarded by the Society of American Military Engineers to the Air Science cadet who is the outstanding engineering student of the year in his group in the AFROTC unit, as recommended by the Dean of the School of Engineering and the Professor of Air Science.

Honors, Prizes, Awards

AIR SCIENCE TROPHY. Awarded by the Department to the Air Science junior cadet who has displayed outstanding military proficiency and maintained a high scholastic standing. A silver cup engraved with the individual's name is presented to the winner.

AIR FORCE ASSOCIATION MEDAL. Awarded by the Air Force Association to the most outstanding Air Science cadet who has completed Summer Training unit. The award is an engraved medal.

RESERVE OFFICERS ASSOCIATION MEDALS. Awarded by the Massachusetts Reserve Officers Association to the Air Force cadets who have been outstanding in scholarship and military proficiency.

AIR SCIENCE TROPHY. Awarded by the Department of Air Science to the graduating Air Science senior cadet who has demonstrated superior qualities of leadership, military bearing and scholarship. The trophy is an engraved silver cup.

ARMED FORCES COMMUNICATIONS AND ELECTRONICS ASSOCIATION MEDAL. Awarded by the Armed Forces Communications and Electronics Association to the graduating Air Science senior cadet majoring in electrical engineering, who has demonstrated outstanding qualities of military leadership, high moral character and a definite aptitude for military service. The award is an engraved medal.

AIR FORCE TIMES AWARD. Awarded annually to the graduating cadet who has distinguished himself by contributing materially to constructive public attention for his cadet corps. The award consists of a Certificate of Merit and a 12-month subscription to the Air Force Times newspaper.

SONS OF THE AMERICAN REVOLUTION MEDAL. Awarded by the Sons of the American Revolution to an Air Science freshman cadet who has shown firm belief in, knowledge of, and a positive attitude toward the Constitution of the United States of America; has maintained a grade average of A in AFROTC subjects; and has expressed and demonstrated an interest in both the Advanced Course and in duty as an Air Force officer. The award consists of a bronze medal with a ribbon service bar.

Appendix III

HONOR SOCIETIES

Academic Honor Societies

Phi Kappa Phi. The Honor Society of Phi Kappa Phi is a national organization, and has been represented on this campus since 1904. Its primary objective is the recognition and encouragement of superior scholarship in all fields of study. Good character is an essential supporting attribute. The Massachusetts chapter elects undergraduates in either their junior or senior years. Members of the Faculty and graduate students are also eligible for election.

Sigma Xi. The Society of the Sigma Xi is the national honor society whose objective is the encouragement of original investigation in science, pure and applied. Since 1938, a chapter of the Society has been active on the campus of the University. The Chapter may elect to associate membership undergraduate students who have shown marked excellence in the study of recognized fields of the sciences and engineering. Election to full membership is accorded those who have clearly demonstrated ability to pursue independent scientific research. The Chapter sponsors a program of public lectures and a number of awards designed to foster the objectives of the Society.

Sigma Gamma Epsilon. The Beta Theta chapter of the Sigma Gamma Epsilon Fraternity was installed at the University of Massachusetts in 1951. The purpose of the fraternity is to stimulate scholastic, scientific, and social advancement of students of the earth sciences in universities and scientific schools with recognized standings in the United States and Canada. Membership is open to men majoring in geology, mining, metallurgy, ceramics, petroleum engineering, or other branches of earth sciences, who meet the requirements of the fraternity.

Omicron Nu. The Alpha Pi chapter of the Society of Omicron Nu was installed on the campus in 1952. The purpose of the Society is to recognize superior scholarship and to promote leadership and research in home economics. Membership is open to juniors and seniors majoring in home economics who meet the requirements of the society.

Phi Tau Sigma. Phi Tau Sigma Honorary Society is the international honor society for food science. It was founded at the University of Massachusetts in 1953, and its executive headquarters are permanently located here. Its purpose is to encourage and recognize achievement in food science. Senior students from all departments related to food science are eligible for election to membership if they meet scholastic and character requirements of the University Chapter.

Tau Beta Pi. The Massachusetts Zeta Chapter of Tau Beta Pi was installed on campus in the fall of 1955. The society exists for the purpose of honoring engineering students of high scholarship, character, and interest in campus activities. Senior and junior students in the School of Engineering are eligible for election to membership if they meet the requirements.

Beta Gamma Sigma. The Gamma Chapter of the University of Massachusetts was installed in 1959. The purposes of the Society are to encourage and reward scholarship and accomplishment among students in commerce and business

Academic Honor Societies

administration; to promote the advancement of education in the art and science of business; and to foster integrity in the conduct of business operations.

Alpha Lambda Delta. The Scholastic Honor Society for Freshman Women was installed at the University of Massachusetts as a chapter of Alpha Lambda Delta, national honor society, in 1960. The purpose is to promote intelligent living and to encourage superior scholastic attainment among freshman women. Members are students who achieve averages of 3.5 or above in the first semester or in cumulative average at the end of the first year of college.

Phi Eta Sigma. The Society of Phi Eta Sigma was installed on the campus in 1955. The purpose of the Society is to recognize outstanding scholastic achievement by freshmen men and to encourage a higher standard of learning among all freshmen. Honorary membership is granted those faculty members who are most effective in encouraging students in the attainment of these goals.

Eta Kappa Nu. Delta Eta Chapter of the Eta Kappa Nu Association was installed on this campus in 1960. The purpose of the association is to recognize outstanding scholarship and leadership in the field of Electrical Engineering. Superior junior and senior students are selected for membership in the fall and spring of each year.

Alpha Zeta is an honorary fraternity with membership limited to men majoring in the College of Agriculture. Election to membership is based upon academic excellence and qualities of leadership. One major project is sponsorship of University Judging Teams.

Officers of Administration

Office of the President South College
JOHN WILLIAM LEDERLE, A.B., A.M., LL.B., PH.D. (University of Michigan),
President.

JOHN WILLIAM RYAN, A.B. (University of Utah), M.A., PH.D. (Indiana
University), *Secretary of the University and Assistant to the President.*

Office of the Provost South College
GILBERT LLEWELLYN WOODSIDE, B.S. (DePauw University), A.M., PH.D. (Har-
vard University), *Provost.*

WILLIAM CHASE VENMAN, B.M.ED. (Oberlin College), M.A. (Western Michi-
gan University), PH.D. (University of Michigan), *Assistant to the
Provost.*

H. HILLS SKILLINGS, A.B. (Amherst College), M.A. (Boston University),
Staff Assistant.

Academic Deans

ISAAC MOYER HUNSBERGER, B.S., M.S., PH.D. (Lehigh University), *Dean,*
College of Arts and Sciences. Bartlett Hall

ROBERT WANNER WAGNER, A.B. (Ohio University), M.A., PH.D. (Uni-
versity of Michigan), *Associate Dean, College of Arts and Sciences.*
Bartlett Hall

MRS. JOSEPHINE L. DOWD, B.S. (Boston University), *Staff Assistant,*
College of Arts and Sciences. Bartlett Hall

HIMY BENJAMIN KIRSHEN, B.S. (Whitman College), M.A. (Columbia Uni-
versity), PH.D. (University of Wisconsin), *Dean, School of Business
Administration.* Draper Hall

JOHN THOMAS CONLON, B.B.A. (University of Massachusetts), M.A.
(University of Connecticut), PH.D. (Michigan State University),
Assistant Dean, School of Business Administration.

Draper Hall

MARY ANN MAHER, B.S., A.M. (Columbia University), *Dean, School of
Nursing.* Public Health Building

GEORGE ANDREWS MARSTON, B.S. in C.E., D.ENG. (Worcester Polytechnic Insti-
tute), M.S. (University of Iowa), *Dean, School of Engineering.*

Engineering Building

EDGAR ERNEST LINDSEY, B.S. in CH.E. (Georgia Institute of Tech-
nology), D.ENG. (Yale University), *Associate Dean, School of
Engineering.* Engineering Building

WARREN PIERCE MCGUIRK, PH.B. (Boston College), ED.M. (Boston Univer-
sity), *Dean of the School of Physical Education.*

Physical Education Building

Administration

MARION A. NIEDERPRUEM, B.S. (New York State College at Buffalo), M.A. (New York University), PH.D. (University of Michigan), *Dean of the School of Home Economics and Professor of Home Economics.*

Skinner Hall

ALBERT WILLIAM PURVIS, A.B. (University of New Brunswick), M.ED., D.ED. (Harvard University), *Dean of the School of Education.*

Education Building

ARLESS A. SPIELMAN, B.S., PH.D. (University of Minnesota), M.S. (Oregon State College), *Dean of the College of Agriculture, Director of the Experiment Station and Extension Service.*

Stockbridge Hall

FRED PAINTER JEFFREY, B.S. (Pennsylvania State University), M.S. (University of Massachusetts), *Associate Dean of the College of Agriculture and Director of the Stockbridge School.*

Stockbridge Hall

DONALD PEARSON ALLAN, B.A. (University of Massachusetts), *Assistant to the Dean, College of Agriculture.*

Stockbridge Hall

Office of the Dean of the Graduate School

South College

EDWARD CARTER MOORE, A.B. (Western Michigan University), M.A. in Education Administration, M.A. in Philosophy, PH.D. (University of Michigan), *Dean of the Graduate School and Coordinator of Research.*

South College

ELIZABETH W. CADIGAN, *Secretary.*

Office of Institutional Studies

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* On leave, 1962-63.

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Bartlett Hall
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Draper Hall
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Wilder Hall
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- NEBHAN KARAM CHAND CHANDIRAMANI, B.VSC., AN.HUS. (Utter Prandesch College of Veterinary Science and Animal Husbandry, Mathura, India), *Instructor in Veterinary Science*.
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- FREDERICK BARKER CHANDLER, B.S. (University of Maine), PH.D. (University of Maryland), *Professor, Research, Agronomy*.
East Wareham
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Goessmann Laboratory

* On leave, 1962-63.

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- CLIFFORD SPENCER CHATER, B.S. (University of Rhode Island), M.S. (Kansas State College), *Assistant Professor, Research, Entomology and Plant Pathology.* Waltham Field Station
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Pennsylvania), *Instructor in Physical Education.*
Physical Education Building

* On leave, 1962-63.

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of Pennsylvania), *Associate Professor of Sociology.* Machmer Hall
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sity), *Associate Professor of Chemical Engineering.*
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setts), *Assistant Professor of Civil Engineering.*
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Lindsey Laboratory
- HAMED MOHAMED EL-BISI, B.S. (University of Heliopolis, Egypt), M.S.,
PH.D. (University of Illinois), *Associate Professor, Research, Food*
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- JOHN WILLIAM ELDRIDGE, B.S. in CH.E. (University of Maine), M.S. in CH.E.
(Syracuse University), PH.D. in CH.E. (University of Minnesota), *Head*
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versity), *Instructor in Accounting.*
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* On leave, 1962-63.

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- NICOLAS ENGALICHEV, B.S., M.S. (State University College of Forestry, Syracuse), *Professor of Forestry and Wildlife Management*.
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* On leave, 1962-63.

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- RICHARD HAVEN, A.B. (Harvard University), M.A. (Princeton University), B.LITT. (Oxford University), PH.D. (Princeton University), *Assistant Professor of English*. Bartlett Hall

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- GEORGE RICHARDSON HIGGINS, B.S. (University of New Hampshire), S.M. (Massachusetts Institute of Technology), *Associate Professor of Civil Engineering.* Gunness Laboratory
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* On leave, 1962-63.

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* On leave, 1962-63.

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Machmer Hall
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Goessmann Laboratory
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Machmer Hall
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Fernald Hall
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Lindsey Laboratories
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Wesson Maternity Hospital, Springfield, Mass.
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The Visiting Nurse Association, Springfield, Mass.
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Health Department, City of Springfield, Mass.
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Springfield Hospital, Springfield, Mass.

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UNIVERSITY OF MASSACHUSETTS ENROLLMENT—September, 1962

UNDERGRADUATE COLLEGE

CLASS	1963		1964		1965		1966		TOTAL	
	MEN	WOMEN	MEN	WOMEN	MEN	WOMEN	MEN	WOMEN	MEN	WOMEN
Arts and Sciences	350	265	381	316	539	420	625	543	1895	1544
Engineering	155	1	185	1	222	2	268	—	830	4
Business Administration	121	8	132	7	137	6	122	11	512	32
Education	—	118	4	100	2	108	4	112	10	438
Agriculture	92	5	85	3	78	5	90	3	345	16
Physical Education	30	28	45	28	46	21	46	19	167	96
Home Economics	—	28	—	40	—	32	—	37	—	137
Nursing	—	16	—	23	—	33	—	42	—	114
Total	748	469	832	518	1024	627	1155	767	3759	2381
Total by classes	1217		1350		1651		1922		6140	75
					Specials				35	

STOCKBRIDGE SCHOOL OF AGRICULTURE

	MEN	WOMEN	TOTAL
1963	177	7	184
1964	253	13	266
Special			450
			1
			451

GRADUATE SCHOOL

MEN	WOMEN	TOTAL
730	245	975

Office of Publications, September, 1962

	TOTAL
TOTAL	6250
Undergraduate School	6250
Stockbridge School	451
Graduate School	975
	7676

SUMMARY

Undergraduate School	6250
Stockbridge School	451
Graduate School	975
	7676

GIFTS AND BEQUESTS

For the information of those who may wish to make a gift or a bequest to this University, the following suggestion is made as to a suitable form which may be used.

There are a number of worth-while activities of the University which are handicapped by lack of funds and for which small endowments would make possible a greater measure of service to our students and to the Commonwealth. The religious work on the Campus is an example. This is now carried on in a very limited way by current private contributions. Further information concerning this and other activities in similar need will be gladly furnished by the President.

SUGGESTED FORM

"I give and bequeath to the Trustees of the University of Massachusetts, at Amherst, Massachusetts, the sum of
..... dollars."

(1) (Unrestricted)

"To be used for the benefit of the University of Massachusetts in such manner as the Trustees thereof may direct."

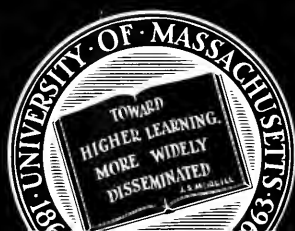
or (2) (Permanent Fund: income unrestricted)

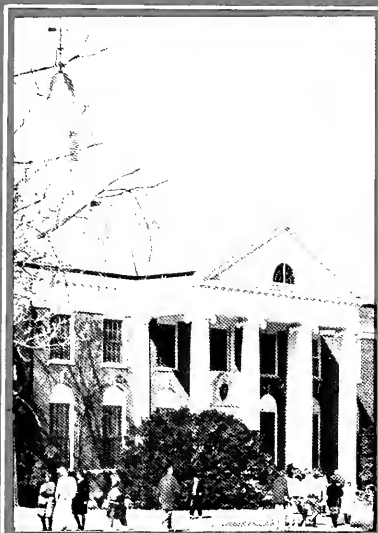
"to constitute an endowment fund to be known as the
..... Fund, such fund to be kept invested by the Trustees of the University of Massachusetts and the income used for the benefit of the College in such manner as the Trustees thereof may direct."

or (3) (Specific Purposes)

"to be used for the following purposes,"

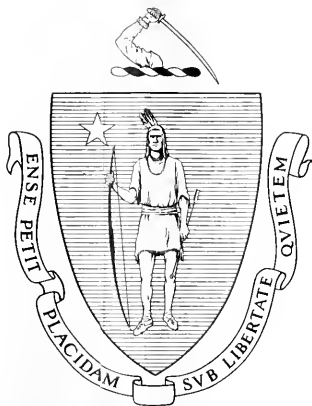
(Here specify in detail the purposes.)





*Adventure
in
Higher
Learning*

UNIVERSITY
OF
MASSACHUSETTS
BULLETIN



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*Adventure
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Higher
Learning*

**GENERAL
INFORMATION
BULLETIN**

UNIVERSITY
OF
MASSACHUSETTS

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A WORD FROM THE PRESIDENT

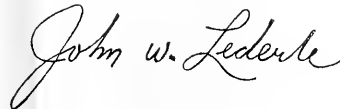
IN the pages that follow, you will find the University of Massachusetts described as "a place to live, to work, to learn." The University is, in other words, not only a place — but an opportunity. And the emphasis is on people, on teachers and students, on the men and women who contribute to and make our society what it is.

The full resources of the University are therefore always at the disposal of our students, whom we regard as the most important resource of all. And certainly if the young people we accept are to live, work and learn *well*, then we must be sure that they are *interested* and *dedicated* people, who will profitably and effectively participate in all that the University has to offer.

This is important, for the University itself, now observing its 100th anniversary as a major public institution of higher learning, is committed to serving national objectives in one of the most challenging eras of world history. We therefore see our students as integrally involved in helping our society to grow and to contribute in all significant ways to fulfilling these objectives.

In the process, students can derive enjoyment and satisfaction in the largest measure. The University has rich opportunities both in its curricular and extracurricular activities. Those who wisely balance their programs, who place studies first and carefully select other activities, can experience the "connection between knowledge and the zest of life" that is reflected in the program of all true universities.

Cordially,

A handwritten signature in cursive script that reads "John W. Lederle". The signature is written in dark ink and is positioned above the printed name and title.

JOHN W. LEDERLE
PRESIDENT

THE UNIVERSITY AND ITS CAMPUS

THE University of Massachusetts is the state university of the Commonwealth, founded in 1863 under provisions of the Morrill Land Grant Act passed by the United States Congress one year earlier.

Now observing its Centennial, the University is a member of the great community of Land Grant colleges and state universities serving the nation as principal resources of higher education for the country's citizenry. Incorporated as the Massachusetts Agricultural College in April, 1863, the institution was opened to a handful of students in 1867. Rooted in the liberal arts tradition (its early presidents were graduates of such colleges as Dartmouth, Williams, Amherst, and Harvard), it has grown steadily from the four teachers and four wooden buildings available for its opening session. Reflecting the broadening interests of its students, the General Court of the Commonwealth of Massachusetts authorized a second name, Massachusetts State College, in April, 1931. Sixteen years later, in May, 1947, the institution became the University of Massachusetts.

Situated in one of the most picturesque sections of the state, the University joins with its academic neighbors—Amherst, Smith, and Mount Holyoke Colleges—in maintaining the rich tradition of educational and cultural activity associated with this beautiful Connecticut Valley region. The University's campus consists of approximately 750 acres of land and 110 buildings. These structures—including classroom and laboratory facilities as well as dormitories and other units—extend in a great circle around the Campus Pond. This arrangement helps in maintaining the University as a community in which the individual holds central importance.

The community itself is located in a region that offers outstanding opportunities for a student's cultural development. Art exhibits, dramatic productions, concerts, and other activities in the Four College area are fully available to all students. In addition, the University maintains excellent recreational facilities as well as intercollegiate and intramural sports activities. The total program is dedicated to giving every student a chance to develop all of his capabilities under the best possible conditions. As the University moves into its second century, this will continue to be its prime objective.



Busy morning scene in the central quadrangle.

Autumnal setting near the Student Union.



ADMISSION - - HOW TO GET READY

Applications for admission may be obtained by writing the Registrar of the University. *There is no application fee required* at the University of Massachusetts. High school seniors are advised to file their applications early in the senior year. Out-of-State and foreign applications must be received prior to *March 1st*, for fall admission. College Board tests should be taken no later than the March testing date. If they are to be considered during the normal processing, in-state applications should be received by *April 1st*. Thereafter, they may be considered only as vacancies occur. Qualified applicants are admitted at the beginning of the fall and spring semesters and at the beginning of the summer session.

All applicants for admission, except veterans, must take the Senior Scholastic Aptitude Test given by the College Entrance Examination Board. In addition, the University requires three College Board Achievement tests, including English Composition of every applicant whose scholastic record in grades 9 through 11 contains four or more grades below the college recommending mark of his high school. All *postgraduate* students and *out-of-state* students are also required to submit these three Achievement tests. All College Board Test reports must be sent *directly* to the University from the College Board Testing Center. The applicant himself must notify the Board that he wishes his scores sent to this University. Candidates for early admission should, as well, ask the High School to include the junior scores on the application. The Scholastic Aptitude Test may be taken on any of the scheduled dates, although the December testing date is preferred. The May date is too late for seniors, but is appropriate for juniors taking the test for guidance purposes.

An autobiographical letter must be submitted with the application. The University recognizes the importance of a first-hand acquaintance with the colleges a student may be considering, and hopes that he will find it possible to visit the campus for his own information and satisfaction. He should be assured, however, that it will not disadvantage his application if he is unable to do so. The University holds several Guest Days for high school seniors in the fall. These are particularly appropriate times to visit the campus and high schools are notified concerning them. *An interview is, however, not part of the admissions procedure.* It is physically impossible for the admissions staff to interview all applicants; therefore, personal conferences will be scheduled only if the candidate or his guidance counselor has a question which cannot be readily resolved by correspondence. If it seems necessary to schedule an admissions counseling conference, it would be prudent for the applicant to make certain that his application and academic

records have been received by the Admissions Office prior to his visit so that his situation may be discussed intelligently.

In most cases applicants will be notified by letter during April of the action taken on their applications. Applicants who present strong academic records, enthusiastic school recommendations, and satisfactory College Board scores will receive earlier notification. This early notification should reassure the well-qualified applicant regarding college entrance and enable the student who has selected the University as his choice of college to settle his plans. Applicants accepted at an early date, however, are under no pressure to make a final decision in regard to their choice of college before the Candidate's Reply Date. In this way the burden of multiple applications on high school guidance counselors and college admissions officers may be lessened.

High Ranking High School Juniors

Applicants who have completed with very high academic standing work through the junior year may be admitted to the University for the semester following the junior year. Such applicants must take the Scholastic Aptitude and three achievement tests given by the College Board in May of the junior year and make scores satisfactory to the University. They must be highly recommended by their high school principal. The maturity and social adjustment of the applicant will be considered along with his intellectual development. Such applicants should apply before the end of the junior year.

Veterans

Veterans are not required to take the Scholastic Aptitude test. Instead, they must take entrance examinations in Algebra and English and a College Qualification test. These are administered by the University Testing Service in January, June and August. Information in regard to these tests will be furnished the veteran at the time he files his application for admission. Six months Active Duty for Training students are not considered veterans. They must take the College Board Scholastic Aptitude test rather than the Veterans' Examinations. Veterans in college or in full time postgraduate studies at present are considered in the same category as other applicants and do not take the Veterans Tests.

Bachelor of Vocational Agriculture Degree

Superior graduates of vocational schools of agriculture in Massachusetts and vocational agricultural departments in Massachusetts high schools may be accepted for the Degree of Bachelor of Vocational Agriculture, provided:

They are unqualifiedly recommended by the Vocational Division of the Department of Education as *bona fide* Vocational Graduates with

superior ranks; they can present at least 16 units of certified entrance credits, approved as to quality and quantity by the State Department of Vocational Education; they successfully pass the English and College Qualification Test administered by the University Guidance Office. Those who have had algebra will be required to include the algebra examination.

Transfers

A limited number of transfers from approved colleges may be admitted. Since applicants for such transfer exceed the number that can be accepted, they are placed on a competitive basis. Ratings will be based upon high school and college records and on the College Board Scholastic Aptitude Test, which is required of all transfers. Any student who has been previously enrolled in a college is considered a transfer and must file a transfer application form. Applicants for transfer should write the Registrar for a transfer application. At least 45 semester credits taken in residence at the University are required of all transfers who are candidates for the Bachelor's Degree.

SUBJECT REQUIREMENTS

The subjects of preparatory study required for admission call for the satisfactory completion of a four-year high school course or its equivalent and are stated in terms of units. A unit is the equivalent of at least four recitations a week for a school year. High school graduation alone is not sufficient. The applicant's record must indicate capacity for handling the quality of scholastic work which the University has established as its standard of achievement.

Sixteen units of secondary school work must be offered, selected according to the following requirements:

College Preparatory Mathematics	3*
English	4
Foreign Language (2 years of 1 language)	2
U. S. History	1
Laboratory Science	1

The remaining units are elective and may be selected from the following subject matter:

- a. Mathematics
- b. Science
- c. Foreign Language
- d. History and Social Studies
- e. Free electives (not more than four units)

*Preferably two years of Algebra and one of Plane Geometry.

Free elective subjects are those not included in groups a-d, as for example: Music, art, drawing, typewriting, aeronautics, agriculture, home economics, etc. Such free electives are allowed in order that the student who wishes may have some opportunity to elect other high school offerings, while at the same time covering the fundamental requirements for college work.

Students planning to major in the physical sciences and mathematics should, if possible, offer two years of algebra, one of plane geometry, and one-half year of trigonometry. Analytical or solid geometry, chemistry, and physics, and an introduction to analytical geometry and calculus are also strongly recommended.

Students planning to pursue an engineering curriculum should offer two years of algebra, one of plane geometry, and one-half year each of trigonometry and solid geometry. Chemistry and physics are also advised. Those deficient in the mathematics should plan to cover it during the summer prior to entrance or expect to take five years to complete the college course.

Candidates who are deficient in any of the prescribed courses can be considered only if their over-all scholastic records indicate exceptional academic promise.

PHYSICAL EXAMINATION

Physical examination by their personal physician is required of all entering freshmen, re-entering students and all students participating in athletics. Physical report forms for this examination will be mailed to each student with the bill for the first semester and must be completed and returned to the University Health Service 10 days before the opening of the semester. Evidence of a *successful* smallpox vaccination and active tetanus immunization are required.

VETERANS' AFFAIRS

The Veterans' Coordinator is a staff member of the Placement and Financial Aid Services. All veterans affairs should clear through the Placement and Financial Aid Services.

Veterans and eligible dependents of veterans who are entering the University for the first time must present a Certificate of Eligibility at registration. This may be obtained from your nearest Veterans Administration office. Board and room fees must be paid in advance whether the veteran is enrolled under the G.I. Bill or not.

Veterans who are transferring to the University of Massachusetts from another institution or who have done summer work at another institution will be required to submit a supplemental Certificate of Eligibility at registration. This may be obtained by applying through the veterans' office at the institution last attended.

WHAT IT COSTS TO ATTEND

Expenses vary from approximately \$1,150 to \$1,300 per year for the normally economical student. First year costs are usually greater than those of the other three years and there is less opportunity for earnings. Therefore, a student is advised to have a definite plan for meeting the expenses of the first year before entering.

The following estimate of a year's expenses, based chiefly upon last year's costs, includes only those items which are strictly college and does not include amounts for clothing, laundry, travel, etc. These costs vary slightly from year to year. Tuition for residents of Massachusetts is \$200 per year and for others \$600.

	<i>Normal</i>
Tuition (citizens of Massachusetts)	\$ 200.00
Room in college dormitory or private home (approx.)	300.00
Board at college dining halls (approx.)	420.00*
Athletic Fee	30.00
Student Union Fee	20.00
Student Activity Tax (approx.)	28.00
Student Health Services Fee	30.00
Student Medical/Surgical Insurance, 12 months' coverage (optional)	16.00
Books, stationery, and other supplies (estimate)	100.00
	<u>\$1,144.00</u>

INITIAL PAYMENT FOR FRESHMEN

The initial payment for first semester expenses required of freshmen at the time of fall registration is indicated below and is made up of the following items:

Tuition (citizens of Massachusetts)	\$ 100.00
Room rent in college dormitories (approx.)	150.00
Board at college dining halls (approx.)	210.00*
Athletic Fee	15.00
Student Union Fee	10.00
Student Activity Tax (approx.)	14.00
Student Health Services Fee	15.00
Student Medical/Surgical Insurance, 12 months' coverage (optional)	16.00
Physical Education Equipment Fee (men only)	10.00
Books, stationery, and other supplies	100.00
	<u>\$ 640.00</u>

*Above plan for 7 days; 5-day plan available for approximately \$340.00 per year or \$170.00 per semester.

These are only approximate figures. A bill will be rendered to the parent of each student prior to the beginning of the semester.

TUITION

As a state institution the University of Massachusetts offers a low rate of tuition to all students entering from the Commonwealth. Eligibility for admission under the low residential rate is determined in accordance with the following policy established by the Board of Trustees.

A student must present evidence satisfactory to the Treasurer of the University that his domicile is in the Commonwealth of Massachusetts in order to be considered eligible to register in the University as a resident student. This means that he must have established a "bona fide" residence in the Commonwealth with the intention of continuing to maintain it as such.

The domicile of a minor shall follow that of the parents unless such minor has been emancipated. In case of emancipation the student, in addition to the requirements of these regulations, respecting residence, shall present satisfactory proof respecting emancipation. Minors under guardianship shall be required to present, in addition to the certification of the domicile of the guardian, satisfactory documentary evidence of the appointment of the guardian. No student shall be considered to have gained residence by reason of his attendance in the University nor shall a student lose residential preference during his continuous attendance at the University. The residence of a wife shall follow that of the husband.

The prescribed form of application for classification as to residence status must be executed by each student. Misrepresentation of facts in order to evade the payment of out-of-state tuition shall be considered sufficient cause for suspension or permanent exclusion from the University. Discretion to adjust individual cases within the spirit of these rules is lodged with the President of the University. Students receiving credit by special examination must pay \$5.00 per credit to be received before the examination may be taken.

ROOM AND BOARD

The University provides accommodations in dormitories for a large number of its students. Freshmen, sophomores and juniors, unless 21 years of age, are required to live in University dormitories unless excused by the Dean's office. The University provides three dining halls for students at Butterfield House, Greenough House and University Dining Commons. The dining halls at Butterfield and Greenough dormitories are intended primarily to provide for students housed in that area, including residents of Chadbourne, Mills and Brooks Houses. All freshmen, sophomores and juniors residing in University dormitories will be required to board at University dining halls, except that such students who are members of fraternities or sororities may be permitted to board at their respective fraternities or

sororities. Any student not required to board on campus may eat at the Dining Commons on a cash basis.

SUMMER ORIENTATION FEE

Members of the incoming freshman class attending the summer orientation program will pay a non-refundable fee of \$15.00 to cover the cost of meals, housing, testing and counseling.

PAYMENT DUE DATES

In accordance with University policy, all charges for tuition, fees, board and room rent in University dormitories are due and payable twenty-one days prior to the date of registration of each semester. Bills will be rendered in advance and payment may best be made by mail. Students may not register until all University charges are paid.

A PLACE TO LIVE, TO WORK, TO LEARN

HOW can I make the most of my college career? Every student asks this question just before the start of his freshman year. Specific answers usually wait until the student is actually in college where teachers and advisers help him to decide on the major course of study he should pursue. Often, of course, a student has already made a decision about his "major," and if the decision is based on a sound assessment of aptitudes and abilities, this is all to the good.

But even for students who are sure about what they want to "take" in college, the question is still very important. The danger in approaching college work lies in the assumption that this is, as with many other activities, "just a routine." As a student reads the general catalogue, he finds rules, regulations, requirements, and prescribed courses of study. All these tend to make him feel that the curriculum is indeed just a routine for getting enough credits to graduate.

For many students this is certainly true. But for the wise student, the word "routine" is supplanted by the word "adventure." The rules, regulations and requirements are not thereby eliminated, for every college must have the means of order and stability by which to achieve basic objectives. But the good student recognizes that he need not work merely to satisfy *minimal* requirements: he can do much more. If he learns early that thought is not locked within the four walls of a classroom, if he is alive with interest, if he realizes that his four years in college will be the best he will ever have for stocking his mind and exercising his imagination, then his "prescribed course of study" will become a springboard to a fascinating realm of knowledge and ideas that only he himself can attain.

A WORD ABOUT FINANCIAL AID

Scholarships, loans, and part-time employment are available for a limited number of needy and deserving students. A limited number of such grants are available to entering freshmen who have made outstanding records in high school. Applications for scholarships may be obtained from the Placement and Financial Aid Services and must be completed and returned by March 1 to be considered. Students may also apply for certain kinds of loans, including those available under the National Defense Student Loan Program, University loans (after the first semester of the freshman year), and the Higher Education Loan Plan (at the end of the freshman year). Also, students may engage in part-time work after the completion of the first semester of their freshman year. Information about each of these programs may be obtained by writing to the Director of Placement and Financial Aid Services. Veterans or dependents of veterans who are eligible for benefits may also apply to this office for information.

The following paragraphs, therefore, are simply intended to show what the University can offer a student, what it requires of him, and what he must do to fulfill these minimal obligations. Beyond these basic offerings and requirements lies the real adventure—the adventure in learning.

A YEAR-ROUND OPERATION

The University conducts its program on virtually a year-round basis. The regular two semesters of the academic schedule are supplemented by a two-term summer session in which a student can earn nearly the equivalent of a full semester's work. Combining the work of the regular academic year with a complete schedule of courses in the summer sessions, students can finish their college careers in three years instead of four. The summer session is open to all freshmen who wish to begin their college education immediately following graduation from high school. It is also available to high school juniors who are accepted for study at the University under the Early Admission Plan (see below under Program for Superior Students).

THE ACADEMIC PROGRAM

The University consists of two main divisions, the four-year undergraduate curriculum and the Graduate School. Instruction in the undergraduate program is assigned to the College of Arts and Sciences, the College of Agriculture, the Schools of Business Administration, Education, Engineering, Home Economics, Nursing, and Physical Education, and the Department of Public Health. A qualified student may enter any one of these units and

work toward the appropriate bachelor's degree, as described on Page 11. The total program is built around a core of studies designed to provide a sound general background. Beyond this, the student elects a program within a particular branch of learning in order to prepare for advanced study in that field or for a career in one of the professions. Offerings in the various branches range from accounting to zoology, and a student electing any major course of study has opportunities for a comprehensive education in the four-year program. Descriptions of the courses of study offered in each of the undergraduate branches can be found in the section beginning on Page 12.

THE PRELIMINARIES: FRESHMAN ORIENTATION

All students entering as freshmen must attend a two-and-a-half-day orientation program at a specified time during the summer prior to entrance. The program consists of testing, counseling, and pre-registration for courses to be taken during the coming semester. Guidance and placement tests are given and scored, and each student is assigned a faculty adviser who will help in the selection of courses and planning of a class schedule. On the final day of each of these periods, a special program is held for parents so that they may learn about the student's proposed courses and schedule for the fall semester, the results of the testing sessions, and the facilities and opportunities available at the University.

GENERAL UNIVERSITY SERVICES

The University is a community of individuals working toward a common goal—the acquisition and dissemination of knowledge. As a community, therefore, the institution has all of the adjunct resources needed to further that goal and to provide for the general well-being of the community's members.

Thus, the University maintains an extensive library system, both through the University Library and the 30 departmental and laboratory libraries. In addition, the University is a participating member in the Hampshire Inter-Library Center, housed at the University and containing journals, documents and reference sets for use in study and research. The Center is jointly operated by Amherst, Smith, and Mount Holyoke Colleges and the University under the Four College Cooperation Program engaged in by the four area institutions.

Concerned as it is with the need for spiritual underpinnings for the educated man, the University gives support to the religious life of its students in various ways. It affords the use of facilities for student groups of all faiths, and it honors the work of the Campus Religious Council which provides a cooperative interrelationship among religious groups. Chaplains are assigned to campus by the various faiths, and students are urged to meet with their own chaplain upon coming to the campus.

The University's Health Service, housed in one of the newest buildings on campus, is concerned with the total health of individuals and groups, as reflected in the need for complete physical, mental and social well-being. The new infirmary contains a fully-equipped out-patient department, X-ray and laboratory resources, and physiotherapy facilities. The Health Service staff of physicians, technicians and nurses is devoted to promoting good physical and mental health, conditions of safety, and other factors affecting the health of students in the campus community. In addition, the University maintains a Speech and Hearing Center to assist students and others with speech and hearing problems.

GRADING SYSTEM

Enrollment in and graduation from the University involve both quality and quantity of work. The quantity of work is measured by the credits obtained by successful completion of courses. The quality of work is measured by grades. Each grade is equated with a quality point as noted below. The quality point average required for continued enrollment and for graduation is set by the Faculty Senate. At present the graduation requirement is a cumulative average of 1.80.

Grades are reported according to a letter system, as follows: A—Excellent, B—Good, C—Average, D—Passing (but not satisfactory), F—Failure, and Inc.—Incomplete. Quality points per semester hour are assigned as follows: A, 4; B, 3; C, 2; D, 1; and F, 0. To compute the semester grade point average, as well as the cumulative average, the total points earned are divided by the total credits carried. Any student whose semester quality point average falls below the cumulative requirement is warned of his status by the Registrar and informed of the rules governing dismissal. Students who achieve high averages are placed in one of three honors groups each semester, as follows: First Honors: 3.8 or higher; Second Honors: 3.4 to 3.7 inclusive; and Third Honors: 3.0 to 3.3 inclusive.

ADVISORY SYSTEM

In order that, from the day he enrolls, the freshman may have someone to whom he may go for consultation and assistance, each student selects a tentative educational objective and is assigned a faculty adviser within that academic area.

In the second semester of the freshman year, each student is given an opportunity to change to a new department or to remain in his current department. In succeeding semesters, students may change to another major department by execution of a Major Change Card (available in the Registrar's Office). It is the function of this adviser to help the student in adjusting himself to the work and life of the University. Academic progress reports issued by the Registrar's Office are sent to the advisers periodically, and the students are expected to report to their advisers from time to time to discuss

their academic standing. The University also forwards reports of academic standing to the parents. Both students and parents are encouraged to consult with the adviser whenever there are problems regarding studies or personal adjustments to college life.

PROGRAMS FOR SUPERIOR STUDENTS

The University regularly provides superior students with challenging educational programs extending from the freshman through the senior year. Under the Early Admission Plan, the University considers applications from students of high standing who have completed their junior year of secondary school.

Many entering students are able to achieve advanced standing and credit for college-level courses successfully completed in their secondary schools as part of the College Entrance Examination Board Advanced Placement Program or an equivalent. The University also administers a number of its own advanced placement tests. A student who demonstrates he is proficient in a basic college subject may bypass the beginning course and go on to advanced work in the subject. Upon attaining satisfactory standing in many of these courses, students are granted academic credit for the courses by-passed. Also, up to thirty semester hours of credit may be granted students of high standing who can fulfill the requirements of some of their courses through independent study.

The major feature of the program for superior students is the honors curriculum available to all who qualify. Freshmen are eligible for the Honors Colloquium program conducted for the first three undergraduate classes.

The Senior Honors Program recognizes merit and gives highly qualified students time and opportunity for independent study under closer, more personal direction than is ordinarily provided in the University curriculum. Students who complete their work satisfactorily are eligible for graduation with honors.

STUDENT HOUSING

It is the policy of the Board of Trustees that all men and women undergraduate students shall be housed in campus dormitories and be required to eat at University dining halls unless given permission to commute from their parents' home or to live at sorority or fraternity houses. University board is optional for seniors and is available on a cash basis. Sororities and fraternities may furnish regular board to members up to the approved capacity for each house. Students who are assigned to housing operated by the University are expected to remain for the academic year and may not be released sooner except as their places are taken by suitable substitutes. The University reserves the right to change room assignments whenever necessary.

Most dormitory rooms are double and are furnished with beds, mattresses,

desks, chairs, and a chest of drawers. Students care for their own rooms and are responsible for any damage. Dormitories open for occupancy on the day immediately preceding the opening of the University. All student property must be removed from the rooms and the key turned in immediately after final examinations in June. Such property not removed by the owner will be removed by the University and stored at the owner's expense. Students assigned to dormitory rooms will be responsible for the room rent of the entire semester. Room rent is not refundable. Room rental charges do not include the several regular school vacation periods. The University reserves the right to utilize student rooms during vacations for conferences and other groups which meet occasionally on the campus.

APARTMENTS FOR MARRIED STUDENTS

The University owns and operates two groups of apartments: Lincoln Apartments for junior faculty, married graduate and undergraduate students, and the County Circle apartments for married graduate and undergraduate students. Apartments are unfurnished with the exception of kitchen units which contain an electric range and refrigerator. Apartments are assigned as of date of availability. New junior faculty, married graduate students and undergraduate students with children receive consideration in that order. Further information and applications may be obtained from the University Housing Office, Draper Hall.

AUTOMOBILES

Only members of the senior class, students 21 years or over, and commuters are permitted to have automobiles or other types of automotive equipment on the campus or in the Town of Amherst. Vehicles must be registered with the Campus Police. Driving to and from classes is not permitted. Exceptions may be made in the case of an individual who has a severe physical limitation. Requests for such exceptions must be made through the University Health Service.

STUDENT ORGANIZATIONS

Participation in extra-curricular activities offers opportunities for furthering the broader objectives of a college experience. The knowledge, skills and judgment developed in the classroom can be tested and refined through use in the organizational setting. Thus, more than fifty professional clubs exist on campus as a means of stimulating vocational interest through close contact with members of the teaching staff and representatives of the professions. Student government offers a forum for debate on matters of importance to the entire University community. For those interested in communications, there are several campus publications as well as an FM radio station. Experience in music and drama is available in a number of forms.

Such activities can be a profitable means of fostering maturity and general enrichment in those students who wish to take optimum advantage of all that the University can offer. In encouraging participation in these activities, the University asks only that students plan their time well, in order that they may profit as much as possible from a total University program devoted, first and foremost, to academic studies.

All extra-curricular activities are supervised by the Committee on Recognized Student Organizations composed of alumni, faculty, and students. Recognition for outstanding achievement in this area is given at an annual Student Leaders Night held in the spring. An office devoted to administering and assisting in the conduct of student activities is located in the Student Union. Detailed information about student organizations may be obtained by contacting the Recognized Student Organizations Adviser.

INTERCOLLEGIATE AND INTRAMURAL ATHLETICS

The University maintains well-organized intercollegiate and intramural sports programs. In intercollegiate athletics, the University is represented by teams in all the leading sports, including football, soccer, cross-country, basketball, swimming, wrestling, indoor and outdoor track, hockey, rifle and pistol, baseball, tennis, golf, lacrosse, gymnastics, skiing.

The University also supports a broad program of intramural activities, in which all students are encouraged to participate. The range of sports available each year includes the team sports of touch football, basketball, softball, volleyball. Individual activities include tennis, bowling, badminton, golf, tennis, swimming, and lacrosse.

PLACEMENT SERVICES

The University maintains an Office of Placement and Financial Aid Services whose responsibilities include vocational and financial counseling and the administration of the affairs involved in aiding students to seek appropriate positions and careers; the granting of loans and scholarships; the assignment of part-time work; the coordination of veterans' affairs; and the dissemination of information relative to military service through the draft or reserves. While providing vocational and career counseling for all undergraduates, the emphasis is on aid to seniors in planning their future following graduation and providing them with job-hunting techniques and other media for finding permanent employment. Actual contact with employers is provided during the year when employers from business, industry, schools, and other sources visit the campus to interview prospective graduates.

Cumulative student personnel records; occupational information and industrial literature libraries; preparation of credentials including personal resumes and recommendations coupled with counseling and guidance are provided to enable senior men and women to accomplish their career objectives consistent with their interests, abilities, aptitudes and education.

THE PROGRAM AND ITS OPPORTUNITIES

The University offers four-year undergraduate curricula leading to the following degrees: Bachelor of Science, Bachelor of Arts, Bachelor of Science in Chemical, Civil, Electrical, Industrial and Mechanical Engineering, and Bachelor of Business Administration. Work toward these degrees is carried on in the College of Arts and Sciences, the College of Agriculture, the Schools of Business Administration, Education, Engineering, Home Economics, Nursing, and Physical Education, and the Department of Public Health. Special arrangements are made for some graduates of county agricultural schools and of agricultural departments of certain high schools to complete the college course with majors in agriculture and horticulture. Upon completion of their course, these students are granted the degree of Bachelor of Vocational Agriculture.

The aim of the four-year course is to give the student as high a degree of proficiency in a particular branch of learning as is possible without sacrificing the breadth, knowledge and general training which should characterize a well-rounded college education. Under this philosophy, the University has made recognized contributions, through its graduates, to the life and culture of America. University alumni hold positions in government, education, business, science and engineering, the arts, medicine, law, and many other professions. With rising enrollments, the University is educating ever greater numbers of young men and women for significant careers and important contributions to American society.

The following pages are designed to give some indication of the variety of such opportunities open to students who are accepted for admission. Descriptions of curricula are given in brief and general terms so that prospective applicants may become quickly acquainted with the entire range of offerings. Graduation requirements for each curriculum have been omitted, principally because a student admitted to the University will have ample opportunity to acquaint himself with such requirements after he has arrived on campus. Courses required in the freshman year, on the other hand, are included in the section beginning on Page 29. Further information on various phases of the major courses of study may be obtained from the Deans of the Colleges and Schools or from the Registrar. Information about other aspects of the University program may be obtained from the appropriate offices listed on Page 32.



I. Moyer Hunsberger, Dean
Robert W. Wagner, Associate Dean
Bartlett Hall

The College of Arts and Sciences offers instruction in the fine arts, the humanities, the social sciences, the natural sciences, and mathematics both for students enrolled in the College and for those in other undergraduate divisions of the University. The program provides for the breadth of intellectual development essential to a liberal education and for concentration which is the necessary foundation for competence in a selected discipline.

The Bachelor of Arts degree may be earned by students majoring in any division of the College. The Bachelor of Science degree may be earned by students in the natural sciences, mathematics, or psychology.

The following major courses of study are available in the College:

ART. The Department of Art is interested in providing two kinds of training: first, to give each student a good general historical and aesthetic knowledge of the arts; second, to give each student an opportunity to develop his creative ability in the several media of the arts.

ASTRONOMY. A Department of Astronomy conducted jointly with Amherst, Mount Holyoke, and Smith Colleges provides instruction in this field. All advanced courses are given on a joint basis for students from the four participating institutions.

BOTANY. Programs in botany prepare students for teaching and research in biological sciences in high schools, universities, industry, and experimental stations.

CHEMISTRY. The prime purpose of the Department of Chemistry is to offer sound preparation for graduate study in chemistry. Accordingly, emphasis is placed upon intellectual accomplishment and broad understanding rather than on terminal training for specific chemical tasks. The program designed for this purpose also affords sound preparation for direct entry into chemical industry, chemical institutes, or governmental laboratories.

ECONOMICS. In economics the aims are twofold: (1) to give the student an understanding of economic theory and of the application of economic principles to the organization of society; (2) to provide students with the elementary training necessary for further study and solution of economic and business problems.

ENGLISH. The major in English affords the student opportunities to improve his knowledge of the English language and his ability to use it clearly, logically, and artistically; to increase his knowledge of Western literature written in English or translated with distinction into English; to read and discuss a literary work with perception and understanding, and to form an independent estimate of it by valid critical standards.

GEOLOGY. For students considering geology as a career, the opportunities are many. Those interested primarily in basic science may look to positions

COLLEGE OF ARTS AND SCIENCES



in teaching, in museum work, on state and federal surveys, and in various research organizations. Those concerned mainly with applied science may direct their efforts toward work in mining geology, petroleum geology, engineering geology, and ground-water geology, and industrial mineralogy.

GERMAN. The courses in German are intended to give a practical knowledge of the language for the purpose of wider reading, research, and oral communication.

GOVERNMENT. The courses offered by the Department of Government are designed to aid the student in gaining a knowledge of the nature, functions, and problems of government, and of the place of government in the modern world. Political theory, constitutional law, international relations, comparative government, politics and public administration are the principal areas covered.

HISTORY. Courses in history are designed to provide an understanding of man through a study of patterns of development in the past. The study should also give the student an introduction to major problems in world affairs.

JOURNALISM. The journalism program is concerned with (1) the study of writing and of communication problems relevant to the media of mass communication, and (2) the best utilization of the University's liberal education resources by students who plan careers in newspaper work, communications research, public relations, magazine and radio journalism, or some other field of communications.

MATHEMATICS. The department offers courses designed to furnish a cultural background as well as a foundation for both undergraduate and graduate work in mathematics, statistics, physics, chemistry, engineering, econometrics, and biometrics.

MICROBIOLOGY. The courses in microbiology are designed to aid the student in acquiring special knowledge of the nature and function of the micro-organisms and to provide an appreciation of the role of experimental biological science in widening man's horizons.

MUSIC. The undergraduate major program in music is pre-professional, so that courses, music organizations, and private study are the means used to prepare each student. Other undergraduates may minor in music, or follow a sequence of courses for continuing study.

PHILOSOPHY. Philosophy seeks a comprehensive understanding of the various areas of man's experience in their interrelatedness. In the context of the historically important theories, the courses concentrate on methods of inquiry into the persisting questions of philosophy, standards of thought, clarification of ethical and aesthetic values, and the basis of criticism.

PHYSICS. Courses are designed to accommodate students who desire specialized training in physics, and also to provide required or elected courses for students majoring in engineering, mathematics, chemistry, or other fields.

PRE-MEDICAL AND PRE-DENTAL CURRICULUM. Pre-medical and pre-dental students are assigned to faculty advisers for their freshman year. At the end of their second semester, they will be assigned to a member of the Upperclass Committee who will be their adviser for the remainder of the course of study. Pre-veterinary students may register in the College of Agriculture or College of Arts and Sciences.

PSYCHOLOGY. The courses in the Psychology Department are planned (1) to impart an understanding of the basic principles, methods and data of psychology as a science and the application of this knowledge to problems of human adjustment; (2) to prepare some majors for graduate study which may lead to a professional career in psychology; and (3) to help prepare others for non-professional careers. In carrying out these aims, majors are urged to elect, with the help of a departmental adviser, a broad program of courses.

ROMANCE LANGUAGES. Two majors are offered: French and Spanish. The courses of these curricula are intended to give (1) a thorough training in the language skills, (2) an appreciation of the aesthetic and intellectual qualities of the literatures, and (3) a serious insight into the cultures of the nations concerned. Language and literature courses in Portuguese and Italian, as well as offerings in Latin and Greek, are also available.

RUSSIAN. Students choosing Russian as their field of major concentration will receive training in reading, writing, speaking and understanding the language, and a knowledge of Russian literature. Russian majors will also acquire the background in Russian history, government and economy necessary for an understanding of the literature and culture of the Russian people.

SOCIOLOGY AND ANTHROPOLOGY. The courses in sociology and anthropology are planned with two aims in view: to give the student an understanding of the factors which influence men in their activities and interests as members of society, and to help prepare students for a wide variety of occupational outlets, including social work.

SPEECH. An undergraduate major in speech may be earned by completing thirty semester hours of course work in the department although nine of these may be earned in English and philosophy. Psychology 26 should be elected as a basic requirement. The student must select an area of concentration in (1) Rhetoric and Public Address, (2) Interpretation and Theatre, (3) Radio and Television, (4) Speech Education, (5) Speech and Hearing Therapy.

ZOOLOGY. The courses in zoology have two major aims: (1) to offer students an opportunity to develop an understanding and appreciation of the scientific method as a part of a liberal education; and (2) to provide training for prospective graduate students in biology, medicine, dentistry, and related fields, as well as future teachers and laboratory technicians in the biological sciences.



Arless A. Spielman, Dean
Stockbridge Hall

COLLEGE OF AGRICULTURE

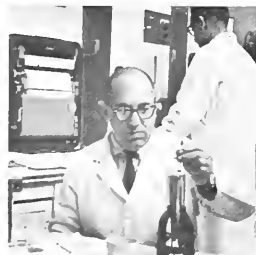
The College of Agriculture offers a broad general education with specific training in a specialized area. Upon the completion of the requirements for the Bachelor of Science degree, the student will have devoted about one-quarter of his time to pure science, one-quarter to social and humanistic studies, and about one-half to applied science and technology. A broad choice of electives within the required courses of each curriculum gives the student the opportunity to prepare for a career in research, industry, business, education, conservation, services. Each department of the College has specific requirements for graduation which are included in the General Catalog under the name of the department. During the first semester of the freshman year, students interested in teaching vocational agriculture, extension work, or specializing in research work, should consult with the head of the department in which they plan to major.

For those students interested in a two-year program in food and agricultural industries, the University provides offerings in the Stockbridge School. A separate bulletin describes these offerings in detail.

The four-year courses of study available in the College of Agriculture include the following:

AGRICULTURAL AND FOOD ECONOMICS. This curriculum is designed (1) to prepare students for employment in executive positions with firms related to agriculture or for administrative positions with governmental agencies concerned with agriculture and (2) to give the essential undergraduate preparation for a career in agricultural economics, in research, teaching, or extension work. The course of study, which leads to the degree of Bachelor of Science, combines training in technical agricultural sciences with courses in business management and economics.

AGRICULTURAL ENGINEERING. Agricultural engineering is concerned with the application of scientific engineering principles to agricultural industries. This professional field includes engineering activities related to the design, development and use of mechanical and electrical equipment; structures; and soil and water control systems for the production, processing and preservation of agricultural products and the improvement of rural living. Agricultural engineers are employed by a variety of agricultural industries and organizations for research, development, teaching, and promotional activities.



Shown above, on left, is Stockbridge Hall, center of activities in College of Agriculture. On right, research in animal physiology. Lower panel pictures some of the major areas in the College: forestry laboratory, landscape architecture laboratory, gas chromatographic analysis of food flavors in Department of Food Science and Technology, the new Holdsworth Natural Resources Center, plant study in floriculture, food bacteriology laboratory.

ANIMAL SCIENCES. The curriculum in the animal sciences, including poultry, is designed to provide fundamental training and knowledge in the comparative nutrition, physiology, breeding, selection and management of various classes of livestock and to understand the role of animal production in the national and world economy. The curriculum provides for an important degree of flexibility depending upon the students' interests and abilities. Options emphasizing commercial animal production are supported by electives in agricultural economics, agricultural engineering, and business administration. Students interested in graduate work in such specialized areas of the animal sciences as nutrition, physiology or genetics should elect programs with special emphasis on the basic sciences.

ENTOMOLOGY. Courses in entomology acquaint students with all phases of insects and insect control, as well as beekeeping. Trained entomologists find positions in public service and industry, such as teaching at all levels; research, quarantine and regulatory work in State or Federal Service; various roles in public health and pest control activities; research, sales and public relations work in the agricultural chemicals industry; and commercial beekeeping.

FOOD TECHNOLOGY. The curriculum in Food Technology provides scientific and applied training in the principles concerned with the processing, preservation, and packaging of foods and food products. The student's background in chemistry, physics, and microbiology is applied to food technology problems and food analysis. Major fields open to graduates include: (1) technical and production work in the food industries; (2) quality control and analytical work related to food products; (3) government food inspection and grading; (4) technological work and research in government, industry, and education.

FORESTRY. The technical curriculum in forestry is concentrated in the field of forest production and management, and leads to the degree of Bachelor of Science. It has professional status, being accredited by the Society of American Foresters. Graduates are prepared for employment with Federal and State agencies and in private industry.

LANDSCAPE ARCHITECTURE. Students following this curriculum, which requires 125 credits for graduation, are prepared through a broad academic approach to take up work in the various phases of landscape architecture. This applied design profession is concerned with the development of land for

human use and enjoyment. In addition to the usual areas of interest, such as site planning for private, semi-public and public works of many types, considerable city and regional planning is now available for those interested.

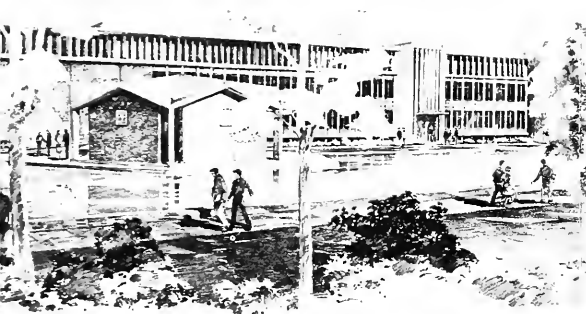
PLANT AND SOIL SCIENCE. The major in plant and soil science permits specialization in many areas of agronomy, soil science, horticulture and plant pathology. Emphasis is on basic sciences that will prepare students for a wide variety of careers in research, teaching, industry, business, marketing, sales, production, control and regulatory services with state and federal agencies. The major in plant science will be required to take a basic core group of subjects related to the physical, biological, and social sciences as well as the humanities.

PRE-VETERINARY. Students may enroll in either the College of Arts and Sciences or in the College of Agriculture. The two-year pre-veterinary curriculum provides 64 semester credits and satisfies the requirements of those veterinary schools which have accepted the largest number of Massachusetts students in the past. Departure from this curriculum necessitates more than two years in preparation. Students who anticipate three or four years of college work in preparation for veterinary school should be guided by the requirements of the pre-professional curriculum.

RESTAURANT AND HOTEL MANAGEMENT. The curriculum in Restaurant and Hotel Management is offered by the Food Science and Technology Department. The program is designed to give the student a general well-rounded background of arts and sciences, coupled with training in subjects useful to the hotel, restaurant, and other food service industries. The nature of the food service industry requires persons with broad, general backgrounds of business training coupled with a scientific knowledge of foods.

WILDLIFE AND FISHERIES BIOLOGY. Wildlife and fisheries biology is concerned with the acquiring and application of knowledge concerning terrestrial and aquatic animal populations which are of recreational or commercial value. This knowledge includes the dynamics of animal populations and their responses to changes in environmental conditions, including changes incurred by land use and direct exploitation by man. A broad understanding of geology, forestry, soils, agriculture, botany, and zoology is required.

H. B. Kirshen, Dean
Draper Hall



SCHOOL OF BUSINESS ADMINISTRATION

The School of Business Administration prepares students to take advantage of important economic opportunities and eventually to assume positions of responsibility in business. The School's educational program is directed toward the broad aspects of business, encouraging high standards of ethical conduct, broad social responsibilities and the development of competence in particular courses of study of the student's own interest, aptitude and choice.

The first two years emphasize general education by providing fundamental courses in the humanities, mathematics, science and social science. In addition, basic courses in accounting and economics prepare the student for further work in the School of Business Administration. The junior and senior years emphasize a greater degree of specialization and provide for this in the programs indicated below. But even in these last two years all students need to view business as a whole in so far as a "core" of courses can do this. This "core" of courses is listed below under the junior-senior curricula and is required of all students. A total of at least 120 credit hours is required for graduation exclusive of credit received in the required physical education courses. Each course of study leads to the degree of Bachelor of Business Administration.

Beginning with the class of 1964 all students in the School of Business Administration must attain, as a graduation requirement, a 2.0 average in Accounting 25 and 26, Elementary Economic Statistics 21, and the junior "core" courses: Finance 55, Financial Institutions; Finance 65, Corporation Finance; General Business 71, Business Law I; Management 61, Principles of Management; and Marketing 53, Principles of Marketing. The "core" must be completed by the end of the junior year unless a student, on recommendation of his department chairman, has received permission from the Dean to postpone any such course to the senior year.

Students transferring to the School of Business Administration from any School or College within the University shall receive junior and senior elective credit only for those courses passed with a grade of C or better.

Students transferring to the School of Business Administration from outside the University as juniors or seniors must complete a minimum of 12 credit hours in courses offered by his major Department.

Above is the soon-to-be-completed School of Business Administration building.

Below, a class in computer techniques for business analyses.



The School of Business Administration is a member of the American Association of Collegiate Schools of Business.

Major courses of study are available in the School of Business Administration as follows:

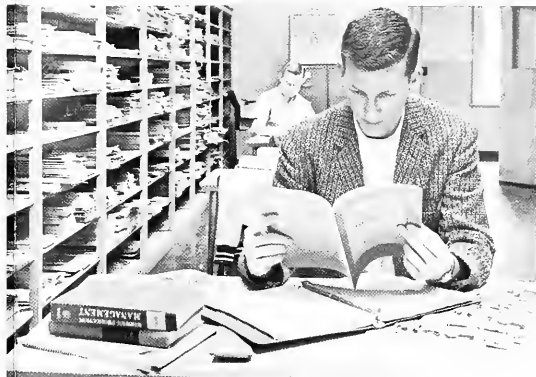
ACCOUNTING. The accounting program is designed to prepare students for public accounting and for positions as accountants in business, industry and government.

GENERAL BUSINESS AND FINANCE. The department has four major programs: *Finance, Business Administration and Economics, General Business and Urban and Regional Studies.* The curriculum in finance is directed towards the fields of banking, investment, brokerage, insurance or governmental agencies concerned with finance. The curriculum in Business Administration and Economics comprehends a wider field to balance a knowledge of both economics and business. The curriculum in General Business was designed for students who do not wish to specialize in any particular field. The curriculum in Urban and Regional Studies is an interdisciplinary program directed toward the problems of metropolitan areas.

MANAGEMENT. Industry and business offer qualified students an opportunity to find careers in General Management, Production Management, and in Personnel Management and Industrial Relations. Course programs are offered in each of these fields and provide the student both a specialized and a comprehensive understanding of the managerial process in industrial enterprises.

MARKETING. Students in marketing prepare for a variety of positions in wholesale and retail enterprises and in the sales activities of manufacturers. The program includes specialized study of basic types of market operations such as advertising, sales management and retailing.

Students in the School learn to use complex office machines.



Periodicals library in the School of Business Administration.

An advanced class in general business and finance.



Albert W. Purvis, Dean
School of Education Building



SCHOOL OF EDUCATION



The School of Education through its undergraduate program seeks to utilize the forces of the University to prepare teachers for elementary and secondary schools and through its graduate offering to prepare administrators and specialists in public education. Its program is based upon the assumption that teachers and other school personnel should have a broad liberal education, considerable mastery of at least one field, and professional courses which should lead to a knowledge of the persons to be taught, familiarity with the problems to be met, and practice in the best techniques of teaching and supervision. In all of this the School of Education takes the position that teacher education is a University function and that success will come only if the School is successful in maintaining the closest possible relationships with other schools and departments that contribute to the program.

All students who contemplate teaching as a career should register early, in their freshman year if possible, with the School of Education although their courses in education do not begin until the junior year. In general, students are admitted without question to the various service courses of the junior and senior years, but admission to the teacher-training program of the concentrated semester block is determined by a composite rating based on scholarship as shown by University grades (a three-year average at least as high as the University median is desired), success in the beginning courses in education, recommendations of University teachers in general education fields, and personality ratings by members of the staff.

ELEMENTARY SCHOOL TEACHING. Candidates for this program major in elementary education. In certain cases, with the approval of the Dean of the School of Education, the student may be permitted to major in some department of the College of Arts and Sciences where the general education program is deemed the equivalent of that designed for elementary education majors. This permission should be requested in freshman year. Such students will satisfy the requirements of their major department so far as the first two years are concerned but they should utilize their electives to take such courses as Government 25, Zoology 54, History, 25, 26 and Art or Music which are recommended by the School of Education. They should take Education 9, 39, 59. The core program for elementary education majors including Education 51 and 64, and Psychology 65 or Home Economics 70, Music 85 and the Elementary Education Block should be taken in the junior and senior years.

SECONDARY SCHOOL TEACHING. All candidates for secondary school teaching will major in the subject field to be taught and minor in education. A maximum of eighteen hours should be taken in this minor. Education 51 and Psychology 56 are required during junior year and Education 52, 88, 85

Above, the new School of Education building. Below, a laboratory in remedial reading techniques.

(called the secondary block) in one semester of senior year. Since the concentrated semester block in secondary school teacher-training carries only twelve credits for some majors, students should consult with their major adviser regarding means of making up the extra three credits, and of meeting all their major requirements in the three semesters of junior and senior years.

SPECIAL FIELD PROGRAMS FOR PROSPECTIVE TEACHERS. In Vocational Agriculture (R. C. Jones, adviser). This program is based on a cooperative agreement between the University and the Vocational Division of the State Department of Education which provides supervisors and consultants in conducting the program. Students otherwise qualified may prepare to teach vocational agriculture by the satisfactory completion of Education 72, 73, and 75. Education 52 is also recommended. To insure a desirable range of preparation, students who contemplate vocational teaching should consult, early in the freshman year if possible, Professor Jones and Mr. T. McGarr.¹

¹Mr. McGarr is State Supervisor for Agricultural Teacher-Training representing the Vocational Division of the State Department of Education in the administration of vocational agricultural acts.

A vocational teacher-training certificate is awarded by the Vocational Division to those who fully qualify.

In Home Economics (Mrs. Marjorie Sullivan, adviser). These students will major in home economics and minor in education. They should elect Education 51, Psychology 56, Home Economics 81 and the concentrated semester block (Education 52, 85).

In Teacher Coaching (S. W. Kauffman, adviser). These students will major in physical education and minor in education. They should elect Psychology 56 and the concentrated semester block (Education 52, 88, 85). They should elect a minor teaching field from the College of Arts and Sciences consisting of a minimum of eighteen hours.

In Music (D. Alviani, adviser). These students will major in music and minor in education. They should elect Education 51, Psychology 56, Music 87, and the concentrated semester block (Education 52, 85).

Class in audio-visual methods.



Students observing a classroom in the Mark's Meadow Laboratory School.





**E. E. Lindsey, Acting Dean
Main Engineering Building**

The departments of Chemical Engineering, Civil Engineering, Mechanical Engineering and Electrical Engineering comprise the School of Engineering. Each department offers a curriculum leading to a Bachelor of Science degree in that particular branch. A curriculum in Industrial Engineering is offered in the Mechanical Engineering department. All curricula are accredited by the Engineers Council for Professional Development.

Engineering can be defined as the combination of science and art by which materials and power are made useful to mankind. An engineer requires intensive technical training but at the same time he should acquire the broad education that distinguishes the professional man from the technician. His education does not end with formal schooling but continues throughout his life as he accumulates experience.

The curricula in engineering have been carefully prepared to offer each student the opportunity to acquire the sound training in mathematics and the basic sciences of chemistry and physics upon which is built the work in the engineering sciences. In the senior year courses are offered which enable the student to use his previous training for engineering analysis, design and engineering systems in his particular field of interest. About twenty per cent of his time is devoted to studies in the social science and humanistic area. Some opportunity is provided to elect courses from both the technical and humanistic-social fields.

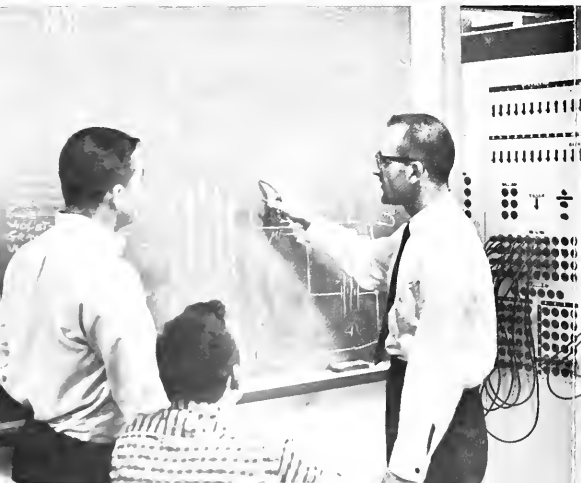
The curriculum of the freshman year is the same for all. Specialization to a limited extent begins in the sophomore year.

CHEMICAL ENGINEERING. Chemical Engineering is concerned with the development of manufacturing processes in which chemical or certain physical changes of materials are involved. These are resolved into a coordinated series of unit operations (physical changes) and unit processes (chemical changes). The work of the chemical engineer is primarily concerned with the design, construction, and operation of equipment and plants in which these are applied. Chemistry, physics, and mathematics are the underlying sciences of chemical engineering, and economics is its guide in practice.

Chemical engineers are employed not only in industry manufacturing chemicals but in many others, such as petroleum refining, coal processing, refractories and clay products, cement, waste treatment, pulp and paper, rayon and textiles, paint and varnish, natural and synthetic rubber, foods, leather, plastics, soap, penicillin and other antibiotics. Much of the work of the atomic energy program is chemical engineering. The types of work done by chemical engineers include: design, construction, research, development, production, financial and patent appraisal, management, and sales.

Above, the Main Engineering Building. Below, classroom demonstration in electrical engineering.

SCHOOL OF ENGINEERING



CIVIL ENGINEERING. Civil engineering is concerned with structures, transportation, movement of fluids, use and storage of water, sanitation, and surveying and mapping. A civil engineer may be engaged in research, in planning and designing, in construction, or in maintenance and operation.

The curriculum gives a thorough training in the fundamental physical sciences and at the same time prepares a student for work in any branch of civil engineering, allowing him to specialize to some extent in whatever branch is most interesting to him—sanitation, mechanics and structures, hydraulics, foundation engineering, highway engineering.

ELECTRICAL ENGINEERING. Electrical engineering deals with the engineering applications of electricity. Because of its unusual amount of diversity, it is usually convenient to separate it into such main divisions as power, communications, electronics and control, and others.

The undergraduate curriculum is designed to prepare the student for work in any of these fields and to serve as a basis for further specialization. Courses in liberal arts and in engineering courses outside of the department give the student an understanding of the broader aspects of engineering and other fields.

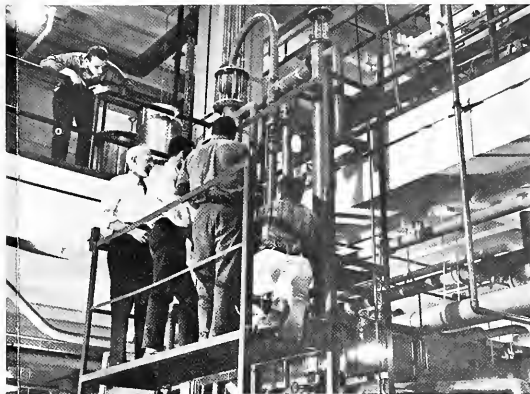
MECHANICAL ENGINEERING. Mechanical engineering is that branch of the profession which, broadly speaking, covers the fields of heat, power, design of machinery, industrial management and manufacturing problems.

Building upon a foundation of mathematics, physics, and chemistry, the department of mechanical engineering undertakes to show the student how fundamental physical laws apply to this field and to give him thorough training in the basic principles so that particular application can be mastered in professional practice. Therefore, no attempt is made to give highly specialized instruction.

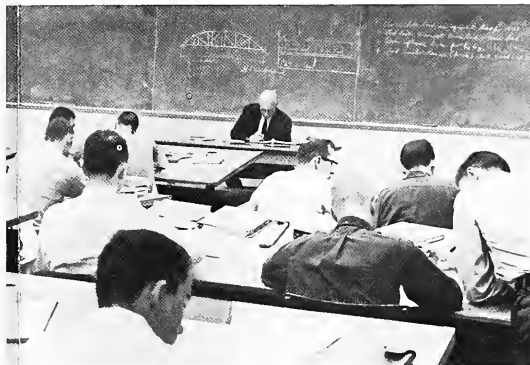
INDUSTRIAL ENGINEERING. Industrial engineering is concerned with the engineering aspects of the organization, operation and management of manufacturing plants. Consequently, the industrial engineering curriculum is built on a foundation of mechanical engineering. To the technical knowledge and scientific attitude developed through the study of engineering is added the study of certain courses in the humanities, in economics, and in management.

ENGINEERING SCIENCE OPTION. Engineering science is concerned with the application of the basic sciences to research and development in the engineering field. As such the curriculum contains extensive mathematics, physics, and other courses in the basic sciences designed to develop the student's skill in precise physical reasoning, analysis and synthesis. The student may elect the option from one of the four major departments at the end of his sophomore year provided he has completed his freshman and sophomore years with a quality point average of 2.80 or above or has achieved a cumulative average of 3.20 for the two preceding semesters.

The freshman year is the same for all students and the sophomore year corresponds to that major department in which the student is enrolled.



Studying techniques in chemical engineering.



Class in structural design in the School of Engineering.



Marian A. Niederpruem, Dean
Skinner Hall

The School of Home Economics encompasses an area of study which applies the principles and concepts of the fundamental arts and sciences to the physiological, psychological, social, and economic environmental needs of man.

The curricula of the school have been designed to provide a liberal education with depth in specialized areas of Food and Nutrition, Textiles, Clothing and Related Arts, and Home Economics Education. The transitional continuing relationships between liberal and professional education seek to develop in the student a disciplined mind, mental curiosity, and professional aspirations.

The five major curricula, found under the specialized areas listed above, are unique to Home Economics. They are Dietetic and Institutional Administration, Food and Nutrition in Business, Fashion in Retailing and Business, Secondary Education and Extension and Nursery School Education. These are found under the specialized areas of Food and Nutrition, (FN); Textiles, Clothing and Related Arts (TCRA); and Home Economics Education (HEEd.). The subject matter areas of Management and Family Economics (MFE), and Human Development (HD), are supportive to the majors. The letters in parenthesis are area codes. Prerequisites of appropriate arts and science courses allow for application of fundamental knowledge to the content of courses in specialized areas. Course content is based on research in Home Economics as well as in the physical and biological sciences, social sciences, arts and humanities.

Professional home economists are college graduates with bachelor degrees in Home Economics. They serve individuals, families and communities through schools and colleges, extension programs, business organizations of many kinds all over the world, community and government organizations and agencies, newspapers, magazines, radio and television. Representative types of activities that Home Economists participate in include teaching, research, writing, dietetics, extension work, interior decoration, fashion merchandising, food consulting, food service management and product development. Experience and advanced study in areas of specialization lead to positions of great responsibility.

Food and Nutrition

Food and Nutrition offers curricula which provide a strong foundation in the arts and sciences to support basic courses in foods and nutrition under two options: Dietetics and Institutional Administration; and Food and Nutrition in Business.

DIETETIC AND INSTITUTIONAL ADMINISTRATION. The curriculum prepares the graduate for positions as staff and administrative dietitians in various

SCHOOL OF
HOME ECONOMICS



Above, Skinner Hall, housing the School of Home Economics. Below, learning experience for student majoring in nursery school education.

types of food service; nutritionists with schools, Public Health and social welfare agencies and teaching and research dietitians. The sequence offers opportunities for further work at the graduate level for the student interested in college teaching, positions with extension and other government services, research in institutions of higher learning, medical centers and industry. This program is planned to meet the basic requirements of the American Dietetic Association for admission to approved dietetic internships or other on-the-job training programs.

FOOD AND NUTRITION IN BUSINESS. This curriculum is based on professional training in Food and Nutrition combined with selected courses in the humanities, social sciences and business. The program is designed for the student who is oriented to the business world, and leads directly into product development, research or consumer services with food, equipment, and utility industries. Positions are open in the field of communications for the student who combines her knowledge of Food and Nutrition with Journalism, English, Public Speaking, Television and Radio. Graduates with a major in this sequence are also placed in advertising and public relations agencies or with consulting firms. This curriculum allows students to pursue graduate study.

Textiles, Clothing and Related Arts

FASHION IN RETAILING AND BUSINESS. The retailing and professional opportunities associated with clothing, textiles, home furnishings and related merchandise are limitless. They include positions with manufacturers, producers, retailers, buying organizations, newspapers and magazines, radio and TV, consumer groups as well as educational institutions and social and government agencies. The student who is interested in the business field can get, by specializing in this area, a curriculum with a strong program of liberal arts with emphasis on the social sciences. Courses which build on this base toward professional business competency include fundamentals of clothing, textiles, fashion and related arts as well as courses in business, retailing and related subjects.

Home Economics Education

Home Economics Education offers curricula which provide a broad cultural education and preparation for teaching under two options: Secondary Education and Extension; and Nursery School Education.

SECONDARY EDUCATION AND EXTENSION. The School of Home Economics, in cooperation with the School of Education, prepares students for teaching Home Economics in junior and senior high schools. Students interested in Home Economics Extension, with the aid of an extension adviser, select courses that prepare them for continuing education positions in extension in both adult and 4-H programs. This curriculum provides basic training for graduate work in the field of home economics teaching and extension.

NURSERY SCHOOL EDUCATION. Students in this option participate in a program of academic studies which are interdisciplinary in nature. This program brings together knowledge from psychology, sociology, education, the arts, biology, anthropology, and relates it to the study of human development and early childhood education. Directed experience with the children of the laboratory nursery school and their families provides the necessary opportunity for students to develop a sound personal philosophy of early childhood education, and to achieve competence in implementing it. More intensive specialization for qualified students may be obtained through the election of a one-semester affiliation with: (1) Merrill-Palmer Institute in Detroit, Michigan, which specializes in the study of human development and family life; (2) the Eliot-Pearson School in Boston, Massachusetts, which specializes in the education of the three- to six-year-old child. The nursery school education program prepares the student for work in various types of group programs serving children of three and four years, such as laboratory nursery schools, public and private nursery schools, specialized nursery schools associated with clinics for exceptional children, hospital recreation programs, and nursery school programs in children's residential institutions. In addition, the nursery school education curriculum provides a good background for graduate work in various other child-serving professions.

Field trip for students in fashion retailing.



Interior decorating—a world of design and color.



Seminar in nutrition for majors in dietetics.



Laboratory in experimental foods.





**Mary A. Maher, Dean
School of Nursing
Western Massachusetts
Public Health Center**



The basic nursing curriculum is designed as a four-year academic program to prepare the qualified high school graduate for a career in professional nursing, as well as for the responsibilities of family and community life.

The program aims to equip the graduate with those understandings and skills which are needed to function effectively in beginning positions in a variety of nursing situations. These include the ability to provide competent nursing care to patients and families in the hospital, home and community; to participate with allied professional and citizen groups for the improvement of total health services to individuals and communities; to participate in organizing, planning and directing the work of nursing auxiliary workers. A foundation is laid for advanced study, through which the nurse may prepare for positions in teaching, supervision, administration, consultation and research.

During the first two years the student builds an educational foundation upon which to base the more specialized portion of the program. Courses in the humanities and in the sciences—biological, physical and behavioral—are taken with other students on the campus.

The clinical aspects of the program are developed beginning with the second year. Instruction and correlated clinical practice are given in selected co-operating agencies by the nursing faculty of the University and the allied professional staffs of the cooperating agencies. These agencies include: the Springfield Hospital; the Wesson Maternity Hospital, Springfield; the Northampton State Hospital; the Visiting Nurse Association of Springfield, the Springfield Health Department; and other community health, educational and welfare resources.

The Bachelor of Science degree, awarded upon successful completion of this program, qualifies the graduate for State Board Examinations in Nursing. If achievement in these examinations is satisfactory, the candidate receives legal status as a registered nurse within the state.

The program is fully accredited by the Accrediting Service of the National League for Nursing.



Above, the Western Massachusetts Public Health Center, home of the School of Nursing. Below, Students involved in study session in hospital library. Uniform is one designed especially for University nursing students.



Library in the School of Nursing.

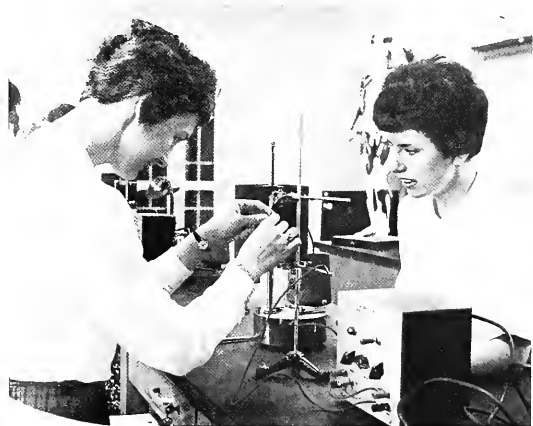


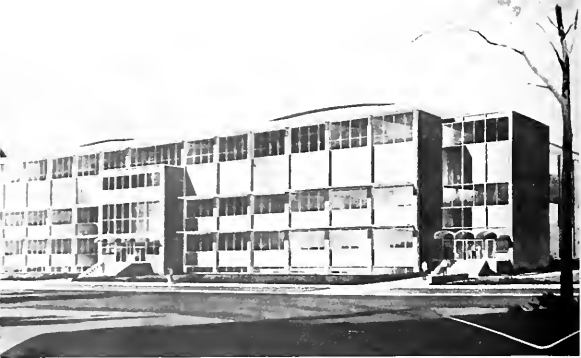
The essential background—knowledge of anatomy and physiology . . .

Clinical study in the children's ward of a hospital.



. . . of laboratory techniques in many areas.





Warren P. McGuirk, Dean
Curry Hicks Physical Education Building

The School of Physical Education includes the Departments of Physical Education for Men, Physical Education for Women, Recreation, and Athletics. It offers a major in Physical Education and in Recreation.

Physical Education for Men

GENERAL PROGRAM. Each male freshman and sophomore student, unless exempted under certain conditions, must successfully complete four semesters of physical education and demonstrate his ability to swim as a requirement for his degree. The physical education requirement does not apply to those students excused by the University physician, veterans of military service, and certain transfer students.

Students may receive credit for physical education, during the sport in season, by becoming squad members of any freshman or varsity team. Freshmen who elect on athletic team sport for physical education credit must rejoin their class sections at the termination of the seasonal sport. Students may not participate in a given sport for credit for more than two semesters.

MAJOR PROGRAM. The major program leading to the degree of Bachelor of Science in physical education is designed to train the student for a career as a teacher of physical education. The curriculum combines both general and professional education and provides for full teacher certification for the student who has met the prescribed requirements of preparation. The program also provides for adequate training in a minor area of teaching, elected by the student, including the coaching of inter-school athletics.

SCHOOL OF
PHYSICAL EDUCATION

Physical Education for Women

GENERAL PROGRAM. Physical Education is required of all women students during their freshman and sophomore years. The courses are planned to provide recreative activity, to improve individual skills, to develop body grace and efficiency and to increase health and vigor.

The first and second year women students are required to take three class hours a week for a total of eight credits, one for each quarter of satisfactory work.

Above, the soon-to-be completed Frank L. Boyden Physical Education Building.
Below, the Women's Physical Education Building.



MAJOR PROGRAM. The major course in physical education is planned to prepare women students for professional careers. Especial attention is given to preparing teachers for elementary and secondary schools in both physical and health education. Other areas for which the graduate will qualify are teaching sports and dance in social agencies, industrial plants, civic centers and camps. A foundation will be laid for specialization in graduate study. The curriculum gives a broad general background as well as the professional preparation.

Recreation

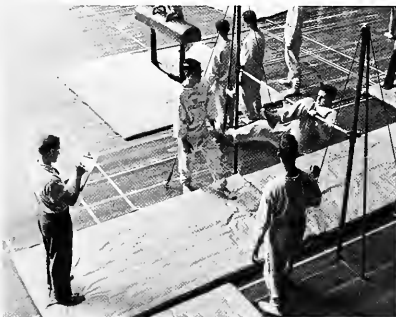
MAJOR PROGRAM. The department seeks to prepare men and women for positions involving administrative, supervisory and program leadership responsibilities in municipal recreation agencies, voluntary and youth-serving agencies, hospitals, and industrial and institutional organizations.

The program is designed to provide opportunities for a general education, a knowledge and understanding of people and society, activity skills and resource knowledge, professional competency, and practical experience in various leadership situations.

In addition to completing the curriculum as described below, the student is required to:

- (1) attend a professional conference approved by the department;
- (2) participate in programming activities at the Student Union, with a scout troop, or in a similar setting approved by the department;

TO KEEP AMERICA PHYSICALLY FIT—A few of the activities associated with the major areas in the School of Physical Education.



- (3) devote one summer (minimum of six weeks) to a recreation position, preferably with pay, in a camp, playground, or similar setting approved by the department.

Department of Athletics

(W. P. McGuirk, *Director*; E. E. Lorden, *Assistant Director*.) The following men coach intercollegiate athletics and intramurals: R. E. Bergquist, freshman coach of baseball and Stockbridge basketball; R. L. Bresciani, Assistant Director of Sports Information; L. E. Briggs, coach of varsity soccer; M. G. Brosky, freshman coach of wrestling; J. L. Cobb, freshman coach of track and acting director of intramurals; J. J. Deloney, assistant coach of football; C. O. Demers, athletic trainer; J. G. Douglas, coach of wrestling; W. Footrick, coach of track and cross country; Capt. R. Fowler, coach of rifle; V. H. Fusia, coach of football; R. F. Garber, coach of lacrosse; C. S. Gladchuk, assistant coach of football and coach of golf; F. J. Glatz, assistant coach of football; J. Gundersheim, coach of freshman gymnastics; V. A. Keedy, physiotherapist; E. K. M. Kjeldsen, varsity coach of gymnastics; S. R. Kosakowski, director of Stockbridge athletics and coach of hockey and tennis; J. A. Leaman, Jr., freshman coach of basketball and soccer; E. E. Lorden, coach of baseball; Capt. W. McGinnis, coach of pistol; W. P. MacConnell, coach of ski; Col. J. C. Marchant, coach of Stockbridge rifle; R. W. O'Connell, financial manager of athletics; J. M. Orr, coach of basketball; R. H. Page, director of sports information; J. R. Rogers, Jr., coach of swimming; T. S. Schmitt, assistant football coach; R. W. Gage, M.D., team physician and medical advisor.

DEPARTMENT OF PUBLIC HEALTH

Robert W. Gage, Chairman

Students majoring in Public Health may select divisional classification in accordance with their special interests.

The Department of Public Health offers programs leading to the Bachelor of Science degree in Environmental Health and the Bachelor of Science degree in Medical Technology. The Master of Science degree in Environmental Health is also offered.

PUBLIC HEALTH. The curriculum in public health is designed to prepare a student for a health career. Career opportunities are open in: (1) administration of health services; (2) in basic sciences related to health; (3) in environmental health services; (4) in food and drug protective services; (5) in health education; and (6) in health information and communications.

MEDICAL TECHNOLOGY. The curriculum in medical technology is recommended for young men and women as a profession offering a wide opportunity of occupational outlets. Medical technology graduates may be pre-

pared for positions in medical laboratories, in federal, state and local health departments, and in commercial and research laboratories.

Following graduation the student will be assisted in arranging for a 12-month internship in an approved hospital laboratory. The student must complete all of the requirements established by the American Society of Clinical Pathologists to qualify for the Registry of Medical Technology.

OPTIONAL PROGRAM IN MEDICAL TECHNOLOGY. Students may elect an optional program some time during their freshman year which will permit completion of both the requirements for the Bachelor of Science degree and one year of hospital internship required by the Registry of Medical Technology in a total of four years. This can be accomplished by scheduling the required courses listed in the four-year academic program in three academic years plus summer school sessions and/or by being granted academic credit for the year of hospital internship. After successful completion of at least 120 credits and satisfying the requirements of the Department of Public Health a student will receive a Bachelor of Science degree.

DIVISION OF MILITARY AND AIR SCIENCE

The Division of Military and Air Science includes the Department of Military Science and the Department of Air Science. No major is offered in either department. Effective academic year 1963-1964, the ROTC (Army and Air Force) program is voluntary. Male students who are physically qualified may register in the two-year basic ROTC course and receive credit toward graduation. Completion of the basic course is a requirement for enrollment in the advanced course which leads to a commission in the armed forces.

DEPARTMENT OF MILITARY SCIENCE (Army)

Albert W. Aykroyd, Colonel, U. S. Army, Head

The Army Reserve Officers Training Corps is the means by which young men who have taken the leadership step of coming to the state university may assure themselves that their military service is performed in commissioned status. The first two years are basic training in leadership and citizenship. The student is informed on the position of the military in the current scene and as it relates to his future. The second two years of ROTC are not only elective, but selective. The best qualified students are selected and are permitted to contract to continue on to a reserve commission. The Army provides these men a subsistence allowance and additional emoluments. There is a six-week summer camp training period between the junior and senior

year. Participation in ROTC has notable effect in character development. It also discloses to the army existing officer material and its potential leaders. Successful completion of this program leads to a commission as a Second Lieutenant, U. S. Army Reserve. Active duty requirements are, at the present time, two years service with an active Army unit.

DEPARTMENT OF AIR SCIENCE

Thomas Carhart, Colonel, U. S. A. F., Head

The mission of the department program is to develop in selected college students, through a permanent program of instruction, those qualities of leadership and other attributes essential to their progressive advancement to positions of increasing responsibility as commissioned officers in the United States Air Force. It is not expected that all so commissioned will select the U. S. A. F. as a career; nevertheless, the program does offer an excellent means to prepare for such a career. The first two years of instruction, the basic course, give a foundation for leadership and air and space age citizenship. The program of the last two years, advanced Air Force ROTC and four weeks of summer training at the end of the junior year, is designed primarily to enhance the professional knowledge and leadership capabilities of those qualified and selected for officer training.

COURSE REQUIREMENTS IN THE FRESHMAN YEAR

The following listings are designed to give prospective students a complete schedule of the courses required in the freshman year in all colleges and schools of the University.

Note: Courses in Military and Air Science, although listed among the programs below, are elective offerings and are not required for graduation.

COLLEGE OF ARTS AND SCIENCES

1st Semester	Credits	2nd Semester	Credits
English 1	2	English 2	2
Speech 3*	2	Speech 3*	2
Mathematics or Natural Science ¹	3	Mathematics or Natural Science ¹	3
Natural Science or History 5 ²	3	Natural Science or History 6 ²	3
Foreign Language ³	3	Foreign Language ³	3
Elective ⁴	3	Elective ⁴	3
Military or Air Science 1 (men)	1	Military or Air Science 2 (men)	1
Physical Education 1, 2 (men)**	2	Physical Education 3, 4 (men)**	2
Physical Education 5, 7 (women)**	2	Physical Education 6, 8 (women)**	2

¹Candidates for the B.S. degree take Mathematics. Those planning to major in chemistry or physics should, if possible, elect Mathematics 5 and 6.

²Candidates for the B.S. degree take natural science; candidates for the B.A. degree take History 5 and 6.

³Subject to exemption on basis of proficiency examination.

⁴Candidates for the B.S. degree take science.

*May be taken either semester.

**Not quality point credit.

COLLEGE OF AGRICULTURE (Continued)

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Math. 6, Diff. Calculus	4
Math. 5, Analy. Geom.	4	Chem. 2 or 4, General	3
Chem. 1, General	3	Mech. Engin. 2, Drawing	3
Mech. Engin. 1, Drawing	2	Physics 6, General	3
Physics 5, General	3	Military or Air Science 2	1
Military or Air Science 1	1	Physical Ed. 3, 4*	2
Physical Ed. 1, 2*	2		

*Not quality point credit.

SCHOOL OF BUSINESS ADMINISTRATION

In each subject a one year sequence is required.

1st Semester	Credits	2nd Semester	Credits
English 1	2	English 2	2
Speech 3*	2	Speech 3*	2
Mathematics	3-4	Mathematics	3-4
Hist. 5, 25, or Govt. 25	3	Hist. 6, 26, or Govt. 26	3
Science: elect one	3	Science: continue 1st sem. sd.	3
Chemistry 1		Chemistry 2	
Physics 3		Physics 4	
Batony 1		Batony 25	
Geology 1		Geology 2	
Zoology 1		Zoology 25 or 35	
Elective†	3	Elective†	3
Military or Air Science 1	1	Military or Air Science 2	1
Physical Ed. 1, 2 (men)**	2	Physical Ed. 3, 4 (men)**	2
Physical Ed. 5, 7 (women)**	2	Physical Ed. 6, 8 (women)**	2

*May be taken either semester.

†Not quality point credit.

‡If a language is elected the student must complete the intermediate year to meet the basic school requirement.

§If a language is not elected:

Where Government has been elected the student shall elect one of the following: History 5, 6, 25, 26, Economics 12.

Where History has been elected the student shall elect Government 25.

The student shall select, with the help of an adviser, a one-semester elective.

COLLEGE OF AGRICULTURE

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3*	2	Speech 3*	2
Mathematics 1, Introductory ¹	3	Mathematics 2 or 4 ¹	3
Chemistry 1, General	3	Chemistry 2, General	3
Batony 1, General	3	Zoology 1, General	3
Military or Air Science 1 (men)	1	Elective ²	3
Food Economics 1	2	Military or Air Science 2 (men)	1
Physical Education 1, 2 (men)**	2	Physical Education 3, 4 (men)**	2
Physical Education 5, 7 (women)**	2	Physical Education 6, 8 (women)**	2

¹Candidates for the Bachelor of Vocational Agriculture degree must take Mathematics 01 (in place of Mathematics 1) and either Mathematics 12 or 1 (in place of Mathematics 2).

²Elective may be any freshman or sophomore course—most will elect Animal Husbandry 2, Horticulture 2, Entomology 26 or Forestry 26. Some majors in Wildlife Management, Food Management, or Food Technology may prefer a year of foreign language to the Food Economics 1-elective sequence. Food Distribution majors will take Microbiology 31.

*May be taken either semester or during a later year.

**Not quality point credit.

All freshman agriculture majors take this program except those majoring in Agricultural Engineering. The latter take the following curriculum:

SCHOOL OF EDUCATION

1st Semester	Credits	2nd Semester	Credits
English 1	2	English 2	2
Speech 3*	2	Speech 3*	2
Math. 1 or Chem. 1	3	Math. 2 or 4 or Chem. 2	3
Zool. 1 or Bot. 1	3	Bot. 1 or Zool. 1	3
Foreign Lang.**	3	Foreign Lang.**	3
History 5	3	History 6	3
Education 9†		Education 9†	
Military or Air Science 1 (men)	1	Military or Air Science 2 (men)	1
Physical Ed. 1, 2 (men)‡	2	Physical Ed. 3, 4 (men)‡	2
Physical Ed. 5, 7 (women)‡	2	Physical Ed. 6, 8 (women)‡	2

*May be taken either semester.

**Intermediate Proficiency Required.

†To be completed in a school year.

‡Not quality point credit.

SCHOOL OF ENGINEERING

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Math. 6, Calculus	4
Math. 5, Analy. Geom. and Calc.	4	Chem. 2 or 4, General*	3 or 4
Chem. 1 or 3, General*	3	M. E. 2, Desc. Geom.	3
M. E. 1, Graphics	2	Physics 6, General	3
Physics 5, General	3	Military or Air Science 2	1
Military or Air Science 1	1	Physical Ed. 3, 4†	2
Physical Ed. 1, 2†	2		

*It is recommended that Chemical Engineering majors take Chemistry 3 and 4 in place of Chemistry 1 and 2.

†Not quality point credit.

SCHOOL OF HOME ECONOMICS

Key: FN—Food and Nutrition

TCRA—Textiles, Clothing and Related Arts

MAJOR IN DIETETIC AND INSTITUTIONAL ADMINISTRATION

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3*	2	Chemistry 2, General	3
Chemistry 1, General	3	Psychology 1, General	3
FN 27, Man and Nutrition	3	Mathematics 1, Introduction	3
Foreign Language or Humanities Elective	3	Zoology 1, Introduction	3
Sociology 25, Introductory	3	Physical Education 6, 8†	2
Physical Education 5, 7†	2		

*May be taken either semester.

If a foreign language is elected, student must complete the intermediate year.

†Not quality point credit.

SCHOOL OF HOME ECONOMICS (Continued)

MAJOR IN FOOD AND NUTRITION IN BUSINESS

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3, Communications	2	Psychology 1, General	3
Chemistry 1, General	3	Chemistry 2, General	3
FN 27, Man and Nutrition	3	Zoology 1, Introductory	3
Sociology 25, Introductory	3	TCRA 23, Art for Living	3
Elective	3	Elective	3
Physical Education 5, 7†	2	Physical Education 6, 8†	2

†Not quality point credit.

MAJOR IN FASHION IN RETAILING AND BUSINESS

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3, Communication	2	Science, Physical or Biological	3
Science, Physical or Biological	3	Psychology, 1	3
Sociology 25	3	Language	3
Language	3	TCRA 24, Textiles I	3
TCRA 23, Art for Living	3	Physical Education 6, 8†	2
Physical Education 5, 7†	2		

†Not quality point credit.

MAJOR IN SECONDARY EDUCATION AND EXTENSION

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 1, Composition	2
Speech 3, Oral Communication	2	Psychology 1, General	3
Chemistry 1, General	3	Chemistry 2, General	3
FN 27, Man and Nutrition	3	Mathematics 1, Introductory	3
Sociology 25, Introductory	3	TCRA 24, Textiles I	3
Government 25	3	Physical Education 6, 8†	2
Physical Education 5, 7†	2		

†Not quality point credit.

MAJOR IN NURSERY SCHOOL EDUCATION

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Zoology 1, Introductory	3	Economics 25, Elements of	3
Foreign Language	3	Foreign Language	3
FN 27, Man and Nutrition	3	Sociology 25, Introductory	3
Psychology 1 or 5, General	3	Elective	3
Speech 3, Oral Communication	2	Physical Education 6 and 8†	2
Physical Education 5 and 7†	2		

†Not quality point credit.

SCHOOL OF NURSING

1st Semester	Credits	2nd Semester	Credits
English 1	2	English 2	2
Chemistry 1	3	Chemistry 2	3
Soc. 25 or Psych. 1	3	Soc. 25 or Psych. 1	3
Zoology 1	3	Nursing 1	3
Social Science Elective	3	Social Science Elective	3
Speech 3**	2	Speech 3**	2
Physical Ed. 1c, b	2	Physical Ed. 6 and 8	2

**May be taken either semester.

SCHOOL OF PHYSICAL EDUCATION

PHYSICAL EDUCATION FOR MEN

1st Semester	Credits	2nd Semester	Credits
English 1	2	English 2	2
P. E. 23, Principles of Health Ed.	3	Speech 3	2
Statistics 21	3	Social Science Elective	3
P. E. 21, Intro. to Phys. Ed.	3	P. E. 22, First Aid and Safety	3
P. E. 5, Skills and Techniques (Lacrosse—Gymnastics)	1	P. E. 6, Skills and Techniques (Gymnastics—Badminton)	1
<i>Elect One</i>		<i>Elect One</i>	
Chemistry 1	3	Chemistry 2	3
Botany 1	3	Botany 1	3
Zoology	3	Zoology 1	3

PHYSICAL EDUCATION FOR WOMEN

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Zoology 1, Introductory	3
Hist. 5, Mod. Europ. Civ.	3	Hist. 6, Mod. Europ. Civ.	3
W. P. E. 1, Intro. to P. E.	2	W. P. E. 2, Intro. to Child. thru P. E. [†]	2
Statistics 21	3	W. P. E. 10, Health for Adults	2
W. P. E. 11, Skills	1	W. P. E. 12, Skills	1
Elective*	3	Elective*	3

*Chemistry 1 and 2 are required if students have not had chemistry in high school. Others may select from Chemistry, Physics, Microbiology, or foreign language.

RECREATION

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Statistics 21	3
Bot. 1, Intro. Bot.	3	Zool. 1, Intro. Zool.	3
Govt. 25, American Govt.	3	Soc. 25, Intro. to Soc.	3
Humanities Elective	3	M. P. E. 22, First Aid & Safety	3
Rec. 1, Intro. to Rec.	3	Rec. 2, Social Rec.	2
P. Rec. 13, Skills & Tech.	1	P. Rec. 14, Skills & Tech.	1

DEPARTMENT OF PUBLIC HEALTH

PUBLIC HEALTH

1st Semester	Credits	2nd Semester	Credits
English 1	2	English 2	2
Speech 3	2	Speech 3	2
Mathematics 1 or 2	3	Mathematics 4	3
Chemistry 1	3	Chemistry 2	3
Foreign Language	3	Foreign Language	3
Biology 1	3	Zoology 1	3
Military or Air. Sci. 1 (men)	1	Military or Air. Sci. 2 (men)	1
Phys. Ed. 1, 2 (men)†	2	Phys. Ed. 3, 4 (men)†	2
Phys. Ed. 5, 7 (women)†	2	Phys. Ed. 6, 8 (women)†	2

†Not quality point credit.

MEDICAL TECHNOLOGY

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3, I or II	2	Speech 3, I or II	2
Chemistry 1, General	3	Chemistry 2, General	3
Botany 1 or Zoology 1	3	Botany 1 or Zoology 1	3
Foreign Language	3	Foreign Language	3
Mathematics 1, Intro.	3	Mathematics 4, Intro.	3
Military (men)	1	Military (men)	1
Phys. Ed. 1, 2 (men)†	2	Phys. Ed. 3, 4 (men)†	2
Phys. Ed. 5, 7 (women)†	2	Phys. Ed. 6, 8 (women)†	2

†Not quality point credit.

DEPARTMENT OF MILITARY SCIENCE (ARMOR)

1st Semester	Credit	2nd Semester	Credit
M. S. 11	1	M. S. 12	1

DEPARTMENT OF AIR SCIENCE

1st Semester	Credits	2nd Semester	Credits
Air Science 11, Leadership Laboratory	1	Air Science 12, Foundations of Aerospace Power	1
And one of the following:*			
English 1 or 2	2		
Mathematics 1, 2, 4, 5, 6, or 7	3-4		
Speech 3	2		
Chemistry 1 or 3	3-4		
Psychology 1 or 5	3		

*Other substitutions may be authorized by the Department of Air Science.

WHERE TO WRITE FOR FURTHER INFORMATION

Academic Affairs

Gilbert L. Woodside, *Provost*

Admission, Registration and Transcripts

Marshall O. Lanphear, *Registrar*

Expenses, Payments

Kenneth Johnson, *Treasurer*

Health Services

Dr. Robert W. Gage

Housing

John C. Wells, *Director of Housing*

Men's Affairs

Robert S. Hopkins, *Dean of Men*

Placement and Financial Aid Services

Robert J. Morrissey, *Director*

Stockbridge School of Agriculture

Fred P. Jeffrey, *Director*

Student Affairs

William F. Field, *Dean of Students*

Summer Sessions

Office of the Provost

Women's Affairs

Helen S. Curtis, *Dean of Women*

All correspondence should be addressed to the appropriate office, University of Massachusetts, Amherst, Massachusetts.



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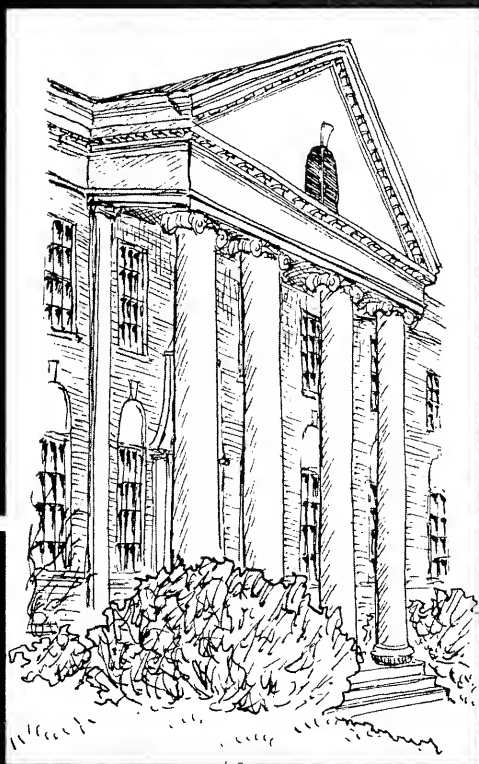
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Kenneth William Johnson, Treasurer





Graduate School

UNIVERSITY OF MASSACHUSETTS

Bulletin

1964 / 1965

Volume LV

November, 1963

Number IV

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Graduate School

UNIVERSITY OF MASSACHUSETTS

Catalog for 1964-1965

UNIVERSITY OF MASSACHUSETTS

Amherst, Massachusetts

CORRESPONDENCE

Correspondence regarding various phases of the Graduate program should be directed as follows:

Office of the President: JOHN W. LEDERLE, President

Office of the Provost: GILBERT L. WOODSIDE, Provost

Graduate School: EDWARD C. MOORE, Dean

Fees, Payments: ROBERT MISHOL, Staff Assistant to the Treasurer

Housing: JOHN C. WELLES, Housing Supervisor

Summer Session: WILLIAM C. VENMAN, Director

Veterans' Affairs: GEORGE E. EMERY, Veterans' Coordinator

Foreign Students Affairs: ROBERT POTASH, Foreign Student Advisor

ACADEMIC CALENDAR 1963-1964

September 12, 1963, Thursday	Registration of graduate students.
September 13, Friday	Classes begin.
October 3, Thursday	Last day on which Ph.D. candidates who plan to complete their work by the June 1964 Commencement may take the preliminary comprehensive examination.
October 12, Saturday	Columbus Day; a holiday.
November 11, Monday	Veterans' Day; a holiday.
November 26, Tuesday, after last class to December 2, Monday, 8:00 A.M.	Thanksgiving recess.
November 29 or 30	Ph.D. language examinations.
December 3, Tuesday	Counseling day for students in residence.
December 18, Wednesday, after last class to January 2, Thursday, 8:00 A.M.	Christmas recess.
January 2, 1964, Thursday	Last day on which thesis outlines may be handed in by Master's degree candidates who plan to finish their work by the 1964 Commencement.
January 11, Thursday	Last day of classes.
January 13, Monday, through January 21, Tuesday	Final examinations.
January 23, Thursday	Graduate pre-registration for new students.
January 30, Thursday	Registration of graduate students.
January 31, Friday, 8:00 A.M.	Classes begin.
February 13, Thursday	Last day on which graduate students may drop courses without a failure.
March 26, Thursday, after last class to April 6, Monday, 8:00 A.M.	Spring recess.
April 20, Monday	Patriot's Day; a holiday.
April 24 or 25, Friday, Saturday	Ph.D. language examinations.
May 6, Wednesday	Counseling day for students in residence.
May 21, Thursday	Last day of classes.
May 22, Friday, through June 1, Monday	Final examinations.
May 28, Thursday	Last day for bound theses to be handed in.
May 30, Saturday	Memorial Day; a holiday.
June 5, Friday through June 7, Sunday	Commencement.

ACADEMIC CALENDAR 1964-1965

September 7, 1964, Monday	Graduate pre-registration day for new students.
September 14, Monday	Registration of graduate students.
September 15, Tuesday	Classes begin.
September 28, Monday	Last day on which graduate students may drop a course without a failure.
October 1, Thursday	Last day on which Ph.D. candidates who plan to complete their work by the June 1965 Commencement may take the preliminary comprehensive examination.
October 12, Monday	Columbus Day; a holiday.
November 11, Wednesday	Veterans' Day a holiday.
November 25, Wednesday, after last class to November 30, Monday, 8:00 A.M.	Thanksgiving recess.
November 27 or 28	Ph.D. language examinations.
December 8, Tuesday	Counseling day for students in residence.
December 19, Saturday, after last class to January 4, Monday, 8:00 A.M.	Christmas recess.
January 4, 1965, Monday	Last day on which thesis outlines may be handed in by Master's degree candidates who plan to finish their work by the 1965 Commencement.
January 13, Wednesday	Last day of classes.
January 15, Wednesday, through January 23, Saturday	Final examinations.
January 26, Tuesday	Graduate pre-registration day for new students.
February 2, Tuesday	Registration.
February 3, Wednesday	Classes begin.
February 16, Tuesday	Last day on which graduate students may drop courses without a failure.
February 19, Friday, after last class to February 23, Tuesday, 8:00 A.M.	Washington's birthday holiday.
April 10, Saturday, after last class to April 20, Tuesday, 8:00 A.M.	Spring recess.
April 29 or 30, Friday, Saturday	Ph.D. language examinations.
May 11, Tuesday	Counseling Day, no classes.
May 25, Tuesday	Last day of classes.
May 27, Thursday, through June 5, Saturday	Final examinations.
May 28, Friday	Last day for bound theses to be handed in.
May 31, Monday	Holiday.
June 10, Friday, through June 12, Sunday	Commencement.

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TRUSTEES of the UNIVERSITY

Organization of 1964

Members of the Board	Term Expires
ALDEN CHASE BRETT of Belmont	1964
ERNEST HOFTYZER of Marion	1964
J. JOHN FOX of Boston	1965
MISS VICTORIA SCHUCK of South Hadley	1965
DENNIS MICHAEL CROWLEY of Boston	1966
MRS. KATHRYN FORAN FURCOLO of Chestnut Hill	1966
FRANK LEAROYD BOYDEN of Deerfield	1967
GEORGE L. PUMPHRET of Dorchester	1967
HARRY DUNLAP BROWN of North Chatham	1968
JOHN WILLIAM HAIGIS, JR. of Greenfield	1968
MOST REVEREND CHRISTOPHER JOSEPH WELDON of Springfield	1969
FRED C. EMERSON of Agawam	1969
EDMUND J. CROCE of Worcester	1969
CALVIN H. PLIMPTON of Amherst	1969
HUGH THOMPSON of Milton	1969
JOSEPH P. HEALEY of Arlington	1970
FREDERICK SHERMAN TROY of Boston	1970

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*JOHN H. DITTFACH, *Professor of Mechanical and Industrial Engineering*

*EDWIN D. DRIVER, *Associate Professor of Sociology and Anthropology*

*IRVING S. FAGERSON, *Professor of Food Science and Technology*

I. MOYER HUNSBERGER, *Dean of the College of Arts and Sciences*

*VINCENT ILARDI, *Associate Professor of History*

FRED P. JEFFREY, *Associate Dean of the College of Agriculture and Director of the Stockbridge School*

*PHILLIPS R. JONES, *Assistant Professor of Physics*

H. B. KIRSHEN, *Dean of the School of Business Administration*

*E. ERNEST LINDSEY, *Acting Dean of the School of Engineering*

WARREN P. MCGUIRK, *Dean of the School of Physical Education*

*WILLIAM J. MELLEN, *Research Professor of Poultry Science*

ADREEN NICHOLS, *Associate Professor of Home Economics*

MARION A. NIEDERPRUEM, *Dean of the School of Home Economics*

*CHARLES F. OLIVER, *Professor of Education*

*ALEXANDER PAGE, *Associate Professor of English*

ALBERT W. PURVIS, *Dean of the School of Education*

*H. DUNCAN ROLLASON, *Associate Professor of Zoology*

*G. DALE SHECKELS, *Head of the Department of Electrical Engineering*

KENNETH SHERK, *Director of Graduate Study, Smith College*

*J. HAROLD SMITH, *Professor of Chemistry*

ARLESS A. SPIELMAN, *Dean of the College of Agriculture and Director of the Experiment Station and Director of the Extension Service*

*WARREN H. TEICHNER, *Professor of Psychology*

*ROBERT W. WAGNER, *Associate Dean of the College of Arts and Sciences and Professor of Mathematics*

* Elected by the Graduate Faculty.

GENERAL INFORMATION

The Graduate School has offered instruction since 1876 and was formally organized as a separate unit in the University in 1908. Its objective is to provide qualified students with proper guidance in the methods of advanced study and research. It is dedicated to the ideal of the advancement of knowledge, and seeks to impart to each student respect for true scholarship.

Courses are available leading to the degree of Doctor of Philosophy, Doctor of Education, Master of Arts, Master of Arts in Teaching, Master of Education, Master of Fine Arts, Master of Business Administration, Master of Landscape Architecture, Master of Science, Master of Science in Accounting, Master of Science in Finance, Master of Science in Agricultural Engineering, Master of Science in Chemical Engineering, Master of Science in Civil Engineering, Master of Science in Electrical Engineering, Master of Science in Industrial Engineering, and Master of Science in Mechanical Engineering.

ADMISSION

Requirements for admission:

1. A Bachelor's degree or the equivalent from any college or university of recognized standing. Applications for admission from all graduates of non-accredited schools in the United States must be supported by the result of an objective test such as the Graduate Record Examination or the Miller Analogies Test.

2. Two official transcripts of all previous college work.

3. Two letters of recommendation. It is urged that wherever practicable both letters come from persons in the field of the applicant's academic major at the institution most recently attended. Applicants whose academic references would go back more than five years may substitute other references if desired.

4. The applicant must have been in the upper half of his graduating class with a grade point average of 2.5 or better. If the transcript does not indicate the rank of the applicant, it is the duty of the Committee on Admissions to evaluate the transcript.

5. Acceptance by the department and by the Admissions Committee of the Graduate Council.

Admission to the Graduate School does not imply admission to candidacy for an advanced degree. Such candidacy is subject to specific requirements as laid down by the several departments. The student must secure the approval of the Head of the Department in which he desires to major before he can become a candidate for a degree in that subject.

Applicants will be admitted to the Graduate School in one of the following three categories:

Regular: a student admitted to full status in the graduate program of an academic department.

Special: a student admitted provisionally on a probationary status. At the conclusion of a semester of work—or two semesters if the department wishes—the student is either admitted to regular status or refused admission. If he is admitted to regular status,

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credits earned while in a special status are acceptable toward his degree if approved by his Guidance Committee.

Unclassified: a student who is not working toward a degree at this institution. Unclassified students do not have advisors. They apply for admission on a separate admission form.

FEES

Fees are determined by the number of courses and corresponding credits taken per semester.

Tuition

Tuition for residents of Massachusetts is charged at the rate of \$10 per credit up to a maximum \$100 per semester. Non-residents are charged \$15 per credit up to a maximum of \$150 per semester. In order to take advantage of the lower tuition rate, a student must have on file a Certificate of Residence properly authenticated by his Town or City Clerk.

Board

Students may elect to use the facilities of the University Dining Commons at an approximate cost of \$166 per semester.

Other Fees

1. Any student taking more than two courses shall be required to pay all the following fees:

Student Union	\$10 per semester
Health Fee	\$15 per semester
Identification Card	\$ 1 per year
Blue Cross/Blue Shield	\$16 per year (optional)

2. Any student enrolled for less than three courses (living in University housing) shall pay Identification Card and Health Fee.

3. Any student enrolled for less than three courses (*not* living in University housing) shall pay Identification Card fee only.

ADMISSION FEE

New students make an advance payment of \$15.00 within thirty days of the time that they are notified that they are accepted for admission. This will be considered as first payment on University tuition and fees. It is not refundable and will be considered as payment for admissions and registration expense if the student does not enter the Graduate School.

Checks should be made out to the Treasurer of the University of Massachusetts and mailed to the Dean of the Graduate School.

LATE PAYMENT AND PRE-REGISTRATION

Any student who does not report for pre-registration on the dates specified or fails to complete his pre-registration may be required to pay a late registration fee of \$5.00. Admission for the following semester is not assured for returning students who fail to pre-register. Pre-registration is optional for students employed off-campus and pursuing a part-time program.

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WAIVER OF TUITION AND FEES

Holders of certain titles are exempt from tuition and certain fees. Waiver forms are available in the Graduate Office. These forms must be processed before registration in order to take advantage of waivers.

Candidates for a Master's degree who have paid a full year's tuition in the Graduate School are not required to pay tuition if they later register only for a Master's thesis.

Candidates for the Doctor of Philosophy degree who have paid two full years' tuition in the Graduate School are not required to pay tuition if they later register only for the Doctor's thesis.

HOUSING

Information about housing may be obtained by writing to the Director of Housing, Draper Hall. A certain number of University apartments are available to graduate students. The Housing Director has a list of rooms that can be rented in private homes at from \$30 to \$40 per month. The cost of books and incidentals should not exceed \$150 per year.

ASSISTANTSHIPS AND FELLOWSHIPS

Graduate Assistants

The University offers a number of graduate assistantships for the purpose of assisting with the instructional and research programs of various departments. The stipend varies, up to a maximum of \$2,500 for the academic year, depending upon the qualifications of the applicant. Graduate assistants are not required to pay tuition if their stipend is \$1,250 or higher. Such assistants may carry up to thirteen credits per semester, but the total for both semesters of any one academic year may not exceed twenty-four credits. Application should be made to the Head of the academic department.

RESEARCH FELLOWSHIPS

A number of research fellowships are available to qualified graduate students. These are made possible because funds are provided by (a) various industries, (b) the Experiment Station, or (c) research grants awarded to members of the Graduate Faculty either from sources outside the University or from a fund provided by the University and administered by the Research Council. Stipends vary with the type of work and the amount of time involved. Interested students should make application to the Head of the Department in which they plan to work.

LOTTA CRABTREE FELLOWSHIPS

A limited number of fellowships paying \$2,000 each are available to students in the broad field of agriculture. Students applying for these fellowships must be interested in earning the Doctor of Philosophy degree for the purpose of serving agricultural pursuits. Application should be made to the Dean of the Graduate School.

THE CRAMPTON RESEARCH FUND

Interest from the Guy Chester Crampton Research Fund is used to help defray the costs of publication of worthy research papers completed by students

GENERAL INFORMATION

or occasionally by staff members. Information concerning the fields of work for which grants may be made, and instructions for application, may be obtained from Department Heads, the chairman of the Crampton Fund Committee or the Graduate School office.

PROGRAMS OFFERED

Courses available as major subjects for the degree of Doctor of Philosophy:

Agronomy	German
Animal Science	Government
Botany	History
Chemistry	Microbiology
Civil Engineering	Philosophy
Economics	Plant Pathology
English	Poultry Science
Entomology	Psychology
Food Science and Technology	Sociology
French	Zoology
Geology	

Course available as major subject for the degree of Doctor of Education:

Education: School Administration, School Guidance

Courses available as major subjects for a Master's degree:

Accounting	Government
Agricultural and Food Economics	History
Agricultural Engineering	Home Economics
Agronomy	Horticulture
Botany	Industrial Engineering
Business Administration	Landscape Architecture
Chemical Engineering	Mathematics
Chemistry	Mechanical Engineering
Civil Engineering	Microbiology
Dairy and Animal Science	Philosophy
Economics	Physical Education
Education	Physics
Electrical Engineering	Plant Pathology
English	Poultry Science
Entomology	Psychology
Finance	Public Health
Fine Arts	Romance Languages
Food Science and Technology	Sociology and Anthropology
Forestry	Speech
Geology	Statistics
German-Russian	Wildlife and Fisheries Biology
	Zoology

REQUIREMENTS FOR DEGREES

All of the requirements for the several advanced degrees listed below (Ph.D. and all Master's degrees) must be completed by May 28, if the degree is to be received at the Commencement following that date. (September 1 for students planning to receive their degrees in the fall; February 1 for students planning to receive their degrees in the winter.)

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Doctor of Philosophy

In order to provide proper direction for the Ph.D. candidate, a Guidance Committee of three will be appointed not later than two months after his first registration. This Committee will be appointed from members of the Graduate Faculty recommended by the Department Head of the student's major department, and will consist of two members of the major department and one other person.

This Guidance Committee shall meet with the candidate as soon as possible after the appointment has been made. At least three weeks prior to the candidate's second registration the Committee shall file in the Graduate Office a summary of the proposed program of the student, including specific courses recommended by the Committee. In addition to this original meeting with the student, the Guidance Committee's responsibilities shall be to:

- a. Plan the program of the student.
- b. Arrange for the preliminary comprehensive examination of the student.
- c. Plan for the satisfying of the language requirement by the student.
- d. Supervise the thesis project and arrange for the final examination. The Guidance Committee will serve as the Thesis Committee for the Ph.D. candidate.
- e. Report the fulfillment of all requirements to the head of the major department, the vote of the Committee to be unanimous on this.

The degree is conferred upon graduate students who have met the following requirements:

1. The preparation of a dissertation satisfactory to the Guidance Committee and the major department.
2. The successful completion of graduate courses in the major field. The Guidance Committee will determine the number of graduate credits which the student must earn.
3. The passing of a preliminary comprehensive examination to be conducted by the major department, to be passed not later than eight months before the completion of the candidate's work. This examination may not be taken until after the language requirements have been met (see number 4 below).

If the student fails the comprehensive examination he may, at the discretion of the Guidance Committee, be permitted a second and final opportunity.

4. The satisfactory completion of the following language requirements: two languages foreign to the candidate at least one of which must be a European language other than English. Proficiency tests should be passed as early as possible and must be passed *prior to the preliminary examination*. In lieu of *one* of the above foreign languages, graduate students may, upon the recommendation of their Guidance Committees, present themselves for a Tool of Research examination. If the student passes this examination, he will be required to pass only one foreign language examination. In special cases where, in the opinion of the Guidance Committee, a knowledge of two foreign languages is not likely to be greatly useful to the student, the student may substitute six hours of graduate cognate work for one of the languages. In such cases the level of proficiency for the remaining language will be increased to require functional use of it, including a reading, writing, speaking and listening knowledge of it.

5. The passing of a final examination, at least partly oral, conducted by the Guidance Committee primarily upon, but not limited to, the contents of the

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candidate's dissertation. The examination cannot be scheduled until all members of the Thesis Committee have approved the thesis. The oral examination is to be conducted by the Thesis Committee. The Examining Committee is to consist of the Thesis Committee and such members of the major department as the head shall appoint. In order to pass, the candidate must receive the unanimous vote of the Thesis Committee. *Not more than one dissenting vote* shall be allowed for the total Examining Committee present.

6. The satisfactory completion of the residence requirement: The equivalent of at least one academic year of full-time graduate work must be spent at the University of Massachusetts. Three years beyond the bachelor's degree are required. Credits for each graduate course become invalid nine years following the date of completion of the course except that graduate credits previously earned which have been accepted by the Graduate Council for full credit toward the requirements of the Ph.D. degree shall become invalid nine years from the date of first registration in the Ph.D. program.

7. The payment of all fees and expenses.

Doctor of Education

The School of Education offers several specialized programs leading to the Doctor of Education degree for those employed in the educational field. The requirements for this degree follow closely those outlined for the Doctor of Philosophy degree except that in place of the foreign language requirement the candidate may demonstrate a mastery of fundamental statistics and computer language and operation. Residency must be met by two consecutive semesters on campus.

FOUR-COLLEGE COOPERATIVE PH.D. DEGREE

A cooperative Ph.D. program has been established by Amherst, Mount Holyoke and Smith Colleges and the University of Massachusetts. The degree is awarded by the University of Massachusetts but some and perhaps much and in a few exceptional cases even all of the work leading to the degree might be done in one or more of the other institutions.

When a student has been awarded a degree under this program, the fact that it is a cooperative Ph.D. degree involving Amherst, Mount Holyoke and Smith Colleges and the University of Massachusetts will be indicated on the diploma, the permanent record card and all transcripts, as well as on the Commencement Program.

The requirements for the degree are similar to those for the Ph.D. degree at the University of Massachusetts except for the statement relating to "residence." For the cooperative Ph.D. degree "residence" is defined as the institution where the thesis work is being done.

When this catalog went to press, the following Departments were authorized to offer the Cooperative Ph.D. degree: all the Departments in the Biological Sciences; Chemistry, French, Geology, German, and Philosophy.

Students interested in this program should write to the Dean of the Graduate School.

CERTIFICATE OF ADVANCED GRADUATE STUDY

The School of Education conducts several programs leading to the Certificate of Advanced Graduate Study. These are not degree programs. These programs call for a minimum of sixty semester hours of graduate work beyond the Bache-

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lor's degree, of which at least thirty must be taken at the University of Massachusetts and of these at least fifteen must be taken in the School of Education. Of all the course work leading to the Certificate at least eighteen credits must be in 200 courses. No credit is valid after ten years and the last 30 credits must be taken within a four year period.

All fees and expenses must be paid before the Certificate will be conferred.

MASTER'S DEGREES

Master of Arts, Master of Fine Arts, Master of Science, Master of Science in Accounting, Master of Science in Finance, Master of Science in Agricultural Engineering, Master of Science in Chemical Engineering, Master of Science in Civil Engineering, Master of Science in Electrical Engineering, Master of Science in Industrial Engineering, and Master of Science in Mechanical Engineering.

The basic requirements for the above degrees are:

1. Thirty graduate credits, of which not more than six of grade B or better may be transferred from other institutions. Twenty-one of the thirty credits must be in the major field. Courses offered for minor credit only cannot be taken for major credit towards an advanced degree by students majoring in the department or non-departmentalized school concerned. If a thesis is offered, six credits must be earned in "200" series courses; if a thesis is not offered, twelve credits must be earned in "200" series courses. Not more than ten credits may be earned by means of a thesis. No credit is valid after six years.

2. The thesis is optional with the school or department, but if there is one, it shall be under the supervision of a committee recommended by the major department. The thesis must be approved by the Thesis Committee and by the major department. Thesis Committees for candidates for the Master's degree will consist of one or more members of the Graduate Faculty at the discretion of the head of the department. The candidate must pass a general oral examination (not limited to the thesis topic) to be conducted by an examining committee of at least three members of the Graduate Faculty. This examination must be taken whether the student writes a thesis or not. The examination will cover the work of the student in preparing for the Master's degree. The recommendation of two of the three members of the examining committee shall be requisite to receiving the degree. If a student offers a thesis, problem courses shall be limited to six credits; if a thesis is not offered, the limit shall be nine credits.

3. Students who are candidates for the Ph.D. degree may apply for the Master's degree when they have fulfilled the residence and course requirements for the doctorate, have passed the language examinations, and have successfully completed preliminary comprehensive examinations for the Ph.D.

4. All foreign language requirements for the Master's degree are optional with the school or department.

5. All fees and expenses must be paid before the degree will be conferred.

Course credits used by any student for fulfilling the requirements for a Master's degree may not be used by the student for fulfilling the requirements for any other Master's degree at this University.

Master of Education

The degree is conferred upon graduate students who have met the following requirements:

1. Thirty to thirty-four credits. If 30 credits are offered, no more than six may be transferred from other institutions; if 34 credits are offered, no more than nine credits may be transferred from other institutions. Fifteen of the total credits must be in Education, and of these twelve credits must be earned in "200" series courses. No credit is valid after six years. Work of less than B grade cannot be transferred.
2. The problem or Field Study is optional but if it is not chosen the total credits must be thirty-four. Credits in workshop courses are limited to six. The student must pass a comprehensive written examination.
3. In order to receive the Master of Education degree the candidate must have a cumulative quality point average of 3.0 at the completion of the required minimum number of credits (or within six semester hours beyond the minimum) for the program in which the candidate is enrolled. Otherwise the School of Education will recommend to the Graduate Council that the candidate be dropped from the School of Education as a graduate student.
4. All fees and expenses must be paid before the degree will be conferred.

Master of Arts in Teaching

This is a cooperative program between the various Colleges and Schools of the University and the School of Education. The program for elementary and secondary school teaching is intended primarily for graduates of approved liberal arts institutions who have had little or no course work in professional education. The program for community college teaching is intended for graduates of approved liberal arts, engineering or business schools who have programs of concentration needed in community colleges. The student will register in the School of Education for one of the following programs:

1. *The Community College Program.* If the student has no professional education he will take Psychology 156 and four other professional courses to be determined by his committee. He will take a minimum of twenty-four semester hours in his teaching field and of these at least twelve will be in advanced graduate courses. An internship of one semester is required.
2. *The Secondary School Program.* Eighteen credit hours in the fundamental professional courses usually required for certification; at least twelve credit hours in some field in Arts and Sciences in which the student has the necessary background. Of these twelve credit hours six must be in "200" series courses.
3. *The Elementary School Program.* Twenty-four credit hours in the fundamental professional courses usually required for certification; at least twelve credit hours in some field in Arts and Sciences of which six must be in "200" series courses.
4. In order to receive the Master of Arts in Teaching degree the candidate must have a cumulative quality point average of 3.0 at the completion of the required minimum number of credits (or within six semester hours beyond the minimum) for the program in which the candidate is enrolled.

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Otherwise the School of Education will recommend to the Graduate Council that the candidate be dropped from the School of Education as a graduate student.

5. All fees and expenses must be paid before the degree will be conferred.

Master of Business Administration

1. Candidates for the degree of Master of Business Administration must satisfactorily complete thirty semester hours of approved graduate work providing such students have completed their undergraduate degree with a major in Business Administration and/or Economics.

2. For those students who have not presented the undergraduate degree in Business Administration and/or Economics the School shall determine what courses will constitute adequate preparation up to a maximum of thirty additional semester hours.

3. Permission to present a thesis may be granted to qualified candidates. For such students, an oral rather than a written general examination is required. The thesis proposal must be approved by the end of the first semester. Nine credit hours in lieu of course credit is allowed for a thesis.

4. Non-Thesis candidates shall be required to pass a written comprehensive examination.

5. Applicants for admission are required to take the Admission Test for Graduate Study in Business given each year by the Educational Testing Service of Princeton, New Jersey. Applicants should apply to the Testing Service for further information.

6. Twenty-four credit hours of the thirty advanced credits required for the M.B.A. degree must be in courses designed exclusively for graduate students.

7. Graduate Assistants register for a maximum of 12 credit hours each semester rather than the 15 hours permitted other students. Generally, Graduate Assistants complete their courses during a summer session period following a spring semester.

8. All expenses and fees must be paid before the degree will be conferred.

Master of Science

Beginning with the Fall semester, 1963, the School of Business Administration plans to have graduate programs in Accounting. Later the School will offer the Master of Science degree in Finance. This is in line with an established policy of the American Association of Collegiate Schools of Business of which this School is an accredited member. The Master of Business Administration degree is a general rather than a specialized degree.

Master of Fine Arts

This degree is particularly designed for those interested in the creative aspects of the arts. The degree may be obtained through the Department of Art for work in the visual arts, or through the Department of English for work in creative writing.

Requirements for the degree:

1. Sixty credits of which at least 54 must be at the graduate level. Not more than twelve credits may be transferred from other institutions. Twelve hours must be taken in one or more of the art fields other than that of the major

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department. No more than eighteen credits may be earned with the thesis project. No credit is valid after eight years.

2. The exact nature of the thesis project will be determined by the student's major professor in conference with the student. It is to be understood that the project will be productive of a work of art. A written analysis of the work itself and of the procedures used in producing it will be required. The candidate will be asked to pass an examination in his major field in addition to presenting his thesis project publicly.

The Master of Fine Arts Program is administered by an interdisciplinary committee appointed jointly by the Dean of the Graduate School and the Dean of the College of Arts and Sciences. Application for admission to the program should be made to the head of the department with which the student wishes to major.

Master of Landscape Architecture

The degree is conferred upon graduate students who have met the following requirements:

1. Work covering at least two years, of which a minimum of one and one-half years must be devoted to study in residence, and a minimum of one-half year spent in practice. Specific requirements concerning the nature of such practice are determined by the department.

2. Submission of a written report on the work done in practice, or an oral examination conducted by the department staff.

3. The earning of not less than forty-five credits of which thirty shall conform essentially to the "fifth year program" (see page 103) the remainder to be selected from the "200" series on page 103, with minor deviations at the discretion of the department.

4. Preparation of a satisfactory thesis.

5. The passing of final examinations, written and oral.

6. All fees and expenses must be paid before the degree is conferred.

GENERAL REGULATIONS

1. Graduate credit will be allowed for grades A, B, and C. Not more than three credits of C will be allowed for a Master's degree. Not more than six credits of C will be allowed for the Doctor of Philosophy degree. Candidates registering for thesis credit (Thesis 300 or 400) will register for three credits each semester up to the total number of credits recommended by the Guidance Committee. Registration beyond that total will be for zero credits. Grades for thesis credit will be S or NS except for the semester in which the Thesis is completed when the grade will be either Pass or Fail as recommended by the Committee. No graduate credit will be given for courses numbered below 100.

2. Course numbering system at the University of Massachusetts:

1-99 for undergraduate students. No graduate credit if elected by graduate students.

100-149 for graduate students only.

150-199 for both graduate and undergraduate students.

200-299 for graduate students only.

3. After registration is completed, courses may be added or dropped or changed from credit to audit only upon the approval of the student's adviser

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and the Dean of the Graduate School. The consent of the instructor also is necessary for the addition of courses. A graduate student may not register after the beginning of classes in any semester except on specific permission of the Graduate Dean and the payment of a late registration fee of \$5.00. If the student is not passing a course at the time it is dropped, a failure will be recorded. No student, under any conditions, may drop a course after two weeks from the beginning of the session, without a failure unless granted permission by the Dean of the Graduate School.

4. A student can obtain credit for an "incomplete" only by finishing the work of the course before the end of the next semester (whether or not he is enrolled). The initiative in arranging for the removal of an "incomplete" rests with the student. This regulation does not pertain to problem credits.

Students in the Graduate School may be dismissed for failure to abide by the rules of the University.

The University reserves the right to make changes in the requirements for degrees without notice.

GRADUATE READING EXAMINATION IN FOREIGN LANGUAGES

1. A Graduate Reading Examination will be given by the German-Russian and Romance Language Departments upon written request from the head of the Department in which the student in question is doing his graduate work. The request should be sent to the head of the language department concerned *at least ten days before the examination is to be administered.*

2. The examination will be given three times during the academic year. The dates are:

1963-64	July (at the end of the summer session) December 6 or 7 April 24 or 25
1964-65	July (at the end of the summer session) November 27 or 28 April 29 or 30

3. Prior to the administration of the reading examination the student may, if he and the representative of the language department agree, have a brief, informal interview so that it can be determined whether he has reached the point at which he is likely to deal competently with Ph.D. reading material in the foreign language.

4. The examination will be a written test of the student's ability to translate with mature comprehension from the foreign language into English. The use of a dictionary will be permitted.

5. The language examination shall consist of the translation of technical material supplied by the student's major department.

6. Language examinations will be set and read by a representative of the language department and a representative of the Graduate Faculty appointed by the Graduate Dean. When the two concur in a grade of Pass or Fail, a report signed by both persons should be sent to the Graduate Office. The Graduate Office will notify the head of the department requesting the examination and the student concerned.

7. In case of failure, a study period of at least four months will be required before a re-examination may be given, unless otherwise agreed upon. In the case of repeated failure, the candidate will not be admitted to the examination

for the fourth time unless the language department concerned is satisfied that he has made adequate progress.

8. At the discretion of the Guidance Committee, a student who has completed two years of undergraduate work in a foreign language with a grade of B or better in the second year may be certified as having satisfied the reading requirement for the Ph.D. in that language without further examination. (This option is not available to students who elect to take only one language with the course work option as a substitute for the second one.)

THESIS

A thesis must be on a topic in the field of the candidate's major subject, and must indicate that its writer possesses the ability and imagination necessary to do independent constructive thinking. The following rules should be adhered to in the preparation and presentation of a thesis:

The objective of a thesis should be to make a contribution to knowledge. When completed it should be of a quality worthy of publication as a contribution from the department concerned.

The thesis, in its completed form, will be judged largely upon the ability of the author to review literature and reach definite deductions; to formulate a problem, plan a method of attack, and work out a solution; and to summarize his material and draw conclusions. Scholastic attainment in writing and presenting the results of the study will also be an important factor in the evaluation. No thesis markedly poor in its English will be accepted.

A. Master's Theses:

1. The professor within the department who is responsible for the direction of the student's research will be appointed the Chairman of the student's Thesis Committee. Only members of the Graduate Faculty may be appointed to a Thesis Committee.

2. It is the responsibility of the chairman of the Thesis Committee to arrange a conference with other members of the Thesis Committee and the student for the purpose of discussing the research problem before approving the thesis outline. This should be done as soon as possible after the appointment of the Thesis Committee.

3. A copy of the student's thesis outline is then to be signed by each member of the Thesis Committee to indicate approval of the outline and to indicate the fact that a conference with the student has been held. The signed copy is then to be sent to the Dean of the Graduate School.

B. Master's and Ph.D. Theses:

1. The Thesis Committee will have direct charge of all matters pertaining to the thesis, and it is recommended that the student use the advice available from this source in the progress of his research. The thesis must have the unanimous approval of this committee and of the major department before arrangements are made for the final examination for the degree.

2. Suitably bound copies of the thesis will be supplied to the Graduate School. A bound original and two bound copies are required for Master's Theses and an unbound original and one bound copy for Ph.D. dissertations. The student is responsible for the binding of the thesis.

3. Because of the time required to give adequate consideration to the research conducted by the student, it is highly desirable that theses be submitted to the

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committee, in the case of Doctor's theses, not later than March 15, and in the case of Master's thesis, not later than May 15 of the academic year in which the degrees are to be conferred. The theses in their final bound form shall be deposited with the Dean of the Graduate School by May 28.

4. It is desirable to secure as much uniformity of style in theses and dissertations as is practicable. However, different disciplines have worked out widely accepted distinctive research styles which should be mastered by the student whose life work is to be in the discipline. The following recommendations are intended to achieve as much uniformity as is practicable:

- a. *The University of Chicago Manual of Style* shall be the Graduate School standard. However, any school, college or department may specify substitute standards agreed upon in that discipline.
- b. The original of the Ph.D. thesis is left unbound. All other theses should be bound in a permanent waterproof buckram. The second (departmental) copy of the Ph.D. thesis should be bound in black. All Master's theses (three copies) should be bound in red.
- c. Lettering is required on the spine of bound theses. Lettering shall read down from the top in the following order: Author's last name, name of department, degree and year of degree. The name of the department may be abbreviated if necessary. No other lettering is necessary.

Example:

Smith
History
Ph.D.
1963

- d. Weight of the paper shall be 20 pound bond. Size shall be 8½ by 11 inches. Margin to the left shall be 1½ inches; margin to the right, 1 inch.
- e. Any method of reproducing duplicate copies is acceptable that produces the required number of clear, neat, and permanent copies.
- f. The form of doctoral dissertations must conform to the "Suggestions for the Preparation of Dissertations for Microfilming" which may be obtained from the Graduate Office.
- g. *Form of title page.* The title page should be arranged in this order:
 - a. Subject.
 - b. Name of author.
 - c. Degrees previously earned and names of institutions awarding them.
 - d. "Thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of—."
 - e. "University of Massachusetts, Amherst."
 - f. Date.
- h. Following the granting of the doctorate, the Graduate School will have the dissertation microfilmed. The dissertation must be put into condi-

GENERAL INFORMATION

tion for publication on microfilm with as much care as if it were to appear in printed form and must have the approval of the student's doctoral committee. The student should supply to the Graduate School an unbound original and one bound copy of his dissertation. He should also provide an abstract, in triplicate, of less than 600 words.

The microfilm fee of \$35.00 covers microfilm publication of the dissertation by University Microfilms, Inc., and the publication of the abstract by them in *Dissertation Abstracts*. The microfilm fee also covers the cost of copyright in the author's name. The dissertation will be catalogued in the Library of Congress and in the University of Massachusetts Library. Microfilm copies may be purchased from University Microfilms, Inc., Ann Arbor, Michigan.

Publication by microfilm does not preclude the printing of the dissertation in whole or in part in a journal or as a monograph.

GRADUATE COURSES DURING THE SUMMER

The University offers opportunities to pursue graduate courses during the summer in connection with the Summer School. Details regarding courses offered, facilities for study, etc., may be found in the Summer School Catalog, a copy of which is available upon request to the Provost of the University.

COUNSELING AND HEALTH SERVICES

The services of the Counseling Center are available to graduate students.

Complete health care, financed by the student health fee, is available without additional charge to *all* students. The Infirmary, furnishing both in-patient and out-patient care, is located immediately north of Brooks Dormitory.

Students will find services are most complete and readily available during regular out-patient hours:

Weekdays	8:00 a.m.— 5:00 p.m.
Saturdays	8:00 a.m.—12:00 noon

Emergency care is available at all times, day or night.

If you need to stay in the Infirmary, an attempt will be made to provide an opportunity for you to study if you feel able. Student visitors will be allowed during specific hours; parents may visit at any reasonable hour.

The resources of the Health Services are available to you so that illness and loss of valuable school time will be minimized. We should be able to help you in finding a solution to your problems of health, physical or emotional. If you have questions, please visit the Infirmary and let us help you before your needs are serious.

PLACEMENT AND FINANCIAL AID SERVICES

The services of the Placement and Financial Aid Offices are available to all degree candidates.

HONORARY FELLOWSHIPS FOR VISITING SCHOLARS

Qualified scholars who may desire temporarily the privileges of the library and research facilities of the University, and who are not candidates for a degree may, upon recommendation of the Dean of the Graduate School and the approval of the President, be appointed Honorary Fellows without stipend.

DESCRIPTION of COURSES

Before consulting the course descriptions listed in this section, students should become thoroughly familiar with the General Regulations governing registration for courses in the Graduate School. The regulations (listed on Page 15) cover such matters as graduate credit, course numbering system, changing or dropping of courses, and requirements regarding incomplete work in a course. Students should also acquaint themselves with the requirements governing the particular degree for which they wish to take courses. These requirements are found under the appropriate degree headings beginning on Page 9.

AGRICULTURAL AND FOOD ECONOMICS

*Graduate Faculty: J. Blackmore, Head of Department,
B. Crossmon, J. H. Foster, E. Jarvesoo, T. W. Leed, S. Russell.*

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. PROBLEMS IN AGRICULTURAL AND FOOD ECONOMICS.

Investigations of problems in agricultural and food economics and firm management. *Credit, 3. The Staff.*

202. AGRICULTURE IN THE NATIONAL ECONOMY.

The application of economic theory, particularly macro-economics and welfare economics, to the determination of agricultural prices and income. The interdependency of agriculture and other sectors of the economy. Effects on agriculture of national, fiscal, and monetary policy. *Credit, 3. The Staff.*

204. ADVANCED FOOD MARKETING.

Market structure, prices, margins, efficiency, demand and supply analyses, theory of imperfect competition.

Prerequisite, Agricultural Economics 155 or permission of instructor.

Credit, 3. The Staff.

205. RESEARCH METHODS IN AGRICULTURAL AND FOOD ECONOMICS.

Scientific method and its application. Selection, planning and conduct of research. Formulation of models and hypotheses. Interdisciplinary considerations. Techniques commonly used and promising new approaches. Evaluation of current research procedures. Research administration.

Credit, 1-3. The Staff.

221. NATURAL RESOURCE DEVELOPMENT ECONOMICS.

Modern economic theory in relation to resource development, economic models for resource use planning, applications of recent innovations in economic analysis to problems of evaluation of resource development plans.

Credit, 3. The Staff.

275. ADVANCED AGRICULTURAL AND FOOD ECONOMICS.

An intensive study of the theory of the firm as it applies to agricultural and food production, including: production functions, cost functions, programming, and decision-making principles; the nature of the aggregate supply functions in agriculture; applications of these principles to the agricultural firm and regional resource allocation, and to the distribution of income to and within agriculture.

Prerequisite, permission of instructor.

Credit, 3. The Staff.

AGRICULTURAL AND FOOD ECONOMICS

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

155. PRINCIPLES OF AGRICULTURAL MARKETING.

The economic principles governing the marketing of agricultural and food products; structure of agricultural markets. Monopoly and imperfect competition. Government in marketing. *Credit, 3.* Mr. Fitzpatrick.

158. AGRICULTURAL POLICY.

Concepts of policy, economic foundations of policy problems, the policy-making process, and policy considerations for producers, consumers and taxpayers; foreign agricultural policy. *Credit, 3.* The Staff.

165. FOOD MERCHANDISING.

The principles of merchandising food products. Effects of store layout, product location, product mix, methods of display, turnover, pricing, ordering, inventory control, upon sales and profits. *Credit, 3.* Mr. Marion.

168. FOOD DISTRIBUTION ECONOMICS.

A critical analysis of the food industry, factors affecting sales, costs, profits. Application of economic principles to financing, site selection, and store management. *Credit, 3.* Mr. Leed.

171. PRICE THEORY AND ANALYSIS.

Elements of food and agricultural price making; demand and supply theory and methods of price analysis and forecasting; introduction to econometrics. *Credit, 3.* Mr. Russell.

172. INTERNATIONAL POLICY IN AGRICULTURE.

The impact of forces such as economic development, population increases, and the decline of colonialism on world agriculture. World trade in agricultural products; the influence of national agricultural policies on trade; international agricultural agencies. *Credit, 3.* Mr. Foster.

175. PRODUCTION ECONOMICS.

Application to farms and food production enterprises of economic principles governing production processes. Enterprise, firm and industry considerations. Methods of economic analysis. Two class hours, one 2-hour laboratory period. *Credit, 3.* The Staff.

176. ADVANCED FARM MANAGEMENT.

Applications of the theory of the firm and modern decision theory to management problems of typical farm firms. Plans for alternative farm adjustments will be analyzed using budgeting and other methods. *Credit, 3.* The Staff.

178. RESOURCE AND CONSERVATION ECONOMICS.

Economic and institutional factors affecting land and water use. Land use planning, elements of conservation economics, recreation economics, water and watershed management. *Credit, 3.* Mr. Foster and Mr. Blackmore.

195. SEMINAR.

Review of current literature and problems. *Credit, 3.* Mr. Blackmore.

AGRICULTURAL ENGINEERING

AGRICULTURAL ENGINEERING

Graduate Faculty: R. W. Kleis, Head of Department, J. T. Clayton, G. A. Fitzgerald, C. A. Johnson, J. S. Norton, L. F. Whitney, J. W. Zahradnik.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS. *Credit, 1-6. The Staff.*

240. ADVANCED FARM STRUCTURES.

The application of structural theory in the development of high strength structures. The use of building materials and fastenings for attaining diaphragms and prestressed components in the development of the structure. The use of structural factors in the control of environment.

Prerequisite, permission of instructor.

Credit, 3. Mr. Clayton.

241. CONTROL OF HEAT AND VAPOR FLOW IN AGRICULTURAL BUILDINGS AND PROCESSES.

Application of mass flow theory to heat and vapor transfer. Thermal and vapor interchange between environment and livestock controlling production rates of metabolic and respiratory heat. The application of instruments and controls.

Prerequisite, Mechanical Engineering 182 or equivalent.

Credit, 3. Mr. Clayton.

250. UNIT OPERATIONS IN AGRICULTURE.

Machine rates and production standards in the handling of crops and food products. Plant layout and equipment for processing and storage. Energy requirements of alternate methods of processing.

Prerequisite, permission of instructor.

Credit, 3. Mr. Zahradnik.

260. AGRICULTURAL PROCESSING.

Heat, refrigeration, and vacuum in dehydrating, storing, and concentrating food products. Critical temperatures, latent heats, fermentation, respiration, and equilibrium moisture content, as they affect the processes and the end products. The application of instruments and controls.

Prerequisite, Agricultural Engineering 250.

Credit, 3. Mr. Zahradnik.

276. ADVANCED AGRICULTURAL MACHINERY DESIGN.

Stress analysis, periodic vibration, and shock loadings, as related to design of agricultural machinery. The mathematical definition of tillage tool surfaces. Dynamics of suspension devices, automatic release equipment, and hydraulic systems.

Prerequisite, Agricultural Engineering 76.

Credit, 3. Mr. Whitney.

291. SEMINAR.

Research Methods in Agricultural Engineering.

Credit, 1. Mr. Kleis.

292. SEMINAR.

Research accomplishments in Agricultural Engineering.

Credit, 1. Mr. Kleis.

AGRICULTURAL ENGINEERING/AGRONOMY

300. THESIS, MASTER'S DEGREE.

Credit, 4-8.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Agricultural Engineering)

151. HOUSE PLANNING.

Plan designs of the small house will be made. The arrangement of interior equipment, especially in the kitchen, and lighting, heating, water supply, and sewage disposal will be studied, together with a brief history of the house materials, construction methods, equipment, and architectural styles.

Credit, 3. Mr. Johnson.

181. ELEMENTS OF FOOD PROCESS ENGINEERING I.

A study of the fundamental principles involved in the application of unit operations to food processing, including selection, management and operation of food processing equipment and instrumentation.

Credit, 3. Mr. Zahradnik.

182. ELEMENTS OF FOOD PROCESS ENGINEERING II.

A continuation of course AE 181; a study of unit operations involved in processing foods including mixing, heating, refrigeration, evaporation, distillation, dehydration, and drying. Also the treatment and handling of final products.

Prerequisite, Agricultural Engineering 181.

Credit, 3. Mr. Zahradnik.

AGRONOMY

Graduate Faculty: W. G. Colby, Head of Department, J. H. Baker, M. Drake, L. Michelson, J. Vengris, M. E. Weeks.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS.

Credit, 3 or 6. The Staff.

216. FORAGE CROPS.

The regional distribution, the cultural requirements and the utilization of the principal forage crops grown in the U.S.

Credit, 3. Mr. Colby.

263. CHEMISTRY OF THE SOIL.

The chemistry of soil formation, soil acidity, nutrient element availability, ionic exchange, and fixation, soil-plant-microorganism relationships, and of organic matter of the soil will be discussed. The laboratory work will consist of physical, analytical and biochemical investigations of soils and important soil constituents.

Credit, 3. Mr. Baker.

264. EXPERIMENTAL METHODS IN AGRONOMY.

Some of the concepts of the application of statistics to the analysis and interpretation of data obtained in agricultural research. Such points as choice of field, design of experiments, effect of competition, interpretation of results, and other special factors that need to be considered in well-planned experiments are discussed.

Credit, 3. Mr. Yegian.

AGRONOMY

290. SEMINAR. *Credit, 1 each semester.* The Staff.
300. THESIS, MASTER'S DEGREE. *Credit, 10.*
400. THESIS, PH.D. DEGREE. *Credit, 30.*

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS (For either major or minor credit)

152. FORAGE AND FIELD CROPS.

Analysis of the principles involved in the establishment, fertilization, and harvest management of forage and field crops.

Two class hours, one 2-hour laboratory period. *Credit, 3.* Mr. Colby.

153. AGROSTOLOGY.

The establishment and maintenance of turfgrasses used on lawns, athletic fields, highways, airports and cemeteries.

Two class hours, one 2-hour laboratory period. *Credit, 3.* Mr. Troll.

160. SOIL-PLANT MINERAL NUTRITION.

A study of mineral nutrients in the growth of plants; the use of fertilizers and other soil amendments; soil reaction; mineral deficiencies and toxicities in plants.

Two class hours, one 2-hour laboratory period. *Credit, 3.* Mr. Drake.

165. ECOLOGY AND CONTROL OF WEEDS.

Identification and ecology of common weeds and principles of weed control with special emphasis on the use of chemical herbicides.

Three class hours. *Credit, 3.* Mr. Vengris.

Soil Science

157. SOIL FORMATION.

The development of soils as related to physical, chemical, biological, climatic and geological factors.

Three class hours. *Credit, 3.* Mr. Southwick.

179. SOIL PHYSICS (1964-1965).

Physical properties of soil, including textural, structural, water, air and temperature relationships; their measurement, evaluation and influence in the soil system.

Two class hours, one 3-hour laboratory period.
Prerequisite, Soil Science 22 or equivalent. *Credit, 3.* Mr. Waddington.

184. SOIL CHEMISTRY (1963-1964).

The inorganic and organic chemical reactions related to the nutrient supply in soils and soil nutrition of plants. Colloidal aspects of soil chemical reactions and soil-plant mineral relationships.

Two class hours, one 3-hour laboratory period.
Prerequisites, Chemistry 27, Botany 168, Soil Science 157.

Credit, 3. Mr. Baker.

ART

Graduate Faculty: P. F. Norton, Head of Department, D. R. Matheson.

The degree of Master of Fine Arts is offered for those interested in the creative aspects of the arts. The degree may be obtained through the Department of Art for work in the visual arts, or through the Department of English for work in creative writing. Requirements for the degree are listed on page 14.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS. *Credit, 3.*

201. SPECIAL PROBLEMS. *Credit, 3.*

300. MASTER'S THESIS. *Credit, up to 18.*

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

151. WATER COLOR.

Initial concentration on transparent water color, emphasizing control of techniques and mastery of color relationships. Further experience with opaque water color, such as gouache, casein.

Six studio hours.

Credit, 3.

152. WATER COLOR.

Continuation of Art 151.

Six studio hours.

Credit, 3.

153. OIL PAINTING.

Easel painting in oil and related media, based on elementary understanding of physical properties of medium, and encouraging individual directions within limitations of sound composition.

Six studio hours.

Credit, 3.

154. OIL PAINTING.

Continuation of Art 153.

Six studio hours.

Credit, 3.

157. PRINTMAKING.

Basic study of materials, techniques, aesthetic considerations peculiar to graphic media of lithography and intaglio (etching, aquatint, etc.), permitting students to print their own work.

Six studio hours.

Credit, 3.

158. PRINTMAKING.

Continuation of Art 157.

Six studio hours.

Credit, 3.

160. SCULPTURE.

Experimentation with materials. Investigation into the nature of 3-dimensional order. Individual projects.

Six studio hours.

Credit, 3.

ART/BOTANY

161. SCULPTURE.

Continuation of Art 160.

Six studio hours.

Credit, 3.

165. CERAMICS.

The designing and making of pottery with the potter's wheel and related tools. A student should have taken one or more basic courses in creative art before this course.

Credit, 3.

166. CERAMICS.

Continuation of Art 165.

Prerequisite, Art 165. Six studio hours.

Credit, 3.

177. ANCIENT ART AND ARCHAEOLOGY.

The art of early cultures, mainly in the European region, including Greek and Roman sculpture and painting.

Credit, 3.

173. MEDIAEVAL ART.

Earliest phases of Christian art in catacombs, barbaric influences of northern Europe, Byzantine developments in the East, and the Romanesque and Gothic in the West.

Credit, 3.

175. RENAISSANCE ART.

Painting, sculpture, architecture, with particular attention given to Italian Art. Emphasizes social and historical importance of arts, and changes in style and aesthetic theory.

Credit, 3.

176. BAROQUE ART.

The art of the 17th and early 18th centuries in Italy, Spain, Germany, France and the Low Countries.

Credit, 3.

177. AMERICAN ART.

Study of the earliest Colonial art and architecture, the impact of later European influences; regional art of the late 19th and 20th centuries, and contemporary phases of abstract art.

Credit, 3.

179. MODERN PAINTING AND SCULPTURE.

Origin of modern movements in art, and an analysis of contemporary techniques and styles as they relate to society.

Credit, 3.

181. MODERN ARCHITECTURE.

History of the changes in style, technical advances, and aesthetic principles during the past two hundred years.

Credit, 3.

BOTANY

Graduate Faculty: R. B. Livingston, Acting Head of Department, H. E. Bigelow, M. E. Bigelow, E. L. Davis, A. C. Gentile, J. R. Rowley, R. M. Schuster, R. T. Wilce.

Candidates for the Degree of Master of Arts and for the Degree of Doctor of Philosophy are accepted for admission under the general regulations of the

Graduate School. Admission to advanced courses does not imply admission to candidacy for an advanced degree. Only students whose knowledge of botany and related chemical and physical sciences is considered by the Department to be adequate will be accepted as candidates for advanced degrees. Research work leading to the thesis may be selected from the fields of cytology, ecology, mycology, morphology, physiology, systematics, anatomy and histology.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. SPECIAL PROBLEMS.

Research not expected to terminate in a thesis; advanced study in special subjects.
Credit, 1-5 each semester. The Staff.

202, 203. ADVANCED PLANT PHYSIOLOGY.

Selected topics in plant physiology.

Lectures, laboratory, and individual conferences.

Prerequisites, Botany 167 and 168 and one semester of Organic Chemistry.

Credit, 2-4 each semester. Mr. Gentile.

205. SEMINAR.

Credit, 1 each semester. Maximum credit, 6. The Staff.

206. ADVANCED PLANT MORPHOGENESIS.

Lectures, discussions and reading on the development of the plant body.

Prerequisites, Botany 157 or 159, Botany 167 or equivalent.

Credit, 3. Mr. Davis.

207. ADVANCED PLANT ECOLOGY.

Lectures, conferences, critical reading and reports on advanced considerations of synecology and autecology.

Credit, 3. Mr. Livingston.

209. ADVANCED MYCOLOGY.

Systematics and ecology of the higher ascomycetes and basidiomycetes; problems in growth and nutrition of fungi.

Credit, 3. H. E. Bigelow and M. E. Bigelow.

210. ADVANCED PHYCOLOGY.

Detailed study of marine and fresh-water algae with emphasis on phylogeny, life histories and ecology.

Prerequisite, Botany 161 or equivalent.

Credit, 3. Mr. Wilce.

214. FOSSIL TRACHEOPHYTES.

Detailed study of anatomy and reproductive histology of those fossil forms which best represent the phylogeny of vascular plants.

Credit, 3. Mr. Putala.

215. PALYNOLOGY.

Development and comparative morphology of contemporary pollen grains and spores. Description and/or identification of modern and fossil pollen and spores with attendant laboratory and field techniques. Consideration is given to application of palynology in research, industry, and public health.

Credit, 3. Mr. Rowley.

300. THESIS, MASTER'S DEGREE.

Credit, 10.

400. THESIS, PH.D. DEGREE.

Total credit determined by Guidance Committee.

BOTANY

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

157. PLANT ANATOMY AND HISTOLOGICAL METHODS.

Study of origin and structure of vegetative and reproductive organs of seed plants coordinated with exercises in preparation of stained slides for microscopic studies. *Credit, 4. Mr. Putala.*

159. THE ANGIOSPERMS.

The evolution and systematics of flowering plants, emphasizing families and their relationships. *Credit, 3. Mr. Schuster.*

160. MORPHOGENESIS.

Development of form and structure at the level of cellular differentiation.

Credit, 3. Mr. Davis.

161. PHYCOLOGY.

Designed to give insight into the phylogeny, taxonomy, morphology and ecology of the major groups of the marine and fresh water algae. To include field work in both marine and fresh water environments. *Credit, 3. Mr. Wilce.*

162. THE ARCHEGONIATES.

The morphology, evolution and systematics of bryophytes, ferns and their allies.

Credit, 3. Mr. Schuster.

166. GENERAL MYCOLOGY.

Survey of the various fungi, their life history and distribution, their significance in disease, their utilization by man. *Credit, 3. Mr. Bigelow.*

167. INTRODUCTORY PLANT PHYSIOLOGY.

Plant processes and their relation to the complex of activity constituting plant growth. Topics include water relations, photosynthesis, fat and protein synthesis, digestion, translocation and respiration. *Credit, 3. Mr. Gentile.*

168. PLANT METABOLISM.

A study of the chemical operation of plants, emphasizing the enzymatic processes involved in the synthesis and breakdown of the more important chemical constituents of plants. *Credit, 4. Mr. Gentile.*

178. PLANT GROWTH.

Internal and environmental factors influencing plant growth with emphasis on the role of hormonal regulation and enzyme localization in relation to growth and development. *Credit, 3. Mr. Gentile.*

181. PLANT ECOLOGY.

Interrelationships between plants and their environment, with special emphasis on the structure and development of plant communities.

Credit, 3. Mr. Livingston.

182. PLANT GEOGRAPHY.

Principles governing the development and natural distribution of plants and plant communities with special consideration of the vegetation of North America.

Credit, 3. Mr. Livingston.

184. AUTECOLOGY.

Plant behavior in relation to the physical and biological environment, with emphasis on the ecology of individual plants.

Prerequisites, Botany 167 and 181.

Credit, 3. Mr. Livingston.

189. DEVELOPMENTAL PLANT CYTOLOGY.

Emphasis on development of plant cell walls, plastids and mitochondria; introduction to fine structure of cytoplasmic and nuclear components and ontogenetic and phylogenetic development of plant cell structures. *Credit, 3.* Mr. Rowley.

BUSINESS ADMINISTRATION

Graduate Faculty: H. B. Kirshen, Dean, J. T. Conlon, Assistant Dean, J. W. Anderson, P. L. Cheng, H. E. Hardy, J. B. Ludtke, W. G. O'Donnell, R. L. Rivers, F. A. Singer.

The program of graduate courses in Business Administration is designed to prepare for positions of responsibility in business, in organizations that serve business, in government, and in related fields of teaching.

The School of Business Administration is an accredited member of the American Association of Collegiate Schools of Business.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

Courses B.A. 203, B.A. 207, B.A. 211, B.A. 222, B.A. 230, B.A. 242, B.A. 251 and B.A. 271 are required of all students who expect to receive the M.B.A. degree.

Courses Accounting 203, Accounting 204, Accounting 205 and B.A. 271 are required of all students who expect to receive the M.S. in Accounting degree. A minimum of 18 credit hours is required in "200" series courses.

M.B.A. COURSES

200. PROBLEMS IN BUSINESS ADMINISTRATION.

Independent study and research on selected problems in Business Administration. Permission of the instructor and the dean required.

Credit, 1-3 each semester. The Staff.

203. CASE ANALYSIS AND REPORT WRITING.

Concentrated study in the practice and analysis of business problems and in the writing of formal reports through the means of cases. *Credit, 3.* Mr. Ludtke.

207. QUANTITATIVE METHODS IN BUSINESS ADMINISTRATION.

The application of symbolic logic, sets, probability theories (discrete) and Markov process to managerial decision-making in organization, marketing, personnel, production, transportation, finance, accounting and other functional areas.

Credit, 3. Mr. Cheng or Mr. Ludtke.

208. QUANTITATIVE METHODS IN BUSINESS ADMINISTRATION.

The application of probability theory (discrete and continuous), stochastic process, linear, quadratic and dynamic programming, waiting lines, sequencing and computer simulation models to selected problems in management science.

Credit, 3. Mr. Cheng or Mr. Ludtke.

211. ACCOUNTING IN MANAGEMENT.

The production and use of accounting and other quantitative data for decision-making related to planning and control.

Credit, 3. Mr. Lentilhon and Mr. Singer.

BUSINESS ADMINISTRATION

222. MARKETING MANAGEMENT.

The broad aspects of product planning and choice of channels of distribution; promotional problems; the interrelations between research, planning, execution and control of marketing activities. *Credit, 3. Mr. Hardy.*

230. FINANCIAL MANAGEMENT.

A case approach to business problems from the point of view of the financial manager. *Credit, 3. Mr. Cheng and Mr. Ludtke.*

242. ORGANIZING FOR PRODUCTION.

Situations which confront executives in charge of manufacturing operations and the direction of people at work. Designed to develop skill in analyzing production processes and to determine specific adaptations of production and personnel techniques to the requirements of differing processes. *Credit, 3. Mr. Claunch.*

251. PRINCIPLES AND POLICIES OF ADMINISTRATION.

An advanced course in the Theory of Business Administration, including the generic functions of management, organization theory, and systematic corporate decision making. *Credit, 3. Mr. O'Donnell.*

252. ADMINISTRATIVE PRACTICES.

The application of principles of management to the analysis and the solution of actual integrative cases, with practice in policy formulation and managerial decision making. *Credit, 3. Mr. O'Donnell.*

271. SEMINAR IN BUSINESS ADMINISTRATION.

A critical and intensive study of selected problems in the field of business.

Credit, 3. Mr. Kyler.

300. THESIS, MASTER'S DEGREE.

Credit, 9.

M.S. IN ACCOUNTING COURSES

ACCOUNTING 201. C.P.A. PREPARATION.

A study of areas covered in the uniform C.P.A. examinations with emphasis placed upon techniques of problem solving. Designed for those persons preparing to take the C.P.A. examination. *Credit, 3. Mr. Anderson.*

ACCOUNTING 202. ACCOUNTING SYSTEMS.

A study of the problems involved in design, installation and operation of appropriate systems of accounts, records and reports for different types of business, and the preparation of flow charts procedures and control reports.

Credit, 3. Mr. Krzystofik.

ACCOUNTING 203. ACCOUNTING THEORY.

The study of literature with agreed and controversial criteria for collecting and reporting financial information. *Credit, 3. Mr. Singer.*

ACCOUNTING 204. CONTEMPORARY ACCOUNTING ISSUES.

Investigation and analysis of selected contemporary issues in accounting with presentation of individual findings through discussion and reports.

Credit, 3. Mr. Denner.

BUSINESS ADMINISTRATION

ACCOUNTING 205. SEMINAR IN ACCOUNTING.

Special problems of the Public Accounting profession, the history of Public Accounting, accounting organizations and publications. The course would stress written and oral communication and might include, for example, the preparation of an audit report. *Credit, 3.* The Staff.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS (For either major or minor credit)

Accounting

162. ADVANCED ACCOUNTING.

A continuation of Accounting 61, concerned with the valuation of assets and liabilities, accounting for net worth, statements of application of funds and the analysis of financial statements. *Credit, 3.* Mr. Fitzgerald.

164. ADVANCED COST ACCOUNTING.

A continuation of the theory and practice of cost accounting with emphasis on standard, estimated, and distribution costs. *Credit, 3.* Mr. Lentilhon.

174. C.P.A. PROBLEMS.

Extensive practice in solution of problems from C.P.A. examinations. Topics covered include governmental and institutional accounting, estates, trusts, receiverships, liquidations and consolidations. *Credit, 3.* Mr. Anderson.

177. AUDITING.

The verification of accounting records dealing with audit theory and procedure. *Credit, 3.* Mr. Krzystofik.

178. ADVANCED FEDERAL TAX PROCEDURES.

Advanced phases of Federal taxation with particular attention to inventories, depreciation, and accounting methods. Study and preparation of returns for partnerships, corporations, estates and trusts; Federal estate and Federal gift taxes.

Prerequisite, Accounting 73.

Credit, 3. Mr. Anderson.

General Business and Finance

166. TRAFFIC MANAGEMENT.

The relationships and responsibilities among carriers, regulatory authorities and users of transportation services. *Credit, 3.* Mr. Rivers.

172. BUSINESS LAW II.

The law of agency and negotiable instruments; bankruptcy and wills.

Credit, 3. Mr. Smart.

173. BUSINESS LAW III.

The law of partnerships, corporations, real and personal property.

Credit, 3. Mr. Burak.

178. ADMINISTRATIVE STATISTICS.

Probability and statistical distributions applied to business management problems; application of Bay's theorem to sampling for business decision making under uncertainty.

Credit, 3. Mr. Cheng.

BUSINESS ADMINISTRATION

181. PROBLEMS IN BUSINESS FINANCE I.

Short- and intermediate-term financing; estimating requirements for funds and the major types of loan arrangements.

(Not open to M.B.A. candidates.)

Credit, 3. Mr. Cheng.

182. PROBLEMS IN BUSINESS FINANCE II.

Long-term financing; capital budgeting; leasing; reserves and dividend policy; pensions; company expansion; mergers and acquisitions and reorganizations.

(Not open to M.B.A. candidates)

Credit, 3. Mr. Cheng.

183. INVESTMENTS.

The principles and techniques that are useful for the analysis and selection of investment media; investment policies of individuals and institutions.

Credit, 3. Mr. Ludtke.

184. SECURITY ANALYSIS.

An examination of the factors effecting investment values of securities and the methods used in their analysis. Students are required to select one industrial group for intensive investigation.

Credit, 3. Mr. Ludtke.

Management

167. MANAGEMENT AND UNION RELATIONS I.

A comparison of union-management objectives, functions and structures including the scope and impact of union penetration into areas of management authority.

Credit, 3. Mr. Conlon.

168. MANAGEMENT AND UNION RELATIONS II.

A study of the human relations problems encountered in the interpretation and administration of collective bargaining agreements.

Prerequisite, Management 167.

Credit, 3. Mr. Conlon.

181. THEORY OF BUSINESS ADMINISTRATION.

The philosophy and theoretical context of administration, corporate objectives, standards, plans, policies, responsibility, authority, line-staff relations, communications, and morale.

Credit, 3. Mr. O'Donnell.

Marketing

176. PURCHASING.

Purchasing by industrial establishments, with emphasis on case problems in purchasing organization and practices.

Credit, 3. Mr. Zane.

179. WHOLESALING.

The field of wholesaling, types and classes or organization including newer developments. The performance of purchasing and selling functions by wholesalers and manufacturers are considered in case problems.

Prerequisite, Marketing 53.

Credit, 3. Mr. Zane.

180. PROBLEMS IN MARKETING.

Cases in Marketing Management; analysis, in depth, of questions concerning the interrelations of marketing functions including merchandising, distribution channels, pricing, and marketing research applied to specific companies and products.

Prerequisite, Marketing 53.

Credit, 3. Mr. Drew-Bear.

BUSINESS ADMINISTRATION/CHEMICAL ENGINEERING

182. PROBLEMS IN RETAILING.

Case analysis and decisions covering pricing; merchandise management; buying and selling policies; store systems; personnel; accounting control and plant operation.

Prerequisite, Marketing 53.

Credit, 3. Mr. Drew-Bear.

184. PROBLEMS IN ADVERTISING.

The applications of procedures for planning campaigns including marketing research appropriations, choice of media, scheduling, preparation of copy and layout.

Prerequisites, Marketing 53 and 73.

Credit, 3. Mr. Hardy.

CHEMICAL ENGINEERING

Graduate Faculty: J. W. Eldridge, Head of Department, K. D. Cashin, D. C. Chappellear, H. C. Duus, E. E. Lindsey, R. J. Novak, L. H. S. Roblee, J. F. Welch.

The graduate program in Chemical Engineering is designed to emphasize advanced study in engineering fundamentals rather than specific technological applications.

To be admitted to full graduate study in this field either of the following requirements should be met:

1. Applicant must have a Bachelor's degree in Chemical Engineering from a recognized school, or

2. Applicant must show satisfactory academic training or demonstrate proficiency in these subjects as a minimum:

Mathematics: through Calculus.

Chemistry: through Organic and Physical.

Engineering Mechanics: Statics, Strength of Materials.

Chemical Engineering: Stoichiometry, Unit Operations, Thermodynamics (including thermodynamics of chemical change).

Electrical Engineering: Elements of Circuits and Machines.

REQUIRED COURSES

1. Ch.E. 300, Thesis, maximum 10 credits.

2. At least four Ch.E. 200 series courses.

3. Additional graduate credit courses, chosen according to the student's interests from the fields of engineering, science, mathematics and the humanities, to constitute the total requirement of 30 credits for M.S. degree.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS.

Credit, 1-3.

201. CHEMICAL ENGINEERING THERMODYNAMICS I.

A review of the fundamental laws of thermodynamics, P-V-T relations of fluids, thermodynamic functions, fluid flow, compression and expansion of gases, liquefaction and separation of gases.

Prerequisite, Chemical Engineering 81 or equivalent.

Credit, 3.

Mr. Duus or Mr. Eldridge.

CHEMICAL ENGINEERING

202. CHEMICAL ENGINEERING THERMODYNAMICS II.

Phase equilibria and chemical reaction equilibria and their applications in chemical processing.

Prerequisites, Chemistry 66 and Chemical Engineering 82.

Credit, 3. Mr. Eldridge.

205. CHEMICAL REACTOR DESIGN.

Study of the principles of chemical reaction kinetics and their application to industrial chemical processes. Systems homogeneous and heterogenous, batch and flow, catalyzed and uncatalyzed, isothermal and adiabatic are discussed.

Prerequisites, Chemistry 66, Math 32 or 92 or equivalent.

Credit, 3. Mr. Chappellear.

211. ADVANCED CHEMICAL ENGINEERING.

Introduction to advanced work in chemical engineering which applies the transport of momentum, energy, and material. Background for fluid flow, heat transfer and mass transfer. Topics covered include: viscosity, thermal conductivity and diffusivity, momentum and energy balances, friction, turbulence, fluid friction, the motion of suspended solids in fluids, and non-Newtonian fluids.

Prerequisite, Chemical Engineering 56.

Credit, 3. Mr. Roblee.

222. ADVANCED HEAT TRANSFER II.

This course is designed for those graduate students who wish to continue the study of heat transfer beyond that presently offered in M.E. 221. The work load is evenly divided between theory and design. Subjects covered include natural and forced convection, heating and cooling both inside and outside of tubes, condensing vapors, boiling liquids and fluidized systems.

Prerequisite, Mechanical Engineering 182 or Chemical Engineering 178.

Credit, 3. Mr. Cashin.

231. MASS TRANSFER I.

Theories of diffusion leading to unified treatment of mass-transfer unit operations; molecular and eddy diffusion, mass-, heat-, and momentum transfer analogies, two film theory, diffusion in turbulent flow and related topics. The last third of the course deals with applications of these principles to general gas-liquid operations.

Prerequisite, Chemical Engineering 56.

Credit, 3. Mr. Roblee.

232. MASS TRANSFER II.

A continuation of course 231. Application of principles to design factors in distillation, gas absorption, adsorption and ion exchange and liquid-liquid extraction. Other unit operations may be substituted for the above depending on the interests of the class.

Prerequisite, Chemical Engineering 231.

Credit, 3. Mr. Cashin.

281. NUCLEAR CHEMICAL ENGINEERING.

Application of chemical engineering to the preparation of nuclear fuels: the recovery and reprocessing of reactor fuels, the preparation of moderator materials, and the disposal of radioactive wastes.

Prerequisite, Chemical Engineering 183.

Credit, 3. Mr. Marcus.

300. THESIS, MASTER'S DEGREE.

A theoretical or experimental study of some chemical engineering problem. Credit will be determined by the work done, and by agreement with the Department and the Graduate Thesis Committee.

Credit, 6-10.

CHEMICAL ENGINEERING

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

161. CHEMICAL ENGINEERING ANALYSIS.

Application of mathematical techniques to chemical engineering problems. The emphasis is on analysis of problems and the devising of satisfactory mathematical models. A part of the course is devoted to study of machine computation with digital and analog devices.

Prerequisites, Chemical Engineering 56 and Math 32. *Credit, 3.* Mr. Roblee.

176. AUTOMATIC PROCESS CONTROL.

A study of the theoretical and practical factors governing automatic control of industrial processes. Topics include control systems, measurement devices, control modes, mathematical relationships and laboratory work.

Prerequisites, Chemical Engineering 56 and Math 32. *Credit, 3.* Mr. Cashin.

178. ADVANCED UNIT OPERATIONS.

A more detailed study of certain unit operations, especially heat transfer.

Prerequisite, Chemical Engineering 56. *Credit, 2.* Mr. Cashin.

183, 184. SURVEY OF NUCLEAR ENGINEERING I, II.

An introduction to the principles of nuclear physics and a survey of problems involved in the design and operation of nuclear reactors. Heat transfer, shielding, metallurgy, controls, waste disposal and health physics.

Two lectures, one laboratory period per week each semester.

Prerequisites, two semesters of chemistry and mathematics through integral calculus. *Credit, 3 each semester.* Mr. Marcus.

187. PROCESS EQUIPMENT DESIGN.

The design of process equipment for the chemical industries: riveted pressure vessels, welded pressure vessels, piping, attachments and closures, etc.

Prerequisites, Chemical Engineering 56 and Civil Engineering 53.

Credit, 2. Mr. Lindsey.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Chemical Engineering)

155. UNIT OPERATIONS I.

The fundamental principles underlying the unit operations of fluid flow, heat transfer, and evaporation; the thermodynamic properties of matter.

Four class hours, one 2-hour computation period.

Prerequisites, Mathematics 30 or 31 and Chemistry 30. *Credit, 5.* Mr. Cashin.

156. UNIT OPERATIONS II.

A continuation of course 155 concerning distillation, gas absorption, liquid-liquid extraction, filtration and, if time permits, size reduction and separation. Three class hours, one 3-hour computation period.

Prerequisite, Chemical Engineering 155.

Credit, 4. Mr. Cashin.

158. ORGANIC CHEMICAL TECHNOLOGY.

Some unit processes involved in the manufacture of organic chemicals; e.g., nitration, amination, halogenation, oxidation.

Prerequisite, Chemistry 51.

Credit, 3. Mr. Duus.

CHEMICAL ENGINEERING/CHEMISTRY

177. ELEMENTS OF UNIT OPERATION.

Primarily for engineering science students. Emphasis is on the scientific principles of the Unit Operations. Molecular and turbulent transport of heat, mass and momentum are considered in detail.

Prerequisite, Engineering Science option or permission of instructor.

Credit, 3. Mr. Roblee.

181. HEAT-ENERGY RELATIONS.

Energy relations in chemical processes, types of energy, energy balances, second law, thermodynamic function, including: P-V-T relations of fluids, compression and expansion processes.

Prerequisite, Chemistry 66.

Credit, 3. Mr. Duus.

182. INDUSTRIAL EQUILIBRIA.

Phase and chemical equilibria and rates of reaction in chemical processes from the industrial point of view.

Prerequisites, Chemistry 66 and Chemical Engineering 181.

Credit, 3. Mr. Duus.

188. CHEMICAL ENGINEERING LABORATORY.

A quantitative study of pilot plant size equipment illustrating some unit operations with special emphasis on the securing of accurate data, correct operating technique, and report writing. Field trips when possible.

Prerequisite, Chemical Engineering 156.

Credit, 3. The Staff.

CHEMISTRY

Graduate Faculty: W. E. McEwen, Head of Department, E. Bennett, J. F. Brandts, G. W. Cannon, L. A. Carpino, J. A. Chandler, D. J. Curran, R. D. Deanin, A. M. Gawienowski, J. W. George, I. M. Hunsberger, C. P. Lillya, H. N. Little, E. J. McWhorter, E. M. Mortensen, J. W. Olver, M. D. Rausch, J. E. Roberts, T. Robinson, R. L. Rowell, J. H. Smith, R. S. Stein, H. D. Stidham, R. M. Williams, O. T. Zajicek.

The Department of Chemistry provides facilities for students intending to complete the requirements for the Master's degree and the Doctor's degree. Students accepted for graduate study are expected to have met the usual requirements for the Bachelor's degree. Those who have not fulfilled these requirements may be admitted as special students until the deficiencies have been removed.

First year graduate students will take placement examinations during the first week of residence. These examinations are for the purpose of evaluating the background of the student, and to assist in the selection of a course of study. Students are admitted to candidacy for a degree only after the completion of qualifying requirements. A research problem is carried out in one of the following fields of chemistry: physical, organic, inorganic, analytical, and bio-chemical.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

201. INORGANIC PREPARATIONS.

Laboratory.—The preparation and testing of various types of inorganic substances, to teach important techniques and give familiarity with the reactions and properties of inorganic materials.

Credit, 3-5. Inorganic Staff.

202. INORGANIC CHEMISTRY OF THE FAMILIAR ELEMENTS.

Lectures and collateral reading on the descriptive chemistry of some of the less familiar elements such as boron, gallium, indium, thallium, the lanthanides, fluorine, titanium, vanadium, tantalum, tungsten, and uranium, with correlations between structure or spatial configurations and chemical properties.

Given in alternate years.

Credit, 3. Mr. Roberts.

203. PHYSICAL CHEMICAL MEASUREMENTS.

Laboratory.—Experiments selected from standard texts and from the literature in Physical Chemistry to meet the needs and background of the individual student.

Prerequisites, Chemistry 165 and 166 or equivalent.

Credit, 3-5. The Staff.

205. CHEMICAL THERMODYNAMICS.

Introduction to Statistical Thermodynamics. Applications of Microcanonical, Canonical, Grand Canonical and Generalized Ensembles to chemical systems. Calculation of thermodynamic functions from spectroscopic data, fluctuations, imperfect gases, nearest neighbor lattice statistics and other special topics of current interest.

1962-63 and each alternate year.

Prerequisites, Chemistry 177 or equivalent.

Credit, 3. Mr. Stidham.

207. CHEMICAL SPECTROSCOPY, TECHNIQUE AND APPLICATIONS.

Contains an introduction to the elementary theory, experimental techniques and interpretation of data obtained in applications of infrared, Raman, visible, ultraviolet, nuclear quadrupole and nuclear magnetic resonance spectroscopy to the solution of chemical problems.

Prerequisite, Chemistry 66 or equivalent.

Credit, 3. Mr. Stengle and Mr. Stidham.

208. CHEMICAL SPECTROSCOPY.—THEORY.

Contains an introduction to the theory of infrared, Raman, visible and ultraviolet, nuclear quadrupole and nuclear magnetic resonance spectroscopy.

1963-64 and each alternate year.

Prerequisites, Chemistry 207 and Mathematics 91 or permission of the instructors.

Credit, 3. Mr. Stidham and Mr. Stengle.

211, 212. QUANTUM CHEMISTRY.

Quantum mechanics and its application to chemical problems. A discussion of the exact theory of structure of simple atoms, the application of approximate methods for complex atoms and molecules, the chemical bond, resonance, the interaction of radiation and matter, group theory.

1963-64 and each alternate year.

Prerequisite, Chemistry 186 or equivalent.

Credit, 3 each semester. Mr. Stein, Mr. Stengle and Mr. Stidham.

215. TOPICS IN PHYSICAL CHEMISTRY.

Prerequisites, Chemistry 177 and 186 or equivalent.

Credit, 2 each semester. Maximum Credit, 6. The Staff.

216. TOPICS IN INORGANIC CHEMISTRY.

Topics such as coordination chemistry, non-aqueous solvents, less familiar oxidation states, acid-base theories, reaction mechanisms, etc. will be offered.

Prerequisite, Chemistry 186 or equivalent.

Credit, 2 each semester. Maximum Credit, 6. The Staff.

CHEMISTRY

217. ORGANIC POLYMERIZATION REACTIONS.

A study of mechanisms, kinetics, and thermodynamics of principal types of polymerization reactions and relationship to the properties or resulting polymers.

Prerequisites, Chemistry 51, 52, 65 and 66.

Three lectures per week.

Credit, 3. Mr. Deanin.

218, 219. PHYSICAL CHEMISTRY OF HIGH POLYMERS.

Structure of solid polymers, determination of molecular weights, sizes and shapes, mechanical properties of solid polymers, colligative properties of polymer solutions, polyelectrolytes, and physical chemistry of proteins.

1963-64 and each alternate year.

Prerequisite, Chemistry 205 or equivalent. *Credit, 3 each semester.* Mr. Stein.

220. TECHNIQUES OF POLYMER CHARACTERIZATION.

A study of experimental techniques for characterization of isolated polymer molecules and polymeric solids, including x-ray diffraction, birefringence, infrared dichroism, NMR, dynamic and static mechanical studies, microscopy, light scattering, solution techniques.

Prerequisites, Chemistry 65 and 66, and Chemistry 218 and 219 (may be taken concurrently).

One lecture per week.

Credit, 1. Mr. Stein and guest lecturers.

221. ADVANCED ANALYTICAL CHEMISTRY.

Laboratory consisting of special work to meet the needs of the individual students.

Prerequisite, Chemistry 183 or equivalent.

Credit, 3-5. Mr. Roberts, Mr. Olver and Mr. Curran.

223. INTRODUCTION TO MICRO-CHEMISTRY.

Laboratory.—The applications of micro technique to synthesis, analysis, and characterization; the microscopic work may include the optics of the microscope, micrometry, the microscopic study of fibers, crystals, and physiochemical phenomena and an introduction to microscopical qualitative analysis; the quantitative work may include the determination of carbon, hydrogen, nitrogen, and halogens in organic materials and selected inorganic determinations.

Prerequisite, Chemistry 183 or equivalent.

Credit, 3-5. Mr. Roberts.

227. HETEROCYCLIC CHEMISTRY.

The chemistry of the common organic heterocyclic compounds containing nitrogen, oxygen, and sulfur. Consideration of mechanisms of the reactions discussed.

Prerequisite, Chemistry 181 or equivalent.

Credit, 3. The Staff.

229, 230. THEORETICAL ORGANIC CHEMISTRY.

Lectures on special topics such as stereochemistry, bond formation, resonance, ionic reactions, free radical reactions, transition state theory, reaction mechanisms, molecular rearrangements, etc.

1962-63 and each alternate year.

Prerequisite, Chemistry 181 or permission of instructor.

Credit, 3 each semester. The Staff.

231 ADVANCED ORGANIC CHEMISTRY.

Laboratory.—More difficult synthesis of organic compounds, frequently those desired as starting materials for research, will be assigned to the individual student. Their preparation will require the use of the original literature.

Prerequisite, a year course in Organic Chemistry.

Credit, 3-5. The Staff.

232. ORGANIC CHEMISTRY.

An intensive survey of certain reactions of organic chemistry with emphasis on their scope and limitations, recent developments, and mechanisms.

Prerequisite, Chemistry 181.

Credit, 3. The Staff.

233. SPECIAL TOPICS IN ORGANIC CHEMISTRY.

One to three topics of current interest will be discussed in detail. Recent development of theoretical and/or synthetic importance to organic chemistry will be covered. A maximum of six credits may be taken.

Prerequisite, Chemistry 181 or permission of instructors.

Three class hours.

Credit, 3. The Staff.

234. SPECIAL TOPICS IN BIOCHEMISTRY.

One to three topics selected from those areas of biochemistry which currently are most significant will be discussed in detail.

A maximum of six credits may be taken.

Prerequisites, Chemistry 193 and 194.

Credit, 3-6. Biochemistry Staff.

235. ADVANCED BIOCHEMICAL TECHNIQUES.

A laboratory course to provide experience in the isolation, identification, and analysis of biochemical compounds.

Prerequisites, Chemistry 193 and 194.

Credit, 2-5. Biochemistry Staff.

236. EXPERIMENTAL ENZYMOLOGY.

A course designed to give experience in the preparation and assay of enzymes.

Prerequisites, Chemistry 193 and 194.

Credit, 2. Mr. Robinson.

238. BIOCHEMISTRY OF PROTEINS.

A discussion of the chemical, physical and biological properties of proteins.

Prerequisites, Chemistry 194 and 166.

Credit, 3. Mr. Little.

239. CHEMISTRY OF NATURAL PRODUCTS.

Natural products of current interest, primarily from the steroid, terpene, and alkaloid groups, with emphasis on structural proofs, stereochemistry, synthesis, and biogenetic relationships.

1962-63 and each alternate year.

Prerequisite, Chemistry 181 or permission of instructor.

Credit, 3. The Staff.

251. SEMINAR.

Conferences, reports or lectures.

Credit, 1 each semester. Maximum credit, 2. Mr. Olver and Mr. Williams.

295. RESEARCH PROBLEM.

The student will prepare two proposals for research problems not directly related to his thesis topic if the latter has been selected. The problems will involve primarily library research. Required of all candidates for the Ph.D. in Chemistry and must be completed before the candidate's preliminary examination for the degree.

Credit, 4. The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 10.

400. THESIS, Ph.D. DEGREE.

Credit, 30.

CHEMISTRY

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS (For either major or minor credit)

177. ADVANCED PHYSICAL CHEMISTRY.

Topics such as chemical thermodynamics, statistical mechanics, introductory quantum chemistry and theories of gases, liquids and solids.

Three class hours.

Prerequisites, Chemistry 165 and 166. *Credit, 3.* Mr. Stengle and Mr. Stidham.

181. ORGANIC CHEMISTRY.

An intensive survey of aliphatic and aromatic chemistry with emphasis on scope and limitations of reactions, mechanisms, and recent developments.

Three class hours.

Prerequisites, one year of Organic Chemistry and permission of instructor.

Credit, 3. The Staff.

182. QUALITATIVE ORGANIC CHEMISTRY.

Identification of unknowns, both single and mixtures of organic compounds, by physical properties, reactions and preparation of derivatives.

Two class hours, two 3-hour laboratory periods.

Prerequisites, one year of Organic Chemistry and permission of instructor.

Credit, 4. The Staff.

183. INSTRUMENTAL ANALYSIS.

The theory and techniques of special methods of analysis such as colorimetry, potentiometry, microscopy, ion exchange, electro-deposition and other recently developed methods of analysis.

Two class hours, one 3-hour laboratory period.

Prerequisites, Chemistry 32 and 166.

Credit, 3. Mr. Roberts, Mr. Olver, and Mr. Curran.

184. RADIOCHEMISTRY.

The character of atomic nuclei, nuclear reactions, radiation and its detection and techniques for the study and utilization of radionuclides.

Two class hours, two 3-hour laboratory periods.

Prerequisite, Chemistry 32 or permission of instructor.

Credit, 3. Mr. Richason.

185. THEORY OF ANALYTICAL PROCESSES.

A detailed consideration of analytical topics having general applicability in chemical investigations. Among the areas included are chemical equilibrium, precipitate formation, chelating agents, multistage separation, and quantitative methods for organic functional groups. Additional topics may be selected from the current literature. A one credit-hour laboratory will be available on an individual and optional basis.

Pre- or co-requisites- Chemistry 52 and 66.

Three class hours.

Credit, 3.

One afternoon laboratory period (optional).

Credit, 1.

Mr. Roberts, Mr. Olver, and Mr. Curran.

186. THEORETICAL INORGANIC CHEMISTRY.

A theoretical survey of inorganic chemistry based on periodic relationships. Topic includes: atomic structure, nuclear chemistry, valence concepts, coordination compounds and acid-base theory.

Three class hours.

Prerequisite, Chemistry 165.

Credit, 3. Mr. Smith.

187. INORGANIC CHEMISTRY OF THE COMMON ELEMENTS.

A systematic consideration of the chemistry of the common elements and their compounds, based on the periodic relationships and modern concepts of structure and bonding. An optional two-credit laboratory will provide an introduction to inorganic laboratory techniques and practices.

Three class hours (6 lab hours optional).

Prerequisite, Chemistry 186 or permission of the instructor.

Credit, 3 (5). Mr. Zajicek and Mr. Chandler.

188. HISTORY OF CHEMISTRY.

An historical and biographical survey of chemistry and chemists through a study of the development of new ideas and the establishment of new theories and laws.

Two class hours.

Credit, 2. Mr. Robinson.

191. CHEMICAL LITERATURE.

Intended to give facility in the location of information of a chemical nature.

One class hour.

Prerequisites, Chemistry 152 and 166 and a reading knowledge of German or permission of instructor.

Credit, 1. Mr. Oberlander.

193, 194. GENERAL BIOCHEMISTRY.

A broad introduction to the general field of biochemistry for students majoring in chemistry or in the biological sciences, and a background for more advanced or specialized study in this field.

Three class hours, one 3-hour laboratory period.

Prerequisites, Chemistry 151 and 152 or equivalent.

Credit, 4 each semester. Mr. Little.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Chemistry)

151, 152. ORGANIC CHEMISTRY.

Introduction to the chemistry of carbon compounds. Survey of the principal classes of organic compounds and their reactions with emphasis on the relation between structure and reactivity.

Prerequisite, Chemistry 4, or 26, or 27, or 29.

Credit, 3 each semester. Organic Staff.

153, 154. ORGANIC CHEMISTRY LABORATORY.

Application of the experimental techniques of organic chemistry to the preparation, purification and analysis of organic compounds.

One 3-hour laboratory period.

Prerequisites, concurrent enrollment in Chemistry 151 and 152.

Credit, 1 each semester. Organic Staff.

155. ORGANIC CHEMISTRY LABORATORY.

Continuation of Chemistry 154. Study of preparations involving special techniques and use of the literature of organic chemistry.

Two 3-hour laboratory periods.

Prerequisites, Chemistry 152 and 154.

Credit, 2. Organic Staff.

165, 166. PHYSICAL CHEMISTRY.

A study of the fundamental theories and laws of physical chemistry.

Prerequisites, Chemistry 30, Mathematics 30, and Physics 26.

Credit, 3 each semester. Physical Chemistry Staff.

CHEMISTRY/CIVIL ENGINEERING

167, 168. PHYSICAL CHEMISTRY LABORATORY.

Experience in modern physicochemical techniques.

One 4-hour laboratory period.

Prerequisites, Chemistry 30, Mathematics 30, and Physics 26 or permission of instructor. Concurrent enrollment in Chemistry 165, 166.

Credit, 2 each semester. Mr. Stengle and Physical Chemistry Staff.

179. ELEMENTARY BIOCHEMISTRY.

The more important facts relating to biological materials and processes. Designed primarily for students not eligible for courses 193 or 194. Not open to chemistry majors.

Three class hours, one 3-hour laboratory period. *Credit, 4.* Mr. Robinson.

CIVIL ENGINEERING

Graduate Faculty: M. P. White, Head of Department, W. W. Boyer, C. E. Carver, Jr., T. H. Feng, D. B. Harris, K. N. Hendrickson, G. R. Higgins, E. C. Osgood.

The Department offers both the Ph.D. and the M.S. degree. For the Ph.D. degree no additional requirements are imposed by the Department other than the general requirements established by the Graduate School of the University. For the M.S. degree, the following requirements must be met:

In addition to the general University requirements for admission to the Graduate School, each candidate in Civil Engineering must satisfy the following departmental requirements: (a) must submit a record of graduate record examination if graduated from an unaccredited institution, or if applying from a foreign country where this examination is offered, (b) must indicate his major field of interest (fluid mechanics, soil mechanics, structures, transportation engineering, sanitary engineering, etc.).

Three options are offered in the department: (1) Mechanics and Structures, (2) Transportation Engineering, (3) Sanitary Engineering.

Students must satisfy one of the following core curricula:

CORE CURRICULUM FOR MECHANICS AND STRUCTURES OPTION

1. Seminar—one hour, no credit, two semesters.
2. Strength of Materials II—C.E. 188.
3. Introduction to Hydrodynamics—C.E. 193.
4. Dynamics of Machinery—M.E. 185.
5. Advanced Engineering Mathematics—Math 175.
6. Thesis.

CORE CURRICULUM FOR TRANSPORTATION ENGINEERING OPTION

1. Seminar—one hour, no credit, two semesters.
2. Hydraulic Engineering—C.E. 192.
3. Theoretical Soil Mechanics—C.E. 279.
4. Probability—Math 163.
5. Municipal Administration—Govt. 178.
6. Thesis.

CIVIL ENGINEERING

CORE CURRICULUM FOR SANITARY ENGINEERING OPTION

1. Seminar—one hour, no credit, two semesters.
2. Hydraulic Engineering—C.E. 192.
3. General Applied Bacteriology—Public Health 181.
4. Probability—Math 163.
5. Municipal Administration—Govt. 178.
6. Analysis of Food Products—Fd. Sci. and Tech. 191.
7. Thesis.

COURSES OPEN TO GRADUATE STUDENTS ONLY

200. SPECIAL PROBLEMS. *Credit, 3-6.* The Staff.
252. STRUCTURAL DYNAMICS.
The behavior of linear and non-linear mechanical systems subjected to periodic forces, to non-periodic forces and to shock loads.
Prerequisites, Civil Engineering 52 and 53. *Credit, 3.* Mr. White.
257. TRANSPORTATION ANALYSIS AND PLANNING.
The analysis of traffic and transportation engineering problems in highways, railroads and airports and the planning related to those facilities.
Prerequisite, Civil Engineering 194. *Credit, 3.* Mr. Boyer.
261. EXPERIMENTAL STRESS ANALYSIS.
Experimental procedures for determination of stresses and strains due to static and dynamic loads.
Prerequisite, Civil Engineering 53. *Credit, 3.* Mr. Harris.
262. FUNDAMENTAL MECHANICS OF MATERIALS.
Mechanical and physical properties of materials related to crystal structure and symmetry. *Credit, 3.* Mr. Harris.
270. ADVANCED STRUCTURAL THEORY.
Plastic analysis and design of steel frames.
Prerequisites, Civil Engineering 71 and 172. *Credit, 3.* Mr. Osgood.
271. SPECIAL STRUCTURES.
The analysis and design of two-hinged and hingeless arches and of folded plate and shell roofs.
Prerequisites, Civil Engineering 71, 172, and 73. *Credit, 3.* Mr. Osgood.
273. ADVANCED TOPICS IN CONCRETE.
Prestressed concrete theory. Methods of analysis applicable to various types of reinforced concrete building frames; elastic theory and ultimate strength procedures. Consideration of beam and girder, flat slab, slab-band, flat plate, lift slab, and rigid frame construction. Design of columns subject to bending and direct stress. *Credit, 3.* Mr. Osgood.
275. ADVANCED FLUID MECHANICS.
Hydraulic similitude, dimensional analysis, methods of obtaining dynamic similarity in hydraulic models in actual practice, analysis of typical hydraulic models.
Prerequisite, Civil Engineering 75. *Credit, 3.* Mr. Carver and Mr. Higgins.

CIVIL ENGINEERING

277. ADVANCED SANITARY ENGINEERING.

Hydraulic and chemical problems encountered in the design and operation of water and sewage works, stream sanitation and the latest trends of practice and research in sanitary engineering.

Prerequisites, Civil Engineering 77 and 78.

Credit, 3. Mr. Feng.

279. THEORETICAL SOIL MECHANICS.

The phenomena in soil masses subjected to such forces as seepage, frost and imposed loads.

Credit, 3. Mr. Hendrickson.

280. APPLIED SOIL MECHANICS.

The solution of case problems applying the principles of soil mechanics to the design of embankments, retaining walls, footings, raft foundations, and pile structures.

Prerequisite, Civil Engineering 279.

Credit, 3. Mr. Hendrickson.

281. SEEPAGE ANALYSIS.

An analytical study of groundwater and seepage problems related to earth structures.

Prerequisite, permission of instructor.

Credit, 3. Mr. Hendrickson.

282. SHEAR STRENGTH OF CLAY.

A survey of current theory and research into the strength characteristics of clay.

Credit, 3. Mr. Bemben.

288. ELASTICITY.

General equations of the mathematical theory of elasticity in space. Plane strain and plane stress in cartesian, polar and general orthogonal co-ordinates.

Credit, 3. Mr. Dzialo and Mr. White.

289. THEORY OF PLATES.

A presentation of the classical theory of plates as well as modern developments. Relationship of the general theory of elasticity to plate theory.

Credit, 3. Mr. Dzialo.

290. STRUCTURAL STABILITY.

A study of the elastic stability of engineering structures. Bending of bars, buckling of thin plates and shells; dynamic stability of bars and plates.

Credit, 3. Mr. Dzialo and Mr. White.

300. THESIS, MASTER'S DEGREE.

Required of all candidates.

Credit, 6.

400. THESIS, PH.D. DEGREE.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

154. DYNAMICS II.

A continuation of the first course in dynamics, using vector methods. Dynamics of a system of particles, kinematics and kinetics of a rigid body in space, top motion, simple gyroscopes.

Prerequisite, Civil Engineering 52.

Credit, 3. The Staff.

172. THEORY OF STRUCTURES II.

The analysis of statically indeterminate structures by several appropriate methods.

Two class hours, one 3-hour laboratory period.

Prerequisite, Civil Engineering 70.

Credit, 3. Mr. Osgood.

174. THEORY OF STRUCTURES III.

The analysis and design of complex or special structures in metal, concrete or wood.

Prerequisites, Civil Engineering 71, 172, and 73 concurrently.

Credit, 3. Mr. Osgood.

182. SOIL TESTING.

Sampling and testing of soils for engineering purposes.

One class hour, two 3-hour laboratory periods.

Prerequisite, Civil Engineering 80 or equivalent.

Credit, 3. Mr. Hendrickson.

185. WATER AND WASTE WATER ANALYSIS.

Analysis of water relative to its quality for various domestic and industrial uses and analysis of waste water relative to its potentiality of pollution.

Two class hours, one 3-hour laboratory period.

Prerequisites, Chemistry 2, Civil Engineering 78.

Credit, 3. Mr. Feng.

186. SANITARY ENGINEERING III.

The hydraulics and chemistry of water and sewage treatment; layout and design of water and sewage treatment plants.

Prerequisites, Civil Engineering 77 and 78.

Credit, 3. Mr. Feng.

187. OPEN CHANNEL FLOW.

A study of steady flow in open channels including backwater curves in natural and artificial channels, hydraulic jump, channel bends and transitions, sediment transport, surges and waves, breakwaters and hydraulic structures.

Prerequisite, Civil Engineering 75.

Credit, 3. Mr. Higgins.

188. STRENGTH OF MATERIALS II.

Determination of stresses and strains in elements of machines and structures.

Prerequisite, Civil Engineering 53.

Credit, 3. Mr. White.

189. FLUID MECHANICS OF THE OCEANS.

An introduction to physical oceanography covering tides and waves, characteristics of sea water, advective and convective processes in the ocean and atmosphere, oceanographic measurements, planetary models of the oceans.

Prerequisites, Physics 5 or equivalent and Mathematics 30.

Credit, 3. Mr. Carver and Mr. Higgins.

191. SURVEYING III.

Elements of astronomical, geodetic and photogrammetric surveying, co-ordinate systems and map projections.

Two class hours, one 3-hour laboratory period.

Prerequisite, Civil Engineering 32.

Credit, 3. Mr. Boyer.

192. HYDRAULIC ENGINEERING.

The analysis and design of hydraulic structures such as storage reservoirs, spillways, dams, levees, shore protection and channel works.

Prerequisite, Civil Engineering 75.

Credit, 3. Mr. Higgins.

CIVIL ENGINEERING/DAIRY AND ANIMAL SCIENCE

193. INTRODUCTION TO HYDRODYNAMICS.

A mathematical treatment of the basic theorems of classical hydrodynamics—potential flow, conformal mapping, wave and vortex motion, Navier-Stokes equations and boundary layer theory.

Prerequisite, Mathematics 32.

Credit, 3. Mr. Carver.

194. ADVANCED TRANSPORTATION ENGINEERING.

Analysis of the engineering aspects of traffic problems such as traffic signal design, street capacities, parking and channelization.

Two class hours, one 3-hour laboratory period.

Prerequisite, Civil Engineering 55.

Credit, 3. Mr. Boyer.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Civil Engineering)

179. PRINCIPLES OF SANITARY ENGINEERING.

For students in the Department of Public Health. Covers phases of Civil Engineering 77 and 78 with consideration of the non-engineering background of the student.

Credit, 3. Mr. Feng.

180. SOIL MECHANICS.

Properties of soil and its behavior as an engineering material. Principles of classification, permeability, shear strength and compressibility and applications to simple field problems.

Two class hours, one 3-hour laboratory period.

Prerequisite, Geology 50.

Credit, 3. Mr. Hendrickson.

DAIRY AND ANIMAL SCIENCE

Animal Science

Graduate Faculty: D. J. Hankinson, Head of Department, D. L. Black, W. G. Black, H. Fenner, R. C. Foley, S. N. Gaunt, F. E. Potter.

Animal Science is a major program of study within the Department of Dairy and Animal Science.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

Major credit for Animal Science students assumes prerequisites in the animal science field as covered in undergraduate courses in this University. All hours by arrangement.

200. SPECIAL PROBLEMS.

A specific problem in some aspect of animal science.

Credit, 3-6. The Staff.

205. RUMINANT NUTRITION.

An advanced course in ruminant digestion and metabolism. Special topics will be selected and discussed in the light of recent and current research.
Prerequisites, Animal Science 151 and Chemistry 179 or equivalent.

Credit, 3. Mr. Lyford.

211. ADVANCED ANIMAL GENETICS.

Modern research in animal breeding with emphasis on the statistical approach. This includes the development of selection indexes for various farm mammals, sire indexes, and breeding plans based on systems of mating and selection.

Prerequisites, Animal Science 166 and Agricultural Economics 177 and 180 or equivalent.

Credit, 3. Mr. Gaunt.

215. MAMMALIAN REPRODUCTION.

An advanced course emphasizing the comparative approach to problems of reproductive anatomy and endocrinology. Lectures, laboratory and seminar reports with theoretical and practical considerations of current research findings in laboratory and domestic animals, and in primates.

Prerequisites, Zoology 172 and 187.

Credit, 3. Mr. D. L. Black.

216. FERTILITY AND FECUNDITY.

The role of heredity, nutrition, pathology and environment in the determination of fertility and fecundity in mammalian forms. Current research directed toward control of reproductive function through experimental means is emphasized.

Prerequisites, Animal Science 166 and Zoology 187 or Animal Science 215.

Credit, 3. Mr. W. G. Black.

226. THE HISTOLOGY OF DOMESTIC ANIMALS.

A functional study of the tissues and organs of domestic animals with special emphasis on those features which have particular economic or physiologic significance in the fields of livestock production, meats, nutrition, milk secretion and animal breeding.

Prerequisites, Zoology 150 and Veterinary Science 175 or equivalent.

Credit, 3. Mr. D. L. Black.

229, 230. SEMINAR.

Reports on current literature.

Credit, 1 each semester. Maximum credit, 4. The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 5-10.

400. THESIS, PH.D. DEGREE.

Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

161. PRINCIPLES OF ANIMAL NUTRITION.

Scientific principles of nutrition in both ruminants and non-ruminants.

Credit, 3.

167. PHYSIOLOGY OF REPRODUCTION.

Comparative aspects of anatomy, embryology, endocrinology, physiology and lactation.

Credit, 4. Mr. W. G. Black.

ANIMAL SCIENCE/DAIRY TECHNOLOGY

168. COMPARATIVE ANIMAL GENETICS.

The workings of heredity and variation in livestock and poultry; the role of selection and breeding systems in genetic improvement and their evaluation.

Prerequisite, Zoology 153.

Credit, 3. Mr. Fox.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Animal Science)

174. DAIRY CATTLE PRODUCTION.

Credit, 3. Mr. Foley.

150. ANIMAL PHYSIOLOGY.

Credit, 4. Mr. D. Black.

Dairy Technology

D. J. Hankinson, Head of Department.

Dairy Technology is a major program of study within the Department of Dairy and Animal Science.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

Major credit Dairy Technology students assumes prerequisites in the dairy technology field as covered in undergraduate courses in this University.

200. PROBLEMS IN DAIRY TECHNOLOGY.

Individual study of specific current problems involved in the processing of dairy products.

Credit, 3. The Staff.

202. ADVANCED DAIRY CHEMISTRY.

The physical, colloidal, and chemical properties of dairy products the role of milk fat, salts, proteins, carbohydrates, and enzyme systems, and their relation to dairy research.

Prerequisite, 175 or equivalent.

Two 1-hour lectures, one 3-hour laboratory period.

Credit, 3. Mr. Potter.

209, 210 SEMINAR.

Reports on current literature.

Credit, 1 each semester. The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 10. The Staff.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Dairy Technology)

165. UNIT OPERATIONS.

Credit, 4. Mr. Potter.

166. QUALITY CONTROL AND STANDARDS.

Credit, 4. Mr. Evans.

ECONOMICS

Graduate Faculty: P. L. Gamble, Head of Department, J. L. Blackman, Jr., M. C. Howard, B. R. Morris, S. Schoeffler, K. Wickman.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

Candidates for admission should have been in the upper half of their graduating class, and should have at least one year of elementary study in Economics and an additional year and one-half of study in Economics, related fields, or equivalent experience. Total 15 credits.

200. SPECIAL STUDIES IN ECONOMICS. *Credit, 2-5 each semester.* The Staff.

211, 212. MACRO-ECONOMIC THEORY.

Nature, construction and use of social accounting systems. A systematic development of static and dynamic theories of aggregative economic behavior and their applications. *Credit, 3 each semester.* The Staff.

213. MONETARY POLICY.

The organization and policies of the major central banks with special reference to the Federal Reserve System in the light of our monetary theory. Given as required. *Credit, 3.* Mr. Gamble.

214. FISCAL POLICY.

The theory and practices of government finance with special reference to the United States. *Credit, 3.* Mr. Gamble.

231, 232. MICRO-ECONOMIC THEORY.

A systematic development of the theory of the consumer, the firm, the industry, and their interactions. *Credit, 3 each semester.* The Staff.

234. MONOPOLY AND PUBLIC UTILITY PROBLEMS.

The problem of social control of monopolies and industries affected with a public interest. Given as required. *Credit, 3.* Mr. Howard.

236. COLLECTIVE BARGAINING.

The legal background of collective bargaining, the process, subject matter, and problems involved. Individual case problems. *Credit, 3.* Mr. Blackman.

240. HISTORY OF ECONOMIC THOUGHT.

A general study of economic thought from its ancient beginnings; the contributions of the various schools; recent changes in economic thought. Given as required. *Credit, 3.* Mr. Martin.

251. MATHEMATICAL ECONOMICS AND ECONOMIC MODEL-BUILDING.

The various modern applications of mathematics to economic analysis. Both static and dynamic processes will be examined. Given as required. Admission by consent of instructor. Prerequisites, Economics 173 or the equivalent and one year of college mathematics. *Credit, 3.* Mr. Schoeffler.

ECONOMICS

252. ECONOMETRICS.

The application of modern statistical methods to macro- and micro-economic theory that has been formulated in mathematical terms.

Prerequisites, Economics 25 and 26, Mathematics 1 and 2, or 4 or consent of the instructor. *Credit, 3.* Mr. Chaudhry.

261, 262. GENERAL ECONOMIC HISTORY.

Evolution of the major sectors of economic activity in the Western World.

Credit, 3 each semester. Mr. Blackman.

271. TAXATION.

The assessment and administration of taxes with particular attention to the economic and social effects of individual taxes and tax systems.

Prerequisites, Economics 25 and 178. *Credit, 3.* Mr. Gamble.

281. ECONOMIC PLANNING.

Various kinds of economic plans in effect or proposed. Appraisal of the techniques of economic planning. *Credit, 3.* Mr. Morris.

291, 292. SEMINAR ON ECONOMIC POLICY.

Selection and application of the tools of economic analysis to major problems of public policy. *Credit, 1-3 each semester.* The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 10.

400. THESIS, PH.D. DEGREE.

Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

Added work required of graduates: (a) extra readings on same or additional assignments, (b) term paper, (c) special problem or project.

153. MONEY, BANKING AND CREDIT.

The development and operation of the monetary and banking systems of the United States; problems of achieving full employment and price stability through monetary controls.

Prerequisite, Economics 25.

Credit, 3. Mr. Gamble.

154. MONEY, INCOME AND MONETARY POLICY.

The relationship between money, income and monetary policy. An examination of the relationships between individuals, banks, money markets, governments and central banks.

Prerequisites, Economics 25 and either Economics 53 or Finance 55.

Credit, 3. Mr. Gamble.

155. ECONOMICS OF CONSUMPTION AND PERSONAL FINANCE.

Patterns of consumption, standards of living and the sources and expenditure of individual and family incomes.

Prerequisite, Economics 25.

Credit, 3. Mr. Morris.

156. BUSINESS FLUCTUATIONS AND FORECASTING.

Nature and causes of business fluctuations; methods of forecasting; government policy for stability; utility of available statistical data as guides to private and public policy.

Prerequisites, Economics 25 and 53 or Finance 55.

Credit, 3. Mr. Miller.

170. THE STRUCTURE OF AMERICAN INDUSTRY.

Business enterprise, market competition, and economic development in American industries. The social effectiveness of industries analyzed through measures of industrial structure and market performance.

Prerequisite, Economics 25.

Credit, 3. Mr. Howard.

173. MODERN ECONOMIC THEORY AND ANALYSIS.

Micro-economic analysis; types of markets; applications of linear programming, theory of games and other techniques for rational business planning; balancing forces in free-enterprise economy.

Prerequisite, Economics 25.

Credit, 3. Mr. Schoeffler.

175. MATHEMATICAL METHODS IN ECONOMICS.

The application of various mathematical concepts and techniques in macro-economic and micro-economic analysis. Special emphasis is placed on the design and interpretation of mathematical models of economic phenomena.

Prerequisites: Economics 25 and 26, Mathematics 1, 2, or 4, or consent of the instructor.

Credit, 3. Mr. Chaudhry.

177. ECONOMICS OF INTERNATIONAL TRADE.

Policies, principles, and practices of international trade.

Prerequisite, Economics 25.

Credit, 3. Mr. Miller.

178. PUBLIC FINANCE.

Principles of public revenues and expenditures; systems and problems of taxation; use of taxes, expenditures, debt policy to provide full employment, economic growth and price stability.

Prerequisite, Economics 25.

Credit, 3. Mr. Gamble.

179. LABOR PROBLEMS.

Background of the labor movement and problems involved in the management-labor relationship and the efforts of management, unions and government to solve them.

Prerequisite, Economics 25.

Credit, 3. Mr. Morris.

180. LABOR LAW AND LEGISLATION.

Economic effects and historical survey of Federal and state laws and an analysis of important court decisions.

Prerequisites, Economics 25 and 79.

Credit, 3. Mr. Blackman.

181. EUROPEAN ECONOMIC EVOLUTION.

Evolution of agriculture, manufacturing, banking, and other sectors of the European economy.

Credit, 3. Mr. Blackman.

182. ECONOMIC DEVELOPMENT.

Economic problems of underdeveloped countries and the policies necessary to induce growth. Individual projects will be required.

Prerequisite, Economics 25.

Credit, 3. Mr. Morris.

183. SOCIAL CONTROL OF BUSINESS.

The formal and informal methods and efforts to maintain, supplement and moderate competition, and the substitution of regulation or public enterprises for competition.

Prerequisite, Economics 25.

Credit, 3. Mr. Howard.

ECONOMICS/EDUCATION

184. COMPARATIVE ECONOMIC SYSTEMS.

The structure, operation, and underlying ideology of the major contemporary forms of social-economic organization. Emphasis on the Soviet Union and the United States.

Prerequisite, Economics 25.

Credit, 3. Mr. Schoeffler.

185. REGIONAL ECONOMICS.

Examination of the U.S. distressed economic areas problem; application of location theory and basic techniques of regional analysis; empirical studies of industrial location.

Prerequisites, Economics 25 and 26 or 70 or permission of instructor.

Credit, 3. Mr. Wickman.

186. DOCTRINAL BACKGROUNDS OF CONTEMPORARY THEORY.

Foundations of classical theory from physiocracy through Mill; neoclassicism and its chief variants, the Lausanne, Austrian and English schools; dissenters Marx, German historical school, Veblen.

Prerequisite, Economics 25.

Credit, 3. Mr. Martin.

188. FINANCIAL ASPECTS OF ECONOMICS.

The application of modern flow-of-funds analysis to the financial behavior of the various sectors of the economy. Special emphasis is placed on the financial aspects of business units and the business sector.

Prerequisites, Economics 25 and Accounting 25 or consent of instructor.

Credit, 3. Mr. Martin.

195, 196. SEMINAR.

Credit, 1-3. The Staff.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Graduate courses in Agricultural Economics and Business Administration may be approved for major credit by a student's guidance committee.

EDUCATION

Graduate Faculty: A. W. Purvis, Dean, A. S. Anthony, R. L. Byrne, A. A. Clegg, Jr., C. V. Jones, R. C. Jones, W. G. Kornegay, C. F. Oliver, R. B. Pippert, L. J. Thelen, R. Wyman.

The following programs leading to the Certificate of Advanced Graduate Study are offered. Each program requires a minimum of sixty credits beyond the Bachelor's degree and the specific program of each candidate must be approved by the candidate's Advisory Committee.

(1) Reading Specialist. Prerequisites, teacher certification and two years of approved teaching. Recommended program: Education 120, 149, 153, 177, 201, or 216, 215, 263, 264, 265, 291 and electives; 21-30 hours in such related graduate courses as abnormal psychology, exceptional child, phonetics, audiology, psychological tests, diagnosis and treatment of behavior problems.

(2) School Guidance Specialist. Prerequisites, teacher certification and one year of approved teaching. Recommended program: Education 149, 177, 201, 215, 216, 240, 241, 242, 243, 291, and electives; 21-30 hours in such related graduate courses as psychological and individual testing, exceptional child, abnormal psychology, theories of personality, sociology, and counseling techniques.

(3) School Principals and Supervisors. Prerequisites, teacher certification and three years of approved teaching and/or administrative experience. Rec-

ommended program: Education 110, 149, 153, 177, 200 or 201, 209 or 213, 211, 214, 220, 283 or 284, 289, 291 and electives; 21-30 hours in related graduate courses in such fields as government, business administration, economics, sociology and psychology.

(4) Specialists in Audio-visual Education. Prerequisites, teacher certification and two years of approved teaching, including one year's experience in the audio-visual field. Recommended program: Education 120, 121, 122, 123, 160, 166, 188, 200 or 201, 211, 214, 267, 268, 291 and electives; 21-30 hours in related graduate courses in such fields as engineering, psychology, physics, and statistics.

Before being admitted to candidacy for the Master of Education degree,¹ the student must have, in addition to minimum Graduate School requirements:

1. For programs in secondary education eighteen semester credits of such fundamental professional courses as Education 51, 52, 53, 72, 75, 85, 88, etc. Also a major (24 semester credits) and a minor (15 semester credits) in the subject matter fields to be taught.
2. For programs in elementary education twenty-four semester credits of such fundamental professional courses as Education 51, 60, 61, 62, 64, 85, etc., a broad general education including a minor (15 semester credits) in Arts and Sciences.
3. For programs in both fields experience in teaching is required. Students entering without teaching experience must arrange for student teaching (without graduate credit) as soon as possible.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

110. EVALUATION IN ELEMENTARY SCHOOLS.

Standardized and teacher made tests, rating scales, report cards, growth charts, readiness measures, and diagnosis of educational deficiency in elementary pupils. (To be taken instead of Education 153 by those training for elementary teaching.)

Credit, 3. Miss McManamy.

120. CONSTRUCTION OF AUDIO-VISUAL AIDS.

Designed to help teachers and audio-visual specialists to prepare audio-visual materials for use in an educational program. Students will prepare slides, graphics, recordings, still pictures, motion pictures.

Prerequisite, Education 166.

Credit, 3. Mr. Sleeman.

121. TEACHING WITH TELEVISION AND RADIO.

Provides the classroom teacher with an understanding of television and radio so that he can participate in the preparation, utilization, and evaluation of educational programs using these media.

Prerequisite, Education 166.

Credit, 3. Mr. Wyman.

122. PHOTOGRAPHY IN EDUCATION.

Theory and practice of taking and processing photographs for use in educational activities.

Prerequisites, Education 120 and 166.

Credit, 3. The Staff.

¹ For a description of the Master of Arts in Teaching see page 13.

EDUCATION

123. AUDIO-VISUAL TECHNOLOGY.

Applications of acoustics, electricity, magnetism, mechanics and optics to audio-visual equipment and techniques.

Prerequisite, Education 166.

Credit, 3. The Staff.

130. ELEMENTARY SCHOOL SCIENCE.

Methods and materials of instruction.

Credit, 3. Mr. King.

131. ELEMENTARY SCHOOL SOCIAL STUDIES.

Recent findings in research in terms of their implications for the elementary school social studies program.

Credit, 3. Mr. Clegg.

149. DATA PROCESSING FOR SCHOOLS.

Theory and practice in the use of simple types of data processing equipment in scheduling, record keeping, attendance, and registers.

Prerequisites, Education 153 or 291.

Credit, 3. Mr. Pippert.

200. PROBLEM.

A critical study of some problem in the educational field. Two bound copies of the written report must be provided for the School of Education by the student.

Prerequisite, Education 291 or its equivalent.

Credit, 1-4. The Staff.

201. PRACTICUM OR INTERNSHIP.

Practice in the application of educational theory and technique in the public schools in such fields as supervision, administration, audio-visual organization, and guidance. The student will prepare a comprehensive written report of his practice, experience and problems. A student cannot offer both Education 200 and 201 for the Master's degree.

Prerequisites, Education 291 and teaching experience. *Credit, 1-4.* The Staff.

209. Administering Secondary Schools.

Housing, finance, schedule, the library, guidance, cafeteria, public relations, etc.

Prerequisite, teaching experience.

Credit, 3. Mr. C. V. Jones.

210. ADMINISTERING EXTRA-CURRICULAR ACTIVITIES.

Scheduling, financing, sponsorship, regulation of pupil participation.

Prerequisite, teaching experience.

Credit, 3. Mr. Oliver.

211. COMMUNITY RELATIONS FOR SCHOOL PERSONNEL.

The development of good public relations policies and the techniques of assisting lay people in interpreting school activities, policies, and objectives.

Credit, 3. Mr. Oliver.

213. ADMINISTERING ELEMENTARY SCHOOLS.

The principal's responsibilities, organization of the school office, scheduling, use of school facilities, curriculum organization, staff relationships, and the place of the school in the community.

Prerequisite, teaching experience.

Credit, 3. The Staff.

214. PRINCIPLES OF SUPERVISION.

Principles and problems of supervision and the exercise of educational leadership in the improvement of instruction in the elementary curriculum and the secondary school content fields. *Credit, 3.* The Staff.

215. WORKSHOP IN EDUCATION¹.

Group study of practical problems in curriculum, instruction, and administration for school personnel in service. *Credit, 2-6.* The Staff.

216. SEMINAR IN EDUCATION.

An intensive analytical study of some phases of education. *Credit, 2-6.* The Staff.

220. SCHOOL LAWS OF MASSACHUSETTS.

A review of the legal relations of school personnel covering experiences in school and community, presented in a series of selected cases. *Credit, 3.* Mr. Purvis.

230. COMPARATIVE EDUCATION.

Studies of contemporary educational systems in such countries as England, France, Germany, Russia, and Japan. *Credit, 3.* Mr. Wellman.

231. CONTEMPORARY PROBLEMS IN EDUCATION.

An intensive examination of several major issues confronting American education. Evaluation, and criticism of proposals being offered for their solution. *Credit, 3.* Mr. Eddy.

232. HISTORY OF AMERICAN EDUCATION.

The development of American education in the context of American intellectual thought. *Credit, 3.* Mr. Cohen.

240. OCCUPATIONS AND PLACEMENT IN SCHOOL GUIDANCE.

The collection, evaluation and use of occupational, educational, and placement information with individuals and groups of students in school guidance. Prerequisites, Education 177, teaching experience and permission of the instructor. *Credit, 3.* Mr. Fredrickson.

241. ADMINISTRATION OF SCHOOL GUIDANCE SERVICES.

Operative framework of guidance programs in terms of personnel, functions, physical facilities, institutional integration, finance and laws. Prerequisites, Education 177, teaching experience and permission of the instructor. *Credit, 3.* Mr. Pippert.

242. ELEMENTARY SCHOOL GUIDANCE.

A study of skills, techniques, and objectives of guidance in the elementary school, emphasizing those aspects of guidance of particular interest to the elementary school teacher or guidance person. Prerequisites, Education 177, Psychology 188, and background in Psychology. *Credit, 3.* Mr. Pippert.

¹ No more than six credits can be taken in Education 215.

EDUCATION

243. GROUP ACTIVITIES IN GUIDANCE.

A guidance study of school groups. Attention will be given to group dynamics, discussion techniques, group counseling, sociometric methods, and other school group activities.

Prerequisite, Education 177, Psychology 188, and background in Psychology.

Credit, 3. Mr. Pippert.

257. CHILDREN'S LITERATURE.

The basic types and foremost works in the literature for children. Attention to different interest and vocabulary levels and to the criteria for selection of lists for individual children.

Prerequisite, Education 161.

Credit, 3. The Staff.

258. IMPLEMENTING THE ELEMENTARY SCHOOL PROGRAM.

Curriculum design and classroom organization, including practices in planning, presenting, and evaluating programs involving integration of skills and activities for the various grade levels.

Prerequisite, Education 160 and teaching experience. *Credit, 3.* Miss O'Leary.

263. DIAGNOSIS OF READING DIFFICULTIES.

Theory and interpretation of diagnostic procedures to develop a background of information in the diagnosis and treatment of reading difficulties.

Prerequisite, Education 161.

Credit, 3. Mr. Byrne.

264. INDIVIDUAL CASE STUDIES OF READING PROBLEMS.

Practical experience in the gathering and summation of information to form a case study of a child in order to determine the seriousness of the reading problem and the underlying causes and to make recommendations for their correction or remediation.

Prerequisite, Education 263.

Credit, 3. Mr. Byrne.

265. TECHNIQUES IN REMEDIAL READING.

Methods and materials in diagnosis and remedial instruction.

Prerequisite, Education 161.

Credit, 3. Miss O'Leary.

267. AUTO-INSTRUCTIONAL DEVICES AND PROGRAMED LEARNING.

Theory and practice of programed learning for typical school subjects. Each student will set up objectives and construct a program for a unit of work. Implications for future use in education will be considered.

Prerequisite, Education 166.

Credit, 3. Mr. Wyman.

268. ADMINISTRATION OF AUDIO-VISUAL SERVICES.

To prepare audio-visual coordinators, directors and supervisors in the operation of an audio-visual service. Teacher training, selection of materials and equipment, storage, cataloging, distribution, maintenance, and financial support.

Prerequisites, Education 166 and teaching experience. *Credit, 3.* Mr. Wyman.

283. COMPREHENSIVE HIGH SCHOOL.

Critical study of the historical development, objectives, course offerings, and crucial issues confronting the all-purpose high school. Critical analysis of various suggestions for improvement.

Credit, 3. Mr. Anthony.

284. THE JUNIOR HIGH SCHOOL.

The history of the Junior High School movement; the philosophy, aims and functions of a Junior High School, the instructional program, the role of the basic skills, guidance, organization, extra-curricular activities, and current trends.

Credit, 3. Mr. Kornegay.

289. COOPERATIVE CURRICULUM PLANNING.

Approved methods of curriculum planning, group work, consensus studies, used by cities and towns in curriculum development.

Prerequisite, Education 188 or 160.

Credit, 3. Mr. Kornegay.

291. EDUCATIONAL RESEARCH.

The principles and methods of research with special emphasis upon the technique used in Education. Statistics are studied chiefly from the standpoint of reporting and understanding the results of research.

Credit, 3. Mr. Rosemeir.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

151. HISTORY OF EDUCATION.

Credit, 3. Mr. Eddy, Mr. Cohen and Mr. Wellman.

152. PRINCIPLES AND METHODS OF TEACHING.

Credit, 3. Mr. Anthony and Mr. Thelen.

153. EDUCATIONAL TESTS AND MEASUREMENTS.

Credit, 3. Mr. Rosemeir.

160. ELEMENTARY SCHOOL CURRICULUM.

Credit, 3. Mr. Clegg.

161. ELEMENTARY READING AND LANGUAGE ARTS.

Credit, 3. Miss O'Leary and Mr. Byrne.

162. ELEMENTARY ARITHMETIC.

Credit, 3. Mr. Hall.

164. PRINCIPLES OF ELEMENTARY EDUCATION.

Credit, 3. Miss McManamy.

166. PREPARATION AND USE OF AUDIO-VISUAL AIDS.

Credit, 3. Mr. Wyman and Mr. Sleeman.

172. VOCATIONAL EDUCATION IN AGRICULTURE.

Credit, 3. Mr. Judge.

173. APPRENTICE TEACHING IN AGRICULTURE.

Credit, 6. Mr. Judge.

175. TECHNIQUE OF TEACHING VOCATIONAL AGRICULTURE.

Credit, 3. Mr. Judge.

177. PRINCIPLES OF SCHOOL GUIDANCE.

Credit, 3. Mr. Fredrickson.

188. SECONDARY SCHOOL CURRICULUM.

Credit, 3. Mr. Kornegay and Mr. Thelen.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Education except M.A.T. candidates)

185. OBSERVATION AND PRACTICE TEACHING.

Credit, 6. The Staff.

ELECTRICAL ENGINEERING

ELECTRICAL ENGINEERING

Graduate Faculty: G. Dale Sheckels, Head of Department, G. W. Bett, H. A. Herchenreder, J. W. Langford, J. W. Mohn, C. S. Roys, D. E. Scott.

Requirements for the Master of Science degree in Electrical Engineering, in addition to those listed on page 12, are as follows:

1. Four required courses totaling 12 credits.
2. Four courses totaling a minimum of 12 credits selected from one of the three areas of interest: power systems, feedback control systems, or information processing. One minor elective course may be substituted for one of the four major courses. A maximum of eight credits of 100 series courses, and three credits of EE 200, may be included in the selection.
3. A minimum of six credits of research with an acceptable thesis.
4. No foreign language is required.
5. Supporting courses will be required for those students lacking the prerequisites specified on the following pages.

First Semester

EE 205. ANALYSIS OF LINEAR SYSTEMS.	<i>Credit, 3.</i>
PHYSICS 201. THEORETICAL PHYSICS.	<i>Credit, 3.</i>
MATHEMATICS 175. ADVANCED ENGINEERING MATHEMATICS.	<i>Credit, 3.</i>
EE 300. RESEARCH (PROPOSAL).	<i>Credit, 0.</i>

Second Semester

EE 206. ELECTROMAGNETIC FIELD THEORY.	<i>Credit, 3.</i>
EE 300. RESEARCH.	<i>Credit, 6.</i>

Two courses each semester from one of the following three groups:

POWER SYSTEMS GROUP

First Semester

EE 177. PRINCIPLES OF SWITCHING CIRCUITS I.	<i>Credit, 4.</i>
EE 186. POWER SYSTEM NETWORKS.	<i>Credit, 4.</i>
EE 211. POWER TRANSMISSION AND RELAYING.	<i>Credit, 3.</i>
EE 213. LIGHTNING PROTECTION AND GROUNDING.	<i>Credit, 3.</i>
EE 200. SPECIAL PROBLEMS.	<i>Credit, 3.</i>

Second Semester

EE 178. PRINCIPLES OF SWITCHING CIRCUITS II.	<i>Credit, 4.</i>
EE 181. ADVANCED ELECTRICAL MACHINERY.	<i>Credit, 4.</i>
EE 190. FEEDBACK CONTROL SYSTEMS.	<i>Credit, 4.</i>
EE 212. SYMMETRICAL COMPONENTS AND SYSTEM STABILITY.	<i>Credit, 3.</i>
EE 200. SPECIAL PROBLEMS.	<i>Credit, 3.</i>

ELECTRICAL ENGINEERING

FEEDBACK CONTROL SYSTEM GROUP

First Semester

EE 231. LINEAR FEEDBACK SYSTEMS.	<i>Credit, 3.</i>
EE 245. RANDOM SIGNALS AND NOISE.	<i>Credit, 3.</i>
EE 247. TRANSISTOR CIRCUITS.	<i>Credit, 3.</i>
EE 200. SPECIAL PROBLEMS.	<i>Credit, 3.</i>

Second Semester

EE 181. ADVANCED ELECTROMECHANICAL ENERGY CONVERSION.	<i>Credit, 4.</i>
EE 188. PULSE CIRCUITS.	<i>Credit, 4.</i>
EE 232. NON-LINEAR FEEDBACK SYSTEMS.	<i>Credit, 3.</i>
EE 200. SPECIAL PROBLEMS.	<i>Credit, 3.</i>

INFORMATION PROCESSING GROUP

First Semester

EE 207. ADVANCED MICROWAVE ENGINEERING.	<i>Credit, 4.</i>
EE 245. RANDOM SIGNALS AND NOISE.	<i>Credit, 3.</i>
EE 247. TRANSISTOR CIRCUITS.	<i>Credit, 3.</i>
EE 200. SPECIAL PROBLEMS.	<i>Credit, 3.</i>

Second Semester

EE 190. FEEDBACK CONTROL SYSTEMS.	<i>Credit, 4.</i>
EE 194. MICROWAVE ENGINEERING.	<i>Credit, 4.</i>
EE 188. PULSE CIRCUITS.	<i>Credit, 4.</i>
EE 248. NETWORK ANALYSIS AND SYNTHESIS.	<i>Credit, 3.</i>
EE 200. SPECIAL PROBLEMS.	<i>Credit, 3.</i>

MINOR ELECTIVE GROUP

First Semester

MATHEMATICS 171. VECTOR ANALYSIS.	<i>Credit, 3.</i>
MATHEMATICS 181. COMPLEX ANALYSIS.	<i>Credit, 3.</i>
MATHEMATICS 183. NUMERICAL ANALYSIS.	<i>Credit, 3.</i>
MATHEMATICS 193. FOURIER SERIES AND ORTHOGONAL FUNCTIONS.	<i>Credit, 3.</i>
PHYSICS 167. STATISTICAL MECHANICS AND INFORMATION THEORY.	<i>Credit, 3.</i>
PHYSICS 211. ELEMENTS OF QUANTUM THEORY.	<i>Credit, 3.</i>

Second Semester

MATHEMATICS 176. ADVANCED ENGINEERING MATHEMATICS.	<i>Credit, 3.</i>
MATHEMATICS 194. THEORETICAL ADVANCED CALCULUS.	<i>Credit, 3.</i>
PHYSICS 188. SOLID STATE PHYSICS.	<i>Credit, 3.</i>

In exceptional cases, the above programs may be modified at the suggestion or with the approval of the major adviser. Additional courses in each of the three areas of interest may be offered upon sufficient demand.

ELECTRICAL ENGINEERING

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS.

A study of recent advances and current problems in a specialized field of electrical engineering. Limited to three credits for degree candidates.

Prerequisite, consent of instructor.

Credit, 3. The Staff.

205. ANALYSIS OF LINEAR SYSTEMS.

Transient behavior of recurrent and distributed electrical, mechanical, acoustical, and heat-flow systems. Modern principles and methods of analysis basic to system synthesis.

Prerequisite, Electrical Engineering 52 or equivalent.

Credit, 3. Mr. Fitzgerald and Mr. Roys.

206. ELECTROMAGNETIC FIELD THEORY.

Microscopic and macroscopic properties of magnetic and insulating materials; gyromagnetism and the permeability tensor; reflection and refraction; skin effect; antenna analysis; relativistic electrodynamics.

Prerequisite, Electrical Engineering 57 or equivalent.

Credit, 3. Mr. Mohn and Mr. Roys.

207. ADVANCED MICROWAVE ENGINEERING.

Analysis of waveguides, gyrators, antennas and other microwave circuit elements; electron ballistics; ionospheric reflection and refraction, and the permittivity tensor; microwave generators; masers and lasers.

Three class hours, one 3-hour laboratory period.

Prerequisites, Electrical Engineering 94 and 206 or equivalent.

Credit, 4. Mr. Mohn and Mr. Roys.

211. POWER TRANSMISSION AND RELAYING.

Electrical characteristics and equivalent circuits for transmission lines and cables. Protective relaying for transmission and distribution systems.

Prerequisite, Electrical Engineering 54 or equivalent.

Credit, 3. Mr. Longley and Mr. Edwards.

212. SYMMETRICAL COMPONENTS AND SYSTEM STABILITY.

The use of symmetrical components for the study of steady state and transient stability of transmission systems. Determination of stability by the step-by-step solution of the non-linear differential equations.

Prerequisite, Electrical Engineering 186 or equivalent.

Credit, 3. Mr. Edwards and Mr. Longley.

213. LIGHTNING PROTECTION AND GROUNDING.

Electrical characteristics of lightning discharges, switching surges, lightning arresters, and insulating materials, and traveling waves on transmission systems. Methods of grounding and protection for overhead lines, cables, substation equipment and generating stations.

Prerequisite, Electrical Engineering 54 or equivalent.

Credit, 3. Mr. Edwards and Mr. Longley.

231. LINEAR FEEDBACK SYSTEMS.

Analysis of linear feedback systems by Root-Locus, Nyquist and Nichols plots. Performance and stability of feedback systems in time and frequency domain by analytical and graphical methods.

Prerequisite, Electrical Engineering 190 or equivalent.

Credit, 3. Mr. Bett, Mr. Herchenreder and Mr. Scott.

ELECTRICAL ENGINEERING

232. NON-LINEAR FEEDBACK SYSTEMS.

Analysis and synthesis of non-linear systems and systems with small non-linearities by Z-plane transforms, first harmonic approximations, phase-plane and Tsypkia loci for on-off controllers.

Prerequisite, Electrical Engineering 231 or equivalent.

Credit, 3. Mr. Bett, Mr. Herchenreder and Mr. Scott.

245. RANDOM SIGNALS AND NOISE.

Fundamental concepts of discrete and continuous probability theory. Averages, sampling, correlation coefficients and functions. Description of randomly varying signals in terms of their statistical properties. Statistical analysis of linear systems. Optimum filter synthesis.

Prerequisite, Electrical Engineering 52 or equivalent.

Credit, 3. Mr. Herchenreder and Mr. Scott.

247. TRANSISTOR CIRCUITS.

Physical principles, characteristics, equivalent circuits and stability limitations. Performance criteria determined with respect to temperature, time, frequency, circuit configuration, signal amplitude and wave-form.

Prerequisite, Electrical Engineering 56 or equivalent.

Credit, 3. Mr. Langford and Mr. Mohn.

248. NETWORK ANALYSIS AND SYNTHESIS.

Modern circuit theory with emphasis on synthesis. Brune, Darlington and other realization techniques. The approximation problem in time and frequency domains.

Prerequisite, Electrical Engineering 205.

Credit, 3. Mr. Langford and Mr. Scott.

300 RESEARCH.

An individual theoretical and/or experimental investigation or a design problem terminating with an acceptable thesis. The research proposal is to be approved at least five months before graduation. The research credit may be spread over several semesters.

Credit, 6. Mr. Bett, Mr. Langford, Mr. Roys, Mr. Sheckels, Mr. Herchenreder, Mr. Mohn and Mr. Scott.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

177. PRINCIPLES OF SWITCHING CIRCUITS.

Logical design of switching circuits with emphasis on the scientific methods available; the analysis and synthesis of switching systems using electromagnetic, electronic and solid state devices.

Three class hours, one 3-hour laboratory period.

Prerequisite, Electrical Engineering 56.

Credit, 4. Mr. Edwards.

178. PRINCIPLES OF SWITCHING CIRCUITS II.

Multiterminal and iterative circuits; circuit reliability; switching codes; alternative methods of sequential circuit design with emphasis on synchronous pulse circuits; trends in switching.

Three class hours, one 3-hour laboratory period.

Prerequisite, EE 177.

Credit, 4. Mr. Edwards.

ELECTRICAL ENGINEERING

181. ADVANCED ELECTROMECHANICAL ENERGY CONVERSION.

Modern methods of analysis; Hamilton's Principle and Lagrange's Equations; matrices, dyadics and tensors; two reaction theory and symmetrical components; the generalized and special machines.

Three class hours, one 3-hour laboratory period.

Prerequisite, EE 54.

Credit, 4. Mr. Edwards and Mr. Roys.

186. POWER SYSTEM NETWORKS.

Power transfer diagrams, voltage studies, system stability criteria, short-circuit calculations and protective methods.

Three class hours, one 3-hour laboratory period.

Prerequisite, Electrical Engineering 52.

Credit, 4. Mr. Edwards and Mr. Sheckels.

188. PULSE CIRCUITS.

Generation, transmission and processing of information by means of pulses, with applications to computers, communication, radar and television.

Three class hours, one 3-hour laboratory period.

Prerequisite, Electrical Engineering 56.

Credit, 4. Mr. Langford.

190. FEEDBACK CONTROL SYSTEMS I.

Analysis and design of error-sensitive control systems. Analytical and graphical determination of steady state and transient performance; applications to electrical, mechanical, and hydraulic systems.

Three class hours, one 3-hour laboratory period.

Prerequisite, Electrical Engineering 52.

Credit, 4. Mr. Bett and Mr. Herchenreder.

194. MICROWAVE ENGINEERING.

The fundamental principles of communications and electromagnetism and their application to the special problems of the generation, transmission, propagation and reception of microwaves.

Three class hours, one 3-hour laboratory period.

Prerequisite, Electrical Engineering 57.

Credit, 4. Mr. Roys and Mr. Mohn.

COURSE FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Electrical Engineering)

179. COMMUNICATION CIRCUITS.

Theory of lumped circuits and lines including matrices, positive real functions, and synthesis methods of Foster and Cauer.

Prerequisite, EE 52.

Three class hours, one 3-hour laboratory period.

Credit, 4. Mr. Langford and Mr. Scott.

180. ELECTRONICS III.

Active circuits and communication theory covering tube and semiconductor circuitry with emphasis on aspects pertaining to information transmission.

Three class hours, one 3-hour laboratory period.

Prerequisite, Electrical Engineering 56.

Credit, 4. Mr. Langford and Mr. Mohn.

184. INDUSTRIAL ELECTRONICS AND CONTROL.

Industrial electronic devices and their characteristics; basic circuits and theory, application to commercial equipment.

Three class hours, one 3-hour laboratory period.

Prerequisite, Electrical Engineering 55 or 62.

Credit, 4. Mr. Roys.

ELECTRICAL ENGINEERING/ENGLISH

185. ELECTRICAL MEASUREMENTS.

Theory and practice of electric and magnetic measurements, accuracy, precision, maximum possible and probable errors, and limitations of measurements and devices.

Two class hours, one 3-hour laboratory period.

Prerequisite, Electrical Engineering 42.

Credit, 3. Mr. Laestadius.

ENGLISH

Graduate Faculty: H. O. Brogan, Head of Department, M. Campbell, J. Chametzky, D. R. Clark, T. W. Copeland, A. R. Duckert, M. Golden, R. Haven, V. P. Helming, S. Kaplan, G. S. Koehler, J. Langland, H. T. McCarthy, C. O. McDonald, W. G. O'Donnell, A. Page, L. Rabel, M. L. Ratner, S. Rudin, A. J. Silver, J. C. Weston, Jr.

All graduate students should secure from the Department of English detailed information on requirements for the degrees.

COURSES OPEN TO GRADUATE STUDENTS ONLY

200. SPECIAL PROBLEMS.

For students wishing to do special work not covered by courses listed in the curriculum. Permission must be secured from the head of the department and the instructor under whom the study will be done. The latter will supervise and evaluate the work.

Credit, 2-6. The Department.

201. OLD ENGLISH.

Introduction to Old English language and poetry, exclusive of Beowulf. (This, or 202, required of all candidates for the Master of Arts or Doctor of Philosophy degree.)

Credit, 3. Miss Duckert.

202. MIDDLE ENGLISH.

A study of the language and chief works in verse and prose, with emphasis on literary developments. (This, or 201, required of all candidates for the Master of Arts or Doctor of Philosophy degree.)

Credit, 3. Mr. Helming.

203. ELIZABETHAN AND JACOBAN DRAMA.

Representative plays by Shakespeare's contemporaries, 1580-1642; special emphasis on works by Marlowe, Jonson, Beaumont and Fletcher, and Ford.

Credit, 3. Mr. McDonald.

204. LITERATURE OF THE 17TH CENTURY.

Readings in 17th century prose from Hobbes to Bunyan, and in poetry from Donne to Milton; analysis of the more significant areas of thought and style.

Credit, 3. Mr. Koehler.

205. LITERATURE OF THE RESTORATION AND 18TH CENTURY.

Readings in English poetry and prose from Dryden to Burns, emphasizing the major writers and including representative plays.

Credit, 3. Mr. Weston.

206. LITERATURE OF THE ROMANTIC PERIOD.

Readings in the major poetry, representative essays, and selected critical writings, including Blake, Coleridge, Wordsworth, Keats, Shelley, Byron, and Hazlitt.

Credit, 3. Mr. Haven.

ENGLISH

207. LITERATURE OF THE VICTORIAN AGE.

Readings in the chief poets and prophets of the Victorian Age, with emphasis on Browning, Tennyson, Carlyle, Newman, Mill, Ruskin, Arnold, and Pater.

Credit, 3. Mr. Silver.

208. AMERICAN LITERATURE OF THE 19TH CENTURY.

Readings in the major writers from Freneau and Emerson to Poe and Melville.

Credit, 3. Mr. Kaplan.

209. THE DEVELOPMENT OF THE ENGLISH NOVEL.

Readings in the English novel to the late 19th century, from Richardson to Conrad, with special attention to some ten representative novels.

Credit, 3. Mr. Page.

210. CONTEMPORARY LITERATURE.

Readings in alternate years in drama, fiction, and poetry.

Credit, 3. Mr. Chametzky.

211. IMAGINATIVE WRITING.

Writers workshop, with emphasis on longer individual projects: a group of short stories, a novella, or a collection of poems.

Credit, 3. Mr. Langland.

(May be repeated for a total of 12 credits.)

212. GENERAL BIBLIOGRAPHY AND RESEARCH METHOD.

The resources of literary investigation, the history of scholarship and editing, the problems of establishing a text, and the scholarly conventions of documentation.

Credit, 1. The Staff.

213. SIXTEENTH CENTURY LITERATURE.

Credit, 3. The Staff.

230. SEMINAR IN COMPARATIVE LITERATURE.

Credit, 3. The Staff.

231. SEMINAR IN AMERICAN LITERATURE.

Credit, 3. The Staff.

232. SEMINAR IN ENGLISH LITERATURE.

Credit, 3. The Staff.

233. SEMINAR IN THE ENGLISH LANGUAGE.

Credit, 3. The Staff.

240. SEMINAR: CRITICISM.

Credit, 3. The Staff.

241. SEMINAR: EDITING.

Credit, 3. The Staff.

242. SEMINAR: WRITING.

Credit, 3. The Staff.

243. SEMINAR: LINGUISTICS.

Credit, 3. The Staff.

245. COMPARATIVE LITERATURE.

Credit, 3. The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 3.

(For the MFA degree this course may be repeated for a total of 12 credits.)

400. THESIS, DOCTORAL DEGREE.

Credit, 15-30.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in English)

157. MAJOR AMERICAN WRITERS.

Selected major American writers of the nineteenth and twentieth centuries, including Emerson, Hawthorne, Longfellow, Lowell, James, Adams, Fitzgerald, and Hemingway.

Three class hours. *Credit, 3.* Mr. O'Donnell, Mr. Kaplan, Mr. Williams, Mr. McCarthy, Mr. Chametzky, Mr. Rudin, and Mr. Gozzi.

ENGLISH/ENTOMOLOGY AND PATHOLOGY

167. SHAKESPEARE.

The dramatic art of Shakespeare as revealed in a study of approximately twenty plays.

Three class hours.

Credit, 3. Mr. O'Donnell, Mr. McDonald, Mr. Sweeney, and Mr. Wolf.

178. ENGLISH LITERATURE OF THE EIGHTEENTH CENTURY.

The literature of the later eighteenth century with special emphasis on the Johnson Circle.

Credit, 3. Mr. Copeland, Mr. Golden, and Mr. Weston.

189. MODERN POETRY.

An analysis of twentieth-century poetry developing from such authors as Hardy, Hopkins, Whitman, and Emily Dickinson to those of the present.

Three class hours.

Credit, 3. Mr. Koehler, Mr. Clark, Mr. Langland, Mr. Barron, Miss Horrigan, and Mr. Tucker.

ENTOMOLOGY AND PLANT PATHOLOGY

Graduate Faculty: J. H. Lilly, Head of Department, W. M. Banfield, W. B. Becker, C. J. Gilgut, J. F. Hanson, F. W. Holmes, R. E. Inman, J. J. McRitchie, R. A. Rohde, F. R. Shaw, M. E. Smith, H. L. Sweetman, W. E. Tomlinson, Jr., W. D. Tunis, H. E. Wave, E. H. Wheeler, W. D. Whitcomb, B. M. Zuckerman.

Entomology

Requirements for the M.S. degree in Entomology include completion of a thesis and demonstration of a reading knowledge of one foreign language. Also each candidate must take or have had Entomology 35, 155, 156 and 157, or their equivalents, plus a minimum of eleven additional graduate credits in Entomology, including the six credits in "200" courses that are required by the Graduate School.

Requirements for the Ph.D. degree include those established by the Graduate School, plus any additional ones specified by the student's Guidance Committee.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

(Most 200 series courses in the department are given on a rotating basis, subject to change on student demand.)

200. SPECIAL PROBLEMS.

Selected research problems in entomology.

Credit, 1-5. The Staff.

201. ADVANCED INSECT MORPHOLOGY AND PHYLOGENY.

Laboratory, lecture, and reading assignments in morphology and phylogeny of all orders of insects, living and fossil.

Prerequisites, Entomology 26, 155, 156, 157 or equivalent.

Credit, 3. Mr. Hanson.

203. INSECT EMBRYOLOGY.

The embryological development of a generalized type of insect, after which specific insects are considered. Lectures, assigned readings, laboratory work.

Prerequisite, Entomology 157.

Credit, 2. Mr. Shaw.

ENTOMOLOGY AND PATHOLOGY

205. PRINCIPLES OF PLANT PROTECTION.

Fundamentals of insecticidal action, natural factors governing insect abundance and activity, infection and disease development, chemical control, cultural practices, quarantine and eradication, host resistance and pathogen variability and weed control. Offered only at the Waltham Field Station.

Credit, 3. The Staff.

207. ADVANCED INSECT PHYSIOLOGY.

Discussion and laboratory work dealing with the functions of the organ systems of insects, with emphasis on methods of analysis and study of physiological processes in insects.

Prerequisite, Entomology 181 or equivalent.

Credit, 3. The Staff.

211. INSECT BEHAVIOR.

The honey bee as a type for the study of behavior; interpretations of the reasons for the actions of this insect. Other species may be included for completeness.

Prerequisites, Entomology 26 and 166 or equivalent.

Credit, 3. Mr. Shaw.

214. ADVANCED ANIMAL ECOLOGY.

Basic principles of terrestrial, limnological, and marine ecology, with special emphasis on the influence of causal factors, both physical and biotic, that regulate the activities of all organisms.

Prerequisite, Entomology 179 or equivalent.

Credit, 3. Mr. Sweetman.

221. INSECT TOXICOLOGY.

The chemistry of insecticides and their physiological effects on insects, man and other animals.

Prerequisite, permission of instructor.

Credit, 3. Mr. Wave.

223. ADVANCED BIOLOGICAL CONTROL.

The basic fundamental principles, as well as practical application of biological control of insects. A section is devoted to control of pest weeds with insects.

Prerequisite, Entomology 80 or equivalent.

Credit, 3. Mr. Sweetman.

242. ADVANCED ANTHROPOD TAXONOMY.

Classification of selected insects and insect allies, including latest methods in Taxonomy and principles of classification.

Credit, 1-9. The Staff.

A. Culicidae	MISS SMITH
B. Immature stages of insects	MISS SMITH
C. Ticks	MR. SHAW
D. Siphonaptera	MR. SHAW
E. Simuliidae	MR. SHAW
F. Tabanidae	MR. SHAW
G. Minor orders of insects	MR. HANSON
H. Anthropods other than insects	MR. HANSON
I. Other groups of insects	THE STAFF

245. HISTORICAL ENTOMOLOGY.

Lives and works of outstanding entomologists of the world; history of entomology.

Prerequisite, permission of instructor.

Credit, 2. Mr. Lilly.

ENTOMOLOGY AND PATHOLOGY

248. PRINCIPLES OF SYSTEMATIC ENTOMOLOGY.

The International Code of Zoological Nomenclature, and the Opinions thereon; type categories; the species concept.

Prerequisites, Entomology 26, 155, 156.

Credit, 3. Mr. Hanson.

250. ADVANCED MEDICAL ENTOMOLOGY.

Detailed studies of insects as parasites of man and animals. Biology, vector-relationship, taxonomy and control.

Prerequisite, Entomology 174 or equivalent.

Credit, 2-5. Mr. Shaw.

270. ADVANCED RESEARCH METHODS.

The principles, methods of analysis and presentation of results of research.

Prerequisite, Entomology 181 or equivalent.

Credit, 3. Mr. Sweetman.

280. SEMINAR.

Reports on the current literature of entomology; special reports by resident and visiting speakers.

One class hour.

(Maximum for M.S. Candidates, 2)

(Maximum for Ph.D. Candidates, 4)

Credit, 1 each semester. The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 10.

400. THESIS, PH.D. DEGREE.

Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

155, 156. CLASSIFICATION OF INSECTS.

The identification of insects, including immature stages. First semester: Orthoptera, Hemiptera, Coleoptera; second semester: other orders. Either semester may be elected independently.

Three 2-hour laboratory periods.

Prerequisite, Entomology 26; Entomology 57 recommended.

Credit, 3. Miss Smith.

157. INSECT MORPHOLOGY.

The external and internal anatomy of the major orders, with stress on phylogenetic relationships, as background for subsequent work in taxonomy and physiology of insects.

One class hour, three 2-hour laboratory periods.

Prerequisite, Entomology 26.

Credit, 4. Mr. Hanson.

160. STRUCTURAL PEST CONTROL.

Methods of combating insect and rodent pests, with emphasis on the control of those pests attacking buildings and other structures, foods, fabrics, and other stored products in homes or other establishments.

Two class hours, one 2-hour laboratory period.

Prerequisite, Zoology; Entomology 26 desirable.

Credit, 3. Mr. Sweetman.

172. FOREST AND SHADE TREE INSECTS.

The principles and methods of controlling insects which attack shade trees, forests and forest products. A study of the more important species, their identification, biology, and specific control measures.

Two class hours, two 2-hour laboratory periods.

Credit, 3. Mr. Hanson.

ENTOMOLOGY AND PLANT PATHOLOGY

174. MEDICAL AND VETERINARY ENTOMOLOGY.

Relationships of insects and their allies to the health of man and animals. The classification, biology and control of these pests.

One class hour, two 2-hour laboratory periods.

Prerequisite, Entomology 26.

Credit, 3. Mr. Shaw.

179. ANIMAL ECOLOGY.

The relation of animals to their environment, covering such physical factors as temperature, moisture, light, etc., and biotic factors as neighbors, competitors, predators, etc. Actual measurements of environmental factors and responses of animals in the field and laboratory.

Two class hours, one 2-hour laboratory period.

Prerequisite, Entomology 26 or Zoology 1.

Credit, 3. Mr. Sweetman.

180. INSECT CONTROL.

The scientific basis of insect control, considered from the chemical, biological, ecological, mechanical, and legislative approaches. Special emphasis on the composition, manufacture, preparation, and reaction of insecticides, and the use of resistant hosts, microorganisms and the larger parasites and predators.

One class hour, two 2-hour laboratory periods.

Prerequisites, Entomology 35, 155, and 157; 179 and 181 desirable.

Credit, 3. Mr. Sweetman.

181. INSECT PHYSIOLOGY.

Detailed consideration is given to the organ systems, showing the functions such as nutrition, respiration, and growth, and the relationship of physiology to behavior.

One class hour, two 2-hour laboratory periods.

Prerequisite, Entomology 26; 155, 156, and 157 desirable. *Credit, 3.* Mr. Wave.

190. EVOLUTION.

A course in orientation. Lectures consider evolution of both organic and inorganic matter with attention to the evolution of human behavior and to the effect of evolutionary concepts on human philosophy. Extra supplementary reading required of graduate students.

Credit, 3. Mr. Hanson.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Entomology)

166. INTRODUCTORY BEEKEEPING.

Credit, 3. Mr. Shaw.

Plant Pathology

Mr. Banfield and Mr. Rohde, major advisers.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS.

Selected research problems in plant pathology.

Credit, 1-5. The Staff.

204. FOREST PATHOLOGY.

The diseases of trees and the decay of forest products.

Prerequisites, Plant Pathology 151 and Botany 166.

Credit, 4. Mr. Banfield.

ENTOMOLOGY AND PLANT PATHOLOGY FOOD SCIENCE AND TECHNOLOGY

205, 206. ADVANCED PLANT PATHOLOGY.

The biological problems that underlie the diseased state in plants and the development of disastrous epiphytotic. *Credit, 2-4 each semester.* Mr. Banfield.

300. THESIS, MASTER'S DEGREE. *Credit, 10.*

400. THESIS, PH.D. DEGREE. *Credit, 30.*

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS (For either major or minor credit)

151. PLANT PATHOLOGY.

The nature, causes and control of plant diseases. *Credit, 3.* Mr. Agrios.

169. FOREST AND SHADE TREE PATHOLOGY.

The nature, cause and control of the principal types of disease in trees including decay of forest products, standing and structural timber.

Credit, 3. Mr. Banfield.

175. METHODS IN PLANT PATHOLOGY.

General techniques and specialized methods used in the investigation of plant diseases.

Prerequisite, one semester of Plant Pathology. *Credit, 3.* Mr. Banfield.

178. NEMATOLOGY.

Anatomy, morphology and classification of plant-parasitic and other soil-inhabiting nematodes. Parasitic relationships with plants and current control measures will be stressed.

Prerequisite, a year of biological science. *Credit, 3.* Mr. Rohde.

190. INSECT TRANSMISSION OF PLANT DISEASES.

Lectures on intricate interrelationships of insects, plants, and microorganisms, with particular emphasis on the basic role played by insects in inception, distribution and perpetuation of plant diseases.

Credit, 3. Mr. Banfield.

FOOD SCIENCE AND TECHNOLOGY

*Graduate Faculty: W. B. Esselen, Head of Department,
I. S. Fagerson, F. J. Francis, K. M. Hayes, H. O. Hultin,
A. S. Levine, W. W. Nawar, F. M. Sawyer, C. R. Stumbo.*

*Institute of Agricultural and Industrial Microbiology: W. Litsky, Director,
W. S. Mueller.*

Graduate students who wish to major in Food Science and Technology may not be admitted to candidacy for an advanced degree until such time as the undergraduate requirements in basic sciences and Food Technology have been met substantially.

Industrial Microbiology is offered as a major for the Ph.D. degree in the Department of Food Science and Technology in cooperation with the Institute of Agricultural and Industrial Microbiology.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. RESEARCH PROBLEM.

Mainly for candidates for the Master of Science degree who do not write a thesis. Original research expected. Two bound copies of a written report of the study are required by the department.

Credit, 3-6. The Staff.

FOOD SCIENCE AND TECHNOLOGY

203. RESEARCH PROJECT.

Research on problems not related to the thesis. For Ph.D. candidates only.

Credit, 1-4. The Staff.

209. SPOROLOGY AND THERMOPROCESSING I.

Biological Aspects. Fundamentals of thermal preservation of foods. Microbiological spoilage and intoxication with emphasis on sporogenous bacteria. Biology of bacterial endospores; their taxonomy, morphology, cytology, metabolism and germination. Thermobacteriology as applied in calculation and evaluation of sterilization processes.

Three class hours.

Prerequisites, Food processing, basic microbiology, biochemistry, calculus and consent of instructor.

Credit, 3. Mr. Stumbo.

210. SPOROLOGY AND THERMOPROCESSING II.

Physical Aspects. Heat transfer in thermally processed foods. Theoretical computation of the thermal process. Thermoprocessing and food quality. Alternative and complimentary means to thermoprocessing; ionizing radiation, chemical vapor-phase sterilization, etc.

One class hour, one 4-hour laboratory period.

Prerequisites, Food Science and Technology 209 and consent of instructor.

Credit, 3. Mr. Stumbo.

216. FOOD PACKAGING.

Characteristics of packaging materials and how they meet the package requirements of various food products. Methods of testing for structural quality and performance including moisture and gas transmission. Consideration of adhesives, lacquers and closures. Plant visits in non-scheduled hours.

One or more class hours, one 4-hour laboratory period.

Prerequisites, Food Science and Technology 162.

Credit, 3. Mr. Levine.

221. LIPID CHEMISTRY.

Composition and chemical properties of edible fats and oils. Physical characteristics—plasticity, polymorphism, melting, solidification. Technology of industrial fats—extraction, refining, hydrogenation, interesterification. Deteriorative reactions—oxidation, thermal degradation. Biological significance. New methods of analysis. Review of current literature.

Two class hours, one 2-hour laboratory period.

Prerequisite, consent of instructor.

Credit, 3. Mr. Nawar.

241. ADVANCED FOOD ANALYSIS.

Physical and chemical means of expressing quality of a product. Application of analytical instrumental methods including paper and gas chromatography, infrared spectrophotometry, radioactive tracer techniques, etc.

One class hour, one conference.

Prerequisites, Food Science and Technology 192 and 194.

Credit, 3. Mr. Fagerson.

250. FOOD COLORIMETRY.

Methods of expressing reflection and transmission colorimetry in terms of the Munsell, C.I.E., Adams, Hunter and other color solids. Interpretation of color changes in terms of the composition and properties of food pigments and colorants. The nature, cause and control of color changes in the handling, processing and storage of food products.

One class hour, one 4-hour laboratory period.

Prerequisites, Food Science and Technology 191 and 192.

Credit, 3. Mr. Francis.

FOOD SCIENCE AND TECHNOLOGY

271, 272. SEMINAR.

Review of current literature and research. Visiting lecturers.

One class hour. Maximum credit, 6.

Credit, 1. The Staff.

295. BIOLOGICAL AND TOXICOLOGICAL ASSAY OF FOODS.

Laboratory training in making biological assays of food constituents important in human and animal nutrition. Added chemicals in foods.

Prerequisites, Chemistry 194 and Food Science and Technology 192.

Credit, 2-5. Mr. Swayer.

300. THESIS, MASTER'S DEGREE.

Credit, 10.

400. THESIS, PH.D. DEGREE.

Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

161, 162. INDUSTRIAL TECHNOLOGY.

A survey of commercial principles in the manufacture and preservation of food products. Includes individual research projects.

One class hour, one 4-hour laboratory period.

Prerequisites, Food Science and Technology 151.

Credit, 3 each semester. Mr. Levine.

191, 192. ANALYSIS OF FOOD PRODUCTS.

Physical, chemical, microbiological and microscopical methods will be employed. Federal and State food regulations are considered.

Two class hours, one 4-hour laboratory period.

Prerequisites, Chemistry 30 and Food Science and Technology 151 or 175.

Credit, 3 each semester. Mr. Hunting.

194. SENSORY EVALUATION METHODS.

An introduction to sensory measurements in the evaluation and acceptance of foods. Panel tests and their statistical interpretation; taste, odor, color, and texture measurements.

One class hour, one 2-hour laboratory period.

Credit, 2. Mr. Sawyer.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Food Science and Technology)

151. INTRODUCTORY FOOD SCIENCE.

A basic course, primarily for department majors, covering food manufacture, processing, distribution and spoilage problems.

Two class hours, one 2-hour laboratory period.

Credit, 3. Mr. Esselen.

152. FOOD CHEMISTRY.

Composition of food products. Changes that occur in the chemistry of foods during storage and processing. Enzymes in the food industry.

Two class hours, one 4-hour laboratory period alternate weeks.

Prerequisites, Food Science and Technology 151.

Credit, 3. Mr. Hultin.

175. PRINCIPLES OF FOOD TECHNOLOGY.

Intended only for those who desire a survey of the field. Not open to Food Science and Technology majors.

Two class hours, one 2-hour laboratory period.

Credit, 3. Mr. Esselen.

FORESTRY

FORESTRY

Graduate Faculty: A. D. Rhodes, Head of Department, H. G. Abbott, E. Bennett, H. B. Gatslick, R. B. Hoadley, W. P. MacConnell, D. L. Mader.

Applicants for admission who plan to major in forestry customarily should have completed an undergraduate major in that field or in wood technology. An exception may be made in the case of individuals having a strong background in a related discipline or the basic sciences. Candidates for a Master's degree majoring in forestry ordinarily must complete a thesis; exceptions will be made in unusual circumstances. Emphasis may be in the area of forest soils, forest ecology, silviculture, resource management, forest economics, marketing, or wood technology.

Facilities for instruction and research include the newly constructed and well equipped Holdsworth Natural Resources Center, a sawmill, dry kiln, and several thousand acres of University-owned and other available forest land within ten miles of the campus.

Although the Department does not offer the Ph.D. degree, it is possible by cooperative arrangement with other departments such as Botany and Agronomy for the student to receive his doctorate in one of these departments based on a thesis project carried out in some phase of forestry.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS.

Selected research problems in forestry or wood technology not related to the candidate's thesis. *Credit, 2-4. The Staff.*

201. ADVANCED FOREST SOILS.

The relation of soils to tree growth and other environmental factors with particular emphasis on research methods, site evaluation, water relationships, and fertility; laboratory and field exercises.

Prerequisite, Forestry 154 or equivalent. *Credit, 3. Mr. Mader.*

202. AERIAL PHOTO-INTERPRETATION.

Advanced aerial photo-interpretation emphasizing the analysis of natural vegetation, especially forest vegetation; a wide selection of aerial photographs is available for interpretive study and cartography.

Prerequisite, Forestry 171 or equivalent. *Credit, 3. Mr. MacConnell.*

203. ADVANCED FOREST ECOLOGY.

Research methods and instrumentation in forest ecology; forest influences with special emphasis on the effect of micro-climate on site quality and the management of watersheds.

Prerequisite, Forestry 153 or equivalent. *Credit, 3. Mr. Mader.*

204. ADVANCED SILVICULTURE.

Growth and reproductive characteristics and requirements of trees and forest stands as they affect silvicultural management, particularly in relation to thinning and the establishment of forest regeneration.

Prerequisites, Forestry 153, 154, and 156 or equivalents. *Credit, 3. Mr. Rhodes.*

205. RESEARCH CONCEPTS IN FOREST BIOLOGY.

A study of the development of biological knowledge relating to forestry from both the historical and philosophical points of view with special emphasis on contributions of contemporaneous scientific research. Given in alternate years.

Credit, 3. Mr. Abbott.

206. ADVANCED FOREST MENSURATION.

Regression analysis applied to stand and tree volume determination, stand growth and yield, forest site evaluation, and related measurement problems. Computer techniques will be used to solve some of the computational problems. Prerequisites, Forestry 155 and 184 or equivalents.

Credit, 3. Mr. Mawson.

207. ADVANCED FOREST MANAGEMENT.

Economic evaluation of forest enterprises; appraisal of rates of return, damage, and stumpage values.

Prerequisite, Forestry 180 or equivalent.

Credit, 3. Mr. MacConnell.

208. MICRO-ECONOMICS OF FORESTRY I.

Principles of micro-economics as applied to forestry problems with special emphasis on marginal analysis in regard to land, labor, and capital.

Prerequisite, Forestry 157 or equivalent.

Credit, 3. Mr. Bond.

209. MICRO-ECONOMICS OF FORESTRY II.

A continuation of Forestry 208 with emphasis on supply and demand, marketing, taxation, and social problems in relation to the forest economy.

Credit, 3. Mr. Bond.

210. CHEMICAL MODIFICATION OF WOOD.

Basic concepts and techniques concerning the chemical modification of wood; the potential and limitations of physical and chemical treatments as they affect the dimensional stability and durability of wood.

Prerequisites, Organic Chemistry and Forestry 52.

Credit, 3. The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 6-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

152. PROPERTIES OF WOOD.

The physical and chemical characteristics of wood in relation to its use; the influence of growth upon wood properties; methods of testing.

Credit, 3. Mr. Hoadley.

153. SILVICS.

Forest ecology as a foundation for silviculture; environmental factors and their effect upon vegetation; development and classification of trees and forest communities; forest influences.

Credit, 3. Mr. Mader.

154. FOREST SOILS.

Effects of soil properties on tree growth; relationship of soils to silviculture, harvesting, watersheds, wildlife, and range management; forest soil description, classification and mapping.

Prerequisite, Agronomy 22.

Credit, 3. Mr. Mader.

FORESTRY

155. THE ELEMENTS OF FOREST MENSURATION.

The measurement of trees, stands, and forest products; field and office practice in timber estimating and log scaling; collection and compilation of forest inventory data. Given each summer, and in alternate years the first semester.

Credit, 3. Mr. Mawson and Mr. MacConnell.

156. THE PRINCIPLES OF SILVICULTURE.

Establishment and culture of forests for the production of wood crops; regeneration and intermediate cuttings, chemical silvicides, prescribed burning, site treatment, slash disposal.

Prerequisite, Forestry 53 recommended.

Credit, 3. Mr. Rhodes.

157. FOREST ECONOMICS AND POLICY.

Development of land use and legislation affecting forest policy in the U. S. Timber resources distribution, consumption and demand, taxation, credit, and social-economic factors.

Credit, 3. Mr. Bond.

159. FOREST PROTECTION.

Principles of protecting forests from fire, insects, diseases, domestic animals, wildlife, and atmospheric agencies with special emphasis on the prevention and control of forest fires.

Credit, 3. Mr. Abbott.

171. AERIAL PHOTOGRAMMETRY.

Principles of photogrammetry in forest management, wildlife biology, and other fields concerned with large land surfaces. Photographic interpretation and map making from aerial photographs.

Credit, 3. Mr. MacConnell.

174. LUMBER MANUFACTURE AND DISTRIBUTION.

The lumber industry; milling and processing, log and lumber grading, lumber storage and distribution.

Credit, 3. Mr. Hoadley.

175. FOREST PRODUCTS.

A survey of the principal forest products, their manufacture and distribution.

Credit, 3. Mr. Gatslick.

178. HARVESTING OF FOREST PRODUCTS.

Basic concepts of harvesting methods with emphasis on supervision. Field exercises in harvesting techniques followed by a week's trip visiting industrial forest operations.

Three 44-hour weeks in the summer.

Credit, 3. Mr. Bond and Mr. MacConnell.

180. PRINCIPLES OF FOREST MANAGEMENT.

Multiple-use management of forest land, organization of the forest for sustained-yield management. Preparation of a management plan for a 10,000-acre forest. Laboratory period optional for non-forestry majors.

Prerequisite for the laboratory, Forestry 55.

Credit, 3-5. Mr. MacConnell.

182. ARTIFICIAL PROPAGATION OF FORESTS, AND FOREST TREE IMPROVEMENT.

Reproductive characteristics of trees; artificial propagation of forest stands by direct seeding and planting; nursery management; and forest tree improvement through provenance tests, selection and hybridization.

Credit, 3. Mr. Abbott.

184. FOREST SURVEY AND SAMPLING DESIGN.

The theory and application of sampling techniques in forest survey and research problems including simple random, stratified, sub-sampling, representative, and probability sampling.

Credit, 3. Mr. Mawson.

185. WOOD SEASONING AND PRESERVATION.

Properties of wood in relation to drying and preservation; theory and practice of air seasoning, kiln drying, and preservative treatment.

Credit, 3. Mr. Gatslick.

195. SEMINAR.

Specialized study in a selected area of forestry or wood technology.

Credit, 1-3. The Staff.

**COURSES IN OTHER DEPARTMENTS FOR WHICH
MAJOR CREDIT WILL BE GIVEN**

When appropriate for the student's program of instruction and research, and with the consent of the student's advisor, major credit will be given for certain courses in the following subject-matter areas: Agricultural and Food Economics, Agronomy and Soil Science, Botany, Business Administration, Chemistry, Economics, Engineering, Entomology, Geology, Horticulture, Landscape Architecture, Mathematics, Physics, Plant Pathology, Recreation, Statistics, Wildlife and Fisheries Biology and Zoology.

GEOLOGY

Graduate Faculty: H. T. U. Smith, Head of Department, O. C. Farquhar, G. E. McGill, W. S. Motts, P. Robinson, G. W. Webb.

Requirements for the M.S. degree are as follows:

1. A minimum of 60 credits in geology, including both undergraduate and graduate work.
2. Courses in related sciences equivalent to those required for undergraduate majors: one year each of chemistry and physics, one semester of zoology, and mathematics through calculus.
3. Proficiency in technical writing.
4. At least six weeks of training in field geology.
5. Graduate credits in geology as required by the Graduate School.
6. A qualifying examination on knowledge of general geology, including field and laboratory techniques and sources of geologic information.
7. A thesis based at least in part on field study, and representing an original contribution to geologic knowledge.
8. A final examination, emphasizing defense of the thesis, together with a more advanced knowledge of the field or fields which represent background for the thesis.

At the beginning of the first semester in residence, new graduate students are given placement examinations covering fields of geology included in their undergraduate program. These examinations provide a partial basis for planning the student's course of study.

Requirements for the Ph.D. degree, in addition to general requirements of the Graduate School, are as follows:

1. Ordinarily the doctoral candidate is assumed to have received the Master's degree or equivalent training; however, selected students with outstanding records may be accepted provisionally with the Bachelor's degree only, and proceed more directly toward meeting doctoral requirements.

GEOLOGY

2. Basic training in physics, chemistry, mathematics, and biology, and additional work in at least one of these fields.
3. At least 6 months of approved field training and experience.
4. A broad knowledge of fundamental concepts, methods of investigation, and historical development of geologic science.
5. Mastery of an elected field or fields of specialization.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS.

Either or both of the following options may be selected:

- A. Independent study—guided reading and/or laboratory study in subjects or techniques not covered by other courses in the department.
- B. Research—original library, field, and/or laboratory investigation of a selected problem.

Prerequisites, 45 credits in geology and consent of department head and of instructor concerned. *Credit, 2-6.* The Staff.

202. ADVANCED MINERALOGY.

Physical and chemical characteristics of minerals and methods of laboratory investigation, including X-ray, differential thermal analysis, and microchemical techniques.

Prerequisites, Geology 201 and permission of instructors. *Credit, 3.* The Staff.

203. IGNEOUS PETROLOGY.

Description, classification, origin, and alteration of igneous rocks. Examination of rocks in hand specimen and in thin section under the microscope. 1963-64 and each alternate year.

Prerequisites, Geology 156 and 181. *Credit, 3.* Mr. Robinson.

205. SEDIMENTARY PETROLOGY.

Description, classification, and origin of sedimentary rocks; laboratory study of structure, texture, and composition using the microscope and other analytical techniques.

Prerequisites, Geology 181 and 174. *Credit, 2.* Mr. Hayes.

206. METAMORPHIC PETROLOGY.

Description, classification and origin of metamorphic rocks. Microscopic study of suites of thin sections.

1964-65 and each alternate year.

Prerequisites, Geology 156 and 181. *Credit, 3.* Mr. Robinson.

212. SEDIMENTATION.

A critical analysis of modes of origin of the several types of sedimentary rocks.

Prerequisites, Geology 174 and 178. *Credit, 3.* Mr. Hayes.

213. GEOPHYSICS.

The physics of the earth and the gravitational, magnetic, electrical, and seismic methods of geophysical exploration. Laboratory work consists of problems and computations.

Prerequisites, Geology 33 and 156; Math 4; Physics 25 and 26.

Credit, 3. Mr. Rice.

214. PETROLEUM GEOLOGY.

Geologic occurrence of oil and gas. Laboratory work consists of problems related to reservoir and trap conditions and to methods of subsurface study.

Prerequisites, Geology 33, 42 and 178; 234 desirable. *Credit, 3.* Mr. Webb.

216. METALLIFEROUS ECONOMIC GEOLOGY.

Nature, origin, and distribution of metalliferous ores. Criteria for recognition of ore deposits, changes in character of ore with depth, mineral associations, and types of wallrock alteration. Optical and microchemical properties of ore minerals and ore concentrates.

Given in alternate years.

Prerequisites, Geology 33, 42 and 156; 203 desirable.

Credit, 3. Mr. Farquhar.

217. NON-METALLIFEROUS ECONOMIC GEOLOGY.

Geology, distribution, and utilization of non-metallic mineral deposits, including coal and other solid hydrocarbons.

Given in alternate years.

Prerequisites, Geology 33, 42, 156, 178 and 181.

Credit, 3. Mr. Farquhar.

218. GROUND-WATER GEOLOGY.

Theoretical and practical ground-water geohydrology and its relation to geomorphology, glacial geology, sedimentology, and engineering geology.

Prerequisites, Chemistry 1 and 2, 15 hours of geology; 78 and 94 recommended.

Credit, 3. Mr. Motts.

220. STRATIGRAPHIC PALEONTOLOGY.

Application of selected fossils and faunal assemblages to stratigraphic correlation, and paleoecological and paleogeographic analysis, with reference to evolutionary trends.

Prerequisites, Geology 163 and 178.

Credit, 2. The Staff.

221. ANIMAL MICROPALAEONTOLOGY.

Principles of animal micropaleontology with emphasis on the use of animal microfossils in stratigraphic investigations.

Prerequisites, Geology 163 and 178.

Credit, 3. The Staff.

222. PLANT MICROPALAEONTOLOGY.

Principles of plant micropaleontology with emphasis on the use of plant microfossils in stratigraphic investigations.

Credit, 3. The Staff.

225. CENOZOIC STRATIGRAPHY.

Occurrence, correlation, and origin of marine and terrestrial Cenozoic deposits and their relation to paleogeographic and tectonic conditions, with particular reference to North America.

Prerequisites, Geology 178 and 189; 234 recommended.

Credit, 3. Mr. Webb.

227. MARINE GEOLOGY.

Physical characteristics and geological processes of the ocean basins and margins, and their bearing on interpretation of geologic history.

Prerequisites, Geology 178 and 194.

Credit, 3. Mr. Webb.

GEOLOGY

228. MAP INTERPRETATION.

A laboratory study of the various types of maps used by geologists, with special reference to the identification and interpretation of landforms and structures.
Prerequisites, Geology 33, 172 and 189. *Credit, 2.* Mr. Smith.

230. ADVANCED GEOMORPHOLOGY.

A critical study of selected topics and current problems in geomorphology.
Prerequisite, Geology 189. *Credit, 2.* Mr. Smith.

232. PHYSIOGRAPHY OF NORTH AMERICA.

A survey of the physiographic provinces of North America and their evolution, with emphasis on problems and methods of approach.
Prerequisite, Geology 189; 234 desirable. *Credit, 3.* Mr. Motts.

234. REGIONAL GEOLOGY OF NORTH AMERICA.

Tectonic concepts as exemplified by the stratigraphic and structural evolution of North America.
Prerequisites, Geology 2, 33 and 178. *Credit, 3.* Mr. McGill.

235. APPALACHIAN GEOLOGY.

Field and library study of regional tectonics and geologic history of New England and other Appalachian areas, with emphasis on controversial problems; several field trips, including one extended trip during spring vacation.
Prerequisite, permission of instructors. *Credit, 2.* Mr. McGill and Mr. Robinson.

236. ADVANCED STRUCTURAL GEOLOGY.

Dynamics and mechanics of rock deformation, including theoretical and experimental studies, with field applications.
Prerequisites, Geology 33, 172 and 178. *Credit, 3.*

238. ADVANCED PHOTOGEOLOGY.

A laboratory study of surface expression as a key to subsurface phenomena as illustrated by specific areas.
Prerequisites, Geology 189 and 191. *Credit, 2.* Mr. Smith.

241. SEMINAR.

Review of current literature or discussion of selected topics.
Credit, 1 each semester. Maximum credit, 2. The Staff.

245. EVOLUTION OF GEOLOGIC CONCEPTS.

Perspective on current geological thought in the light of its historical background; particular attention to controversial questions and to the rise and decline of ruling theories.
Prerequisite, one year of graduate study. *Credit, 2.* Mr. Motts.

250. GEOCHEMISTRY.

Principles of geochemistry and interpretation of geochemical data in relation to geological processes and to the origin and history of the earth.
Prerequisites, Geology 42, 156, one year of college chemistry and permission of instructor. *Credit, 2.* Mr. Nelson.

300. THESIS, MASTER'S DEGREE.

Credit, 10.

400. THESIS, PH.D. DEGREE.

Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

178. PRINCIPLES OF STRATIGRAPHY.

Principles of stratigraphic correlation as related to the major rock units of the United States and Europe.

Prerequisite, Geology 174.

Credit, 3. Mr. Webb.

181. OPTICAL MINERALOGY.

Principles of optics, optical properties of minerals and methods for their measurement, relationship between optical properties and crystallography, and mineral identification by the immersion method.

Prerequisites, Geology 42, Physics 3 and 4.

Credit, 3. Mr. Nelson.

182. PETROGRAPHY.

Identification of minerals in thin section, study of common igneous, sedimentary, and metamorphic rocks in thin section, routine petrographic calculations and measurements, and introduction to petrogenetic theory. Examination of selected igneous and metamorphic rocks in the field.

Prerequisites, Geology 56 and 181.

Credit, 3. Mr. Robinson.

189. GEOMORPHOLOGY.

Origin and development of landforms in relation to geological processes, climatic environment, and tectonic history. Application of geomorphic methods to interpretation of Cenozoic geologic history.

Two class hours, one 2-hour laboratory period.

Prerequisites, Geology 1, 2 and 33.

Credit, 3. Mr. Smith.

191. PHOTOGEOLOGY.

A laboratory study of the instruments and methods employed in making measurements and preparing base maps and geologic maps from vertical and oblique aerial photos.

Two 3-hour laboratory periods.

Prerequisites, Geology 33 and 172.

Credit, 3. Mr. Smith.

194. PLEISTOCENE GEOLOGY.

Geochronology of Pleistocene time as related to climatic changes and their influence on glaciology, erosional and depositional processes, landforms, sedimentary deposits, shifting sea level, and the paleontological record. Field trips by arrangement.

Two class hours, one 2-hour laboratory period.

Prerequisites, Geology 1 and 2.

Credit, 3. Mr. Motts.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Geology)

150. ENGINEERING GEOLOGY.

Materials and surface features of the earth and their relation to engineering problems; map reading as related to the phenomena of physical geology.

Two class hours, one 3-hour laboratory period.

Credit, 3. Mr. Farquhar.

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156. LITHOLOGY.

A descriptive study of the classes of rocks with reference to manner of origin, modes of occurrence, structural features and the chemical and petrographic distinction within each group.

One class hour, two 2-hour laboratory periods.

Prerequisites, Geology 1 and 42.

Credit, 3. Mr. Nelson.

163. INVERTEBRATE PALEONTOLOGY.

History, development and identification of invertebrate animal fossils. Field trips by arrangement.

Prerequisites, Geology 2 and Zoology 1.

Credit, 3. The Staff.

164. PLANT PALEONTOLOGY.

History, development and identification of plant fossils. Field trips by arrangement.

Credit, 3. The Staff.

172. GEOLOGIC FIELD MAPPING.

An introduction to the instruments and techniques used in field mapping, and their application to the geologic mapping of selected areas. Eight field hours, by arrangement.

Prerequisites, Geology 33 and 156 or permission of instructor.

Credit, 3. Mr. Robinson.

174. SEDIMENTOLOGY.

Composition, classification, and origin of sedimentary rocks, including discussion of source area, mode of transportation, deposition and diagenesis.

Prerequisites, Geology 1, 2 and 42.

Credit, 2. Mr. Motts.

GERMAN AND RUSSIAN

German

Graduate Faculty: F. C. Ellert, Head of Department, R. Hauser, P. Heller, E. Schiffer, H. J. Weigand.

MASTER OF ARTS

Prerequisites for admission: A B.A. degree with a major in German language and literature and indication of ability to do successful graduate work. Deficiencies in literary background and insufficient command of spoken or written German must be made up before the candidate can be admitted to certain courses required for the degree.

Language: For this degree the student must have, or must acquire, a reading knowledge of at least one major language, modern or ancient, other than German and English.

Program of study: A minimum of twenty-one credits in the major field. Twelve of these credits must be earned in "courses open to graduate students only" (200 series), unless a student chooses to offer a thesis in place of six of these credits. The "Proseminar" is required. One course must be of linguistic character; this will normally be the course in Middle High German.

COOPERATIVE PH.D. DEGREE IN GERMAN

In order to enroll for this program candidates must satisfy a Screening Committee as to their qualifications for advanced work in the field. Language

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requirements include a reading knowledge of French and of an additional language (other than German or English) pertinent to the candidate's field of specialization. Study programs for Ph.D. candidates, which must include 1) Old High German or Gothic and 2) Middle High German, will be determined by the Guidance Committees.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. PROBLEMS COURSE.

Directed study in some special area of literature or linguistics.

Credit, 3. Miss Schiffer.

201. MIDDLE HIGH GERMAN.

Readings in Middle High German Literature in the original with an introduction to the grammar.

Credit, 3. Mr. Schaefer.

202. GERMAN LITERATURE IN THE MIDDLE AGES.

A study of German literature from the earliest literary documents to the 15th century.

Credit, 3. Mr. Schaefer.

204. GERMANIC PHILOLOGY.

Gothic, Old High German.

Credit, 3. The Staff.

206. THE AGE OF HUMANISM AND THE REFORMATION.

German literature between 1400 and 1600; *Der Ackermann aus Böhmen*, Brant, Murner, Hutten, Luther, Hans Sachs.

Credit, 3. The Staff.

211. THE AGE OF ENLIGHTENMENT WITH SPECIAL REFERENCE TO LESSING.

Credit, 3. Mr. Heller.

213. YOUNG GOETHE.

A close survey of Goethe's work prior to the Weimar period.

Credit, 3. Mr. Heller.

214. THE CLASSICAL GOETHE.

Credit, 3. The Staff.

221. SCHILLER.

A study of his life and works.

Credit, 3. The Staff.

225. THE GERMAN BILDUNGSROMAN.

Goethe, Novalis, Keller, Stifter, Mann, Hesse.

Credit, 3. Mr. Weigand.

230. HEINE AND HIS AGE.

Credit, 3. Mr. Ellert.

235. THE DRAMA OF THE ROMANTIC PERIOD.

Comprehensive treatment of the works of Tieck, Kleist and Grillparzer.

Credit, 3. The Staff.

236. THE REALISTIC DRAMA.

Comprehensive treatment of the works of Hebbel, Büchner and Hauptmann.

Credit, 3. Mr. Hauser.

240. LYRICAL POETRY OF THE XXTH CENTURY.

Intensive study of the works of George, Hofmannsthal and Rilke.

Credit, 3. Mr. Weigand.

GERMAN AND RUSSIAN

245. NIHILISM AND AFFIRMATION IN CONTEMPORARY LITERATURE.

A study of drama, fiction and essays reflecting the crisis of the modern age, with special emphasis on the period of Expressionism. *Credit, 3.* Mr. Heller.

255. STYLISTICS.

An advanced course in German composition, audio-lingual proficiency, literary interpretation, and grammar. *Credit, 3.* The Staff.

270. PROSEMINAR.

Introduction to methods of literary interpretation, bibliography, research and criticism. Reports and papers on selected texts. Close discussion of secondary sources in the field of literary scholarship (e.g., W. Kayser's *Das sprachliche Kunstwerk*; E. Staiger's *Kunst der Interpretation*). Required of all majors. *Credit, 3.* Mr. Heller and Mr. Lea.

280. SEMINAR.

Close study of a single topic, author or work. One of the main purposes of the course is to suggest projects for independent research to advanced students. The subject matter will vary from year to year. Topic for 1963-64: Werfel. *Credit, 3.* Mr. Ellert.

300. THESIS, MASTER'S DEGREE.

Credit, 6-9.

400. THESIS, PH.D. DEGREE.

Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS (For either major or minor credit)

151. NINETEENTH CENTURY PROSE.

German prose from the death of Goethe to 1890 (early realism to naturalism) with emphasis on literary and social forces in the works of Stifter, Keller, Fontane, and others. *Credit, 3.* Mr. Weigand.

152. POETRY AND DRAMA OF THE NINETEENTH CENTURY.

The development of the drama and of lyric poetry from 1830 to 1890 with special emphasis on dramatic works of Grillparzer, Hebbel, and Büchner and the poetry of Mörike and C. F. Meyer. *Credit, 3.* Mr. Hauser.

153. TWENTIETH CENTURY PROSE.

Main literary currents in contemporary German prose from Nietzsche to Hesse with particular attention to the works of Thomas Mann, Kafka, and Werfel. *Credit, 3.* Mr. Lea.

154. POETRY AND DRAMA OF THE TWENTIETH CENTURY.

Reading and discussion of significant lyrical works of Hofmannsthal, George, and Rilke, and representative dramas by Hauptmann and Georg Kaiser. *Credit, 3.* Mr. Lea.

155. STORM AND STRESS.

Storm and stress in German literature centering in the young Goethe. *Credit, 3.* Mr. Ellert.

156. ROMANTICISM.

The poetry and prose writings of the romantic period from Novalis to Heine. *Credit, 3.* Miss Schiffer.

157. GOETHE'S FAUST.

Credit, 3. Mr. Ellert, Mr. Heller or Mr. Weigand.

159. THE GERMANIC LANGUAGES.

An introduction to General and Germanic philology for German and English majors; a survey of the relationship between German, English, and the other Indo-European tongues and of the historical development of German and English as the two major Germanic literary languages. *Credit, 3.* Mr. Schaefer.

160. THE CLASSICAL PERIOD.

Representative works by Lessing, Goethe, and Schiller.

Credit, 3. Miss Schiffer.

Comparative Literature

171. THE ENLIGHTENMENT.

Characteristic themes, ideas and attitudes in 18th Century European literature. The course will focus on major representatives of the Age of Reason such as Pope, Swift, and Johnson in England; Montesquieu, Voltaire, and Diderot in France; Wieland and Lessing in Germany.

Prerequisite, proficiency in French or German.

Credit, 3. Mr. Heller and Mr. Page.

191. ANGLO-GERMAN LITERARY RELATIONSHIPS.

Credit, 3. Mr. Page and Mr. Weigand.

Russian

153 (I). DOSTOEVSKY.

Credit, 3. The Staff.

154 (II). TOLSTOY.

Credit, 3. The Staff.

156 (II). RUSSIAN DRAMA.

Drama in the originals, from the beginnings to the establishment of a national theatre culminating in plays of Ostrovskij, Chekhov, Gorky.

Prerequisite, proficiency in Russian.

Credit, 3. The Staff.

157 (I). SOVIET LITERATURE.

A representative study of the beginnings and development of Soviet prose, drama and criticism from Gorky to Sholokhov and Pasternak.

Prerequisite, proficiency in Russian.

Credit, 3. The Staff.

158 (II). RUSSIAN POETRY.

Russian poetry in the originals, from the early days of the 19th century to the present, with an emphasis on the major poetic trends.

Prerequisite, proficiency in Russian.

Credit, 3. The Staff.

164 (II). THE HISTORY OF THE RUSSIAN LANGUAGE.

A description of the historical development of the Russian language (and its relation to other languages) from the earliest period to the present.

Prerequisite, Russian 62, Junior or Senior standing.

Credit, 3.

GOVERNMENT

GOVERNMENT

Graduate Faculty: L. P. Beth, Acting Head of Department, L. Allen, G. Braunthal, J. Fenton, J. S. Harris, F. Houn, G. Lewy, L. Mainzer, F. E. Oppenheim, A. Syed, G. Tinder, F. A. Vali.

In addition to the general requirements for the Master of Arts degree, candidates in Government must possess a reading knowledge of a foreign language approved by the department or an adequate knowledge of statistics where appropriate. An acceptable Master's thesis is also required.

Study programs for Ph.D. candidates will be determined by the Guidance Committees—the designation of fields in political science to be covered and the selection of courses in minor field (if any).

COURSES OPEN TO GRADUATE STUDENTS ONLY (For either major or minor credit)

200. SPECIAL PROBLEMS.

Credit, 1-6.

250. PUBLIC ADMINISTRATION: ORGANIZATION.

Behavior within governmental bureaucracy, in terms of the interaction between the individual and organization influences.

Prerequisite, Government 161 or 178. *Credit, 3.* Mr. Harris or Mr. Mainzer.

251. PUBLIC ADMINISTRATION: RESPONSIBILITY.

Problems of political responsibility of government bureaucracy within specific constitutional systems.

Prerequisite, Government 161 or 178. *Credit, 3.* Mr. Harris or Mr. Mainzer.

260. PROBLEMS OF INTERNATIONAL RELATIONS.

Analysis of major problems in international relations.

Prerequisite, Government 153. *Credit, 3.* Mr. Vali or Mr. Braunthal.

261. PROBLEMS OF INTERNATIONAL LAW AND ORGANIZATION.

Analysis of major problems in international organizations.

Prerequisite, Government 168 or 170. *Credit, 3.* Mr. Vali or Mr. Braunthal.

270. SEMINAR IN PUBLIC LAW.

A study of selected topics in public law.

Prerequisites, Government 164 and 165 or equivalent. *Credit, 3.* Mr. Beth.

271. LAW AND THE POLITICAL PROCESS.

The interrelationships between law and politics, and the necessity for law in organized societies.

Prerequisites, Government 164 and 165 or equivalent. *Credit, 3.* Mr. Beth.

275. POLITICS AND THE LEGISLATIVE PROCESS.

Selected topics relating to American politics, political parties, elections and the legislative process.

Prerequisite, Government 163. *Credit, 3.* Mr. Fenton.

276. RESEARCH IN POLITICAL BEHAVIOR.

Introduction to research techniques as applied to special problems in the field of political behavior. Emphasis upon various approaches to the study of the individual voter, the American politician, interest groups and legislatures.

Credit, 3. Mr. Fenton.

277. DIRECTED STUDIES IN POLITICS.

The study in depth of a particular aspect of political behavior. The content of this course will vary with the particular research interests of the instructor and the students. *Credit, 3.* Mr. Fenton.

280. RECENT POLITICAL THEORY.

The major trends of twentieth-century political theory will be surveyed; in addition, intensive analysis of selected thinkers of this period will be carried out. *Credit, 3.* Mr. Oppenheim or Mr. Lewy.

281. SELECTED PROBLEMS IN POLITICAL THEORY.

An examination of significant problems within the field of political theory. Students will be asked to study traditional solutions and to devise original solutions. *Credit, 3.* Mr. Oppenheim or Mr. Lewy.

290. COMPARATIVE GOVERNMENT.

An historical and functional analysis of the institutions of government in modern democracies and dictatorships. Prerequisite, Government 26. *Credit, 3.* Mr. Allen, Mr. Braunthal or Mr. Harris.

291. COMPARATIVE POLITICAL PARTIES AND POLITICS.

The ideology, structure and dynamics of diverse types of political parties, party systems and electoral systems, in an effort to suggest interrelationships. *Credit, 3.* Mr. Allen, Mr. Braunthal or Mr. Harris.

292. SEMINAR IN COMPARATIVE GOVERNMENT.

Intensive study of selected political systems and of particular governmental institutions and processes. *Credit, 3.* Mr. Allen, Mr. Braunthal or Mr. Harris.

293. SEMINAR OF THE GOVERNMENT AND POLITICS OF SOUTH ASIA.

Intensive study of selected problems relating to the government and politics of India, Pakistan, and Ceylon. *Credit, 3.* Mr. Syed.

295. EAST ASIAN FOREIGN POLICIES.

Study of the foreign policies of China, Japan and other East Asian countries in modern times and of Western diplomacy in the area. *Credit, 3.* Mr. Houn.

296. SEMINAR ON EAST ASIAN POLITICS.

Intensive study of selected problems relating to the politics of China, Japan and other Asian countries. *Credit, 3.* Mr. Houn.

300. THESIS, MASTER'S DEGREE.

Credit, 6.

400. THESIS, PH.D. DEGREE.

Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

151. MUNICIPAL GOVERNMENT.

A survey of the governmental structure and function of American municipalities. *Credit, 3.* Mr. Grady.

152. AMERICAN FOREIGN POLICY.

Constitutional, political and administrative considerations which influence the formulation and execution of American foreign policy. Special emphasis on current issues. *Credit, 3.* Mr. Braunthal and Mr. Allen.

GOVERNMENT

153. INTERNATIONAL RELATIONS.

The nation-state system and conceptions of national interest in modern world politics. The forms and distribution of power by which states seek to implement national interests. The making of foreign policy and methods of adjusting international conflict. Current international problems.

Credit, 3. Mr. Braunthal, Mr. Vali and Mr. Allen.

154. STATE GOVERNMENT.

State politics, organization and functions with emphasis on the role of the state in our federal system.

Credit, 3. Mr. Mayhew.

155. THE PRESIDENCY IN AMERICAN GOVERNMENT.

The growth of the executive in United States Government. Varying conceptions of the presidential office. Constitutional and political aspects of the office in legislation, administration and conduct of foreign and military affairs. The president as party leader.

Summer School only.

Credit, 3. Mr. Goodwin.

156. THE LEGISLATIVE PROCESS.

The role of the legislature in national and state government. The functions of legislatures; legislative procedures; the role played by political parties and pressure groups in the legislative process.

Emphasis on research.

Credit, 3. Mr. Mayhew or Mr. Fenton.

157. THE GOVERNMENT AND POLITICS OF RUSSIA.

The development, organization and functioning of the Communist party; governmental organization and the administrative process; terror as a system of power; organization for governmental control in industry and agriculture; Soviet foreign policy; its formation and execution.

Prerequisite, Government 25.

Credit, 3. Mr. Vali.

161. PUBLIC ADMINISTRATION.

Organization and management in modern government, with emphasis on the bureaucracy's role in public formation.

Credit, 3. Mr. Mainzer.

162. ADMINISTRATIVE LAW.

Governmental activities in the regulation of industry, agriculture, and labor, with emphasis on the legal framework within which these activities operate.

Credit, 3. Mr. Mainzer.

163. POLITICAL PARTIES AND ELECTIONS.

The American political process, with emphasis on parties, pressure groups, and public opinion.

Credit, 3. Mr. Fenton or Mr. Mayhew.

164. CIVIL LIBERTIES.

A study of the development in American Constitutional Law of the concept of civil liberty, including the following fields: free speech and religion, fair trial, and race discrimination. The function of courts in the safeguarding of these liberties.

Prerequisite, Government 25.

Credit, 3. Mr. Beth.

165. CONSTITUTIONAL LAW.

A study of the United States Constitution as interpreted by decisions of the Supreme Court.

Credit, 3. Mr. Beth.

GOVERNMENT

166. AMERICAN POLITICAL THOUGHT.

The development of American political thought from Colonial times to the present.
Credit, 3. Mr. Oppenheim or Mr. Syed.

168. INTERNATIONAL LAW.

The origin, character, and function of international law.
Three class hours. *Credit, 3.* Mr. Braunthal or Mr. Vali.

170. INTERNATIONAL ORGANIZATION.

International organization in the twentieth century, with emphasis upon the United Nations and regional organizations.
Credit, 3. Mr. Braunthal or Mr. Vali.

171. ANCIENT AND MEDIEVAL POLITICAL THOUGHT.

The development of political thought and its relation to cultural and institutional growth from the time of the Greeks to the end of the Middle Ages.
Credit, 3. Mr. Lewy.

172. MODERN POLITICAL THOUGHT.

The development of political thought and its relation to cultural and institutional growth from the rise of the modern state to the present.
Credit, 3. Mr. Lewy and Mr. Oppenheim.

176. PUBLIC OPINION IN POLITICS.

Opinion and communication as aspects of the political process with emphasis upon communication through mass media. The relations between mass attitudes and communication and political institutions and the formation of public policy.
Credit, 3. Mr. Fenton.

178. MUNICIPAL ADMINISTRATION.

Administrative management in American municipalities based on descriptive literature, case materials and personal observation, with particular attention to Massachusetts cities and towns.
Credit, 3. Mr. O'Hare.

183. PUBLIC PERSONNEL ADMINISTRATION.

Theory, practice, and organization of the personnel functions in governmental administration, including recruitment, testing, classification, compensation, promotions, training, and employee relations.
Credit, 3. Mr. Mainzer.

184. GOVERNMENTAL FINANCIAL ADMINISTRATION.

Theory, practice and organization, including budgeting, revenues, debt operations, records, administration, purchasing, audits, and financial reporting.
Credit, 3. Mr. O'Hare.

185. MAJOR GOVERNMENTS IN ASIA.

A comparative analysis of the government and politics of selected democratic and non-democratic countries in Asia—Japan, India, Pakistan, Indonesia, and Communist China.
Credit, 3. Mr. Houn and Mr. Syed.

191. SCOPE AND METHODS OF POLITICAL SCIENCE.

Critical examination of the scope and unity of political science and the significant methodological positions and research techniques.
Credit, 3. Mr. Mainzer.

193. THE PRACTICE OF AMERICAN POLITICS.

A course in practical American politics, given by a prominent political leader under the University Distinguished Professorship in Public Affairs.
Prerequisite, Government 25. *Credit, 3.*

GOVERNMENT/HISTORY

195, 196. SEMINAR.

Special problems in the field of government.

Prerequisite, permission of the department.

Credit, 3. The Staff.

Interdepartmental Courses

SOCIAL SCIENCE 160. AFRICA, SOUTH OF THE SAHARA.

Recent political, economic, and social developments in the principal countries in Africa south of the Sahara.

Prerequisites, at least two courses in one or more of the following fields: Government, Economics, Sociology.

Credit, 3. The Staff.

SOCIAL SCIENCE 169. INDIA AND SOUTHEAST ASIA.

Recent political, economic, and social developments in India and the countries of South and Southeast Asia.

Prerequisites, at least two semester courses in one or more of the following fields: Government, Economics, and Sociology.

Credit, 3. Mr. Driver.

HISTORY

Graduate Faculty: H. H. Quint, Head of Department, T. C. Caldwell, M. Cantor, H. W. Cary, C. E. Cody, M. S. De Pillis, P. A. Gagnon, H. J. Gordon, Jr., L. S. Greenbaum, V. Ilardi, R. A. Potash, R. H. Powers, F. B. Wickwire, S. Williams.

THE PH.D. PROGRAM

The Department of History offers doctoral work in seven major fields: (1) Medieval; (2) Early Modern Europe; (3) Modern Europe; (4) Great Britain; (5) Latin America; (6) the United States to 1860; and (7) the United States since 1860. The doctoral candidate will concentrate his course of study in four of them and his program will be determined by his guidance committee. He must take a minimum of four graduate seminars in at least three of his chosen fields. Such seminars will concentrate on research training and the techniques of historical writing.

At the conclusion of the candidate's first two semesters of graduate work at the University he will be required to take a preliminary "screening" examination; failure to pass it will automatically bar him from further study for the Ph.D. degree, but not from acquiring the M.A. degree. The General Examination will be taken no later than the end of the student's fifth semester of full-time work or its equivalent. Not until he has passed the General Examination will he be admitted to formal candidacy for the doctoral degree.

A student entering the University of Massachusetts with previous graduate training at other institutions may be admitted to the graduate program with advanced standing at the discretion of the Department. The Department's Graduate Committee will evaluate his previous graduate training and he will be informed of his exact status upon notification of admission to the Department's graduate program.

THE M.A. PROGRAM

In addition to the general requirements for the Master of Arts degree, candidates in History must fulfill the following departmental requirements:

A reading knowledge of one foreign language.

The requirement concerning a thesis may be fulfilled by one of the following options: (a) completion of a thesis, for ten credits, (b) completion of two seminar courses, with grades of at least B, (c) completion of a five credit thesis and one seminar.

A comprehensive written examination, in fields specified by the Department, is required of all candidates.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. SPECIAL PROBLEMS IN HISTORY.

Directed research and writing for qualified students.

Prerequisite, permission of instructor.

Credit, 1-6. The Staff.

201, 202. LITERATURE OF AMERICAN HISTORY.

Interpretations of major themes as developed in the works of leading historians.

The first course will treat the period through the Civil War; the second, 1865 to the present.

Credit, 3 each semester. The Staff.

205. ERA OF THE CONFEDERATION AND THE CONSTITUTION.

The formative years of the American Nation; the evolution of federal and state constitutions; basic political issues and conflicts; the pattern of economic and social development; and the origins of American foreign policy.

Credit, 3. Mr. Davis.

207. BRITAIN IN THE NINETEENTH CENTURY.

Central themes and topics. Emphasis on the history of thought in its relation to political, economic and social developments.

Credit, 3. Mr. Caldwell.

208. RECENT EUROPEAN HISTORY.

Basic developments in diplomatic, political, social and economic history since 1890 with particular emphasis upon organic growth and change.

Credit, 3. Mr. Gordon.

209. TOPICS IN CONTEMPORARY LATIN AMERICAN HISTORY.

A study of major movements since about 1930 with attention directed to the political, economic, social, and ideological forces contributing to change. Reading knowledge of Spanish or Portuguese is desirable but not required.

Credit, 3. Mr. Potash.

210. TOPICS IN EARLY MEDIEVAL HISTORY.

Continuity between ancient and medieval civilization.

Prerequisites, working knowledge of Latin and one modern language (German, French, Italian) or by special permission of instructor.

Credit, 3. Mr. Williams.

211. TOPICS IN THE AGE OF THE RENAISSANCE AND REFORMATION.

A study of European culture between 1400 and 1600. A reading knowledge of a modern European language is generally required.

Credit, 3. Mr. Ilardi.

212. TOPICS IN THE AGE OF THE ENLIGHTENMENT.

The movement of ideas in Atlantic Civilization during the 18th Century. Study of the mind and writings of representative European and American thinkers with emphasis upon politics, religion, science, literature and the arts.

Credit, 3. Mr. Greenbaum.

HISTORY

213. TOPICS IN UNITED STATES INTELLECTUAL HISTORY.

Specific aspects of such general topics as the American adaptation of the European heritage, the growth of the concept of Americanism, the emergence of patrician leadership, the achievement of realistic democracy, the triumph of nationalism, the assertion of individualism in a corporate society, and the scientific-humanistic culture conflict.

Credit, 3. Mr. Quint.

214. TOPICS IN MASSACHUSETTS HISTORY.

The development of the Commonwealth and its relationship to regional and national institutions and thought from early colonial times to the present. The course, utilizing abundant primary and secondary source materials, provides a foundation for the pursuit of further research.

Credit, 3. Mr. Cary.

215. PHILOSOPHY OF HISTORY.

A consideration of the "philosophy of history" both as epistemology and as a method of explanation, and a comparison of the aims of history and the sciences. The course involves an analysis of the nature of history: the difference between truth and fact, the possibility of objectivity, and the theory of historical explanation. Major historians in the field are read, from Thucydides and Augustine to Croce and Toynbee.

Credit, 3. Mr. Powers.

216. PROBLEMS IN BRITISH IMPERIAL HISTORY SINCE 1783.

Aspects of such general topics as the problems of imperial government after the American Revolution, the Durham Report and the growth of the dominions, the difficulties and effect of implantation of British institutions in Asia and Africa, the lessening of British control and the Statute of Westminster, and the political and economic importance of the Commonwealth in world affairs.

Credit, 3. Mr. Wickwire.

217. PROBLEMS IN RUSSIAN HISTORY.

Russia in the 19th and 20th centuries with particular emphasis on Russian and Soviet historiography. The student has the opportunity of doing intensive reading and presenting careful analyses of selected topics.

Credit, 3. Mr. Dilkes.

218. TOPICS IN THE RECENT SOCIAL HISTORY OF EUROPE.

The social changes resulting from the industrialization of Europe since 1815 and their relationship to economic and political developments. The student is introduced to the methods and materials needed for effective work in recent social history. He is guided through a series of short problems illustrating proper utilization of the sources.

Credit, 3. Mr. Gordon.

219. TOPICS IN MODERN SPANISH HISTORY.

Spanish history from the end of the reign of Philip II to the end of the Spanish Civil War. The course deals with such selected topics as: the problem of 17th century "decadence"; Spain and the Enlightenment; Spanish reaction to the French Revolution; Spanish Liberalism and the Carlist Wars; the First Republic, the Catalan Question and cantonalism; the rise of radical parties, Socialist and Anarchist, under the Old Regime; and the Second Republic and the Spanish Civil War.

Credit, 3. Mr. Leonard.

220. TOPICS IN NINETEENTH CENTURY INTELLECTUAL HISTORY.

Selected major currents in European thought since the French Revolution, their origins, development and influence. Reading knowledge of French or German is desirable.

Credit, 3. Mr. Powers.

221. TOPICS IN TUDOR AND STUART ENGLAND.

Selected aspects of the Tudor age; the interplay of social, economic, intellectual and political factors involved in the Stuart Revolution. Constitutional development receives major emphasis. *Credit, 3.* Mr. Caldwell.

222. WORLD WAR II AND AFTERMATH.

A study of pre-nuclear total war in its military development and its political, economic and social ramifications in modern Western society, followed by a study of the postwar settlements and their effects. *Credit, 3.* Mr. Gagnon.

223. AMERICAN HISTORIOGRAPHY.

The history of the writing of American history from earliest times to the present. The course places important works in their historical context—Puritanism, Enlightenment, Revolutionary nationalism, sectionalism, the rise of industrialism, imperialism, and the like. Also treated are the works themselves—their form, representative nature, scholarly value, and method.

Credit, 3. Mr. DePillis.

224. EUROPEAN HISTORIOGRAPHY.

A study of the most influential European historians and schools of historical interpretation since the Greeks, as well as the relation of historiography to the intellectual and political history of Europe.

Credit, 3. Mr. Powers.

251. SEMINAR IN AMERICAN DIPLOMATIC HISTORY.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Cary.

252. UNITED STATES IN THE COLONIAL PERIOD.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Bernhard.

253. SEMINAR IN THE AGE OF JACKSONIAN DEMOCRACY.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Cantor.

254. CIVIL WAR AND RECONSTRUCTION.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Thompson.

256. SEMINAR IN THE WESTWARD MOVEMENT OF THE UNITED STATES.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. DePillis and Mr. Davis.

258. THE PROGRESSIVE ERA IN THE UNITED STATES.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Quint.

259. EUROPEAN DIPLOMACY BETWEEN THE WARS.

Training in historical research and an introduction into the relationships among European nations in a critical period.

Prerequisite, permission of instructor.

Credit, 3. Mr. Gordon.

260. MODERN ENGLISH HISTORY.

Research on selected topics, 1890-1940.

Prerequisite, permission of instructor.

Credit, 3. Mr. Caldwell.

HISTORY

261. THE UNITED STATES BETWEEN THE WORLD WARS.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Quint.

262. ARGENTINE HISTORY.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Potash.

263. MEXICAN HISTORY.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Potash.

264. MEDIEVAL HISTORY.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Williams.

265. RENAISSANCE AND REFORMATION.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Ilardi.

266. THE ENLIGHTENMENT.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Greenbaum.

267. EIGHTEENTH CENTURY BRITAIN.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Wickwire.

268. MODERN GERMANY.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Gordon.

269. MODERN FRANCE.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Gagnon.

270. RUSSIAN HISTORY.

Training in historical research.

Prerequisite, permission of instructor.

Credit, 3. Mr. Dilkes.

300. THESIS, MASTER'S DEGREE.

Credit, 5-10.

400. THESIS, PH.D. DEGREE.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

151. THE ANCIENT WORLD TO ALEXANDER THE GREAT.

From the neolithic background of civilization to the dissolution of Alexander's Empire.

Credit, 3. Mr. Williams.

152. THE ANCIENT WORLD: THE HELLENISTIC PERIOD TO CONSTANTINE.
From the development of Hellenistic civilization to the stagnation of Graeco-Roman culture. *Credit, 3.* Mr. Williams.

153, 154. HISTORY OF FAR EASTERN CIVILIZATION.
The first semester will stress traditional and modern China, the second, Japan and Korea. Either semester may be elected independently. *Credit, 3.* Mr. Cody.

155, 156. A HISTORY OF RUSSIA.
A survey of the political, economic, social and intellectual development of Russia. The first semester will treat the Tsarist era, the second, the origins of Russian Marxism and the Soviet period. Either semester may be elected independently. *Credit, 3.* Mr. Dilkes.

157. COLONIAL LATIN AMERICA.
A study of Spanish and Portuguese expansion into the New World, the Indian cultures, the development of political, social, and economic institutions, and the growth of the independence movement to 1810. *Credit, 3.* Mr. Potash.

158. ARGENTINA AND BRAZIL SINCE INDEPENDENCE.
The emergence of the major South American states. Particular attention will be paid to the themes of political organization and economic change; and in the contemporary period to the growth of nationalism, and mass-based political movements. *Credit, 3.* Mr. Potash.

159. THE HISTORY OF MEXICO.
A study of Mexico from the end of the eighteenth century to the present. Emphasis will be given to political economic, and social developments. *Credit, 3.* Mr. Potash.

160. SOCIAL HISTORY OF THE UNITED STATES.
The evolving status of individuals and groups and problems of migration, livelihood, urbanization, and social conflict. *Credit, 3.* Mr. DePillis.

161. EARLY MIDDLE AGES (300-1100).
Spread of Christianity; pagan and early Christian culture; Germanic kingship; the Carolingian world; early feudalism; monasticism and ecclesiastical centralization. *Credit, 3.* Mr. Williams.

162. THE LATER MIDDLE AGES (1100-1350).
Revival of towns and commerce; the growth and development of the feudal monarchies and ecclesiastical authority; rise of secularism. *Credit, 3.* Mr. Williams.

163, 164. HISTORY OF AMERICAN THOUGHT AND CULTURE.
The basic strands of American thought and their reflection in American culture. First semester deals with the period before 1865. Either semester may be elected independently. *Credit, 3.* Mr. Quint.

165. TUDOR-STUART ENGLAND, 1485-1688.
Selected aspects of the constitutional, social, intellectual, and imperial history of England in this period. *Credit, 3.* Mr. Caldwell.

HISTORY

166. THE HISTORY OF MODERN GERMANY.

The evolution and development of Germany since the accession of Frederick the Great with emphasis upon diplomatic, political, military and social-economic trends and problems. *Credit, 3.* Mr. Gordon.

167. UNITED STATES CONSTITUTIONAL HISTORY TO THE CIVIL WAR.

Origins and development of American constitutionalism from the 17th century to the outbreak of sectional armed conflict. *Credit, 3.* Mr. Cantor.

168. UNITED STATES CONSTITUTIONAL HISTORY FROM THE CIVIL WAR TO THE PRESENT.

Evolution of constitutional power in modern America.

Credit, 3. Mr. Cantor.

169. EUROPE, 1870-1918.

Internal developments of the principal countries; a detailed study of conditions and diplomacy which led to the World War; and military and diplomatic history of the war years. *Credit, 3.* Mr. Van Steenberg.

170. EUROPE SINCE 1918.

Major developments in the internal and international affairs of the European states since World War I.

Credit, 3. Mr. Caldwell.

171. THE SOUTH IN AMERICAN HISTORY.

From early settlement to contemporary regional problems.

Credit, 3. Mr. Thompson.

172. HISTORY OF AMERICAN WESTWARD EXPANSION, 1763-1893.

Advance of settlement from the Appalachians to the Pacific and the influence of the frontier upon social, economic, and political conditions.

Credit, 3. Mr. DePillis and Mr. Davis.

173, 174. THE AGE OF THE RENAISSANCE AND REFORMATION, 1300-1600.

A study of the changes in European thought and institutions during the development of Humanism and the Protestant and Catholic Reformations. Either semester may be elected independently.

Credit, 3. Mr. Ilardi.

175. EUROPE IN THE ENLIGHTENMENT, 1685-1789.

Civilization of Western Europe in the eighteenth century, its social milieu, intellectual setting, institutional forces, religious tendencies, aesthetic contributions, and the growth of revolutionary spirit. *Credit, 3.* Mr. Greenbaum.

176. HISTORY OF EUROPE, 1815-1870.

Major developments in the internal and international affairs of the European states from the Congress of Vienna to the Franco-Prussian War.

Credit, 3. Mr. Gagnon.

177. MODERN BRITAIN.

A study of selected topics on the political, social, and intellectual development of Britain in the nineteenth and twentieth centuries. *Credit, 3.* Mr. Caldwell.

178. FRANCE SINCE 1789.

A study of selected, formative political crises from 1789 to the present, and their settings in the economic, social, and intellectual life of modern France.

Credit, 3. Mr. Gagnon.

179. NEW ENGLAND TO 1860.

A study of the colonial and early national periods, with emphasis upon the political, social and economic aspects of life in this region.

Credit, 3. Mr. Cary and Mr. Bernhard.

181, 182. DIPLOMATIC HISTORY OF THE UNITED STATES.

The development of American foreign relations, 1776 to the present. Either semester may be elected independently.

Credit, 3. Mr. Cary.

183. THE PROGRESSIVE AGE (1900-1920).

A study of the political response to the changing economic and social conditions in American life.

Credit, 3. Mr. Quint.

184. CONSERVATISM AND REFORM (1920-1945).

American political, economic and intellectual life between the two World Wars.

Credit, 3. Mr. Thompson.

185. EUROPEAN INTELLECTUAL HISTORY IN THE NINETEENTH CENTURY.

Chief intellectual currents in Europe; romanticism, liberalism, religious revival, socialism, Darwinism, racism, and mass culture.

Credit, 3. Mr. Powers.

186. EUROPEAN INTELLECTUAL HISTORY IN THE TWENTIETH CENTURY.

Philosophical, academic, literary, aesthetic, political and popular currents since 1900.

Credit, 3. Mr. Powers.

187. AMERICAN COLONIAL HISTORY TO 1763.

Discovery and exploration; early European settlements; systems of political and economic control; religious and intellectual development; and Anglo-French rivalry.

Credit, 3. Mr. Bernhard.

188. THE AMERICAN REVOLUTIONARY ERA.

Coming of the Revolution; War for Independence; evolution of American federalism.

Credit, 3. Mr. Bernhard.

189. JEFFERSONIAN AND JACKSONIAN AMERICA.

Political, economic and social developments in the National Period.

Credit, 3. Mr. Cantor.

190. HISTORIOGRAPHY AND HISTORICAL METHOD.

Training in location, appraisal, and handling of source materials. Critical evaluation of techniques and ideas of representative historians from Thucydides to Toynbee.

Credit, 3. Mr. Greenbaum, Mr. Leonard and Mr. Powers.

191. CIVIL WAR AND RECONSTRUCTION, 1860-1877.

Conduct of the war; political problems; national reunification.

Credit, 3. Mr. Cantor.

192. HISTORY OF THE BRITISH EMPIRE AND COMMONWEALTH SINCE 1783.

Evolution of British imperial policy; growth of the Dominions, the Commonwealth, and the dependent empire; role of the Empire in world politics.

Credit, 3. Mr. Wickwire.

193. MILITARY HISTORY OF MODERN EUROPE.

Development of European military theory and practice from the Napoleonic era to the present.

Credit, 3. Mr. Gordon.

194. THE FRENCH REVOLUTION AND NAPOLEON.

Political change in Europe from the Old Regime and the French Revolution to the fall of Napoleon.

Credit, 3. Mr. Greenbaum.

HOME ECONOMICS

HOME ECONOMICS

*Graduate Faculty: M. A. Niederpruem, Dean,
G. M. Cook, M. E. Lojkin, A. Nichols, E. Rust.*

A Master of Science degree may be earned in the School of Home Economics by candidates who hold an accredited baccalaureate degree and are accepted under the general regulations of the Graduate School of the University. Emphasis may be selected from the areas of Food and Nutrition; Textiles, Clothing and Related Arts; Home Economics Education; Management and Family Economics and Human Development.

In general, the baccalaureate degree of the applicant need not be in Home Economics. However, adequate concentration in studies basic to the areas of emphasis is required, or must be satisfied, before acceptance as a candidate will be granted.

Students applying for graduate work in Home Economics Education should have a Bachelor's degree in Home Economics and supporting disciplines to qualify for graduate work in one of the areas of emphasis listed above. Students' background should include some courses in Education and Supervised Teaching. The candidates for this degree are required to take at least 9 credits in one subject matter area of Home Economics, including a problem and a seminar.

Other areas of emphasis require the following prescribed academic backgrounds: Food and Nutrition—strength in the physical and biological sciences; Textiles, Clothing and Related Arts—strength in the social sciences; Management and Family Economics—strength in the social sciences; Human Development—strength in the biological and social sciences. Candidates interested in the latter area, which includes Child Development and Family Life, may wish to avail themselves of the privilege of affiliating at Merrill-Palmer in Detroit. Such students must take at least 15 credits in residence at the University.

COURSES OPEN TO GRADUATE STUDENTS ONLY

200. SPECIAL PROBLEM IN ONE OF THE FOLLOWING FIELDS: Food and Nutrition; Textiles, Clothing and Related Arts; Home Economics Education; Management and Family Economics; and Human Development. *Credit, 3-6.*

300. THESIS, MASTER'S DEGREE.
Individual research.

Credit, 6-10.

FOOD AND NUTRITION (FN)
COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

121. DEVELOPMENTS IN NUTRITION EDUCATION.

Interpretation of changing and new concepts and of technical material; place of nutrition in schools and public health programs.

Prerequisite, FN 52 or 3 credits in physiological sciences. *Credit, 3.* Mrs. Cook.

203. ADVANCED NUTRITION—METABOLISM OF THE MAJOR FOODSTUFFS.

Energy metabolism and the metabolism of carbohydrates, fats, proteins, and related substances, their role in human nutrition, and physiological effects of

dietary inadequacies. Special reports from current literature supplementing class discussion.

Prerequisites, Biochemistry and/or Physiology. *Credit, 3. The Staff.*

204. ADVANCED NUTRITION—VITAMINS AND MINERALS.

Vitamins and minerals in metabolism, their specific functions in the body and results of mild and severe deficiencies.

Prerequisites, Biochemistry and/or Physiology. *Credit, 3. The Staff.*

207. PROBLEMS IN NUTRITION.

Qualified students may work on a problem of special interest to them in the fields of vitamin and mineral metabolism, basal metabolism, dietary survey techniques, etc.

Prerequisite, FN 203 or 204 or equivalent. *Credit, 3. The Staff.*

210. NUTRITION SEMINAR.

Readings, discussions and preparation of bibliographies on nutrition problems of current interest.

Credit, 1-3. The Staff.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

152. ADVANCED NUTRITION AND DIETETICS.

Absorption, utilization and interrelationship of food nutrients. Evaluation of factors that influence nutrient requirements. Critique of methods of determining nutrient requirements.

Two class hours, one 2-hour laboratory.

Prerequisites, FN 27, 51, Chemistry 79 and Zoology 35. *Credit, 3. Mrs. Cook.*

173. NUTRITION DURING GROWTH AND DEVELOPMENT.

Nutrition as it affects physical growth and development from prenatal through adolescence. Criteria for judging and studies of nutritional status of children. Opportunity for laboratory work in the Nursery School.

Prerequisite, FN 27 or 52. *Credit 3. Mrs. Cook.*

189. NUTRITION IN DISEASE.

Physiological basis for the use of therapeutic diets in certain diseases. Current medical and nutrition literature used.

Prerequisites, FN 52, Chemistry 79, Zoology 35 or equivalent.

Credit, 3. Mrs. Cook.

191. INSTITUTIONAL ADMINISTRATION.

Principles of organization, personnel management, sanitation, food service, planning and equipment selection. Field trips in the area.

Two class hours, one 4-hour laboratory period or field trip.

Prerequisite, FN 51 or 56. *Credit, 4. Mrs. McCullough.*

192. QUANTITY FOOD PREPARATION.

Experience in use of large equipment and application of principles of quantity food preparation, service and cost control. University Dining Hall and Amherst School Lunch Program utilized.

Two class hours, one 4-hour laboratory period.

Prerequisite, FN 51 or Food Science 33, FN 30. *Credit, 4. Mrs. McCullough.*

HOME ECONOMICS

194. EXPERIMENTAL FOODS.

Investigation of experimental techniques and advanced knowledge related to the chemistry of food preparation. Original research projects included. For those interested in dietetics, food and nutrition in business or non-majors interested in foods.

Two class hours, one 3-hour laboratory period.

Prerequisites, FN 30 and 51; and/or Chemistry 33 or Chemistry 51 and 52 or permission of instructor. *Credit, 3.* Miss D. Davis.

Textiles, Clothing and Related Arts (TCRA)

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

210. SEMINAR.

Readings, reports and discussions on the current literature in the area of Textiles, Clothing and Related Arts. *Credit, 1-3.* The Staff.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

153. ADVANCED CLOTHING CONSTRUCTION.

Principles and practices of clothing construction. Emphasis on study of patterns and problems of fitting. Opportunities for students to create original designs. Two class hours, one 3-hour laboratory period.

Prerequisite, TCRA 28.

Credit, 3. Mrs. Jarvesoo.

165. APPAREL SELECTION AND DESIGN.

A comprehensive study of the development of individual expression and the attainment of satisfactions in men's, women's and children's apparel through an understanding and adaptation of basic knowledge of selection and design.

Prerequisites, TCRA 23 or permission of instructor, Psychology 1 or Sociology 25. *Credit, 3.* Miss Hawes.

176. HISTORY OF DECORATIVE ARTS.

A study of style periods in historic context—their aesthetic contributions. Emphasis on developments in western dress, furniture and furnishings. Illustrated lectures. Study tours.

Prerequisites, TCRA 23 or by permission of instructor.

Credit, 3. Mrs. Jarvesoo.

186. TEXTILES II.

Concentrated study and evaluation of recent scientific and technical developments in fibers and finishes affecting appearance, performance, care and cost.

Prerequisite, TCRA 24.

Credit, 3. Miss Hawes.

Home Economics Education (HEED)

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

210. SEMINAR.

Readings, reports and discussions on the current literature in the area of Home Economics Education. *Credit, 1-3.* The Staff.

HOME ECONOMICS

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS (For either major or minor credit)

181. ADULT EDUCATION IN HOME ECONOMICS.

Organization of material, selection, use and evaluation of teaching techniques suited to group work with adolescents and adults. Credit toward meeting state standards for teachers and A.D.A. requirement.

Two class hours, one 2-hour laboratory period.

Prerequisite, minimum 6 credits in major area. *Credit, 3. Mrs. Sullivan.*

182. CURRICULUM IN HOME ECONOMICS.

Organization, scope and sequence of learning experiences in home economics education at secondary level. Philosophy and content of curriculum, development of resource units.

Two class hours, one 2-hour laboratory period.

Prerequisites, Psychology 56 and 66, Education 51. *Credit, 3. Mrs. Sullivan.*

Management and Family Economics (MFE)

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

130. HOME MANAGEMENT FOR TODAY'S FAMILIES.

Emphasis on management principles involved in family economics, work simplification, and decision making in the home. For teachers, extension workers and others who work in an advisory capacity with families.

Prerequisites, B.S. degree in Home Economics, MFE 175 and 177 or equivalent, and professional experience. *Credit, 3. Miss Nichols and the Staff.*

210. SEMINAR.

Readings, reports and discussions on the current literature in the area of family economics and home management. *Credit, 1-3. The Staff.*

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

175. PERSONAL AND FAMILY ECONOMICS.

Analysis of financial problems and alternatives available to individuals and families under changing conditions. Exploring aspects of financial institutions affecting people in our economic society.

Prerequisite, Economics 25 or by special permission of instructor.

Credit, 3. The Staff.

Human Development (HD)

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

210. SEMINAR.

Readings, reports and discussions on the current literature in the area of Human Development. *Credit, 1-3. The Staff.*

HOME ECONOMICS/HORTICULTURE

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

170. CHILD DEVELOPMENT.

The study of the child from the developmental point of view. Emphasis is on interaction of heredity and environment on development.

Three class hours, one 1-hour laboratory period.

Prerequisites, Sociology 25 and Psychology 1.

Credit, 3. Mrs. Myers.

183. NURSERY SCHOOL MANAGEMENT.

Principles and methods of nursery school education. Directed experience in teaching and curriculum planning for three- and four-year-old children. Field trips.

Two class hours, one 3-hour laboratory period.

Prerequisite, HD 70 or Psychology 65.

Credit, 3. Miss Banks.

184. NURSERY SCHOOL MANAGEMENT.

Continuation of 183.

Two class hours, one 3-hour laboratory period.

Prerequisite, HD 83 or permission of instructor.

Credit, 3. Miss Banks.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Home Economics)

Home Economics Education (HEED)

163. ART ACTIVITY IN RECREATION.

Stresses creative growth of the individual. Adapted for those working in schools, playgrounds, camps, in recreational leadership and occupational therapy.

Two class hours, one 2-hour laboratory period.

Prerequisite, Psychology 1.

Credit, 3. Mrs. Sullivan.

HORTICULTURE

Graduate Faculty: F. W. Southwick, Head of Department, A. W. Boicourt, J. R. Havis, W. H. Lachman, W. D. Weeks.

All students who major in Horticulture are required to present a thesis as a part of their major requirements.

The graduate program permits specialization in Floriculture, Olericulture or Pomology.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

201, 202. HORTICULTURE LITERATURE.

A critical review of scientific literature in the specialization area of Floriculture, Olericulture, or Pomology. Topics selected according to the area of specialization and needs of the individual student.

Credit, 2 each semester. Maximum credit, 4. The Staff.

203. ADVANCED SYSTEMATIC FLORICULTURE.

Taxonomic study of floricultural plants.

Prerequisites, Horticulture 154 and Botany 159.

Credit, 3. Mr. Boicourt.

HORTICULTURE/LANDSCAPE ARCHITECTURE

207. ADVANCED POMOLOGY I.

The more important research dealing with pollination, fruit set and thinning, preharvest drop, biennial bearing, and the physiology of fruit during storage.

Prerequisite, Horticulture 51 or equivalent. *Credit, 3.* Mr. Southwick.

208. ADVANCED POMOLOGY II.

The more important research on stock and scion interrelationships, water and temperature influences, and mineral nutrition of fruit plants.

Prerequisite, Horticulture 51 or equivalent. *Credit, 3.* Mr. Weeks.

265. SYSTEMATIC OLERICULTURE.

An intensive study of the history, ontogeny, nomenclature, classification, identification, and structure of the various kinds, varieties, and strains of vegetables.

Given in alternate years. *Credit, 4.* Mr. Maynard.

276. ADVANCED VEGETABLE PLANT IMPROVEMENT.

Hybridization and selection of specific vegetable crops; heterosis and its implications in vegetable breeding; also sterility and its place in the seed production of F₁ hybrids.

Prerequisites, Horticulture 162 and Zoology 153 or equivalent.

Credit, 3. Mr. Lachman.

291, 292, SEMINAR.

Each student will present papers on assigned topics relating to his area of specialization. Required of all graduate students majoring in Horticulture.

Credit, 1 each semester. The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

162. PLANT BREEDING METHODS.

An advanced study of genetic topics peculiar to plants, together with the methods and problems of the plant breeder.

Prerequisite, Zoology 153 or equivalent.

Credit, 3. Mr. Lachman.

165. PRINCIPLES OF OLERICULTURE.

A study of the physiological and nutritional factors influencing the growth and culture of vegetable plants.

Credit, 3. Mr. Maynard.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Horticulture)

154. HERBACEOUS PLANTS.

Credit, 3. Mr. Boicourt.

LANDSCAPE ARCHITECTURE

Graduate Faculty: R. H. Otto, Head of Department, A. D. Caven, T. S. Bacon, Jr., T. S. Hamilton, Jr., R. L. Kent, P. N. Procopio.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS.

Individual study by the B.L.A. candidate in lieu of a thesis; or exploratory work preliminary to the thesis by the M.L.A. candidate. *Credit, 3.* The Staff.

LANDSCAPE ARCHITECTURE

290. THEORY.

Special studies in the history and theory of landscape architecture and planning.
Credit, 3. Mr. Hamilton or Mr. Bacon.

291. DESIGN.

Individual problems in any or all branches of public and private work.
Credit, 3. Mr. Otto.

292. CONSTRUCTION.

Road alignment, computations and advanced landscape construction.
Credit, 3. Mr. Procopio.

293. PRESENTATION.

Studies in drafting, pen and crayon, rendering, water coloring, etc.
Credit, 3. Mr. Kent.

294. PRACTICE.

Professional field work under supervision, conducted upon going projects as opportunity offers.
Credit, 3. The Staff.

297. ARCHITECTURE.

Selected problems. *Credit, 3.* Mr. Kantianis.

300. THESIS, MASTER'S DEGREE.

Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS (For either major or minor credit)

167. ARCHITECTURE.

Architectural development, including styles and forms in architecture, especially as affected by materials and methods of construction.

Credit, 3. Mr. Kantianis.

168. ARCHITECTURAL DESIGN.

The relations between exterior and interior spaces and structures as a primary element in design and construction. A series of problems integrating theory, design analysis, and graphics.

Credit, 4. Mr. Kantianis.

171. PLANTING DESIGN.

The utilization of plant materials in combination as applied to the many conditions and demands of landscape work.

Credit, 3. The Staff.

173, 174. CITY PLANNING.

The historical and legal aspects of land use and regional development, and a critical examination of planning techniques used in guiding the physical growth of communities. Either semester may be elected independently.

Credit, 3 each semester. Mr. Bacon.

175, 176. PROJECTS IN PLANNING.

An application of the principles of modern civic development through a series of problems on the design of various types of urban land areas.

Credit, 3 each semester. Mr. Bacon.

177, 178. URBAN PROBLEMS.

Housing, industrial location and development, decentralization, arterial systems, civic and metropolitan design, and regional planning.
Open to non-majors.

Prerequisites, L.A. 173 and 174 or permission of instructor.

Credit, 3 each semester. Mr. Bacon.

LANDSCAPE ARCHITECTURE

181, 182. ADVANCED DESIGN.

Comprehensive site planning projects covering the major areas of landscape and urban design, plus exchange problems whenever applicable. Field trips required, approximate cost \$40.00.

Prerequisites, L.A. 53 and 54.

Credit, 4 each semester. Mr. Procopio.

184. PRESENTATION.

Preparation and rendering of landscape and architectural plans, elevations, perspectives, etc.

Credit, 2. Mr. Kent.

196. PROFESSIONAL PRACTICE.

Seminar on the methods and procedures of the professional office.

Credit, 1. Mr. Otto.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Landscape Architecture)

153. INTERMEDIATE DESIGN.

Projects involving the fundamentals of landscape design integrating theory, analysis, research, application and graphics.

Prerequisites, Landscape Architecture 2 and 28.

Credit, 4. Mr. Kent.

154. INTERMEDIATE DESIGN.

Spatial organization, intuitive aspects of design, and perceptual studies within comprehensive projects. Field trip required, approximate cost \$40.00.

Prerequisites, Landscape Architecture 24 and 53.

Credit, 4. Mr. Kent.

155. CONSTRUCTION DETAILS.

A series of problems in architectural garden features as walks, steps, walls, fences, pools and small structures.

Credit, 4. Mr. Procopio.

FOR THE DEGREE OF BACHELOR OF LANDSCAPE ARCHITECTURE

To receive this professional bachelor's degree, each candidate will be required:

1. To have received the degree of Bachelor of Science or Bachelor of Arts from a recognized institution.
2. To have completed as a prerequisite 24 semester credits in landscape architecture, substantially equivalent to the technical courses now required in the undergraduate major in landscape architecture at this university.
3. In addition, to have completed in residence at this institution, 30 credits in landscape architecture and closely related subjects prescribed by the department. (See Fifth Year Program below.)
4. To have received the unanimous approval of the faculty of the department and the vote of approval of the faculty of the Graduate School.

FIFTH YEAR PROGRAM

The regular program of studies for the Fifth Year, subject to minor changes dependent upon courses taken previously, is as follows:

First Semester

201. GENERAL DESIGN.

Class A Exchange problems and advanced local projects. *Credit, 3.* Mr. Otto.

LANDSCAPE ARCHITECTURE/MATHEMATICS

203. ECOLOGY AND PHYSIOGRAPHY.

Plant associations as related to ground forms and conditions.

Credit, 3. Mr. Mosher.

205. ARCHITECTURE.

Studies in principles and problems of architectural design.

Credit, 3. Mr. Kantianis.

207. CONTRACTS, SPECIFICATIONS, ESTIMATING COSTS.

Preparation of supporting data for proposed plans. *Credit, 3.* Mr. Hamilton.

209. LANDSCAPE SKETCHING.

Graphic expression of suitable subjects in various media. *Credit, 3.* Mr. Kent.

Second Semester

202. GENERAL DESIGN.

Continuation of 201.

Credit, 3. Mr. Otto.

204. LANDSCAPE OPERATIONS.

Supervision of local landscape projects.

Credit, 3. The Staff.

206. ARCHITECTURE.

Studies in principles and problems of architectural design.

Credit, 3. Mr. Kantianis.

210. ARCHITECTURAL SKETCHING.

Graphic expression of suitable subjects in various media.

Credit, 3. Mr. Kent.

Elective: Suitable subject assigned.

MATHEMATICS

Graduate Faculty: R. W. Wagner, Acting Head of Department, A. E. Andersen, A. G. Azpeitia, H. F. Cullen, D. J. Dickinson, H. G. Jacob, E. Killam, D. S. Stockton.

Special Departmental Entrance Requirements:

Candidates for admission who plan to major in this department must have completed at least eighteen semester credit hours in undergraduate mathematics beyond the content of Mathematics 29 and 30 (Differential and Integral Calculus).

A one-year course in Modern Algebra and a one-year course in advanced, theoretical calculus would be desirable. Both of these courses as well as a course in Sets and Ordered Structures are necessary, before entrance to graduate school, if a student is to complete the work of a Master's degree in one year.

Special Degree Requirements:

The following courses, or equivalent courses taken elsewhere are required for a Master's degree: 53, 54 (no graduate credit for Mathematics majors), 185, 186, 188, 241, 201; either 221 or 227; one of the four courses 202, 222, 228, 242.

A total of 30 graduate credit-hours is required of which not more than six credit-hours may be taken in other departments. The choice of courses taken in other departments is subject to the approval of this department.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. TOPICS COURSE.

Topics may be chosen from the fields of algebra, geometry, theory of functions, topology, and applied mathematics.

Prerequisite, permission of instructor.

Credit, 1, 2, or 3. The Staff.

201, 202. INTRODUCTION TO MODERN ALGEBRA.

Axiomatic foundation of algebra, groups, rings, fields and vector spaces; linear transformations and matrices.

Prerequisite, Mathematics 154.

Credit, 3 each semester. The Staff.

221, 222. THEORY OF FUNCTIONS OF A REAL VARIABLE.

Limits, continuity and differentiability of functions of one and two real variables, theories of integration, sequences of functions.

Prerequisite, Mathematics 241.

Credit, 3 each semester. The Staff.

224. INTRODUCTION TO FUNCTIONAL ANALYSIS.

Banach and Hilbert spaces, continuous linear operators, spectral theory, Banach algebras.

Prerequisites, Mathematics 154 and 241.

Credit, 3. The Staff.

227. THEORY OF FUNCTIONS OF A COMPLEX VARIABLE.

Holomorphic functions, power series and complex integration, singularities, series and infinite products of holomorphic functions, entire and meromorphic functions.

Prerequisites, Mathematics 241 and 186.

Credit, 3. The Staff.

228. THEORY OF FUNCTIONS OF A COMPLEX VARIABLE.

Topics selected from: Conformal mappings, Riemann surfaces, special functions, Laplace and Fourier series and transforms, differential equations and boundary value problems. Physical applications.

Prerequisite, Mathematics 227.

Credit, 3. The Staff.

241. TOPOLOGY I.—INTRODUCTION TO GENERAL TOPOLOGY.

Topological, Hausdorff and metric spaces; homeomorphisms; connectivity and compactness.

Prerequisites, Mathematics 185 and 188.

Credit, 3. The Staff.

242. TOPOLOGY II.—INTRODUCTION TO ALGEBRAIC TOPOLOGY.

Simplexes, complexes, homology and homotopy.

Prerequisite, Mathematics 241.

Credit, 3. The Staff.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

161. PROJECTIVE GEOMETRY.

A study, from both the synthetic and analytic viewpoints, of properties invariant under projection, with emphasis on the real plane. Equivalence of Desarguesian and coordinate projective geometries.

Prerequisite, Mathematics 153.

Credit, 3. The Staff.

MATHEMATICS

162. HIGHER GEOMETRY.

A study along the lines of Klein's *Erlanger Programm* of various geometries and their groups of transformations, emphasizing Projective, Affine, and Euclidean. Prerequisites, Mathematics 154 and 161, or permission of instructor.

Credit, 3. The Staff.

168. LINEAR ALGEBRA.

Row equivalence. Linear transformations and matrices. Similarity, invariant subspaces, canonical forms. Inner product spaces, linear functions, the spectral theorem. Bilinear forms.

Three class hours.

Prerequisite, Mathematics 154 or 152.

Credit, 3. The Staff.

169. THEORY OF GROUPS AND GROUP REPRESENTATIONS.

Axiom systems, Lagrange theorem, generators, relations. Conjugate classes, normal subgroups, quotient groups. Sylow theorems. Abelian groups. Unitary and irreducible representations. Characters, orthogonality relations.

Three class hours.

Prerequisite, Mathematics 168.

Credit, 3. The Staff.

174. THEORY OF NUMBERS.

Euclid's algorithm, theory of prime numbers, aliquot parts, congruences, further topics in number theory.

Three class hours.

Prerequisite, Mathematics 153.

Credit, 3. The Staff.

183. NUMERICAL ANALYSIS.

Approximation and error evaluation; finite differences; approximation by polynomials using finite difference methods and minimal criteria; special reference to sets of orthogonal polynomials.

Three class hours.

Prerequisites, Mathematics 32 or 26; Computer Science 21 (may be taken concurrently).

Credit, 3. The Staff.

184. NUMERICAL ANALYSIS.

Evaluation of definite integrals; solution of differential equations, polynomial equations, other conditional equations, and systems of linear equations with related matrix manipulations.

Three class hours.

Prerequisites, Mathematics 183 and 192 or 32.

Credit, 3. The Staff.

185. INTRODUCTORY MODERN ANALYSIS.

Real and complex numbers. Basic topology of the real number system. Limit and continuity. Differentiation. Partial differentiation.

Three class hours.

Prerequisite, Mathematics 26.

Credit, 3. The Staff.

186. INTRODUCTORY MODERN ANALYSIS.

Bounded variation. Riemann-Stieltjes integration. Multiple integrals. Line integrals. Infinite series. Sequences of functions. Improper Riemann-Stieltjes integrals.

Three class hours.

Prerequisite, Mathematics 185.

Credit, 3. The Staff.

188. SETS AND ORDERED STRUCTURES.

Basic properties of sets. Ordered sets. Complete ordered sets. Well-ordered sets. Cardinal and ordinal numbers. Axiom of choice, well-ordering theorem, Zorn's Lemma and other forms of the axiom of choice. Cardinal arithmetic.

Three class hours.

Prerequisite, Mathematics 185 or permission.

Credit, 3. The Staff.

193. FOURIER SERIES AND ORTHOGONAL FUNCTIONS.

Solutions of boundary value problems by Fourier series, Bessel functions, Legendre polynomials; convergence of representations by orthogonal functions.

Three class hours.

Prerequisite, Mathematics 192 or 32.

Credit, 3. The Staff.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Mathematics)

152. INTRODUCTION TO VECTOR SPACES AND GROUPS.

The last two-thirds of Mathematics 54. Finite dimensional vector spaces, linear transformations, elementary theory of matrices and determinants.

Three class hours for the last two-thirds of a semester.

Prerequisite, Mathematics 9 or permission of the department head.

Credit, 2. The Staff.

153. INTRODUCTION TO MODERN ALGEBRA.

Basic concepts, groups, rings, the real and complex fields.

Three class hours.

Prerequisite, Mathematics 26 or 31, or permission.

Credit, 3. The Staff.

154. CONTINUATION OF MATHEMATICS 153.

Polynomials, cyclic groups, finite dimensional vector spaces, linear transformations, elementary theory of matrices and determinants.

Three class hours.

Prerequisite, Mathematics 153.

Credit, 3. The Staff.

155. MATHEMATICS OF FINANCE.

The mathematical principles of simple and compound interest, annuities, depreciation, valuation of bonds, and insurance. May not be counted for Mathematics major credit.

Three class hours.

Prerequisite, Mathematics 1, 5 or 7.

Credit, 3. The Staff.

157. LINEAR PROGRAMMING AND THEORY OF GAMES.

Topics include sets, probability, vectors, matrices, and an introduction to linear programming and theory of games.

Three class hours.

Prerequisite, permission of instructor.

Credit, 3. The Staff.

171. VECTOR ANALYSIS.

The Algebra and Calculus of vectors. Applications to Physics and other fields will be considered.

Three class hours.

Prerequisite, Physics 4 or 6; corequisite, Mathematics 31 or 26.

Credit, 3. The Staff.

MATHEMATICS/MECHANICAL ENGINEERING

175. ADVANCED ENGINEERING MATHEMATICS.

Series solution of differential equations, functions of several variables, partial differential equations, numerical analysis and the Laplace transform. Not available for majors in Mathematics.

Three class hours.

Prerequisite, Mathematics 192 or 32.

Credit, 3. The Staff.

176. ADVANCED ENGINEERING MATHEMATICS.

Vectors and vector spaces, vector field theory, complex analysis. Not available for majors in Mathematics.

Three class hours.

Prerequisite, Mathematics 192 or 32.

Credit, 3. The Staff.

181. COMPLEX ANALYSIS.

The algebra of complex numbers, the elementary functions and their mappings, differentiation, integration, Taylors series, and residues.

Three class hours.

Prerequisite, Mathematics 192 or 32.

Credit, 3. The Staff.

192. DIFFERENTIAL EQUATIONS.

Three class hours.

Prerequisite, Mathematics 191.

Credit, 3. The Staff.

MECHANICAL AND INDUSTRIAL ENGINEERING

Mechanical Engineering

Graduate Faculty: W. H. Weaver, Head of Department, M. E. Bates, R. W. Day, J. H. Dittfach, C. A. Keyser, J. M. O'Byrne, R. K. Patterson, E. J. Rising, D. Sobala, J. D. Swenson.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS IN MECHANICAL ENGINEERING.

Special investigational or research problems, the scope to be varied to meet specific conditions.

Prerequisite, as required by the problem.

Credit, 1-6. The Staff.

201. ADVANCED THERMODYNAMICS.

A detailed treatment of the first and second laws and a selection of advanced topics to fit individual needs.

Prerequisite, M.E. 87.

Credit, 3. The Staff.

211. THEORY OF POWER MACHINES.

Advanced thermodynamic study applied to heat power equipment such as gasoline and Diesel engines, steam and gas turbines, rotary and reciprocating compressors, jet propulsion, and rockets.

Prerequisites, M.E. 177 and 184.

Credit, 3. The Staff.

221. ADVANCED HEAT TRANSFER.

Advanced topics in heat transfer.

Prerequisite, M.E. 182.

Credit, 3. The Staff.

MECHANICAL ENGINEERING

241. ADVANCED DYNAMICS.

Vibration and stability of systems with many degrees of freedom, normal modes and frequencies; approximate methods. Nonlinear systems, self excited vibrations. Gyroscopic effects in mechanical systems. Selected topics with application to problems in engineering.

Prerequisite, M.E. 185.

Mr. White and Mr. Sobala.

251. ADVANCED TOPICS IN MACHINE DESIGN.

Application of advanced theories to Machine Design and Kinematics. A variety of topics and considerable creative work are included.

Prerequisite, M.E. 183.

Credit, 3. Mr. Bates.

300. THESIS, MASTER'S DEGREE.

Credit, 3-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS (For either major or minor credit)

104. MECHANICAL DRAWING IN HIGH SCHOOL.

Discussion of course material for pre-engineering high school mechanical drawing courses. Theory and laboratory practice.

Limit: 30 participants (Summer School).

Credit, 3.

150. FUNDAMENTALS OF METALLURGY.

Physical metallurgy involving crystal structure, solid solutions, diffusion in the solid state, freezing of metals, hardening of metals, annealing, and equilibrium diagrams. Fundamentals are applied to the study of the iron-iron carbide diagram, the S-curve, heat treatment of steel and the properties and uses of the other principal engineering metals. Laboratory work stresses metallographic technique. Two class hours, one 3-hour laboratory period.

Prerequisite, M.E. 35 or Chemistry 166.

Credit, 3. The Staff.

168. KINEMATICS.

Principles of mechanism, including velocity and acceleration diagrams, instant centers, gear teeth and gear trains, cams, and various speed transmissions.

Two class hours, one 3-hour laboratory period.

Prerequisites, M.E. 1 and C.E. 52

Credit, 3. The Staff.

174. BASIC AERODYNAMICS.

An introduction of the basic concepts of applied aerodynamics, for the student who has no previous background in the subject. Topics include properties of air, ideal fluid flow, airfoils and their properties, aircraft performance and stability.

Three class hours.

Prerequisite, C.E. 76.

Credit, 3. Mr. Sobala.

175. STEAM POWER PLANTS.

A study of steam power plants, including boilers, stokers, fuels, combustion, steam generation, prime movers, auxiliary equipment, and problems involved in design and operation.

Three class hours.

Prerequisite, M.E. 64.

Credit, 3. Mr. Swenson.

MECHANICAL ENGINEERING

176. REFRIGERATION AND AIR CONDITIONING.

The fundamental principles of thermodynamics as applied to refrigeration and air conditioning. Application of refrigeration to industrial processes and the control of temperature, humidity and motion of air in buildings.

Two class hours, one 3-hour laboratory period.

Prerequisite, M.E. 64.

Credit, 3. Mr. Swenson.

177. INTERNAL COMBUSTION ENGINES.

The thermodynamic and performance aspects of reciprocating gasoline and Diesel engines, steady flow gas turbines and turbo-jet engines, and rockets are major topics.

Three class hours.

Prerequisite, M.E. 64.

Credit, 3. Mr. Dittfach.

182. HEAT TRANSFER.

Methods of evaluating heat transfer rates and predicting operating temperatures. Heat transfer by conduction, radiation, and convection. Topics include one- and two-dimensional conduction, heat flow, transient heat flow, fins, numerical and graphical solutions, free and forced convection and radiation.

Three class hours.

Prerequisites, M.E. 64 and Mathematics 32 or 192.

Credit, 3. Mr. O'Byrne.

183. MACHINE DESIGN.

Principles involved in the design of various machine parts. Related topics included such as economy of manufacture, safety, styling, invention, and creativity. Two class hours, one 3-hour laboratory period.

Prerequisites, C.E. 53 and M.E. 168.

Credit, 3. Mr. Bates and Mr. Patterson.

184. BASIC ENGINEERING ANALYSIS.

The application of mathematical methods to the solution of mechanical engineering problems in such fields as vibrations, elasticity, fluid mechanics, and dynamics. The analysis of the problems and the derivation of the governing equations.

Three class hours.

Prerequisites, M.E. 185, Mathematics 32 or 192.

Credit, 3. The Staff.

185. DYNAMICS OF MACHINERY.

Elements of vibration theory, vibration isolation, vibration analysis of equivalent masses and shaft systems. Vibration absorbers of dynamics balancing. Students may schedule the course without the laboratory (3 cr.) or with the laboratory (4 cr.).

Three class hours, one 3-hour laboratory period.

Prerequisites, C.E. 52 and M.E. 168.

Credit, 3-4. Mr. Sobala.

186. ADVANCED MACHINE DESIGN.

A continuation of Course 183. Additional elementary parts are analyzed, and some complete machines are studied. Considerable emphasis on invention and creativity.

Two class hours, one 3-hour laboratory period.

Prerequisite, M. E. 183.

Credit, 3. Mr. Bates and Mr. Patterson.

187. ENGINEERING THERMODYNAMICS III.

Topics investigated include combustion and gas dynamics with emphasis on one dimensional flow with normal and oblique shock.

Three class hours.

Prerequisites, Math 32 and M.E. 64.

Credit, 3. The Staff.

190. ADVANCED METALLURGY.

Advanced topics in metallurgy including the structure of metals and recent metallurgical developments.

Two class hours; one 3-hour laboratory period.

Prerequisite, M.E. 150.

Credit, 3. The Staff.

197. EXPERIMENTAL MECHANICAL ENGINEERING.

Prerequisite, permission of instructor.

Credit, 3. The Staff.

Industrial Engineering

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS IN INDUSTRIAL ENGINEERING.

Special investigational or research problems in industrial engineering, the scope to be varied to meet specific conditions.

Prerequisite as required by the problem.

Credit, 1-6. The Staff.

253. METHODS OF MEASUREMENT OF HUMAN WORK.

A critical study of the assumptions in measuring human effort in industry including the problems present in rating, predetermined data systems, the use of the high speed camera in securing data.

Three class hours.

Prerequisite, I.E. 53 and 72 or comparable courses.

Credit, 3. The Staff.

254. ADVANCED TOPICS IN ENGINEERING ECONOMY.

A more intensive study of the basic subject field of engineering economy as stated in I.E. 54.

Three class hours.

Prerequisite, I.E. 54 or a similar basic course in engineering economy.

Credit, 3. The Staff.

256. ADVANCED TOPICS IN DATA PROCESSING.

Probability theory and information theory, components and operation of analog and digital computers, the analysis of large scale data processing systems as applied to the functioning of industrial control systems.

Three class hours.

Prerequisite, I.E. 56 or a similar basic course in data processing principles and applications.

Credit, 3. The Staff.

277. MANUFACTURING CONTROL.

A quantitative approach to decision making in production management. Incremental analysis, linear programming, waiting line theory, statistics as applied to problems of economic quantity planning, production programming, statistical control and equipment purchase.

Three class hours.

Prerequisite, a basic knowledge of statistics and the principles of operations research.

Credit, 3. The Staff.

279. QUANTITATIVE METHODS IN INDUSTRIAL ENGINEERING.

The application of mathematical concepts and the principles of operations research and probability to various Industrial Engineering problems. The theo-

INDUSTRIAL ENGINEERING

retical background will be presented, demonstrated by example and applied by exercises and case problems.

Three class hours.

Prerequisite, a basic knowledge of statistics and the principles of operations research. *Credit, 3. The Staff.*

300. THESIS, MASTER'S DEGREE.

Credit, 3-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS (For either major or minor credit)

153. METHODS AND STANDARDS ENGINEERING.

The principles involved in the simplification of the work pattern and the design of the work place, and in the establishment of production standards for industrial engineering students.

Three class hours, one 3-hour laboratory period.

Prerequisite, I.E. 71, previously or concurrently.

Credit, 4. The Staff.

154. ENGINEERING ECONOMY.

A study of the bases for comparison of alternatives in engineering projects, break-even and minimum cost points, evaluation of proposals for new activities, economy of operations, the evaluation of public activities, the output and life of typical items of engineering and industrial equipment, manufacturing lot sizes, economic purchase quantities, the selection and replacement of structures and machines.

Three class hours.

Prerequisites, Economics 25, Mathematics 6, and Industrial Engineering 179.

Credit, 3. The Staff.

156. ANALYSIS OF DATA PROCESSING SYSTEMS.

Principles and applications of data processing and electronic computer systems for use by Industrial Engineers as a management tool for control and decision making.

Three class hours.

Prerequisite, approval of instructor.

Credit, 3. The Staff.

172. PRINCIPLES OF ENGINEERING STATISTICS.

A study of statistical principles as applied to engineering problems including: analysis of variances, design of experiments, sampling plans, statistical quality control.

Three class hours.

Prerequisite, a basic course in statistics comparable to I.E. 71.

Credit, 3. The Staff.

175. JOB EVALUATION.

The principles used to determine an evaluation of all occupations in order to establish an equitable rating between them, to establish sound wage and salary policies.

Two class hours.

Prerequisite, I.E. 51.

Credit, 2. The Staff.

176. TIME STUDY.

The principles involved in the establishment of production standards and their application in the management functions of cost accounting, estimating, production control, incentives, budgetary control.

Prerequisites, I.E. 175, 182 concurrently except for Business Administration majors. *Credit, 3. The Staff.*

INDUSTRIAL ENGINEERING/MICROBIOLOGY

177. FACTORY PLANNING AND LAY-OUT.

The principles applying to the determination and development of the physical relationship between plant equipment and operators working toward the highest degree of economy and effectiveness in operation.

One class hour, one 3-hour laboratory period.

Prerequisites, M.E. 2 and I.E. 51.

Credit, 2. The Staff.

178. PRODUCTION CONTROL.

The principles used to regulate production activities in keeping with the manufacturing plan.

Three class hours.

Prerequisites, I.E. 51.

Credit, 3. The Staff.

179. INDUSTRIAL ENGINEERING PROBLEMS.

The principles of statistics, theory of probability, theory of games, principles of linear programming applied to solutions of problems in inventory control, costing, production control, quality control, production standards, work measurement, delay allowances.

Three class hours.

Prerequisites, Mathematics 57, Statistics 177, and I.E. 53.

Credit, 3. The Staff.

180. PLANT BUDGETARY CONTROL.

The principles used to predetermine expenses for the factors of production and the comparison of results with the estimates to determine and deal with the causes of expense variations as applied by the operating organization in the industrial plant.

Three class hours.

Prerequisites, I.E. 51.

Credit, 3. The Staff.

182. WORK SIMPLIFICATION.

The principles involved in the simplification of means of doing work and in the application and use of these principles.

One class hour, one 3-hour laboratory period.

Prerequisites, M.E. 168 and I.E. 176 concurrently.

Credit, 2. The Staff.

MICROBIOLOGY

*Graduate Faculty: C. D. Cox, Head of Department,
E. Canale-Parola, R. P. Mortlock.*

Admission to graduate courses requires departmental permission and does not imply candidacy for an advanced degree. Graduate students should not attempt to register for 200 level graduate courses in microbiology until the Department is satisfied as to their prerequisite knowledge of microbiology and cognate sciences. Students judged by the Department to be deficient in chemistry, biology, and other sciences, may be accepted as graduate student majors in microbiology and their deficiencies removed during graduate study. Extensive, advanced undergraduate courses in microbiology are not as essential as undergraduate background in chemistry, biological sciences, mathematics and physics, in preparation for graduate work in microbiology.

MICROBIOLOGY

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

203. MICROBIAL CYTOLOGY.

Lectures, literature reviews, and laboratory demonstrations, designed to give the student a comprehensive survey of the structure of microbial cells and the functions of their components. *Credit, 3-5. The Staff.*

205. ADVANCED IMMUNOLOGY.

Advanced theories and laboratory procedures basic to immunology and serology. *Credit, 3-6. The Staff.*

206. MICROBIOLOGICAL FERMENTATIONS.

Theories, methods, and processes by which various chemicals and biological materials are produced industrially through the action of microorganisms. The laboratory experiments consider the microorganisms involved, procedures used, and the chemistry of the fermentation reactions. *Credit, 3. Mr. Czarnecki.*

208. SEMINAR.

Reports and discussions of pertinent literature. Normally required of all graduate majors each semester in residence. *Credit, 1. The Staff.*

210. CURRENT TOPICS.

Intensive consideration of a specific microbiological topic of current interest, utilizing staff and student participation and visiting scientists. Lectures and discussions only. Credit depends upon particular topic each semester given. *Credit, 1-2. The Staff.*

213. ANTIBIOTICS.

The historical background and theory of action of antibiotics are correlated with practical laboratory procedures used in the study of their isolation, methods of assay, and effects on morphology and survival of bacteria. *Credit, 3. Mr. Czarnecki.*

214. MICROBIAL GENETICS.

Inheritance and variation in microorganisms. Mechanisms of recombination, transformation, transduction and other genetic phenomena in microorganisms, with emphasis on molecular basis. *Credit, 4. The Staff.*

254. HOST-PARASITE RELATIONSHIPS.

Intensive treatment of specific relationships between parasitic microorganisms and their hosts, by appropriate literature and laboratory studies. *Credit, 2-5. The Staff.*

257. MAMMALIAN VIROLOGY.

The structure, and the chemical, physical and biological properties of viruses with emphasis on mammalian viruses. Laboratory treatment includes technics of propagation and study, including tissue culture. *Credit, 4. The Staff.*

266. ADVANCED MICROBIAL PHYSIOLOGY.

Similar to Microbiology 166, except more intensive treatment of specific areas dictated by particular research interests and requirements of the student. *Credit, 2-5. The Staff.*

267. MICROBIAL METABOLISM.

Metabolic pathways and mechanisms in microorganisms. Lectures, readings and discussions. *Credit, 3.* Mr. Mortlock.

290. RESEARCH.

Not for thesis credit, but normally for research preliminary to registration for thesis credit. May be repeated for a total of no more than 9 credits for a Master's degree or 18 credits for a Doctor's degree.

Credit, 2-6 each semester. The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 10.

400. THESIS, PH.D. DEGREE.

Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

151. GENERAL MICROBIOLOGY (I).

General considerations of microbial structure, growth and physiology, and the reactions of microorganisms to their physical, chemical and biological environments. Designed for students intending to take more advanced courses in microbiology and other science majors.

Two class hours, two 3-hour laboratory periods.

Prerequisites, at least one year of chemistry, one year of biological science.

Credit, 4. Mr. Canale-Parola, Mr. Mortlock.

154. PATHOGENIC BACTERIOLOGY.

Correlation of physiologic and metabolic properties and processes of bacteria with the pathogenesis of disease.

Two class hours, two 3-hour laboratory periods.

Prerequisite, Microbiology 151.

Credit, 4. Mr. Cox.

155. IMMUNOLOGY.

Fundamental study of the nature of antigens and antibodies, their interactions and significance in resistance and hypersensitivity.

Two class hours, two 3-hour laboratory periods.

Prerequisite, Microbiology 151.

Credit, 4. Mr. Cox.

157. VIROLOGY.

The structure, and the chemical, physical and biological properties of viruses, with emphasis on the bacterial viruses.

Two class hours, two 3-hour laboratory periods.

Prerequisite, Microbiology 151.

Credit, 4. The Staff.

164. GENERAL MICROBIOLOGY (II).

Principles of selective enrichment and isolation. Morphological, physiological and ecological characteristics of a number of bacterial groups isolated from nature.

Two class hours, two 3-hour laboratory periods.

Prerequisite, Microbiology 151.

Credit, 4. Mr. Canale-Parola.

MICROBIOLOGY/PHILOSOPHY

166. MICROBIAL PHYSIOLOGY.

Fundamental study of the growth, nutrition, metabolism and respiration of microorganisms.

Two class hours, two 3-hour laboratory periods.

Prerequisites, Microbiology 151 and courses in organic and/or biochemistry.

Credit, 4. Mr. Mortlock.

PHILOSOPHY

Graduate Faculty: C. Shute, Head of Department, L. H. Ehrlich, E. C. Moore, F. E. Oppenheim (Government), J. W. Swanson.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. RESEARCH AND READING IN PHILOSOPHY.

Independent graduate research on specific topics in philosophy under the supervision of a faculty member.

Prerequisite, graduate status and permission of the department.

Credit, 2-6. Maximum credit, 6. The Staff.

241. ETHICAL THEORY.

Analysis of selected problems of normative and meta-ethics involved in contemporary development of ethical theory.

Prerequisite, permission of instructor.

Credit, 3.

251, 252. SELECTED PHILOSOPHERS.

Each semester a leading philosopher will be chosen for intensive reading.

Prerequisite, permission of instructor.

Credit, 3. The Staff.

258. KANT.

The *Critique of Pure Reason* will be read in its relation to Kant's philosophy as a whole.

Prerequisite, permission of instructor.

Credit, 3.

261, 262. PROBLEMS IN THE HISTORY OF IDEAS.

An inquiry into a distinct major philosophical problem or group of related philosophical problems.

Prerequisite, permission of instructor.

Credit, 3. The Staff.

266. PHILOSOPHY OF EDUCATION.

An evaluation of various educational theories and practices on the different levels viewed in the light of historical perspective and contemporary thought.

Prerequisite, permission of instructor.

Credit, 3. Mr. Ehrlich.

281. PHILOSOPHY OF LANGUAGE.

An inquiry into the nature of language, meaning, reference, communication and translation. Topics include the later Wittgenstein, Quine's contextualism, the Whorf-Sapir hypothesis, problems in psycholinguistics.

Prerequisite, permission of instructor.

Credit, 3. Mr. Swanson.

285. METAPHYSICS.

The leading issues in contemporary debate on the nature and limits of metaphysical theory; examination of metaphysical concepts in relation to their use and treatment by other disciplines.

Prerequisite, permission of instructor.

Credit, 3.

286. THEORY OF KNOWLEDGE.

A study of perception, subject-object relation, origins of knowledge, concept formation and language, the analytic-synthetic distinction, limits of empiricism and rationalism, relation of epistemology to metaphysics.

Prerequisite, permission of instructor.

Credit, 3. Mr. Swanson.

295, 296. SEMINAR.

Conferences and reports on special studies in philosophy.

Credit, 1-3. The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 6-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

Prerequisites. The prerequisites listed are those normally required of undergraduate students. They may be waived by the instructor for graduate students with adequate preparation.

153. PLATO AND ARISTOTLE.

The major works of Plato and Aristotle in ethics, logic, and metaphysics will be read for the systematic character of their thought and its contemporary relevance.

Credit, 2-3. Mr. Brentlinger.

154. PHILOSOPHY IN THE MIDDLE AGES.

The writings of major philosophers of the period, including Augustine, Aquinas, Duns Scotus, and Ockham; the historical setting and their relevance to modern thought.

Credit, 2-3. Mr. Ehrlich.

155. CONTINENTAL RATIONALISM.

A study of the world views of Descartes, Spinoza, and Leibniz through their most important metaphysical and ethical writings.

Credit, 2-3. Mr. Brentlinger.

156. BRITISH EMPIRICISM.

A study of the philosophies of Locke, Berkeley, and Hume and their influences on the development of contemporary empiricisms.

Credit, 2-3. Mr. Clay.

158. PHILOSOPHY IN THE AGE OF ENLIGHTENMENT.

A study of texts by representative thinkers from Descartes and Locke to Kant. The relation of these thinkers to modern science and contemporary thought.

Prerequisite, Philosophy 52.

Credit, 2-3. Mr. Ehrlich.

161. CONTEMPORARY PHILOSOPHIES.

A survey of the diverse philosophical directions representing the intense activity of contemporary American and European thinking.

Prerequisite, Philosophy 52 or 158.

Credit, 2-3. Mr. Clay.

164. EXISTENTIAL PHILOSOPHIES.

Examination by means of a study of selected original texts, of the main problems peculiar to this movement as a whole and to its main exponents individually.

Prerequisite, Philosophy 51 or 52.

Credit, 2-3. Mr. Ehrlich.

PHILOSOPHY

167. AMERICAN PHILOSOPHY.

Examination by means of a study of selected original texts by the outstanding American philosophers, of their contribution to Western thought and American civilization.

Prerequisite, Philosophy 51 or 52.

Credit, 2-3. Mr. Moore.

168. ORIENTAL PHILOSOPHIES.

The leading philosophies of Asia with emphasis on India, and the bearing of philosophical differences between East and West on the problem of mutual understanding.

Prerequisite, Philosophy 51 or 52.

Credit, 2-3. Mr. Shute.

172. PHILOSOPHY OF SCIENCE.

A critical analysis of the structure of scientific method and the language of science, the respective roles of induction and deduction in science, and the status of theoretical terms.

Credit, 2-3. Mr. Swanson.

175. SYMBOLIC LOGIC.

An introduction to such topics as the nature of a decision procedure, completeness of quantification theory, definition of cardinal numbers via sets, object-languages and meta-languages.

Prerequisite, Philosophy 31 or instructor's approval.

Credit, 2-3. Mr. Swanson or Mr. Clay.

176. MATHEMATICAL LOGIC.

Theory of formal systems: equivalence, completeness, incompleteness, decision procedures, formal syntax and semantics, recursive function theory, formal number theory, "reduction" of mathematics to logic.

Prerequisite, Philosophy 75 or permission of the instructor.

Credit, 2-3. Mr. Clay or Mr. Swanson.

181. PHILOSOPHY OF RELIGION.

Readings in contrasting religious philosophies followed by analysis of concepts in understanding religion as coherently related to the other aspects of experience.

Credit, 2-3. Mr. Shute.

182. AESTHETICS.

Leading theories of the nature of art, the analysis of aesthetic experience, the distinctive function of art in culture and personality, and the principles of criticism.

Credit, 2-3. Mr. Shute.

184. POLITICAL PHILOSOPHY.

An attempt to develop critically the moral basis of organized societal living on all levels, with special reference to contemporary problems of sovereignty and nationalism.

Prerequisites, two semester courses in philosophy, or instructor's approval.

Credit, 2-3. Mr. Oppenheim.

192. CONTEMPORARY PROBLEMS.

A consideration of selected persistent philosophical problems—e.g., induction, relation of mind and body, perception, certainty of statements, knowledge of other minds, etc.

Prerequisite, permission of the department.

Credit, 2-3. Mr. Clay.

PHILOSOPHY/PHYSICAL EDUCATION

195, 196. SEMINAR.

A study of one major philosopher, major philosophical tradition, or restricted subject in a special field of philosophical inquiry.

Prerequisite, permission of the instructor.

Credit, 2-3. The Staff.

PHYSICAL EDUCATION

Graduate Faculty: D. C. Bischoff, Director of School Graduate Program, E. V. Hubbard, B. Ricci, Jr., C. L. Vendien.

The School of Physical Education offers a M.S. in Physical Education. The following school requirements for admission to the Graduate Physical Education Program are in addition to the University requirements for admission:

1. Thirty semester hours of Physical Education, including student teaching, or twenty-four semester hours without student teaching, accompanied by evidence of successful salaried teaching in which Physical Education was included. Kinesiology, Physiology of Exercise, Tests and Measurements, Adapted Physical Education, and Philosophy of Physical Education, or their content equivalents, shall be included. In the event any of these requirements have not been satisfied, the applicant will be required to complete his deficiencies without graduate credit.
2. A medical examination presenting evidence of good physical condition.
3. Evidence of proficiency in physical activities. The candidate will be required to demonstrate a high level of competency in four activities that he may choose from those activities offered in the Physical Education Programs at the University of Massachusetts.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

201. RESEARCH METHODS IN PHYSICAL EDUCATION.

Experimental, historical, descriptive, and philosophical methods of research. Identification and comparison of methods in significant research studies. Required.

Credit, 3. Mr. Ricci.

202. CONTEMPORARY PROBLEMS IN PHYSICAL EDUCATION.

Seminar, review, analysis, and evaluation of contemporary problems. Required. A broad review of literature combined with critical analysis of selected items.

Credit, 3. The Staff.

203. PHILOSOPHY OF PHYSICAL EDUCATION.

An investigation of the attitudes toward and contributions of physical education in the evolution of educational thought. Required.

Prerequisite, Physical Education 76 or its equivalent.

Credit, 3. Mr. Bischoff.

224. SUPERVISION OF PHYSICAL EDUCATION PROGRAM.

A description and evaluation of creative leadership responsibilities of the teacher or administrator in a supervisory capacity. Special emphasis will be given to analysis of duties, cooperative relationships, research, and new techniques.

Credit, 3. Miss Vendien.

PHYSICAL EDUCATION/PHYSICS

227. COMPARATIVE PHYSICAL EDUCATION AND ATHLETICS.

A comparative analysis of physical education and athletics in selected countries. Special emphasis will be given to historical, cultural, and social values affecting the status of sports and recreation, and current international cooperation.

Credit, 3. Miss Vendien.

235. MECHANICAL ANALYSIS OF MOTOR SKILLS.

An analysis of patterns of human movement in terms of physical laws dealing with stability, motion, and force, applied to the teaching of motor skills.

Prerequisite, Physical Education 42 or its equivalent. *Credit, 3.* Mr. James.

236. EXPERIMENTAL PHYSIOLOGY OF EXERCISE.

The experimental investigation of the physiological effects of exercise.

Prerequisite, Physical Education 78 or its equivalent.

Credit, 3. Mr. Ricci.

238. KINESTHETIC FORM.

The problem of the definition of form in movement as it relates to learning.

Credit, 3. Miss Hubbard.

245. DANCE COMPOSITION.

A survey of various theories of dance composition, providing experience in the composition, presentation, and critical evaluation of dances.

Credit, 3. Miss Roby or Miss Reid.

247. COMPARATIVE THEORY AND METHOD OF DANCE EDUCATION.

Educational aims of dance. The expressive purpose and formal principles common to various types of dance included in the curriculum; the use of resources provided by the theory and method of leading dance artists.

Credit, 3. Miss Hubbard.

300. MASTER'S THESIS.

Credit, 6. The Staff.

COURSE FOR MINOR CREDIT ONLY

The following course may not be counted toward the M.S. Degree in Physical Education.

180. DRIVER EDUCATION INSTRUCTION COURSE.

Driver education and driver training at the instructor's level. Leads to certification as instructor in driver education and driver training.

Credit, 3. Mr. Briggs.

PHYSICS

Graduate Faculty: Philip Rosen, Head of Department, W. D. Foland, P. R. Jones, I. Kang, R. A. Patten, S. R. Sastry, E. A. Soltysik, J. D. Trimmer.

Candidates planning to major in Physics should have completed at least (preferably, more than) fifteen semester credit hours in undergraduate physics beyond an introductory course (such as Physics 5, 6, 7) and also six credits of mathematics beyond a full year of college-level calculus.

Requirements for the Master's Degree normally include six credits of work devoted to thesis; by special arrangement, the thesis may be replaced by six credits of class work plus a general written examination.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS.

Credit, 1-6. The Staff.

201, 202. THEORETICAL PHYSICS.

Topics in theoretical physics, with emphasis on classical mechanics (methods of Lagrange, Hamilton, and Jacobi) and on electromagnetic fields in continuous media.

Prerequisites, Physics 52 and 56 and Mathematics 92.

Credit, 3 each semester. Mr. Kang.

203, 204. METHODS OF MATHEMATICAL PHYSICS.

Selected topics with applications to physics in vector and tensor analysis, vector spaces, Hilbert spaces and integral transforms, complex variables, Green's functions, partial differential equations.

Prerequisite, Mathematics 185 or consent of instructor.

Credit, 3 each semester. Mr. Foland.

211, 212. QUANTUM THEORY.

Elements of wave mechanics, matrix mechanics, and transformation theory. Applications in atomic and nuclear physics.

Prerequisites, Physics 201 for 211; Physics 211 for 212.

Credit, 3 each semester. Mr. Soltysik.

300. THESIS, MASTER'S DEGREE.

Credit, 6.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

166. KINETIC THEORY.

Classical kinetic theory of gases, with an introduction to phenomena in the non-uniform gas.

Prerequisite, Physics 155.

Credit, 3. Mr. Soltysik.

167. STATISTICAL MECHANICS AND INFORMATION THEORY.

A study of the concepts of entropy, information, and order.

Prerequisite, Physics 161.

Credit, 3. Mr. Trimmer.

185, 186. MODERN PHYSICS.

Lectures and problems on Twentieth-century physics, the first semester devoted principally to atomic aspects, the second to nuclear.

Prerequisites, Physics 152 and six other credits in junior-senior physics.

Credit, 3 each semester. Mr. Sastry.

188. SOLID STATE PHYSICS.

An introduction to theoretical and experimental physics of the solid state.

Prerequisite, Physics 185.

Credit, 3. Mr. Patten.

191. GASEOUS ELECTRONICS.

Electrical conduction in gases, interactions of space charge and electromagnetic waves, plasmas.

Prerequisite, Physics 152 or equivalent.

Credit, 3. Mr. Trimmer.

197, 198 ADVANCED EXPERIMENTAL WORK IN SELECTED TOPICS.

These courses provide experiments adapted to the needs of the individual student, for training in laboratory techniques and methods of measurement.

Two laboratory hours per credit.

Prerequisites, Physics 151, 152 or 155, 156; and Mathematics 25.

Credit, 1-3 each semester. Mr. Patten.

PHYSICS/POULTRY SCIENCE

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Physics)

151, 152. ELECTRICITY AND MAGNETISM.

The basic phenomena and laws of electricity and magnetism. Measurement, with an introduction to circuitry and electronics.

Two class hours, one 2-hour laboratory period.

Prerequisites, Physics 4 or 7, Mathematics 25.

Credit, 3 each semester. Mr. Jones.

155, 156. MECHANICS.

Development of the fundamental concepts of dynamics with applications to particles and rigid bodies in translation and rotation.

Prerequisites, Physics 4 or 7, Mathematics 25.

Credit, 3 each semester. Mr. Foland.

160. SOUND AND ACOUSTICS.

Vibrations, coupled systems, sound structure, and acoustic properties; principles and applications.

Prerequisites, Physics 4 or 7, Mathematics 25.

Credit, 3. Mr. Trimmer.

161. HEAT AND THERMODYNAMICS.

Heat exchanges and related energy changes in systems of matter.

Prerequisites, Physics 4 or 7, Mathematics 25.

Credit, 3. Mr. Crooker.

163. OPTICS.

An intermediate course in geometrical and physical optics.

Two class hours, one 2-hour laboratory period.

Prerequisites, Physics 4 or 7, Mathematics 10.

Credit, 3. Mr. Crooker.

POULTRY SCIENCE

Graduate Faculty: Thomas W. Fox, Head of Department, Donald L. Anderson, William J. Mellen, J. Robert Smyth, Jr., David K. Wetherbee.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS.

Research problems or critical literature review in avian genetics, physiology or nutrition not related to the candidate's thesis.

Credit, 1-6. The Staff.

204. AVIAN GENETICS.

Lectures covering the classical and physiological genetics of morphological traits of avian species. Particular emphasis is given to melanogenesis and characteristics involving epidermal structures.

Prerequisites, one year's training in biology and Zoology 153 or its equivalent.

Credit, 3. Mr. Smyth.

205. GENETICS OF PRODUCTIVE TRAITS.

Lectures and reports on the genetics of meat production and reproduction. Special emphasis is placed on the physiological genetics of fertility and embryogenesis.

Prerequisites, one year's training in biology and Zoology or its equivalent.

Credit, 2. Mr. Smyth.

206. QUANTITATIVE INHERITANCE AND SELECTION.

The principles of population genetics and quantitative inheritance as applied to selection for traits of economic importance in poultry; theoretical and practical considerations of breeding systems.

Prerequisites, Poultry 205, Zoology 153, Statistics 177 or equivalent.

Credit, 3. Mr. Fox.

207. ADVANCED POULTRY NUTRITION.

Lectures, reports and discussions of significant research developments and theories in avian nutrition.

Prerequisites, Chemistry 151, 152 and 179; and Animal Science 155 or its equivalent.

Credit, 3. Mr. Anderson.

208. ADVANCED POULTRY PHYSIOLOGY.

Lectures and reports on specific problems in avian physiology.

Prerequisites, Chemistry 179 and Zoology 35, or equivalent.

Credit, 3. Mr. Mellen.

250, 251. SEMINAR.—REVIEW OF CURRENT LITERATURE.

Credit, 1 each semester. The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 10.

400. THESIS, PH.D. DEGREE.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

AN. SCI. 150. ANIMAL PHYSIOLOGY.

A comparative study of the physiology of mammals and birds, with emphasis on those aspects most pertinent to animal science.

Three class hours, one 3-hour laboratory period.

Prerequisite, Zoology 35.

Credit, 4. Mr. Black.

AN. SCI. 161. PRINCIPLES OF ANIMAL NUTRITION.

Scientific principles of nutrition, emphasizing the basic biochemical and physiological concepts underlying the specific functions and interrelationships of the nutrients required for maintenance, production, and reproduction in both ruminants and non-ruminants.

Credit, 3. Mr. Anderson.

AN. SCI. 167. PHYSIOLOGY OF REPRODUCTION.

Comparative aspects of anatomy, embryology, endocrinology and physiology of reproduction and lactation.

Three class hours, one 2-hour laboratory period.

Credit, 4. Mr. Black.

AN. SCI. 168. COMPARATIVE ANIMAL GENETICS.

The mechanisms of heredity and variation in livestock and poultry; the role of selection and breeding systems in genetic improvement and their evaluation.

Prerequisite, Zoology 153.

Credit, 3. Mr. Fox.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR
CREDIT MAY BE GIVEN

Graduate courses in Agronomy, Animal Science, Microbiology, Chemistry, Home Economics, and Zoology may be approved for major credit.

POULTRY SCIENCE/PSYCHOLOGY

COURSE FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Poultry Science)

135. ADVANCED POULTRY SCIENCE.

A critical review of research in any one of the following fields: (a) genetics and Physiology, (b) nutrition, (c) marketing, or (d) production management. Three written reports and a comprehensive final examination are required. Designed for teachers of vocational agriculture. *Credit, 3. The Staff.*

PSYCHOLOGY

Graduate Faculty: C. C. Neet, Head of Department, B. G. Berenson, M. Budoff, E. Dzendolet, S. Epstein, R. S. Feldman, A. E. Goss, R. H. Harrison, S. L. Kates, D. W. Lewit, J. W. Moore, J. L. Myers, N. A. Myers, L. E. Price, W. B. Simon, J. A. Southworth, W. H. Teichner, A. Trehub.

The graduate student majoring in Psychology may orient his program toward either the Doctor of Philosophy degree or the Master of Science degree. Areas of concentration leading to the Ph.D. are: child, clinical, counseling, engineering, learning, personality-abnormal, physiological, sensory, and social psychology.

Students taking the doctorate must satisfy the general requirements of the Graduate School for the degree. They must also complete the course requirements of their area of specialization. A list of these requirements will be supplied on request to the Department. The doctorate program provides practicum courses in each of the applied specialization areas. Institutions and agencies available for such field work include Belchertown State Hospital, Clarke School for the Deaf, Department of Psychology Child Guidance Clinic, Hartford V. A. Mental Hygiene Clinic, Holyoke Mental Health Clinic, Monson State Hospital, Northampton State Hospital, Northampton V. A. Hospital, Springfield Child Guidance Clinic, Springfield V. A. Mental Hygiene Clinic, University Guidance and Counseling Services, University Nursery School, Worcester V. A. Mental Hygiene Clinic, Worcester Youth Guidance Center, and various industrial concerns in nearby towns.

All students qualifying for the Master of Science degree in Psychology must, in addition to meeting the degree requirements of the Graduate School, take course 175 and either 200 or 300. A final oral examination, given by the problem or thesis committee and the Department, is required. Credits taken to satisfy the requirements for the Master's degree can be applied to the total number of credits required for the doctorate.

Students applying for admission for either the Doctor's or Master's degree program, in addition to meeting the requirements of the Graduate School, should have taken an Introductory course and 18 additional undergraduate credits in Psychology, including a course in laboratory experimental psychology, or the equivalent, and a course in Statistics. In case the student has not taken this number of credits or lacks these courses, he may be allowed to make up the deficiencies in the Undergraduate School of the University. In exceptional cases, students with entrance deficiencies may, at the end of one semester's study, petition the Department to waive remaining undergraduate deficiencies.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. PROBLEM IN PSYCHOLOGY.

A research project which may be taken in lieu of the master's thesis, or by doctoral students as minor research. *Credit, 4-6.* The Staff.

202. NEURAL CORRELATES OF BEHAVIOR.

A study of neurophysiological processes related to behavior. Topics considered are neuroelectric phenomena, psychopharmacology, neurophysiology of learning, and drive-reward systems.

Prerequisite, Psychology 163 or equivalent. *Credit, 3.* Mr. Feldman.

203. LEARNING I.

The basic laws of learning, and relevant research techniques.

Credit, 3. Mr. Moore.

204. LEARNING II.

The implications of the basic laws of learning for explaining complex behavior.

Prerequisite, Psychology 203.

Credit, 3. Mr. Moore.

205. VERBAL BEHAVIOR AND LEARNING.

Methods, situations, and variables involved in assessments of verbal repertoires and in investigations of changes in those repertoires.

Two class hours, one 2-hour laboratory period.

Prerequisite, Psychology 203 or 204 or equivalent.

Credit, 3. Mr. Goss.

206. MOTOR LEARNING AND PERFORMANCE.

Measures of motor learning and performance, pertinent tasks, and conditions influencing learning and performance.

Two class hours, one 2-hour laboratory period.

Prerequisite, Psychology 203 or 204 or equivalent.

Credit, 3. Mr. Goss and Mr. Seibel.

207. SYSTEMATIC PSYCHOLOGY.

The general structure of psychological theory and an historical and comparative consideration of the backgrounds, viewpoints on scientific methodology, research interests and techniques, and the component variables, hypotheses, and laws of structural, Gestalt, functional, and behavioristic movements.

Credit, 3. Mr. Goss.

208. PERCEPTION.

Methods, data, and theory concerning such phenomena as perception of movement, time and frequency, space, form and pattern, and attention.

Two class hours, one 2-hour laboratory period.

Prerequisites, Psychology 211 or 212 or equivalent and Psychology 203 or 204 or equivalent.

Credit, 3. Mr. Teichner.

210. EMOTION AND MOTIVATION.

The nature, determinants, and interrelationships of emotion and motivation; the techniques involved in investigating these phenomena.

Credit, 3. Mr. Wagner.

211. SENSORY PROCESSES I.

Auditory and cutaneous senses; the fundamental data with their implications concerning functioning of these systems.

Prerequisites, Psychology 51 or 6 credits of advanced Psychology and 3 hours of Zoology or the equivalent.

Credit, 3. Mr. Dzendolek.

PSYCHOLOGY

212. SENSORY PROCESSES II.

Visual, gustatory and olfactory senses; the fundamental data with their implications concerning functioning of these systems.

Prerequisites, Psychology 51 or 211 or 6 credits of advanced Psychology and 3 hours of Zoology or the equivalent. *Credit, 3.* Mr. Dzenolet.

213. TEST CONSTRUCTION I.

Theory and practice of the construction and analysis of tests; correlation procedures; reliability; validity; item analysis; test weights; introduction to factor analysis techniques.

Prerequisite, Psychology 175, previously or concurrently.

Credit, 3. Mr. Manley.

214. TEST CONSTRUCTION II.

Measurement theory; psychophysical methods; construction, analysis, and comparison of various attitude scales.

Prerequisite, Psychology 213.

Credit, 3. Mr. Manley.

215. QUANTITATIVE METHODS IN PSYCHOLOGY.

Curve fitting, information theory descriptions of data, analyses of curves in terms of harmonic motion, auto- and cross-correlation.

Prerequisite, Psychology 175 or equivalent.

Credit, 3. Mr. Moore.

216. ADVANCED APPLIED STATISTICS.

Various experimental designs, the assumptions underlying their use, and the appropriate statistical analyses; orthogonal and randomized designs, trend analysis, non-parametric techniques, and multi-variate analysis.

Prerequisite, Psychology 175 or its equivalent.

Credit, 3. Mr. Myers.

218. QUANTITATIVE THEORIES OF BEHAVIOR.

Several theories which generate quantitative predictions of behavior are presented. For each of several experimental situations of varying complexity, mathematical developments of model are discussed and adequacy of description of data evaluated.

Prerequisites, Psychology 175 and 203 or 204 or equivalent.

Credit, 3. Mr. Myers.

219. FACTOR ANALYSIS.

Theory and methods of factor analysis in psychological research.

Prerequisite, Psychology 213 or equivalent.

Credit, 3. Mr. Manley.

221. ATTITUDES AND SOCIAL PERCEPTION.

Cognitive mechanisms in social behavior; experimental and survey techniques in the study of social perception, attitudes, and attitude change.

Two class hours, one 2-hour laboratory period.

Prerequisite, Psychology 61 or equivalent.

Credit, 3. Mr. Lewit.

222. GROUP DYNAMICS.

Interpersonal behavior in small groups, with attention to group structure, individual factors, communication, and experimental techniques.

Two class hours, one 2-hour laboratory period.

Prerequisite, Psychology 62 or equivalent.

Credit, 3. Mr. Lewit.

226. THEORIES OF PERSONALITY.

Problems and sources of data relating to the study of personality. An evaluation of the contributions of psychological theories, and an approach to an integrated theory.

Prerequisite, Psychology 207.

Credit, 3. Mr. Harrison.

230. PSYCHOANALYTIC THEORY.

The original theoretical writings of Freud, other orthodox psychoanalysts and selected neo-Freudians. Emphasis will be placed on the historical development of the key psychoanalytic concepts and on the reasons for their revision.

Prerequisite, one of the following: Psychology 79, 90, 226 or consent of the instructor.

Credit, 3. Mr. Simon and Mr. Harrison.

235. ADVANCED ABNORMAL PSYCHOLOGY.

Behavior disorders and their relationships to normal behavior, with major emphasis on theories of etiology and symptom formation, and on general problems of therapy.

Prerequisite, Psychology 83 or the consent of the instructor.

Credit, 3. Mr. Neet.

242. LEARNING AND MOTIVATION IN CHILDREN I.

Analysis of experiments on learning and motivation in simple situations with children.

Two class hours, one 2-hour laboratory period.

Prerequisite, Psychology 203 or 65 or consent of instructor.

Credit, 3. Mr. Price.

243. LEARNING AND MOTIVATION IN CHILDREN II.

Analysis of experiments on learning and motivation in complex situations with children. Topics include rote learning, transfer and retention, and concept formation.

Two class hours, one 2-hour laboratory period.

Prerequisite, Psychology 203 or 242 or consent of the instructor.

Credit, 3. Mr. Price.

244. PERSONALITY AND SOCIAL DEVELOPMENT IN CHILDREN.

Review and analysis of the literature on personality development and the socialization process in children.

Prerequisites, Psychology 65, 79 or their equivalent.

Credit, 3. Mr. Schumer.

245. THE PSYCHOLOGY OF EXCEPTIONAL CHILDREN.

The etiology, diagnosis, and treatment of exceptional children, with special emphasis on intellectual, social, physical and sensory deviations.

Prerequisites, Psychology 82 and 83 or 235 and 65. Students having only two of these three prerequisites may take the course on consent of the instructor.

Credit, 3. Mr. Budoff.

246. DIAGNOSIS AND TREATMENT OF BEHAVIOR DISORDERS IN CHILDREN.

The diagnosis and treatment of psychological maladjustments in infancy and childhood; treatment procedures, resources, and methods used in dealing with behavior and personality problems. Lectures, discussions and case demonstrations.

Prerequisites, Psychology 182 and 83 or 235, 65 or 242, 252 and 253.

Credit, 3. Mr. Budoff.

PSYCHOLOGY

250. FUNDAMENTALS OF CLINICAL PRACTICE.

The aim of the course is to provide a foundation for advanced courses in clinical psychology. Topics covered include history, professional problems, clinical theories, the clinical method, and fundamentals of diagnosis and treatment of emotional disturbances.

Credit, 3. Mr. Epstein.

252. DIAGNOSTIC METHODS I.

The methods of administration and of the scoring procedures of a variety of diagnostic methods with emphasis on the Rorschach and Thematic Apperception Test.

Prerequisite, Psychology 182.

Credit, 3. Mr. Harrison and Mr. Simon.

253. DIAGNOSTIC METHODS II.

Basic interpretive procedures of diagnostic devices with emphasis on the Rorschach and Thematic Apperception Test.

Prerequisite, Psychology 252.

Credit, 3. Mr. Epstein.

255. PSYCHOTHERAPY I.

Analyses of techniques of individual psychotherapy. The student may elect concurrently a practicum in psychotherapy in which a therapy case, under supervision, will be carried in one of the following facilities: child guidance clinic, student counseling center, mental hospital.

Prerequisites, Psychology 226, 235, 252 and 253.

Credit, 3. Mr. Kates.

256. PSYCHOTHERAPY II.

Analyses of group and specialized techniques of psychotherapy. The student will elect concurrently a practicum in which supervised practice in one or more group psychotherapeutic methods will be given.

Prerequisites, Psychology 226, 235, 252, 253 and 255.

Credit, 3. Mr. Kates.

257, 258. SEMINAR.

Selected topics of current significance in psychology. Research studies will be analyzed and theoretical advances explored.

Either semester may be elected independently. Both may be taken only with change in topic.

Prerequisite, permission of instructor.

Credit, 2 each semester. Maximum credit, 6. The Staff.

265. COUNSELING THEORIES AND TECHNIQUES.

A detailed consideration of current theories and techniques employed in counseling psychology.

Prerequisites, Psychology 79, 81 and 182 or permission of instructor.

Credit, 3. Mr. Southworth and Mr. Berenson.

271. ADVANCED INDUSTRIAL PSYCHOLOGY I.

Human factors in work and performance; interrelationships of motivational and perceptual phenomena to the working environment.

Prerequisite, Psychology 186 or permission of instructor.

Credit, 3. Mr. Teichner.

272. ADVANCED INDUSTRIAL PSYCHOLOGY.

The theory and principles of man-machine-environment systems, with special attention to description, analysis, and synthesis in terms of information theory, servo analogues, psychophysiological effects, and operations research. Operations research will be considered only as it applies to the context of industrial psychology.

Prerequisites, Psychology 186 and 271.

Credit, 3. Mr. Teichner.

283, 284. PRACTICUM.

Practice in the application of psychological techniques to the following areas of psychology: child, clinical, counseling, industrial, and social. Either semester may be elected independently. *Total credit, 3-12.* The Staff, with the Staffs of cooperating institutions and agencies.

295, 296. RESEARCH METHODOLOGY.

A study and evaluation of research methods and of problems in the major fields of psychology. *Credit, 2 each semester.* The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 8-10.

400. THESIS, PH.D. DEGREE.

Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

161. SOCIAL PSYCHOLOGY I.

Development, interrelationships, and functions of attitudes. Emphasis upon religious and political behavior, psychoanalytic and behavioristic theories of prejudice, attitude measurement, propaganda, group persuasion. Survey project. Three class hours.

Prerequisite, Psychology 1 or 5.

Credit, 3. Mr. Lewit.

162. SOCIAL PSYCHOLOGY II.

Individual behavior in groups. Interpersonal perception and communication. Norms, power, leadership, and coalition formation. Individual motivation and group problem-solving.

Three class hours.

Prerequisite, Psychology 1 or 5.

Credit, 3. Mr. Lewit.

163. PHYSIOLOGICAL PSYCHOLOGY.

The neurophysiological bases of behavior. The structural and functional relationships among the nervous system, sense and effector organs and drives.

Prerequisites, Psychology 1 or 5 and a year of Zoology. *Credit 3.* Mr. Feldman.

166. ADOLESCENT PSYCHOLOGY.

A consideration of the development, and emotional, social and intellectual adjustment of the individual during the adolescent years.

Three class hours.

Prerequisite, Psychology 1 or 5.

Credit, 3. Mr. Price.

172. ADVANCED EXPERIMENTAL PSYCHOLOGY.

The literature, techniques, and apparatus of experimental psychology. Selected projects carried out individually by the members of the class.

One class hour, two 2-hour laboratory periods.

Prerequisite, Psychology 51 or 52 or 53; Zoology 35. *Credit, 3.* Mr. Dzendolet.

175. PSYCHOLOGICAL STATISTICS.

The application of statistical procedures to the analysis of psychological data and to problems of measurement in psychology and related fields.

Two class hours, one 2-hour laboratory period.

Prerequisites, Psychology 1 or 5, Statistics 50 or Mathematics 64.

Credit, 3. Mr. Myers.

PSYCHOLOGY

181. PSYCHOLOGICAL TESTS.

Survey of tests of intelligence, aptitude, interest, personality and adjustment. Test rationale construction, characteristics, uses of evaluation are emphasized. Two class hours, one 2-hour laboratory period.

Prerequisite, Psychology 1 or 5.

Credit, 3. Mr. Schumer.

182. PSYCHOLOGICAL TESTS, INDIVIDUAL INTELLIGENCE TESTS.

A study of theories of intelligence and of individual intelligence tests.

Two class hours, one 2-hour laboratory period.

Prerequisite, Psychology 1 or 5.

Credit, 3. Mr. Budoff.

185. INDUSTRIAL PSYCHOLOGY I.

Psychological principles underlying personnel selection and training, communication and decision-making in industry.

Three class hours.

Prerequisite, Psychology 1 or 5.

Credit, 3. Mr. Teichner.

186. INDUSTRIAL PSYCHOLOGY II.

The application of human factors data to the analysis, evaluation, design and use of man-machine systems and equipment. Emphasis is on analysis of human abilities and limitations of speed, accuracy, perception and decision processes.

Three class hours.

Prerequisite, Psychology 1 or 5.

Credit, 3. Mr. Teichner.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Psychology)

151. SENSATION AND PERCEPTION.

A study of the data, theories and the methods of studying sensation and perception.

Two class hours, one 2-hour laboratory period.

Prerequisites, any two of Psychology 1, 5, 6 or 1 or 5 and consent of instructor.

Credit, 3. Mr. Dzenolet.

152. LEARNING AND THINKING.

A consideration of the effects and conditions of practice on acquisition, generalization, discrimination, transfer, retention and extinction phenomena.

Two class hours, one 2-hour laboratory period.

Prerequisites, any two of Psychology 1, 5, 6 or 1 or 5 and consent of instructor.

Credit, 3. Mr. Moore.

153. MOTIVATION.

The data, theories and the methods of investigating motivation. Topics include primary drives, emotions, frustration and conflict, and learned drives.

Two class hours, one 2-hour laboratory period.

Prerequisites, any two of Psychology 1, 5, 6 or 1 or 5 and consent of instructor.

Credit, 3. Mr. Wagner.

156. EDUCATIONAL PSYCHOLOGY.

Psychological principles and facts fundamental to educational situations. Major areas studied are: learner, learning, adjustment, guidance, teacher, teaching methods, evaluation and measurement.

Three class hours.

Prerequisite, Psychology 1 or 5.

Credit, 3. Mr. Schumer.

165. CHILD PSYCHOLOGY.

The psychological development of the child including maturation and development of behavior, language, emotions, intelligence, social behavior, motivation and personality. Nursery school observation and practice.

Three class hours.

Prerequisite, Psychology 1 or 5.

Credit, 3. Mr. Price.

167. INTRODUCTION TO THE STUDY OF EXCEPTIONAL CHILDREN.

Emphasis is on the etiology, diagnosis, characteristics, education and prognosis of deviations in mental, physical and socio-emotional development.

Three class hours.

Prerequisite, Psychology 65 or consent of the instructor. *Credit, 3.* Mr. Budoff.

179. PERSONALITY.

An introduction to the scientific study of personality. Topics include psychoanalytic and cognitive approaches, the influence of social-cultural conditions, personality types and learning.

Three class hours.

Prerequisite, Psychology 1 or 5.

Credit, 3. Mr. Kates.

183. ABNORMAL PSYCHOLOGY.

The etiology, symptoms and therapy of behavior abnormalities including the neuroses, psychoses, epilepsies, speech disorders and mental deficiency. Hospital trips and clinics.

Three class hours.

Prerequisite, Psychology 1 or 5.

Credit, 3. Mr. Neet.

187. PSYCHOLOGY OF OCCUPATIONS.

A study of interests, abilities and attitudes related to occupational selection, proficiency, and satisfaction. Psychological techniques fundamental to occupational research are emphasized.

Three class hours.

Prerequisite, Psychology 81.

Credit, 3. Mr. Field.

188. THEORIES AND TECHNIQUES OF COUNSELING AND GUIDANCE.

The theories, techniques and tests necessary in counseling and guidance. Practice in organizing and evaluating relevant data in the analysis of illustrative cases.

Two class hours, one 2-hour laboratory period.

Prerequisite, Psychology 81 or consent of the instructor.

Credit, 3. Mr. Berenson.

190. CONTEMPORARY PSYCHOLOGIES.

A logical, historical, and systematic analysis of contemporary psychological theories, including structuralism, functionalism, Gestalt and organistic psychologies, psychoanalysis, and behaviorisms.

Three class hours.

Prerequisite, Psychology 1 or 5.

Credit, 3. Mr. Goss.

192. CLINICAL PSYCHOLOGY.

An introduction to the theoretical approach and methods used in understanding and treating the psychologically-disturbed individual.

Two class hours, one 2-hour laboratory period.

Prerequisite, Psychology 83 or consent of the instructor. *Credit, 3.* Mr. Epstein.

PUBLIC HEALTH

PUBLIC HEALTH

Graduate Faculty: R. W. Gage, M.D., Head of Department.

Students interested in pursuing investigation or obtaining training in the various areas of public health will be accepted if previous experience indicates an aptitude for graduate study. In general, the course of study will lead to the degree of Master of Science in Public Health. A cooperative program will be arranged with other departments in the event of special interest or need.

Applicants must satisfy the entrance requirements of the Graduate School. Usually they will be best prepared by having completed an undergraduate major in physical or biological science; they may in special circumstances be accepted with other undergraduate major training. Experience in health services may be accepted in lieu of specific undergraduate requirements.

COURSES OPEN TO GRADUATE STUDENTS ONLY (For either major or minor credit)

200. SPECIAL PROBLEMS IN PUBLIC HEALTH.

Special investigational or research problems in public health for advanced students. The scope of the work can be varied to meet specific conditions.

Credit, 3-6. The Staff.

201. PUBLIC HEALTH LAW.

The uses and limitations of law in disease control. Individual work includes studies of court decisions and the preparation of administrative regulations.

Credit, 3. Mr. Wisnieski.

202. METHODS OF PUBLIC HEALTH EDUCATION.

The classical health education efforts that have favorably influenced community health. Individual work involves the preparation of pamphlets and exhibits, setting up demonstrations, and arranging short courses for adult groups.

Credit, 3. Mr. Wisnieski.

203. THE PLANNING OF ENVIRONMENTAL HEALTH PROGRAMS.

Principles of environmental health are translated into community programs planned to meet attainable objectives. Sanitary surveys and rating systems are studied as measuring devices for the practical effect of programs.

Credit, 3. Mr. Wisnieski.

206. ADVANCED EPIDEMIOLOGY.

Lectures and discussions on the principles and methods of epidemiological investigation, with laboratory work in assembling and analyzing crude data resulting from field investigations of epidemics.

Prerequisite, Public Health 188 or equivalent.

Credit, 3. The Staff.

207. SEMINAR.

Lectures and reports on current literature and special topics. (Credits 1-4. Maximum credit, 4.)

Credit 1-4. The Staff.

300. THESIS, MASTER'S DEGREE.

Independent research leading to the preparation of a thesis that will make an original contribution to public health literature. Results should be suitable for publication. The thesis is optional for M.S. candidates who have had sufficient training in public health before entering graduate school to profit more from thesis research than from additional courses.

Credit, 10.

PUBLIC HEALTH

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS (For either major or minor credit)

161 (I), 162 (II). ENVIRONMENTAL HEALTH.

The influence of health measures on community welfare with emphasis on all phases of environmental health. *Credit, 3.* Mr. Wisnieski.

163 (I). INDUSTRIAL HYGIENE AND SANITATION.

The practices and principles of industrial processes involved in industrial health and sanitation. *Credit, 3.* Mr. Perriello.

164 (II). MICROSCOPY OF WATER.

Miscoscopic forms of life exclusive of the bacteria. Counting and control of plankton in potable waters. Elements of limnology. Three class hours, one 2-hour laboratory period. *Credit, 3.* Mr. Perriello.

181 (II). APPLIED PUBLIC HEALTH BACTERIOLOGY.

Standard methods used in present day applied bacteriology. Areas of study include: soils, dairy products, water and shellfish, and air. Prerequisite, Microbiology 51 or permission of instructor. Two class hours, two 2-hour laboratory periods. *Credit, 3.* Mr. Perriello.

184 (II). PUBLIC HEALTH ADMINISTRATION.

The organization, function, and administration of governmental health agencies including: public health laws, regulations, and sanitary codes, their origin and enforcement. *Credit, 3.* Mr. Perriello.

186 (II). PUBLIC HEALTH STATISTICS.

Evaluation of environmental health practices using graphical summaries and biostatistical methods. One class hour, one 4-hour laboratory period. Prerequisites, Public Health 161 and 162. *Credit, 2.* Mr. Wisnieski.

188 (II). EPIDEMIOLOGY AND COMMUNICABLE DISEASE CONTROL.

The general principles of the spread of infections, supported through the study of the communicable diseases, grouped according to their modes of transmission. Prerequisite, Microbiology 1 or permission of instructor. *Credit, 3.* Mr. Wisnieski.

190. SANITARY BACTERIOLOGY.

Sample collections and laboratory procedures in stream pollution studies, standard methods of bacteriological examination of foods, food poisonings and infections. Prerequisite, Applied Public Health Bacteriology 81 or permission of instructor. One 4-hour and one 2-hour laboratory periods. *Credit, 3.* Mr. Perriello.

194 (SUMMER). SUPERVISED FIELD TRAINING.

A thirteen-week field training program with an official agency under the supervision of the Staff. This is a prerequisite for professional placement. *Credit, 3-6.* The Staff.

ROMANCE LANGUAGES

ROMANCE LANGUAGES

Graduate Faculty: R. E. Taylor, Head of Department, N. J. Araujo, S. M. Greenfield, R. B. Johnson, A. G. Raymond, I. P. Rothberg, S. C. Goding.

Requirements for admission to candidacy for the M.A. in French or Spanish in the Department of Romance Languages:

1. Oral and written proficiency in the language of specialization as established by preliminary examination.
2. A reading knowledge of a second modern foreign language.

Course requirements for the M.A.:

1. Romance Language 200 (6 credits) or 300.
2. Terminal examinations as follows:
 - a. Comprehensive examination.
 - b. For those electing Romance Language 300, oral defense of thesis.
 - c. For those electing Romance Language 200, oral defense of problem.

Students are urged to elect Romance Language 201 and Linguistics 197. Students electing Romance Language 201 must possess a basic knowledge of Latin.

THE FOUR-COLLEGE COOPERATIVE Ph.D. IN FRENCH

The University of Massachusetts requirements for admission to the Graduate School require "acceptance by the Department." For the Cooperative Ph.D. in French, acceptance is by all four departments.

In addition to the general requirements at the University of Massachusetts, the following special requirements must be met:

1. Required courses:
 - a. One semester of Old French readings.
 - b. One semester of French Philology, including an introduction to Vulgar Latin.
 - c. One semester of Linguistics.
 - d. 400, Ph.D. thesis.
2. A minor consisting of a minimum of 15 credits in an allied field, subject to the approval of the Guidance Committee.
3. A reading knowledge of a second Romance Language and of German or a major language outside the Romance group.
4. Candidates planning on writing a thesis on the Medieval or the Renaissance field must have a reading knowledge of Latin.
5. An oral examination as part of the preliminary comprehensive examination.
6. A comprehensive knowledge of the whole body of French literature.
7. A thorough knowledge of the candidate's special field.
8. A knowledge of Linguistics as well as the ability to read and speak the language.
9. Evidence of knowledge of the history and culture of France.
10. Evidence of the ability to teach French.
11. Credit for a grade of "C" will be given only if permitted by the institution in which the course is taken.
12. Strongly recommended:
 - a. One semester of Advanced Phonetics.
 - b. A period of residence in France.

ROMANCE LANGUAGES

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. PROBLEM COURSE.

Directed study in some phase of linguistics or literature. *Credit, 3-6.* The Staff.

201. INTRODUCTION TO PHILOLOGY.

The development of Romance Languages from Latin: phonology, morphology, and syntax. Given as needed. *Credit, 3.* The Staff.

202. OLD FRENCH OR OLD SPANISH READINGS.

A study of the early monuments of French or Spanish literature. Given as needed. *Credit, 3.* The Staff.

203, 204. AREA STUDIES IN FRENCH OR HISPANIC CIVILIZATION.

French and Hispanic cultures as manifested in artistic, intellectual and human achievements. Given as needed. *Credit, 3 each semester.* The Staff.

205, 206. ADVANCED STUDIES IN FRENCH OR HISPANIC LITERATURE.

Specialized studies of literary genres or single authors. Given as needed.

Credit, 3 each semester. The Staff.

207, 208. THE CRAFT OF FICTION IN THE MODERN FRENCH NOVEL.

The goal of the course will be to explore different modes in the treatment of realism through a study of the craft of fiction of individual novelists. Given as needed. *Credit, 3.* The Staff.

215, 216. SEMINAR IN FRENCH OR SPANISH.

Comprehensive training leading to the now requisite oral mastery of French, to correct grammatical techniques and analyses, to accurate explication de texte, to linguistics and to present-day pedagogical procedures.

Credit, 2-3 each semester. Maximum credit, 6. The Staff.

235. HISTORY OF THE FRENCH LANGUAGE.

Credit, 3. The Staff.

254. FRENCH PHILOLOGY.

Credit, 3. The Staff.

285, 286. SPECIAL STUDIES IN 19TH CENTURY FRENCH LITERATURE.

Credit, 3 each semester. The Staff.

300. THESIS, MASTER'S DEGREE.

Maximum credit, 10.

400. THESIS, PH.D. DEGREE.

Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

Courses in French

151. FRENCH LITERATURE OF THE EIGHTEENTH CENTURY.

The chief writers of the Age of Enlightenment.

Conducted in French.

Credit, 3. Mr. Taylor.

153, 154. FRENCH LITERATURE OF THE TWENTIETH CENTURY.

The modern French Theatre from Scribe to the present. (One semester.) A study of the Modern French Novel from Proust to the present. (One semester.)

Credit, 3 each semester. The Staff.

ROMANCE LANGUAGES

155, 156. FRENCH LITERATURE OF THE SEVENTEENTH CENTURY.

The Classic period with readings from the most representative works.

Credit, 3 each semester. Mr. Taylor and Mr. Johnson.

157, 158. FRENCH LITERATURE OF THE NINETEENTH CENTURY.

A detailed study of the more important authors and movements.

Credit, 3 each semester. Mr. Goding.

175. COURS DE STYLE.

Syntax and idiom at an advanced level. The student is taught how to express himself clearly and logically in living French. Given as needed.

Credit, 2 each semester. Mr. Smith.

177. THE FRENCH RENAISSANCE I.

A study of the major writers of the Sixteenth Century with appropriate attention to important humanistic and artistic developments.

Credit, 2. The Staff.

178. ADVANCED FRENCH STUDIES II.

A special study of a French author or literary genre. Subject to be announced at the end of the preceding academic year.

Credit, 2. The Staff.

179. FRENCH CIVILIZATION.

A study of those elements which lie back of the cultural contribution of France to world civilization, including arts, sciences, school systems, the press, the family, social classes, influences of history and geography. The assigned reading will be drawn from contemporary French literature.

1963-64 and each alternate year.

Credit, 3. Mr. Mankin.

180. ADVANCED LANGUAGE STUDY.

Methods of teaching review of grammar and pronunciation.

Credit, 3. Mr. Goding.

181, 182. CONTEMPORARY FRENCH POETRY.

French poetry from Nerval to the present. Study of French verse structure. Explanations de texte. Conducted in French.

Credit, 3 each semester. Mr. Johnson.

Courses in Spanish

164. ADVANCED SPANISH COMPOSITION AND SYNTAX.

A study of syntax and idioms, and those more advanced and difficult elements which constitute stylistics.

Credit, 3.

179. SPANISH LITERATURE OF THE NINETEENTH CENTURY.

A study of the major writers and literary movements of the period.

1963-64 and each alternate year.

Credit, 3. Mr. Greenfield.

180. SPANISH-AMERICAN LITERATURE OF 1900.

A general view, with intensive study of selected major works.

1963-64 and each alternate year.

Credit, 3. Mr. Greenfield.

181. TWENTIETH-CENTURY SPANISH LITERATURE.

Major writers of Spain in the late nineteenth and twentieth centuries.

1964-65 and each alternate year.

Credit, 3. Mr. Greenfield.

182. TWENTIETH-CENTURY SPANISH-AMERICAN LITERATURE.

Major writers of Spanish America from Dario to the present.

1964-65 and each alternate year.

Credit, 3. Mr. Greenfield.

ROMANCE LANGUAGES/SOCIOLOGY AND ANTHROPOLOGY

183. PROSE AND POETRY OF THE SIXTEENTH CENTURY.

Masterpieces of Spanish prose of the 16th Century; development of poetry in the major poets from Garcilaso to Herrera.

1964-65 and each alternate year.

Credit, 3. Mr. Wexler.

184. CERVANTES.

Intensive study of the *Quijote*.

1964-65 and each alternate year.

Credit, 3. Mr. Wexler.

185. DRAMA OF THE GOLDEN AGE.

Deals primarily with the comedia during the period of maximum creation, 1556-1681.

1963-64 and each alternate year.

Credit, 3. Mr. Wexler.

186. PROSE AND POETRY OF THE SEVENTEENTH CENTURY.

Masterpieces of Spanish prose of the 17th Century, excluding the *Quijote*; Góngora and the Baroque poets.

1963-64 and each alternate year.

Credit, 3. Mr. Wexler.

Linguistics

193. LINGUISTICS.

A basic course combining comprehensive treatment of the field with special attention to recent contributions, particularly in structural linguistics, to the study of language and literature.

Three class hours.

Credit, 3. Miss Duckert.

SOCIOLOGY AND ANTHROPOLOGY

Graduate Faculty: J. H. Korson, Head of Department, E. D. Driver, T. M. Fraser, H. H. Golden, M. M. Gordon, M. E. W. Goss, B. Kay, C. W. King, J. Lopreato, G. Mair, J. O'Rourke, P. I. Rose, L. Sussmann, T. O. Wilkinson.

All applicants for admission to graduate work in Sociology are expected to be conversant with the basic concepts in the field. With respect to this requirement, an entering student may be asked to remove any deficiencies at the request of the Department.

Students working toward the doctorate in Sociology, in addition to fulfilling the general requirements of the Graduate School for the degree, must include in a program of study the following courses in Sociology: 281, 282, 283, 284, 195, 196, 297, 298, and two semesters of statistics. Written and oral comprehensive examinations covering Sociological Theory, Research Methodology, and three areas of substantive interest are required of all students before the doctoral dissertation is undertaken. Upon successful completion of comprehensive examinations, the student will be admitted to candidacy for the Ph.D. degree.

Students working toward the Master of Arts degree in Sociology must satisfy the general requirements of the Graduate School for the degree and must include in a program of study the following courses in sociology: 281, 282, 195, and one semester of statistics. An oral examination by the department covering the student's thesis is required. A special program is available for students who desire to work for a Master's degree in Correctional Administration.

SOCIOLOGY AND ANTHROPOLOGY

200. SPECIAL PROBLEM.

A special project in Sociology.

Prerequisite, Sociology 195 or equivalent.

Credit, 3. The Staff.

212. SOCIAL CHANGE.

Analysis of change as a process, especially the factors making for acceptance or rejection of innovations. Intrasocietal sources of change. Consequences of contacts between societies, with emphasis on underdeveloped areas.

Prerequisite, Sociology 72 or permission of instructor. *Credit, 3.* Mr. King.

214. CRIMINOLOGY.

Criminological theories, past and present with special emphasis on present research trends as they relate to theoretical formulations.

Prerequisite, Sociology 78 or equivalent or permission of instructor.

Credit, 3. Mr. Driver.

216. CORRECTIONAL THEORY AND PRACTICE.

An analysis of contemporary approaches to correction. An evaluation of probation, parole, the socialized court movement, community crime prevention, and related problems.

Prerequisites, Sociology 78 and 195.

Credit, 3. Miss Kay.

217. JUVENILE DELINQUENCY.

Theories of causation and treatment of delinquency.

Prerequisite, Sociology 78 or permission of instructor.

Credit, 3. Miss Kay.

218. INDUSTRIAL SOCIOLOGY.

A study of the role, status, and function of the worker in the industrial community; the impact of technological change on the community; analysis of selected occupational functions.

Prerequisite, Sociology 68 or Economics 79 or permission of instructor.

Credit, 3. Mr. Korson.

219. THE SOCIOLOGY OF RELIGION.

The relations of religious ideology and ecclesiastical organization to the total social institutional system. Special attention to the religions of larger civilizations, especially Islam, Buddhism, Medieval Christianity, Gentile Paganism, Protestantism, and Judaism.

Credit, 3. Mr. Manfredi.

222. SOCIOLOGY OF EDUCATION.

Educational characteristics of an industrial population; comparative social structures and their school systems; educational selection and social stratification; educational development as effect and cause of social change; the internal organization and culture of schools and universities.

Prerequisites, one graduate course in sociological theory and one course in research methods.

Credit, 3. Miss Sussmann.

229. SOCIOLOGY OF SMALL GROUPS.

Survey of sociological theory and research of small groups. Dynamics of leadership patterns, role theories, organization-disorganization theories, decision making, internal process and sociometric structuring. The relevance of small group theory and research to concepts of the inclusive social system.

Prerequisite, Sociology 82 or equivalent or permission of instructor.

Credit, 3. Mr. O'Rourke.

SOCIOLOGY AND ANTHROPOLOGY

231. SOCIAL GERONTOLOGY.

Implications of aging for society and the individual. Position of the aged in non-industrialized and industrialized societies. Changing roles of older people in the American family and the community.

Prerequisite, Sociology 57 or permission of instructor. *Credit, 3.* Mr. King.

232. SOCIOLOGY OF MEDICINE.

A survey of theory and research concerned with medical care as a social institution. The relation of social factors to illness, and social processes involved in medical education.

Prerequisites, Sociology 82 and 195. *Credit, 3.* Mrs. Goss.

259. SOCIAL STRATIFICATION.

A consideration of the major contemporary writers and their contribution to this area. Research techniques in the analysis of social class and social mobility are examined.

Prerequisite, Sociology 59 or equivalent or permission of instructor.

Credit, 3. Mr. Gordon.

262. DEMOGRAPHY.

An analysis of the demographic transition from peasant-agriculturalism to urban-industrialism. Emphasis is given to the consequences of this transition for patterns of settlement and for fertility, mortality, and migration. Special studies are made of the demographic characteristics of non-industrialized nations as factors in their potential development.

Prerequisite, Sociology 161 or equivalent or permission of instructor.

Credit, 3. Mr. Wilkinson.

263. FERTILITY AND SOCIETY.

A review of past and present trends in fertility in Western and non-Western culture. Attention is given to problems of measurement, to interrelations between fertility and other social and economic variables, and to the quantitative and qualitative implications of contemporary research.

Prerequisite, Sociology 161 or equivalent or permission of instructor.

Credit, 3. Mr. Mair.

264. POPULATION CHARACTERISTICS AND SOCIO-ECONOMIC CHANGE.

Analysis of relationship between selected demographic characteristics and socio-economic changes, with special attention to the sociological uses of statistical information on the world's countries.

Prerequisite, Sociology 161 or equivalent or permission of instructor.

Credit, 3. Mrs. Golden.

272. POPULATION OF INDIA AND PAKISTAN.

Trends in population growth and its distribution among various social strata. An assessment of the relative influence of fertility, mortality, migration, social organization, and cultural values on growth patterns.

Prerequisites, Sociology 161 and 195.

Credit, 3. Mr. Driver.

281. HISTORY OF SOCIOLOGICAL THEORY.

A survey of literature from classical times to the Utilitarians.

Prerequisite, Sociology 82 or permission of instructor. *Credit, 3.* Mr. Manfredi.

282. SOCIOLOGICAL THEORY.

The development of sociological theory beginning with Auguste Comte.

Prerequisite, Sociology 281.

Credit, 3. Mr. Manfredi.

SOCIOLOGY AND ANTHROPOLOGY

283. CONTEMPORARY SOCIOLOGICAL THEORY.

A consideration of the literature from 1900 to the present.

Prerequisites, Sociology 281, 282, and permission of instructor.

Credit, 3. Mr. Gordon.

284. CONTEMPORARY SOCIOLOGICAL THEORY.

A consideration of the literature from 1900 to the present.

Prerequisites, Sociology 281, 282, 283, and permission of instructor.

Credit, 3. Mr. Gordon.

297. ADVANCED RESEARCH METHODS.

Research design and the analysis of empirical data with special emphasis on the methods of the sample survey.

Prerequisites, Sociology 195, and 196 or permission of the instructor.

Credit, 3. Miss Sussmann.

298. ADVANCED RESEARCH METHODS.

Laboratory experience in the analysis of empirical data as they bear on descriptive and explanatory hypotheses.

Prerequisites, Sociology 297 and permission of the instructor.

Credit, 3. Miss Sussmann.

299. INTERNSHIP.

Supervised training and practice in the administration of a state correctional institution or organization. Students chosen for this training will serve with one of the following: Women's Reformatory (Framingham), Men's Reformatory (Concord), The Bureau of Classification (Department of Correction), Youth Service Board (Department of Education), The United Prison Association (Boston) or other agencies approved by the department. A minimum of three months (40-hour weeks) is required and will normally take place the summer following completion of the major part of the student's course work.

Prerequisites, Sociology 192, 214, and 217.

Credit, 3. The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 6.

400. THESIS, PH.D. DEGREE.

Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS (For either major or minor credit)

148. SOCIAL STATISTICS.

An introduction to principles, techniques and applications of factor analysis in sociology and related fields.

Prerequisite, Sociology 150 or equivalent.

Credit, 3. Mr. Park.

150. ELEMENTARY STATISTICS.

Basic statistical principles and techniques with special reference to application in sociology.

Credit, 3. Mr. Park.

151. URBAN SOCIOLOGY.

A comparative study of modern social conditions, and methods of adjustment, with special reference to city environment. Characteristics of the population, urban ecology, and problems of adjustment in the fields of housing, health, education, and recreation.

Credit, 3. Mrs. Golden.

SOCIOLOGY AND ANTHROPOLOGY

152. RURAL AND PEASANT SOCIETIES.

A study of rural and peasant societies from the standpoint of their population and institutions, their emerging needs, and their relation to mass society.

Credit, 3. Mr. Lopreato.

156. RACE RELATIONS.

The social, economic, and political aspects of racial problems in the U. S., with particular reference to the Negro and major ethnic groups. Problems resulting from contact of races in Asia, Africa, and South America.

Credit, 3. Mr. Gordon.

157. THE FAMILY.

The development of the customs of courtship and marriage of the contemporary American family; basic causes of changes and trends of the family including mate selection, marriage laws, marital prediction, husband-wife relations, and the role of the child.

Credit, 3. Mr. King.

161. POPULATION PROBLEMS.

The physical and social factors which influence population change through births, deaths, and migration, with special emphasis on the population problems of underdeveloped areas in the world today.

Credit, 3. Mr. Wilkinson.

170. SOCIAL STRUCTURE OF INDIA.

The origins, distribution, and cultural traits of the major groups in India. Special attention given to marriage, family, and caste patterns, and their relation to and positions in the economic and political system.

Credit, 3. Mr. Driver.

174. SOCIAL INTERACTION.

A study of the processes leading to the socialization of the group member, with emphasis on role properties, play, control models, power definitions and allocation.

Credit, 3. Mr. Lopreato.

175. SOCIAL PROBLEMS.

The incidence, distribution, and interrelations among the major types of social tensions in human societies. Research projects and field trips required.

Credit, 3. Mr. Stanfield.

192. INTRODUCTION TO SOCIAL WELFARE.

Contemporary problems of social concern; methods of caring for adult and child dependents and defectives; public and private agency administration and techniques; and an examination of federal, state, and local community programs.

Credit, 3. Miss Kay.

195. RESEARCH METHODS.

Logical analysis of sociological inquiry; survey of major research techniques and examination of principal methodological problems in sociology.

Credit, 3. Mr. Park.

196. RESEARCH METHODS.

Research techniques in sociology, including: formulating research objectives; collecting, processing and analyzing data for a project organized around the problems of measurement in sociology.

Prerequisites, Sociology 150 and 195.

Credit, 3. Mr. Park.

SOCIOLOGY AND ANTHROPOLOGY

Anthropology

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

236. INDIVIDUAL AND SOCIETY.

A cross-cultural consideration of the relationship between the individual and his society with attention to theories, methods and empirical findings as reported in the literature of the behavioral sciences.

Prerequisites, Anthropology 163 and 164 or permission of instructor.

Credit, 3. Mr. Stanfield.

237. THEORY IN SOCIAL ANTHROPOLOGY.

Theoretical problems which have had a lasting place in anthropological thought; social structure, cultural dynamics and stability, and the transmission of culture as discussed by leading writers.

Prerequisites, Anthropology 163 and 164 or permission of instructor.

Credit, 3. Mr. Fortier.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

160. WORLD ARCHAEOLOGY.

An introduction to the history, methods and theory of archaeology, with an outline of the main characteristics of the prehistoric record, emphasizing social aspects and evolutionary significance.

Prerequisite, Anthropology 163.

Two class hours, one 2-hour laboratory period.

Credit, 3. Mr. Bick.

163. SOCIAL ANTHROPOLOGY.

An introduction to the principles of physical and cultural anthropology, including cross-cultural analyses of family systems, religion, economics, linguistics and art.

Prerequisite, permission of instructor.

Credit, 3. The Staff.

164. PROBLEMS IN ANTHROPOLOGY.

A consideration in detail of current anthropological thought in regard to specific problems chosen from physical anthropology, archaeology and cultural anthropology.

Prerequisite, 163 or permission of instructor.

Credit, 3. Mr. Fraser.

165. ETHNOGRAPHIC SURVEY OF NON-LITERATE PEOPLES.

The current cultures of representative societies from Africa, Oceania, North America, South America, and Asia viewed in relation to historical and environmental influences.

Prerequisite, permission of instructor.

Credit, 3. Mr. Fraser

167. ETHNOLOGY OF AFRICA.

A limited consideration of the history, physical types, social organization and culture of Africa south of the Sahara with special consideration of several diverse cultures.

Prerequisite, permission of instructor.

Credit, 3. Mr. Bick.

173. PEOPLES OF SOUTHEAST ASIA.

An introduction to the history and ethnography of the native cultures of Southeast Asia, including consideration of the peasant populations and their expanding role in the development of modern Southeast Asian states.

Prerequisite, Anthropology 163.

Credit, 3. Mr. Fraser.

SOCIOLOGY AND ANTHROPOLOGY/SPEECH

Interdepartmental Courses

SOCIAL SCIENCE 160. AFRICA, SOUTH OF THE SAHARA.

An introductory study of recent political, economic, and social developments in the principal countries in Africa, south of the Sahara.

Prerequisites, at least two courses in one or more of the following fields: Government, Economics, Sociology. *Credit, 3. Miss Carter.*

SOCIAL SCIENCE 169. INDIA AND SOUTHEAST ASIA.

An introductory study of recent political, economic, and social developments in India and the countries of South and Southeast Asia.

Prerequisites, at least two semester courses in one or more of the following fields: Government, Economics, Sociology. *Credit, 3. Mr. Driver.*

SPEECH

Graduate Faculty: A. E. Niedeck, Head of Department, I. E. Hegarty.

A two year graduate program for preparation as a teacher of the deaf, leading to a Master of Arts degree, may combine graduate study in Speech Pathology and Audiology and the teacher training program at Clarke School for the Deaf, Northampton, Massachusetts. Federal grants from the U. S. Office of Education are available for qualified candidates interested in this program.

1. General Admission Requirements:

- a. Basic requirements for admission to the Graduate School.
- b. Students presenting at least twelve hours in Speech (i.e., Speech 81, 83, 82, 85 or their equivalents) and nine hours in Psychology or Education may arrange a graduate program leading to the Advanced Certificate in Speech in the American Speech and Hearing Association.
- c. Students presenting at least three hours in Speech (i.e., Speech 81, 85, or 82) and a major in Psychology may arrange a graduate program leading to the Basic Certificate in Speech of the American Speech and Hearing Association.
- d. Students presenting at least three hours in Speech (i.e., Speech 81, 85, or 82) and a major in Education may arrange a graduate program leading to the Basic Certificate in the American Speech and Hearing Association and the requirements of the Massachusetts Department of Education for teachers of the speech and hearing handicapped.

2. Basic Requirements:

- a. Thirty hours of graduate courses, including twenty-four hours in the major field. Psychology or Education may be chosen as the minor field.
- b. A thesis will be required.
- c. There will be no foreign language required.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. CLINICAL PRACTICUM.

Supervised clinical practice with children and adults with various speech and hearing disorders; group and individual therapy techniques.

Prerequisites, Speech 81, 83, 85 or equivalents.

Credit, 3-6 each semester. The Staff.

SPEECH

201. VOICE PROBLEMS.

A study of voice disorders, organic and functional; symptoms and principles and techniques of therapy and diagnosis.

Prerequisites, Speech 83 and 85 or equivalents. *Credit, 3.* Miss Hegarty.

203. EXPERIMENTAL PHONETICS.

Study and analysis of phonetic elements of language, emphasis on laboratory instrumentation and research techniques.

Prerequisites, Speech 81 and 83 or equivalents. *Credit, 3.* The Staff.

300. MASTER'S THESIS.

Credit, 3-6. Miss Hegarty.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

181. PHONETICS.

A scientific study of the sounds of English; descriptive analysis of individual vowels and consonants. Study of the International Phonetic Alphabet; training in auditory discrimination.

Three class hours.

Credit, 3. Miss Hanifan and Miss Labelle.

182. INTRODUCTION TO CLINICAL PRACTICE.

Training in basic diagnostic and therapeutic techniques for various speech handicaps; emphasis on articulation defects, delayed speech and stuttering, supervised practice required.

Prerequisites, Speech 81 and 85.

Two class hours, one 2-hour laboratory period.

Credit, 3. Miss Hanifan and Miss Labelle.

183. ANATOMY AND PHYSIOLOGY OF THE SPEECH AND HEARING MECHANISM.

A study of the anatomy and physiology of the speech and hearing mechanism; consideration of phonation, resonance, articulation and audition.

Three class hours.

Prerequisite, Speech 85.

Credit, 3. Miss Hegarty.

184. AUDIOLOGY.

A study of the symptoms and causes of hearing loss; special attention to diagnostic test procedures. Supervised practice in audiometric testing. Observation; field trips.

Three class hours.

Prerequisite, Speech 85.

Credit, 3. The Staff.

185. INTRODUCTION TO SPEECH PATHOLOGY.

A study of the causes, functional and organic, of speech problems among children and adults; principles of diagnosis and therapy. Observation; field trips.

Three class hours.

Prerequisite, Psychology 26.

Credit, 3. Miss Hegarty.

186. REHABILITATION OF THE ACOUSTICALLY HANDICAPPED.

Training in the techniques of speech therapy, auditory training, and speech reading for children and adults with hearing impairments. Laboratory practice under supervision.

Two class hours, one 2-hour laboratory period.

Prerequisite, Speech 84.

Credit, 3. The Staff.

188. **ADVANCED CLINICAL PRACTICE.**

Advanced training in clinical practice under supervision; special consideration of organic speech disorders. Opportunity for supervised clinical practice at Lemuel Shattuck Hospital.

Prerequisite, Speech 82.

Two class hours, one 2-hour laboratory period. *Credit, 3.* Miss Hegarty.

196. **SEMINAR IN SPEECH PATHOLOGY.**

Individual student reports on selected topics in the field of Speech Pathology. Three class hours.

Prerequisite, Speech 85.

Credit, 3. Miss Hegarty.

STATISTICS

Graduate Faculty: G. B. Oakland, Head of Department, R. W. Wagner, R. K. Damon, Jr., J. Myers, F. Wolock.

Students taking the master of arts in statistics must meet the degree requirements of the Graduate School. Although desirable, previous work in statistics is not essential for graduate study in statistics. A sound background of supporting mathematics is of greater importance. Thus majors in statistics will receive their statistical training as graduate students. Their undergraduate work will consist largely of mathematics and other related fields.

List of Courses

- *Statistics 151, Elementary Statistics
- *Statistics 155, 156, Introductory Statistics
- *Statistics 161, The Design of Experiments (Methods)
- Statistics 162, The Design of Experiments (Theory)
- *Statistics 171, Sample Surveys
- *Statistics 172, Sample Theory and Methods
- *Statistics 181, Multivariate Analysis (Methods)
- Statistics 182, Multivariate Analysis (Theory)
- *Statistics 192, Frequency Distributions
- Statistics 201, 202, Statistical Tests and Decision Procedures
- Statistics 225, 226, Estimation Theory and Hypothesis Testing
- Statistics 241, 242, Recent Developments in Statistics
- Statistics 280, Seminar

*Intended for the year 1963-64.

Statistics 151, 155, and 156 are for minor credit only

Statistics 161, 162, 171, 172, 181, 182, 192 are for major credit as are the courses in the 200 series.

STATISTICS

The candidate will consult with a member of the Statistics Faculty in preparing a program of study. A total of 30 graduate credit hours is required; of which not more than 6 credit hours may be taken in other departments. On approval, courses of a mathematical nature can be substituted for an additional 6 credit hours of statistics. The following courses would be required for a Master's degree in statistics: Twelve credit hours from: 161, 162, 171, 172, 181, 182, and 192 and twelve credit hours from: 201, 202, 225, 226, 241, and 242. A sample program could consist of 21 graduate credit hours from courses 162, 172, 182, 201, 202, 241, and 242, and the remaining 6 credit hours from other departments and with an additional three credit hours of a course of a mathematical nature.

Students specializing in statistics are advised to have a sound minor in a field of application. This minor can be chosen from courses equivalent to those required for undergraduate majors. Cognate courses are needed to supply a basis for mature thinking. Students should choose cognate courses from such fields as genetics, animal and plant breeding, sociology, psychology, engineering, econometrics, and market research, etc. Statistics leans very heavily on mathematics, and most of the prerequisites and corequisites will come from such mathematical courses as: probability, linear algebra, numerical analysis, introductory modern analysis, and differential equations.

The statistical specialist must have a knowledge of modern computing methods, their capabilities and limitations. Familiarity with computers is essential for advanced work in statistics. Students are required to program a problem and obtain its solution on a computer.

The candidate is expected to obtain experience in statistical applications. A minor role in consulting work or an internship in an organization where statistics can be applied provides experience in this direction.

It is proposed to introduce the graduate program for the degree of Master of Arts in Statistics in 3 waves as indicated below.

COURSES OPEN TO GRADUATE STUDENTS ONLY

***201, 202. STATISTICAL TESTS AND DECISION PROCEDURES.

Power of a test, O. C. Curves, Parametric tests; F. Hotelling's T, Multiple comparisons, Bartlett's Non-parametric tests: Chi-square, Kolmogorov-Smirnov, order statistics, ranking.

Prerequisites or corequisite, Statistics 162 and 172. *Credit, 3 each semester.*

***225, 226. ESTIMATION THEORY AND HYPOTHESIS TESTING.

Maximum likelihood, types of estimators, properties of estimators, 2 sample problem, k sample problem.

Prerequisites or corequisites, Statistics 162, 172 and 182. *Credit, 3 each semester.*

**241, 242. RECENT DEVELOPMENTS IN STATISTICS.

The course material is selected from such modern areas of statistical thought as: stochastic processes, counting, gaussian and stationary processes, spectral distribution functions, birth and death processes, monte carlo, Box's optimizing processes.

Prerequisite, consent of instructor.

Credit, 3 each semester.

***Offered 1965-66 **Offered 1964-65

***280. SEMINAR.

Research papers by staff and students; invited lectures by prominent statisticians.
Credit, 1, 2, or 3.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
 (For either major or minor credit)

*161. DESIGN OF EXPERIMENTS (METHODS).

Purpose of experimental designs and their basic assumptions; individual comparisons, components of error, confounding; applications from various fields.
 Prerequisite, Statistics 151 or 156. *Credit, 3.*

**162. DESIGN OF EXPERIMENTS (THEORY).

Conceptual basis of experimental designs, especially randomized blocks, latin squares, factorial and sequential, incomplete blocks, and experiments with attributes.
 Prerequisite, Statistics 156. *Credit, 3.*

*171. SURVEY SAMPLING.

The theory and practice of sampling; optimum allocation of resources, estimation of sample size, various sampling methods, ratio and regression estimates, the problem of non-response.
 Prerequisite, Statistics 151 or 156. *Credit, 3.*

*172. SAMPLING THEORY AND METHODS.

Problems and methods of sampling, production and quality control, acceptance sampling OC and ASN curves; types and properties of estimators.
 Prerequisite, Statistics 156. *Credit, 3.*

*181. MULTIVARIATE ANALYSIS (METHODS).

Applications of the theory in Statistics 82 to actual problems; it may involve research studies by the students, critiques of published research, or analysis of other bodies of data.
 Prerequisite, Statistics 151 or 156. *Credit, 3.*

**182. MULTIVARIATE ANALYSIS (THEORY).

Correlations and regression, principal components, canonical analysis, analysis of dispersion and covariance, tests of homogeneity, discriminant functions.
 Prerequisites, Statistics 156 and Mathematics 68. *Credit, 3.*

*192. FREQUENCY DISTRIBUTIONS.

Basic probability, frequency functions, transformation of variates, generating functions, normal and related distributions, binomial, multinomial, hypergeometric, Poisson, exponential, logarithmic and other distributions including Pearson's system.
 Prerequisites, Statistics 156 and Mathematics 92 (or concurrently). *Credit, 3.*

***Offered 1965-66

**Offered 1964-65

*Offered 1963-64

STATISTICS/WILDLIFE AND FISHERIES BIOLOGY

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Statistics)

151. ELEMENTARY STATISTICS.

The analysis of variance, the design of experiments, sample surveys, multiple regression, non-parametric tests. *Credit, 3.*

155, 156. INTRODUCTORY STATISTICS.

Parallel courses to Statistics 21 and 51 but with calculus prerequisite.

Corequisite, Mathematics 26, 91 or 31.

Credit, 3.

WILDLIFE AND FISHERIES BIOLOGY

Frederick Greeley and Charles F. Cole, Major Advisors.

William G. Sheldon, Leader, Massachusetts Cooperative Wildlife Research Unit,

James McCann, Leader, Massachusetts Cooperative Fishery Research Unit.

Most applicants for admission to graduate work in wildlife and fisheries biology must have completed a Bachelor's degree in the biological sciences. **Occasional exceptions are made for applicants from other fields, provided they make up their deficiencies in basic biology as part of their graduate program.**

Graduate students pursue courses of study directed toward acquiring proficiency in independent research in either the wildlife or fisheries field. Work in fisheries involves both fresh water and marine environments. Courses may be taken in the department and in related fields. A research thesis is normally required. Fisheries research is conducted in close cooperation with the Massachusetts Division of Fisheries and Game and the Massachusetts Division of Marine Fisheries. Wildlife research is usually conducted in the Massachusetts Cooperative Wildlife Research Unit under the supervision of the unit leader. The unit receives support from the Massachusetts Division of Fisheries and Game, the United States Fish and Wildlife Service and the Wildlife Management Institute.

Undergraduate students who receive their Bachelor's degree in fisheries or wildlife at the University of Massachusetts are urged to pursue graduate work at other Universities, many of which also have Cooperative Research Units.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS IN WILDLIFE OR FISHERIES BIOLOGY.

Credit, 3 per semester. Maximum credit, 6. The Staff.

201, 202. SEMINAR IN WILDLIFE AND FISHERIES BIOLOGY.

Review and discussion of the literature in Wildlife and Fisheries Biology, including such subjects as population dynamics and manipulation, law and administration, Afro-Eurasian problems, influence of land-use, Arctic environments and others.

Credit, 3 each semester. Maximum credit, 6. The Staff.

300. THESIS, MASTER'S DEGREE.

Credit, 6-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

161. PRINCIPLES OF WILDLIFE BIOLOGY.

Fundamental ecology and principles of Wildlife Management, with emphasis on population characteristics and responses. *Credit, 3. Mr. Greeley.*

WILDLIFE AND FISHERIES BIOLOGY/ZOOLOGY

162. TECHNIQUES OF WILDLIFE BIOLOGY.

Methods of collecting and interpreting data in Wildlife Management, with emphasis on field and laboratory experience in census methods and criteria for determining sex, age and other characteristics of wild birds and mammals.

Credit, 3. Mr. Greeley.

163. MANAGEMENT OF WETLAND WILDLIFE.

Life histories, identification and habitat requirements of waterfowl and marshland furbearing animals; management of wetland habitats.

1964-65 and each alternate year.

Credit, 3. Mr. Greeley.

164. MANAGEMENT OF UPLAND WILDLIFE.

Life histories, identification and habitat requirements of upland game birds, game mammals, and furbearers; management of upland habitats.

1965-66 and each alternate year.

Credit, 3. Mr. Greeley.

165. TECHNIQUES OF FISHERIES BIOLOGY.

Principles and techniques of fishery management, stressing population and growth dynamics, and field procedures.

Credit, 3. Mr. Cole.

166. PHYSIOLOGY OF FISHES.

Study of physiological functions relative to the environment of fishes. The adaptations of local species to particular habitats will be studied in the field and laboratory.

1965-66 and each alternate year.

Credit, 3. Mr. Cole.

168. SURVEY OF FISHERIES RESOURCES.

Review of the sport and commercial fisheries of the United States, with special emphasis on crustaceans, molluscs and fishes. Coastal field trips by arrangement.

Credit, 3. Mr. Cole.

COURSES IN OTHER DEPARTMENTS FOR WHICH

MAJOR CREDIT MAY BE GIVEN

When appropriate for the student's program of instruction and research, and with the consent of the student's advisor, major credit will be given for certain courses in the following subject-matter areas: Agricultural and Food Economics, Botany, Education, Entomology and Plant Pathology, Forestry, Statistics, and Zoology.

ZOOLOGY

Graduate Faculty: D. Fairbairn, Head of Department, E. Anderson,

L. M. Bartlett, W. R. Harvey, B. M. Honigberg, J. G. Moner,

W. B. Nutting, H. Rauch, J. L. Roberts, H. D. Rollason,

J. G. Snedecor, D. P. Snyder, P. A. Swenson.

Facilities are provided for students intending to complete the requirements for the Degree, Master of Science, or Doctor of Philosophy. A minimum of 20 credits of biology is required for admission to graduate standing; applicants who cannot satisfy this requirement may be admitted as special students. Candidates for the Master's degree must satisfy Departmental and Graduate School foreign language requirements in one of German, French or Russian. Any two of these languages are required of doctoral candidates.

The degree, Master of Science, is awarded to students who satisfactorily meet the requirements of the Graduate School and who present a thesis or a minimum

ZOOLOGY

of six and a maximum of nine credits in Zoology 200. An oral examination is required of all candidates.

Each candidate for the degree, Doctor of Philosophy, follows a course of study acceptable to him and to his guidance committee. Before a thesis is submitted he must demonstrate general competence by means of written, followed by oral, examinations.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. SPECIAL PROBLEMS. *Credit, 1-9.* The Staff.

202 (I). ADVANCED INVERTEBRATE ZOOLOGY.

Morphology, habits and life cycles of aquatic invertebrates.

Laboratory, discussion periods, field trips.

Prerequisites, Zoology 1 and 170.

Credit, 3. Mr. Nutting.

204 (II). HELMINTHOLOGY.

Host-parasite relationships, systematics, morphology, and life histories of meta-zoan animal parasites with emphasis on helminths.

Laboratory on research techniques.

Prerequisites, Zoology 169, 170 or equivalents and permission of instructor.

Credit, 3. Mr. L. S. Roberts.

210 (I). ELECTRON MICROSCOPY.

Lectures and laboratory on the electron microscope and methods of specimen preparation.

Prerequisite, permission of instructor.

Credit, 3. Mr. Anderson.

220 (II). EXPERIMENTAL EMBRYOLOGY.

Physiology, biochemistry, and ultrastructure of development with reference to gametogenesis, fertilization, cleavage, induction, differentiation, regeneration, and metamorphosis. Emphasis on control mechanisms.

Prerequisites, Zoology 172, Chemistry 33 or equivalents.

Credit, 3. Mr. Harvey.

240 (II). ADVANCED CELLULAR AND COMPARATIVE PHYSIOLOGY.

Detailed study of one or more of the following topics: physiology of the cell growth cycle, radiation biology and regulatory mechanisms in cells and higher animals.

Prerequisites, Zoology 183 and 184.

Credit, 2-4. Mr. Swenson, J. L. Roberts, and Moner.

245 (II). ADVANCED VERTEBRATE PHYSIOLOGY.

Experience in small animal surgery and in making standard experimental preparations; suitable techniques for recording results; special emphasis on proper interpretation of data.

One class hour, one 4-hour laboratory period.

Prerequisites, Zoology 35 and 171.

Credit, 3. Mr. Snedecor.

248 (II). PHYSIOLOGICAL GENETICS.

The nature of the gene and its action in the developmental and physiological processes of the organism.

Prerequisites, Zoology 153 or equivalent and permission of instructor.

Credit, 3. Mr. Rauch.

255. DEPARTMENTAL SEMINAR.

Credit, 1 each semester. Maximum credit, 4. The Staff.

265 (I). ANIMAL BEHAVIOR.

The evolution and significance of behavior patterns of invertebrates and lower vertebrates.

Two 2-hour lecture-discussion periods.

Prerequisites, Zoology 153, 180 or 181 or 182, and 169 or 170.

Credit, 3. Mr. Bartlett, Nutting, and Sargent.

273 (II). GENERAL CYTOLOGY.

The morphological features of cells in relation to their function. Lectures, seminar reports and individual laboratory work.

Prerequisite, Zoology 150.

Credit, 3. Mr. Rollason.

275 (II). FINE STRUCTURE AND FUNCTION OF CELLS.

Lectures, discussions, readings and reports on fine structure of cells and dynamic morphology.

Prerequisites, General Physiology and Cytology.

Credit, 3. Mr. Anderson.

300. THESIS, MASTER'S DEGREE.

Credit, 10.

400. THESIS, PH.D. DEGREE.

Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

150 (I). HISTOLOGY.

Study of the cell, tissues, and microscopic anatomy with emphasis on the mammal; introduction to microtechnique.

Two class hours, one 3-hour laboratory period.

Credit, 3. Mr. Rollason.

152 (II). GENETICS LABORATORY.

Laboratory experiments illustrating transmission genetics, including linkage and gene location.

One 3-hour laboratory period.

Prerequisite, Zoology 153 or equivalent.

Credit, 1. Mr. Rauch.

153 (I). PRINCIPLES OF GENETICS.

Mechanisms of heredity in plants and animals, emphasizing transmission and action of genes, population genetics and evolution.

Three class hours.

Prerequisite, Zoology 1.

Credit, 3. Mr. Rauch.

164 (II). BIOLOGY OF PROTOZOA (1964-65).

Morphology and physiology of Protozoa, with emphasis on the contributions made on the basic problems of biology through the study of these organisms. One class hour, one 2-hour and one 3-hour laboratory periods.

Prerequisites, Zoology 1 and permission of instructor.

Given in alternate years.

Credit, 3. Mr. Honigberg.

169 (I). GENERAL PARASITOLOGY.

Morphology, life cycles, and physiology of primarily protozoan and helminth parasites, with emphasis on broad aspects of parasitism.

Two class hours, two 2-hour laboratory periods.

Prerequisites, Zoology 1 and one year of college chemistry.

Credit, 4. Mr. Honigberg.

ZOOLOGY

170 (II). INVERTEBRATE ZOOLOGY.

Survey of the phyla of invertebrate animals from evolutionary and phylogenetic aspects.

Lectures, discussion periods, laboratory.

Prerequisite, Zoology 1.

Credit, 3. Mr. Nutting.

171 (I). COMPARATIVE VERTEBRATE ANATOMY.

A thorough study of the anatomy of the vertebrates, with emphasis on the evolution, special modifications, and functional interrelationships of each of the organ systems.

Two class hours, one 3-hour laboratory period.

Prerequisite, Zoology 1.

Credit, 3. Mr. Snyder.

172 (II). EMBRYOLOGY.

Lectures emphasize physiological and biochemical aspects of development. Laboratories cover descriptive and comparative phases of ontogeny, especially of amphibian, bird, and mammal.

Two class hours, one 3-hour laboratory period.

Prerequisite, Zoology 171.

Credit, 3. Mr. Harvey.

174 (II). LIMNOLOGY (1963-64).

Study of inland waters, including geological, physical, chemical and biological aspects. Given in alternate years.

Two class hours, two 3-hour laboratories or field trips.

Prerequisites, Botany 1, Zoology 1, Chemistry 1 and 2, and permission of instructor.

Credit, 4. Mr. Andrews,

in cooperation with the departments of Botany,
Entomology, Public Health, Geology, and Zoology.

178 (I). POPULATION GENETICS.

Introduction to the principles of population genetics; the population approach to the origin of species and the study of human genetics.

One lecture, one 2-hour discussion period.

Prerequisites, Zoology 153 or equivalent and permission of instructor.

Credit, 2. Mr. Rauch.

180 (II). ORNITHOLOGY.

Avian biology with emphasis on structural and functional adaptations, and particularly behavioral patterns. Laboratory includes field trips.

Two class hours, one 2-hour laboratory period.

Prerequisite, Zoology 1.

Credit, 3. Mr. Bartlett.

181 (I). VERTEBRATE ZOOLOGY.

History, relationships, patterns of distribution, classification and ecology, with major emphasis on the fishes.

One class hour, two 2-hour laboratory periods, field trips.

Prerequisite, Zoology 1.

Credit, 3. Mr. Andrews.

182 (II). MAMMALOLOGY.

Evolution, distribution, classification and ecology of mammals. Laboratory will include field trips, preparation of study material, and identification of local fauna. Enrollment limited to 15.

Two class hours, one 3-hour laboratory period.

Prerequisites, Zoology 1 and permission of instructor.

Credit, 3. Mr. Snyder.

183 (I). GENERAL AND CELLULAR PHYSIOLOGY.

Modern trends in physiology with emphasis on the chemical and physical properties of cells, including protoplasmic organization, cellular metabolism, permeability, bioelectric phenomena, muscle contraction, radiation biology, and cellular regulatory mechanisms.

Three class hours, one 3-hour laboratory period.

Prerequisites, one year biology and organic chemistry.

Credit, 4. Mr. Swenson and Moner.

184 (I). COMPARATIVE PHYSIOLOGY.

Physiological principles involved in adaptations of animals to their environment; emphasis in the laboratory on experimental methods used to study adaptive mechanisms.

Three class hours, one 3-hour laboratory period.

Prerequisites, Zoology 1, 35 or 183.

Credit, 4. Mr. Roberts.

186 (II). FISHERY BIOLOGY.

Properties of fish populations including reproduction, growth, demography, density; conditions of fresh waters influencing the composition of fish populations.

Two class hours, one 3-hour laboratory period.

Prerequisite, Zoology 181 or permission of instructor.

Credit, 3. Mr. Andrews.

187 (I). ENDOCRINOLOGY.

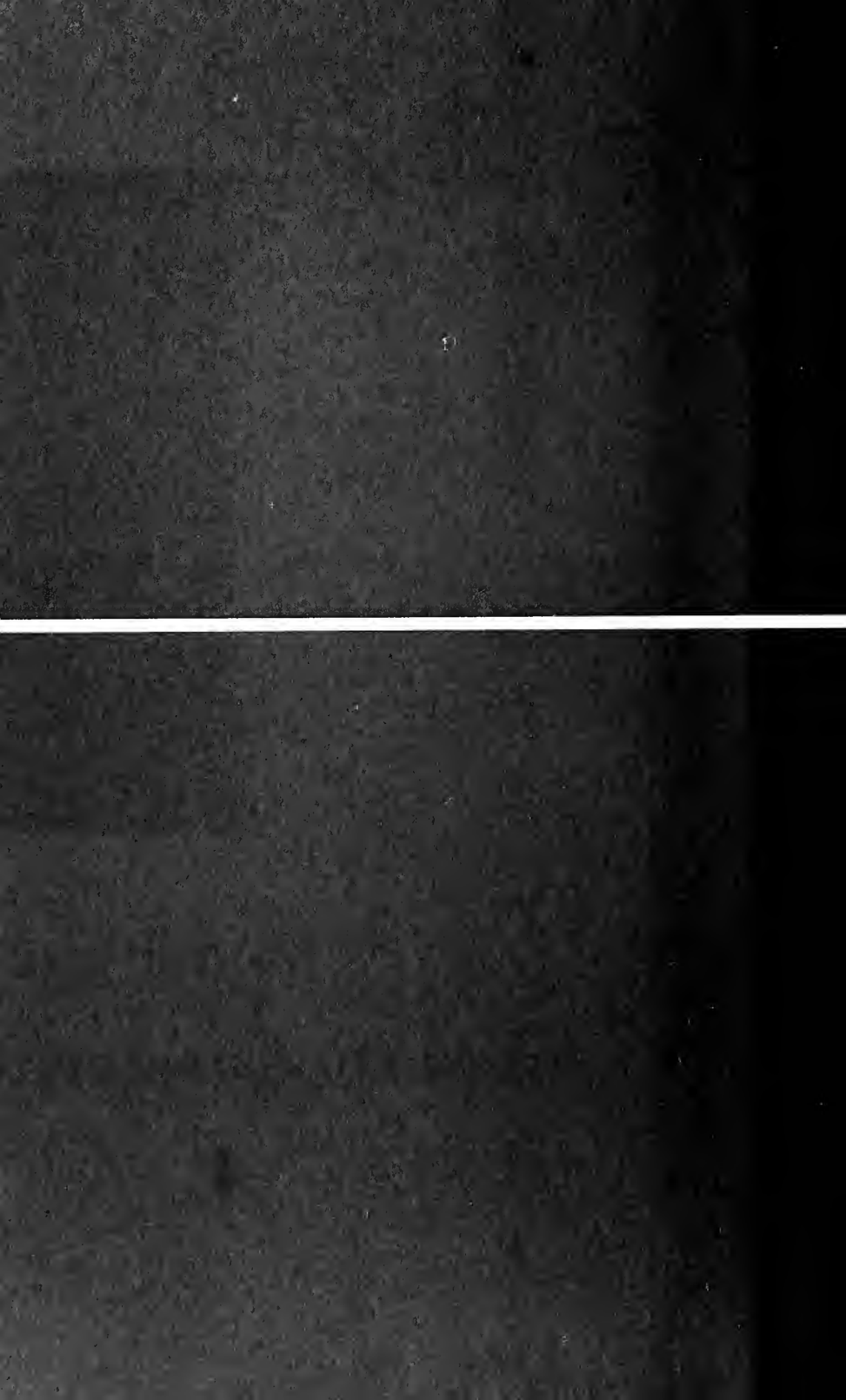
The importance of the endocrines in their control over normal functions (growth, metabolism, reproduction, etc.) in a variety of animals.

Two class hours, one 3-hour laboratory period.

Credit, 3. Mr. Snedecor

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UNIVERSITY OF MASSACHUSETTS
bulletin

STOCKBRIDGE SCHOOL
of agriculture

1964 / 1966



BULLETIN

UNIVERSITY OF MASSACHUSETTS

Stockbridge School of Agriculture 1964-1966



The University of Massachusetts is both a State University and a Land Grant College and as such has been established by Acts of Congress and of the Legislature of Massachusetts.

The two year course at the University of Massachusetts is known as the Stockbridge School of Agriculture, named after an early president of the University. Included herein are descriptions of the various courses offered, information concerning expenses, enrollment and regulations. In the back of the catalogue will be found forms for application and certification of residence.

The University reserves, for itself and its departments, the right to withdraw or change the announcements made in its catalogue.

UNIVERSITY BULLETIN
Amherst, Massachusetts

VOLUME LV

NOVEMBER, 1963

NUMBER 5

Published six times a year by the University of Massachusetts in February (Summer School Catalog), March (Undergraduate Catalog), August (General Information Catalog) and November (Graduate School Catalogue, Stockbridge School Catalogue and President's Report).

CALENDAR

1963

First Semester

September 11—Wednesday. Registration of Freshmen.

September 12—Thursday. Registration of Seniors.

September 13—Friday. Classes begin at 8 a.m.

October 12—Saturday. Holiday, no classes.

November 2—Saturday. Mid-semester marks close.

November 11—Monday. Holiday, no classes.

November 26—Tuesday. Thanksgiving recess begins after last class.

December 2—Monday. Classes resume at 8 a.m.

December 18—Wednesday. Christmas recess begins after last class.

1964

January 2—Thursday. Classes resume at 8 a.m.

January 11—Saturday. Last day of classes.

January 13—Monday. Final examinations begin at 8 a.m.

January 18—Saturday. Final examinations end at 12 m.

Second Semester

January 29—Wednesday. Registration of Freshmen.

January 30—Thursday. Registration of Seniors.

January 31—Friday. Classes begin at 8 a.m.

February 22—Saturday. Holiday, no classes.

March 21—Saturday. Mid-semester marks close.

March 26—Thursday. Easter recess begins after last class.

March 26—Thursday. Second semester ends for freshman students except Animal Science, Food Distribution, Poultry Science, Restaurant and Hotel Management and Wood Utilization majors.

March 30—Monday. Placement begins for freshmen.

April 6—Monday. Classes resume at 8 a.m.

April 20—Monday. Holiday, no classes.

May 16—Saturday. Last day of classes before final examinations.

May 18—Monday. Final examinations begin at 8 a.m.

May 22—Friday. Final examinations end at 5 p.m.

May 30, 31—Saturday, Sunday. Commencement.

1964

First Semester

September 14—Monday. Registration of Freshmen.

September 15—Tuesday. Registration of Seniors.

September 16—Wednesday. Classes begin at 8 a.m.

- October 12—Monday. Holiday, no classes.
- October 31—Saturday. Mid-semester marks close.
- November 11—Wednesday. Holiday, no classes.
- November 25—Wednesday. Thanksgiving recess begins after last class.
- November 30—Monday. Classes resume at 8 a.m.
- December 19—Saturday. Christmas recess begins after last class.

1965

- January 4—Monday. Classes resume at 8 a.m.
- January 13—Wednesday. Last day of classes.
- January 15—Friday. Final examinations begin at 8 a.m.
- January 21—Thursday. Final examinations end at 5 p.m.

Second Semester

- February 1—Monday. Registration of Freshmen.
- February 2—Tuesday. Registration of Seniors.
- February 3—Wednesday. Classes begin at 8 a.m.
- February 22—Monday. Holiday, no classes.
- March 20—Saturday. Mid-semester marks close.
- March 26—Friday. Second semester ends for freshman students except Animal Science, Food Distribution, Poultry Science, Restaurant and Hotel Management and Wood Utilization majors.
- March 29—Monday. Placement begins for freshmen.
- April 10—Saturday. Easter recess begins after last class.
- April 20—Tuesday. Classes resume at 8 a.m.
- April 23—Friday. Monday class schedule will be followed.
- May 22—Saturday. Last day of classes before final examinations.
- May 24—Monday. Final examinations begin at 8 a.m.
- May 28—Friday. Final examinations end at 5 p.m.
- June 5, 6—Saturday, Sunday. Commencement.

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ALFRED W. BOICOURT, M.S.	French Hall
<i>Professor, Program Leader, Coordinator in Floriculture</i>	
ROBERT B. BRUCE, M.S.	Stockbridge Hall
<i>Assistant Professor, Research, Dairy and Animal Science</i>	
ERNEST M. BUCK, M.S.	Stockbridge Hall
<i>Assistant Professor of Dairy and Animal Science</i>	
JAMES W. CALLAHAN, M.S.	Draper Hall
<i>Assistant Professor of Agricultural and Food Economics</i>	
A. DONALD CAVEN, M.L.A.	Wilder Hall
<i>Assistant Professor of Landscape Architecture</i>	
WILLIAM G. COLBY, Ph.D.	Stockbridge Hall
<i>Professor of Agronomy and Head of Department</i>	
WILLIAM H. COLLINS, M.S.	Engineering Annex
<i>Assistant Professor, Research, Agricultural Engineering</i>	
MRS. GLADYS M. COOK, M.S.	Edna Skinner Hall
<i>Associate Professor of Home Economics</i>	
NORMAN G. COURNOYER, M.B.A.	Stockbridge Hall
<i>Assistant Professor of Food Science and Technology</i>	
JOHN W. DENISON, B.S.	Stockbridge Hall
<i>Instructor in Poultry Science</i>	
MRS. MARRON S. DUBOIS, BA.	Bartlett Hall
<i>Instructor in English</i>	
WILLIAM B. ESSELEN, Ph.D.	Chenoweth Laboratory
<i>Commonwealth Head of Department of Food Science and Technology</i>	
DAVID A. EVANS, M.S.	Flint Laboratory
<i>Assistant Professor of Dairy and Animal Science</i>	
GERALD A. FITZGERALD, S.B.	Stockbridge Hall
<i>Extension Professor of Agricultural Engineering</i>	
ROBERT A. FITZPATRICK, M.S.	Draper Hall
<i>Associate Professor, Research, Agricultural and Food Economics</i>	
RICHARD C. FOLEY, Ph.D.	Stockbridge Hall
<i>Professor of Dairy and Animal Science</i>	
THOMAS S. FOSTER, B.S.	Holdsworth Natural Resources Center
<i>Instructor, Research, Forestry and Wildlife Management</i>	
THOMAS W. FOX, Ph.D.	Stockbridge Hall
<i>Professor of Poultry Science and Head of Department</i>	
HAROLD B. GATSLICK, Ph.D.	Holdsworth Natural Resources Center
<i>Professor of Forestry and Wildlife Management</i>	
GEORGE B. GODDARD, B.S.	French Hall
<i>Assistant Professor of Horticulture</i>	
FREDERICK GREELEY, Ph.D.	Holdsworth Natural Resources Center
<i>Associate Professor of Forestry and Wildlife Management</i>	
ROBERT M. GROVER, B.S.	Stockbridge Hall
<i>Assistant Extension Professor of Poultry Science</i>	
TOM S. HAMILTON, JR., M.S.	Wilder Hall
<i>Assistant Professor of Landscape Architecture</i>	
DENZEL J. HANKINSON, Ph.D.	Flint Laboratory
<i>Professor of Dairy and Animal Science and Head of Department</i>	
JOHN F. HANSON, Ph.D.	Fernald Hall
<i>Associate Professor of Entomology and Plant Pathology</i>	
KIRBY M. HAYES, M.S.	Chenoweth Laboratory
<i>Extension Professor of Food Science and Technology</i>	
ROBERT B. HOADLEY, D.FOR.	Holdsworth Natural Resources Center
<i>Assistant Professor of Forestry and Wildlife Management</i>	

- WARD M. HUNTING, Ph.D. Chenoweth Laboratory
Assistant Professor of Food Science and Technology
- FRED P. JEFFREY, M.S. Stockbridge Hall
Associate Dean of the College of Agriculture and Director of the Stockbridge School
- RANDOLPH A. JESTER, M.S. French Hall
Assistant Professor of Horticulture
- MRS. CARRIE JOHNSON, B.S. Edna Skinner Hall
Graduate Assistant in Home Economics
- CURTIS A. JOHNSON, M.S.C. Stockbridge Hall
Associate Extension Professor of Agricultural Engineering
- ERNEST A. JOHNSON, M.S. Engineering Annex
Assistant Professor of Agricultural Engineering
- GORDON S. KING, M.S. Fernald Hall
Professor of Entomology and Plant Pathology
- ROBERT W. KLEIS, Ph.D. Stockbridge Hall
Professor of Agricultural Engineering and Head of Department
- STEPHEN R. KOSAKOWSKI Physical Education Building
Athletic Coach, Physical Education
- DEANE LEE, M.S. Draper Hall
Assistant Professor of Agricultural and Food Economics
- THEODORE W. LEED, Ph.D. Draper Hall
Extension Professor of Agricultural and Food Economics
- ARTHUR S. LEVINE, Ph.D. Chenoweth Laboratory
Professor of Food Science and Technology
- JOHN H. LILLY, Ph.D. Fernald Hall
Professor of Entomology and Plant Pathology and Head of Department
- ROBERT B. LIVINGSTON, Ph.D. Morrill Hall
Professor of Botany, and Acting Head, Department of Botany
- DONALD E. LUNDBERG, Ph.D. Chenoweth Laboratory
Professor of Food Science and Technology
- DONALD R. MARION, M.S. Draper Hall
Assistant Professor, Research, Agricultural and Food Economics
- JOSEPH C. MAWSON, M.F. Holdsworth Natural Resources Center
Instructor in Forestry and Wildlife Management
- DONALD N. MAYNARD, M.S. Nathaniel Bowditch Hall
Assistant Professor, Research, Horticulture
- MRS. JANE F. MCCULLOUGH, M.S. Edna Skinner Hall
Assistant Professor of Home Economics
- WILLIAM J. MELLEN, Ph.D. Stockbridge Hall
Professor, Research, Poultry Science
- LOUIS F. MICHELSON, Ph.D. Stockbridge Hall
Assistant Professor of Agronomy
- HAROLD E. MOSHER, M.L.A. French Hall
Associate Extension Professor of Landscape Architecture
- ARTHUR E. NIEDECK, M.A. Bartlett Hall
Professor of Speech and Head of Department
- RAYMOND H. OTTO, M.L.A. Wilder Hall
Professor of Landscape Architecture and Head of Department

EDWARD S. PIRA, M.S.	Stockbridge Hall
<i>Assistant Professor of Agricultural Engineering</i>	
FRANK E. POTTER, Ph.D.	Flint Laboratory
<i>Associate Professor of Dairy and Animal Science</i>	
PAUL N. PROCOPIO, M.S.	Wilder Hall
<i>Professor of Landscape Architecture</i>	
EUGENE C. PUTALA, M.S.	Morrill Hall
<i>Assistant Professor of Botany</i>	
WILLIAM E. RANDALL, JR., Ph.D.	Physical Education Building
<i>Professor of Recreation Leadership and Head of Department</i>	
MRS. EDITH REINISCH, M.S.	Public Health Building
<i>Instructor in Bacteriology</i>	
LAWRENCE D. RHOADES, B.S.	Draper Hall
<i>Associate Extension Professor of Agricultural and Food Economics</i>	
ARNOLD D. RHODES, M.F.	Holdsworth Natural Resources Center
<i>Professor of Forestry and Wildlife Management and Head of Department</i>	
RUSSELL E. SMITH, V.M.D.	Paige Laboratory
<i>Professor of Veterinary Science</i>	
J. ROBERT SMYTH, JR., Ph.D.	Stockbridge Hall
<i>Professor, Research, Poultry Science</i>	
GLENN H. SNOEYENBOS, D.V.M.	Paige Laboratory
<i>Head, Department of Veterinary Science</i>	
FRANKLIN W. SOUTHWICK, Ph.D.	French Hall
<i>Professor, Horticulture and Head of Department</i>	
RICHARD A. SOUTHWICK, M.S.	Stockbridge Hall
<i>Assistant Professor of Agronomy</i>	
HERBERT G. SPINDLER, M.B.S.	Draper Hall
<i>Assistant Professor, Research, Agricultural and Food Economics</i>	
RICHARD L. STROMGREN, M.A.	Bartlett Hall
<i>Instructor in Speech</i>	
HARVEY L. SWEETMAN, Ph.D.	Fernald Hall
<i>Professor of Entomology and Plant Pathology</i>	
RUTH J. TOTMAN, M.Ed.	Women's Physical Education Building
<i>Professor and Head of Department of Physical Education for Women</i>	
JOSEPH TROLL, M.S.	Stockbridge Hall
<i>Assistant Professor of Agronomy</i>	
ALDEN P. TUTTLE, M.S.	Nathaniel Bowditch Hall
<i>Assistant Professor of Horticulture</i>	
DONALD V. P. WADDINGTON, M.S.	Stockbridge Hall
<i>Instructor in Agronomy</i>	
WALTER D. WEEKS, Ph.D.	French Hall
<i>Associate Professor, Research, Horticulture</i>	
ELLSWORTH H. WHEELER, Ph.D.	Fernald Hall
<i>Professor of Entomology and Plant Pathology</i>	
LESTER F. WHITNEY, M.S.	Engineering Annex
<i>Associate Professor of Agricultural Engineering</i>	
KAROL S. WISNIESKI, M.P.H.	Public Health Building
<i>Assistant Professor of Public Health</i>	

ALBERT L. WRISLEY, JR., B.S.	Stockbridge Hall
<i>Assistant Professor of Food Science and Technology</i>	
JOHN M. ZAK, M.S.	Stockbridge Hall
<i>Assistant Professor of Agronomy</i>	

THE STOCKBRIDGE SCHOOL OF AGRICULTURE

The Stockbridge School of Agriculture is part of the College of Agriculture at the University of Massachusetts. Starting with the class of 1961 graduates received the Associate Degree. The School was founded in 1918 and has graduated over 4,000 students. The successful careers of our graduates are the best proof available as to the value of this kind of concentrated and technical education.

The Stockbridge School program is set up to meet requirements of a cooperative course as defined in Veterans Administration regulation 12205.

The entering student is required to select one of the following eleven programs of study:

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Animal Science	22
Arboriculture and Park Management	26
Dairy Technology	29
Food Distribution	32
Horticulture	
Floriculture	37
Fruit and Vegetable Crops	37
Landscape Operations	42
Poultry Science	45
Restaurant and Hotel Management	48
Turf Management	51
Wood Utilization	54

GENERAL INFORMATION

Entrance Requirements

High School graduates are eligible to apply and there are no formal entrance tests. Preference is given to students with good preparation in English, Mathematics, and Science, and a particular effort is made to select applicants who have demonstrated a strong motivation in their major field of interest.

How to apply

Fill out application blank, Form I, page 67, printing or typing all information required. Be sure to check the course you wish to elect. Mail this form, with residence certificate, Form II, on page 68, to the Director of the Stockbridge School. If your application is accepted you will be notified and the certificate of residence will be kept on hand until you register.

Registration

For registration dates see calendar in front of catalogue.

Instruction

Courses are taught by the University staff. In addition to teaching by lecture and discussion there is a strong emphasis on practical laboratory work. The combined advantages of university instruction and a university plant with all its varied resources are thus made available to Stockbridge students.

Freshmen majoring in Arboriculture and Park Management, Dairy Technology, Floriculture, Fruit and Vegetable Crops, Landscape Operations, and Turf Management, are assigned to summer placement jobs on or about April 1, which gives them approximately five months of field experience. Freshmen majoring in Animal Science, Food Distribution, Poultry Science, Restaurant

and Hotel Management, and Wood Utilization, do not leave for summer placement until the last week of May following their final examinations. These students, therefore, spend about three months in the field.

Transferring to the University

It is possible, but not easy, to transfer to the University following graduation from Stockbridge. Each case is considered individually by the University Registrar.

A. Application for Transfer

1. A student may be recommended for transfer from the Stockbridge School to the undergraduate course if his cumulative Stockbridge record is 3 or better.
2. The Stockbridge student makes written application to the Head of his Department for transfer to the undergraduate course, stating the major he wishes to follow, the reasons for desiring to make the transfer, and whether he wants the B.S. or B.V.A. degree.
3. The Head of the Department forwards this request to the Registrar with his recommendation.
4. If the recommendation is favorable the Registrar furnishes the student with an application for admission. This is completed by the High School Principal and returned to the Registrar.
5. The applicant is then notified of any entrance deficiencies he may have and advised in regard to examinations he must take. If he is a candidate for the B.S. degree, he takes those in Algebra, English, and the College Qualification Test administered by the University Guidance Office. If he is a candidate for the B.V.A. degree, he does not have to take the Algebra. These tests are given in January, June, and September. The standard of passing will be the same as for veterans taking these tests.
6. Action will be taken on the application after these examination results and the Stockbridge record are available.
7. The Registrars will notify the Head of the Department and the student of the action taken. If the action is favorable, the Registrar will furnish the Department with a photostatic copy of the Stockbridge record.

B. Evaluation of Stockbridge Record

1. Not more than 30 semester hours of blanket transfer credit are allowable for the student who has completed the Stockbridge course with a cumulative average of 3.00 or higher, 10 for the completion of two semesters, and 5 for the completion of one.
2. The Head of the Department to which the student is transferring will determine how much additional credit will be needed to qualify for the Bachelor's degree.
3. A student who has completed three semesters of work in the Stockbridge School should be encouraged to complete his course before transferring to the undergraduate course.

SCHOLARSHIP REGULATIONS

Absence from Classes

1. Attendance at all lectures, laboratories, and class trips is expected of all students.
2. Each instructor establishes his own attendance rules and the Director will support whatever rules are established.
3. All students are expected to report promptly to the University Infirmary when ill. If treated by an outside physician, bring a statement from him if an excuse for absence from class is expected.

Grading System

Grades are computed on a quality point system as follows :

<i>Grade</i>	<i>Interpretation</i>	<i>Quality points per semester hour</i>
A	Excellent	4
B	Good	3
C	Average	2
D	Passing but not satisfactory	1
F	Failure	0
Inc.	All required work not turned in or permission granted to repeat final examination	—

Semester Grade Point Average

To compute the semester grade point average, the total points earned will be divided by the total credits carried. Credits carried are defined as total credits earned and failed. Grade point averages will be recorded to one decimal place. For example, averages from 2.65 to 2.74 will be recorded as 2.7. A student with an Inc. will not have his semester quality point average computed until this mark has been converted to a letter grade except in those cases where obvious dismissal would be involved.

Cumulative Average

To compute the cumulative grade point average, the total points earned will be divided by the total credits carried — the sum of total credits earned and failed. If a student fails a course and then repeats it, quality points will be computed on the basis of the new grade.

Dismissal

The Stockbridge Advisory Committee meets regularly with the Director to review academic performance of students. Dismissal for academic reasons is based on regulations administered by this committee. A student will be dismissed if his *cumulative* quality point average is less than 1.45 at the end of the first semester, 1.55 at the end of the second semester, or 1.95 at the end of the third semester.

Graduation Requirements

A cumulative quality point average of at least 1.95 is required for graduation. Attendance at graduation is required of all seniors before the diploma will be awarded.

No students will be graduated unless all bills due either to the University or to private individuals, business concerns, or a fraternity have been paid on or before the Wednesday preceding graduation exercises.

Seniors who have taken out University loans will have their diplomas held as collateral until these are paid in full. This in no way interferes with the privilege of graduation.

EXPENSES

Tuition

Residents of Massachusetts are charged \$100 per semester. Tuition per semester for non-residents or non-citizens of the United States is \$300. Massachusetts residents are required to file a statement signed by either town or city clerk stating that the applicant (in case he is of voting age) or the applicant's parent is a legal resident. (See Form II in back of catalogue).

Variation in Course Charges

There is a difference in charges for the freshman year depending on the length of the placement period.

Summary of Expenses Estimated:

	FIRST YEAR		SECOND YEAR
	(1½ Semesters)	(2 Semesters)	(2 Semesters)
Tuition (Citizens of Mass.)	\$150.00	\$200.00	\$200.00
Room in University Dormitory	150.00	200.00	200.00
Board at University Commons (5-day week) . .	244.00*	314.00	314.00
Books, Stationery, and Other Supplies	100.00	100.00	100.00
Athletic Fee	22.50	30.00	30.00
Physical Education Equipment Fee	5.00	5.00	—
Student Health Fee	22.50	30.00	30.00
Student Union Fee	15.00	20.00	20.00
Student Health Insurance—12 months' Coverage (Optional)	16.00	16.00	16.00
†Student Taxes	34.00	34.00	34.00
	<hr/>	<hr/>	<hr/>
	\$759.00	\$949.00	\$944.00

*7-day board plan is available: 1½ semesters \$301.00—2 semesters \$390.00. A weekend meal ticket may be purchased (\$40.00 per semester) covering 4 meals: Breakfast and Dinner on Saturday; Dinner and Supper on Sunday.

The figures for board and room are estimates based on prevailing prices and may be subject to change.

†Student Taxes:

	FIRST YEAR	SECOND YEAR
Class Tax	\$ 2.00	\$ 2.00
Commencement Tax	8.00	8.00
Stosag (School Yearbook)	8.00	8.00
Interdorm Phones	16.00	16.00
	<hr/>	<hr/>
	\$34.00	\$34.00

Estimated cost of required field trips during the two years, \$15.00-\$50.00

Advance Payment

New students will be expected to make an advance payment of \$15 to the treasurer of the University as soon as they are notified by the director that they are accepted for admission. This will be considered as first payment on

registration fees which will be due at time of matriculation in the fall. It is not refundable and will be considered as payment for admissions and registration expense if the student does not matriculate.

Refund of Student Payments

Prepaid tuition and fees will be refunded to students withdrawing as follows:

A. Within the first two weeks from the date of registration	80 %
B. Within the third week	60 %
C. Within the fourth week	40 %
D. Within the fifth week	20 %
E. After fifth week, no refund.	
Prepaid board — pro rata refund.	
Prepaid room rent — no refund.	

Payment Due Dates

In accordance with University policy, all charges for tuition, fees, board and room rent in University Residence Halls are due and payable approximately twenty-one days prior to the date of registration of each semester. Bills will be rendered in advance with due date shown and payment may best be made by mail. Students may not register until all University charges are paid.

Late Registration

Any student who does not complete his registration, including payment of semester charges, on the regular registration days will be required to pay a fee of \$5.00.

Rooms for Men

All men except commuters, married students, or those living at the Stockbridge Fraternity (Alpha Tau Gamma) are required to live in University dormitories. If dormitory facilities are scarce late applicants may have to find a room in a private home in Amherst.

Rooms for Women

All women except commuters or married students must live in University dormitories. Under the supervision of the Dean of Women, life in each dormitory is directed by a council of student leaders, advised by a full-time housemother, so that conditions are conducive to good study and living habits.

Note

In all dormitories, whether for men or women, the student must supply a study lamp, a metal waste basket, bed linen, pillow and blankets. Dormitories are open at 10:00 a.m. on the day preceding freshman registration.

Board

All freshmen living in dormitories as well as senior women in dormitories must board at the University Commons. Those living at Alpha Tau Gamma—whether freshmen or seniors—may board at the fraternity. Senior men living in dormitories may take their meals at the Commons or make other

arrangements if they choose to do so. Preparation of food in dormitory rooms is not permitted under any circumstances.

Laboratory Charges

Some departments — Agricultural Engineering, Agronomy, Animal Science, Entomology, Horticulture, and others — have laboratory charges which range from two to six dollars per course. These charges must be paid at the University Store before the student is admitted to the course.

Student Cars

Freshmen living in dormitories are not permitted to have cars. Seniors have this privilege but the practice is not encouraged. All those permitted to have cars on campus must register their vehicles with the Campus Police at the time of registration or immediately after bringing their cars to the University. Driving to and from classes is strictly prohibited except for those with severe physical limitations.

BOOKS AND SUPPLIES

For the convenience of students, the University maintains a store service in the Student Union building. Here all textbooks may be purchased at cost plus transportation charges. Students are informed at the first class session in each course what books are required and must secure individual copies according to order list sent in by instructor.

There is little opportunity to secure secondhand books because most students find the texts assigned of value to retain as reference sources after completing a course.

PART-TIME EMPLOYMENT

Students desiring financial aid from the University in the form of part-time employment, are required to file applications with the Placement and Financial Aid Services. Applications received prior to May 15 of each year receive first preference for jobs available. Incoming freshmen are not encouraged to work the first semester unless a dire need exists.

These application forms are used to determine the comparative need and qualifications of the applicants. No student is eligible for part-time work unless he or she has filed the required form and has been certified as deserving by the Placement and Financial Aid Services staff. Application forms may be secured at the office of Placement and Financial Aid Services, Machmer Hall.

REQUIRED PLACEMENT TRAINING

The placement training period between the first and second year usually enables a student to earn from \$500 to \$1000 depending upon his skill and general ability, and the type of work. This will pay a large part of the second year expenses.

Prospective students should understand that the above estimates cover expenses which may be called strictly University expenses, and that there

are other financial obligations voluntarily assumed by students which they should expect to meet. Total cost for a full academic year runs between \$1200 and \$1400. Freshmen with only one and one-half semesters in residence require from \$900 to \$1050. Estimates for clothing, laundry, entertainment and travel are included in these cost figures.

LOANS

Bartlett Loan Fund

This fund was established by the F. A. Bartlett Tree Expert Company of Stamford, Connecticut. It is available for short term loans to students majoring in Arboriculture. Apply at the Director's Office in Stockbridge Hall.

Restaurant and Hotel Management Loan Fund

Money to establish this fund was donated by the University Stewards Club. Restaurant and Hotel Management majors may borrow from it on a short term basis. Apply at the Director's Office in Stockbridge Hall.

Stockbridge Emergency Loan Fund

This loan fund has been built up by class gifts over the years — classes of 1951, 1952, 1953, 1955, 1956, 1957, 1958, 1959, and 1961. It provides loans for short periods of time, one week to one month, to any student in an emergency situation. There are no interest charges and application should be made in the office of the Director.

The Vincent Goldthwait Loan Fund

This fund was established by Dr. Joel E. Goldthwait, U. of M. 1885, of Boston, as a memorial to his son who died in 1922 during his junior year at Harvard. Its purpose is to aid worthy students in financial difficulties. Amounts in excess of \$200 are rarely granted and most loans range from \$50 to \$150.

A regular promissory note must be executed, endorsed by parent or guardian, and repayment may be made within any reasonable period after graduation up to one year. There is no interest charge.

All requests for such aid should be made in person to the Assistant Director of Placement and Financial Aid Services who is responsible for the administration of all loans. He will also describe other loan arrangements upon request.

SCHOLARSHIPS

Prospective senior students should file scholarship applications with the Placement and Financial Aid Services before starting placement training in the spring. Entering students who wish to apply for a scholarship should request an application blank and submit the completed form prior to March 1.

Ascension Farm School Scholarships

Trust funds from the Ascension Farm School Corporation of Great Barrington were given to the University trustees in 1952 the income from which shall be used to provide for the "education and training in agriculture of boys resident in Western Massachusetts," as stated in its original charter.

This makes possible the award of scholarships to men students residing in Hampden, Hampshire, Franklin, and Berkshire counties with special consideration to be given applicants from the last named county.

The Margaret Fitz Barnes Scholarship

A \$100 scholarship awarded annually to a young man or young woman interested in landscape operations who is in need of financial aid and has been accepted or is enrolled in the Stockbridge School of Agriculture.

The Boston Market Gardeners Association Scholarship

An annual scholarship of \$100 to be awarded to a deserving student majoring in fruit and vegetable crops. This scholarship may be awarded either to a four-year or Stockbridge student.

H. B. Cantor Foundation Scholarship

A \$500 scholarship for students majoring in restaurant and hotel management. Students must be recommended by the University Scholarship Committee. This scholarship may be awarded to either four-year or Stockbridge School of Agriculture students.

Ellsworth Milton Statler Foundation Scholarships

Two \$500 scholarships for students majoring in restaurant and hotel management. Students must be recommended by the University Scholarship Committee and approved by a Committee of the Statler Foundation. These scholarships may be awarded to either four-year or Stockbridge School of Agriculture students.

Boston Steward's Club Scholarships

Annual scholarships of \$500 are awarded to deserving students majoring in restaurant and hotel management. Students must be recommended by the University Scholarship Committee and approved by the Boston Steward's Club. These scholarships may be awarded to either four-year or Stockbridge School of Agriculture students.

Lotta Crabtree Scholarships

By special arrangement with the Lotta Crabtree Foundation trustees of Boston, a number of scholarships are available to Stockbridge students.

Holyoke and Northampton Florists' and Gardeners' Club Scholarship

An annual scholarship of \$100 to be awarded to a senior student (man or woman) in the Stockbridge School who is majoring in floriculture or landscape operations.

The V. A. Rice Scholarship Fund

A \$100 scholarship for a worthy student majoring in animal science — either Stockbridge or four-year.

Wilbur H. H. Ward Scholarships

The Wilbur H. H. Ward Fund is administered by a board of trustees independent of the University. Applicants for these scholarships should write to Mrs. Marian R. Erush, Stockbridge Hall, University of Massachusetts, Amherst, Mass.

Farm Bureau Scholarship

The Hampshire County and the Berkshire County Farm Bureaus each offer a \$100 scholarship to a Massachusetts farm boy or girl to assist in obtaining a higher education.

CONVOCATION

No classes are scheduled on Wednesdays from 11:15 A.M.-12:05 P.M., with the idea that a convocation may be held during this hour. On occasion a convocation for either freshmen or seniors will be compulsory. The number of convocations held per year will be based on recommendations from the Student Senate.

STUDENT ACTIVITIES

Student Union Building

The Student Union is available to all students for recreational purposes. Among other things it includes a large ballroom for dinners and movies, the University Store, offices for student activities, offices for the University chaplains — Jewish, Catholic, and Protestant — meeting rooms and lounges, and dining rooms. Nearby churches welcome student attendance. In 1963 a large and attractive Newman Center was built in the area of the main entrance to campus.

Commodity Clubs

All major departments sponsor commodity clubs which hold regular meetings devoted to professional improvement as well as social activities. Stockbridge students are urged to join a club of their choice.

Stockbridge Senate

Members of both classes are represented on the Senate. This body serves as a general committee on student government and aids in maintaining the best traditions and customs of the school.

Yearbook

The Stockbridge yearbook is called STOSAG and is published annually by the senior class.

Fraternity

There is one social fraternity, Alpha Tau Gamma, with membership limited to Stockbridge students.

Progress Banquet

A Progress Banquet is held once a year, usually in March, at which time scholastic and athletic awards are announced.

Bowditch Speaking Contest

Seniors in the Stockbridge School are entitled to compete in the annual Nathaniel A. Bowditch Speaking Contest which is held early in May. Cash prizes of \$25, \$15, and \$10, are provided by the Massachusetts Society for the Promotion of Agriculture.

Judging Teams

All Stockbridge students are eligible to compete for places on various judging teams which compete with other two-year schools in the New England and New York area. The contest is usually held in April and includes teams in poultry, dairy products, livestock and dairy cattle.

Scholastic Society

A Stockbridge Honorary Scholastic Society called "LEAR" was established in 1935 to encourage high scholarship. Students whose record for the first three semesters is 3.4 quality points or better, are elected to membership in the society each March. Engraved certificates are awarded to members of the graduating class who have achieved this distinction.

Athletics and Physical Education

The School has its own separate athletic program with regular schedules in soccer, basketball, hockey, and riflery. The official insignia is the letter S for soccer, basketball and hockey, and the letter S with crossed rifles for riflery.

The soccer, basketball, and hockey teams play mostly with preparatory school teams in the area. The rifle team engages in postal matches with collegiate teams throughout the country, and in shoulder-to-shoulder matches with college freshman teams in the New England area.

A physical education building containing a swimming pool, an indoor cage 150 by 180 feet for all kinds of sports and games, and locker room and shower facilities are provided. Individual equipment is supplied to all members of the athletic teams and for students wanting general recreation. Students may avail themselves of these facilities during limited periods in the school year when not assigned to other activities.

All freshmen are required to take Physical Education three hours each week. The passing of Physical Education is a requirement for graduation. Men are required to pay a \$5.00 Physical Education fee. Women do not pay a fee but must purchase a gymnasium suit at a cost of \$7.50.

STUDENT RELATIONS

The customary high standard of University men in honor, manliness, self-respect, and consideration for the rights of others constitute the standards of student deportment.

Any student known to be guilty of dishonest conduct or persistent violation of rules must be reported by the instructor to the director for discipline.

The privileges of the University may be withdrawn from any student at any time if such action is deemed advisable.

It should be understood that the University, acting through its president or any administrative officer designated by him, distinctly reserves the right not only to suspend or dismiss students, but also to name conditions under which students may remain in the institution. For example, if a student is not doing creditable work he may not only be disciplined, but he may be required to meet certain prescribed conditions in respect to his studies, even though under the foregoing rules his status as a student be not affected. The same provision applies equally to the matter of absences.

Similarly, also, it applies to participation in student activities. Though this will ordinarily be governed by the rules as already laid down, yet if in the judgment of the University authorities a student is neglecting his work on account of these activities, the privilege of participating in them may be withdrawn for such time as is considered necessary. Moreover, it may be withdrawn as a punishment for misconduct.

HEALTH SERVICE

Medical care is provided through the University Health Services. The center of activities is the modern and well-equipped Infirmary where there are facilities for complete outpatient care, available during regular hours daily. Included are services of a staff of physicians, nurses, technologists, and counselors, who are prepared to furnish necessary care at any time. Services are augmented by modern X-ray, laboratory, and physiotherapy facilities.

In addition, the Infirmary contains 80 beds, with modern equipment for the care of bed patients.

All students are assessed a student health fee which currently has been set at \$15.00 per semester. In return for this fee, each student is entitled to receive:

- (A) Unlimited out-patient visits during usual hours of the Out-patient Department.
- (B) Emergency care whenever indicated. Dormitory calls are discouraged. It is felt that only in very few situations is it not advisable for a student to be brought to the Infirmary where much more adequate care is available.
- (C) Unlimited service within the competence of the Health Services staff whenever rendered on the campus; no additional charge is made for any such service. In the case of serious emotional illness, the services of the mental hygienist may have to be limited in consideration of the needs of other students.
- (D) Medication is provided from the Infirmary supplies. It is intended that a charge will be made only for basic medications which students have been taking prior to entrance (insulin, etc.), those unusually expensive medications taken for long periods (steroids, etc.), and those ordered specifically for an individual student (allergy materials, etc.).
- (E) X-ray and laboratory examinations are available at the Infirmary as ordered by the staff physicians.
- (F) Unlimited bed-patient care in the Infirmary as long as registered as a student, and when such care is directed by the staff physician.

A supplementary insurance program is available at an unusually favorable rate. This will provide for major surgical care, medical or surgical hospital and physician's care when not in Amherst, out-patient x-ray service not available through the Infirmary, and ambulance service. All students will be billed for this insurance and all are urged to accept it without requesting waiver.

It is the aim of the Health Services to promote optimum health throughout the University and to minimize for each student the possibility of loss of time for reasons of health. In addition to providing medical care, the Health Services attend to all matters of health and safety of the University Community. Many of its activities are basically preventive in nature. In this connection it is urged that all students avail themselves of the help of the Health Services Staff as soon as even a minor need is evident. Many major disabilities are prevented by timely attention to apparently minor ailments.

GOODELL LIBRARY

The Goodell Library forms the central unit of the University Library and contains the largest portion of the book collections of the University, numbering 251,991 books and periodicals. A central card catalog lists all books to be found in the University. The agricultural and scientific collections are especially strong in the literature of entomology, botany, chemistry, horticulture, land architecture, soil science and animal husbandry. In addition there are extensive collections in literature, history, economics and sociology. There are over 1900 current periodical titles (popular, literary, and scientific) subscribed to by the Library. The publications of the several state agricultural experiment stations are well represented in the collections. The Library is also a depository for a large portion of the publications of the United States Government, including Department of Agriculture publications.

The Library hours during regular term time are Mondays through Fridays, 8:00 A.M. to 10:00 P.M.; Saturdays, 8:00 A.M. to 4:30 P.M.; and Sundays and holidays, 2:00 P.M. to 10:00 P.M. Service is provided at the Reserve Desk until 12:00 midnight, Sundays through Thursdays.

Goodell Library is named in memory of Henry Hill Goodell, President of the University from 1886 to 1904 and Librarian from 1886 to 1889.

An addition to the library has been completed recently and provides large reading areas to seat about 1,000 students. The book stack has space for 460,000 volumes in addition to the 200,000 volume capacity of the older Goodell building. The reference collection and circulation desk of the University Library are now housed on the 5th level of the new addition. A special microfilm reading area and rooms for special collections are also provided.

OPPORTUNITIES FOR WOMEN

Somewhere around three to five percent of the Stockbridge students are women — for the most part majoring in Animal Science, Floriculture and Restaurant and Hotel Management with an occasional major in Poultry Science. Graduates with strong determination and a liking for their vocation have made successful careers. Others, even though they have not made a career in the field of their major, have developed a lasting interest or hobby in something they both like and understand.

EMPLOYMENT AFTER GRADUATION

The University does not guarantee employment following graduation to students registered in any of its courses, but through the Placement and Financial Aid Services it has an opportunity to recommend students for a large

number of positions. A record is kept of each student's work and experience and of his success in positions for which he has been recommended after he has finished his course. Opportunities for trained men and women, especially those who have had experience are good.

A student desiring a recommendation from the University must meet the following conditions: —

- (1) He must be of good character.
- (2) His previous record must be good.
- (3) His work in all courses must be satisfactory.

Students who have not previously had a considerable amount of practical experience cannot, as a rule, be recommended for positions of responsibility. This is especially true of the better positions for which managers or superintendents are wanted.

SUMMER PLACEMENT

The Director is in charge of arranging summer placement jobs for all freshmen. It cannot be guaranteed that every student will be placed but in normal times jobs are found for all.

Positions are secured that will enable the student to gain practical experience in his particular field. Wage rates vary in different localities but the student may expect to earn a reasonable amount. However, the purpose of the placement job is to gain experience rather than to expect a high monetary return.

It is urged that all freshmen arrange an interview with the Director prior to the Christmas vacation so that his qualifications and the type of work he wishes to do may be determined. No final arrangements for placement training may be made prior to consulting with the Director.

Students are required to complete the training period without unnecessary absences. No job transfers are to be made without the permission of the Director nor may a position be given up until the Director has been notified.

A monthly report must be furnished on the form supplied and submitted not later than the fifth of each month. Students must complete in a satisfactory manner all reports as required by the various departments and those failing to complete all placement requirements are not permitted to take the work of the second year.

ANIMAL SCIENCE

Head of Department: PROFESSOR DENZEL J. HANKINSON, PROFESSOR FOLEY,
ASSISTANT PROFESSOR BRUCE, ASSISTANT PROFESSOR BUCK, ASSISTANT PROFESSOR
LYFORD

A major program of study in the Department of Dairy and Animal Science.

Animal Science in this School, includes dairy cattle, beef cattle, horses, sheep and swine.

The purposes of the curriculum in animal science are (1) to provide the student with a thorough understanding of the basic principles involved in the development of more efficient and useful animals: these principles are

the ones involved in the biology of animal reproduction, the chemistry of animal growth and nutrition, and the economics of livestock production; (2) to apply these principles in the selection, feeding and management of the various classes of livestock and (3) to provide practice in judging, fitting, showing and general management of livestock as well as the production of milk and other products, and the slaughtering, cutting, curing and marketing of meat products.

The University dairy herd is comprised of the Ayrshire, Guernsey, Holstein and Jersey breeds. In beef cattle, a herd of Aberdeen-Angus and a herd of Herefords are maintained; in sheep, flocks of Shropshires and Dorsets; in swine, crossbred strain of meat-type hogs; and in horses, a band of Morgans.

The University farm consists of barns and land adjacent to the campus and a 300 acre tract in the process of development at South Deerfield, approximately 7 miles from the campus. The farm is equipped with up-to-date machinery for producing and harvesting hay and silage for livestock feeding. The farm, barns, animals and accessories comprise the laboratory facilities.

Job Opportunities

Owners and operators of dairy farms, farm managers; superintendents or foremen, herdsmen in various kinds of livestock enterprises; dairy herd association testers; inseminators in artificial breeding units; businesses allied to agriculture such as farm cooperative fieldmen, sales and service men for feed, fertilizer and farm machinery companies. Stockbridge graduates with superior academic records can transfer to the University by earning a satisfactory record on two examinations.

Animal Science

First Year

First Semester		Second Semester	
(Fifteen Weeks Resident Instruction)	Crs.	(Fifteen Weeks Resident Instruction followed by Three Months Placement Training)	Crs.
Agricultural Economics S-1 (Practical Economics)	3	Agricultural Engineering S-7 (Structures and Utilities)	3
Agronomy S-1 (Soil Management)	3	Agronomy S-2 (Fertilizers) First half of Semester	2
Animal Science S-1 (Introductory Animal Science)	2	Animal Science S-2 (Principles of Feeding)	5
Bacteriology S-1 (Bacteriology and Rural Hygiene)	3	English S-1 (Business English)	3
Dairy Technology S-1 (General Dairying)	3	Entomology S-12 (Livestock and Forage Crop Insects) Second half of Semester	2
Mathematics S-1 (General Course)	2	Poultry Science S-10 (General Poultry Husbandry)	3
Practical Science S-7 (Primarily Chemistry)	2	Physical Education S-2 (a, b)	-
Physical Education S-1 (a, b)	-		

Second Year

First Semester		Second Semester	
(Fifteen Weeks Resident Instruction)	Crs.	(Fifteen Weeks Resident Instruction)	Crs.
Agricultural Economics S-15 (Farm Management)	4	Agricultural Engineering S-9 (Drainage, Irrigation and Soil Conservation)	3
Agricultural Engineering S-3 (Machinery)	3	Agronomy S-4 (Field Crops)	3
Animal Science S-3 (Animal Breeding)	5	Animal Science S-4 (Livestock Production)	5
Animal Science S-5 (Farm Meats)	3	Animal Science S-6 (Dairy Cattle and Milk Production)	5
Speech S-1	2		
Veterinary Science S-1	3		

Animal Science S-1. (Introductory Animal Science) I.

Introduces the student to the broad field of animal science. Emphasis is placed on types, breeds, market classes, elementary animal physiology including digestion, circulation, and endocrinology.

1 class hour and 1 2-hour lecture demonstration period.

Credit, 2.

MR. BRUCE.

Animal Science S-2. (Principles of Feeding) II.

A study of digestive processes and feeding regimes in farm animals. Laboratory uses Morrison's Feeding Standards for nutrient requirement and formulation of practical rations.

Textbook: Morrison, "Feeds and Feeding."

4 class hours and 1 2-hour laboratory period.

Credit, 5.

MR. LYFORD.

Animal Science S-3. (Animal Breeding) I.

Acquaints the student with the physiology of reproduction, the theoretical and practical application of genetic principles in breeding livestock, and the bases of selection.

A one-day field trip to a Selective Breeding Association is required (approximate cost \$5.00).

3 class hours and 2 2-hour laboratory periods.

Credit, 5.

MR. BRUCE.

Animal Science S-4. (Livestock Production) II.

Beef, sheep, swine, and horse production in the United States and particularly in New England. Four students will be selected to compete in the Northeastern Agricultural Schools Judging Contest.

A one-day field trip is required (approximate cost \$5.00).

Textbook: Ensminger, "Animal Science."

3 class hours and 2 2-hour laboratory periods.

Credit, 5.

MR. BRUCE.

Animal Science S-5. (Farm Meats) I.

A survey of the meat packing industry. Classes and grades, inspection and preservation of meat. Laboratories cover slaughtering and cutting techniques, and carcass evaluation.

Textbook: Ziegler, "The Meat We Eat."

2 class hours and 1 2-hour lecture demonstration period.

Credit, 3.

MR. BUCK.

Animal Science S-6. (Dairy Cattle and Milk Production) II.

Treats all phases of dairy cattle management. Advantages and disadvantages of dairying in the Northeast are considered in relation to present and future management problems.

The cost of transportation for required field trips will not exceed \$10.00.

Textbook: Henderson and Reaves, "Dairy Cattle Feeding and Management."

3 class hours and 2 2-hour laboratory periods.

Credit, 5.

MR. FOLEY.

Animal Science S-8. (Meat and Meat Products) II.

Principles of meat evaluation and utilization. Classes and grades inspection, grading, preservation. Laboratories include carcass evaluation, wholesale and retail cutting, identification and manufactured meat products.

A one-day field trip to a large meat packing plant (approximate cost \$5.00) is a required part of the course.

Textbook: Ziegler, "The Meat We Eat."

2 class hours and 1 2-hour lecture demonstration period.

Credit, 3.

MR. BUCK.

Animal Science S-9. (Special Dairy Cattle Course for Dairy Technology Seniors and Poultry Science Freshmen) I.

The principles of dairy cattle feeding and livestock breeding; and successful herd management practices are related to the problems facing dairy farmers in the Northeast.

The cost of transportation for required field trips will not exceed \$5.00.

Textbook: Henderson and Reaves, "Dairy Cattle Feeding and Management."

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. FOLEY.

ARBORICULTURE AND PARK MANAGEMENT

Head of Department: PROFESSOR RAYMOND H. OTTO. PROFESSOR KING.

This program permits a student to enter into two closely related and expanding professions.

Arboriculture

Arboriculture, the care of shade and ornamental trees, is becoming more important in Massachusetts as the citizens realize the necessity of trees in every day life. It includes tree planting; large tree moving; diagnosis and treatment of tree disease, defects, and mechanical injuries; identification and control of tree insect pests; fertilizing; pruning and repair of storm or otherwise damaged trees; and removal of dead or undesirable trees.

This growing appreciation of the value of trees has led to the development of organizations to supply tree maintenance service. These firms desire trained men. All Massachusetts towns are required to elect tree wardens. At present there are over three thousand men actively engaged in municipal and private tree care in Massachusetts and the future is almost unlimited on a state basis. Nationally, over 800 million dollars is spent annually on shade and ornamental trees to supply these needs.

The University offered the first course in the country on shade tree care in 1895, and now offers one of the few complete two-year courses in arboriculture in the United States. Annually in March, a Conference of one week's duration for tree wardens, arborists and utility men is held on the campus. The programs of the conferences are of interest to students in this course.

The University campus of 700 acres has a wide variety of trees of all ages with which the student becomes acquainted, and serves as a laboratory for problems similar to those one will have to meet in practice. The research laboratory in shade tree diseases for the state is also located on the campus.

The Massachusetts Arborists Association and the Massachusetts Tree Wardens and Foresters Association have approved this course as a basic training program.

Park Management

The student will be prepared for various aspects of park management, general forest management, and other phases of land use. Park formation and expansion to meet public needs is a growing field and there is need for trained men. Many phases of Park Management and Arboriculture are not only related but interchangeable.

General

All freshman students must attend an orientation course, Arboriculture S-0, for one week prior to the starting of school. Eight hours a day will be devoted to this.

Field trips will be required during the two years at an estimated cost of \$40.00.

A placement training period is required between the freshman and senior years.

Job Opportunities

Operators, foremen and salesmen for arboriculture firms, utility line clearance foremen, deputy tree wardens or tree wardens in towns and cities, tree care in estates, parks, state highways, turnpike authorities, college campuses or grounds of public institutions, or developing one's own service organization for the practice of arboriculture.

The phase of land use known as Park Administration and Management offers numerous opportunities with municipal, county, state, and national groups dealing with parks. Many town and city governments are combining Park and Tree Departments where personnel are needed who have an understanding of Arboriculture and Park Management.

An accident insurance policy will be required of all prospective students. Such a policy will be available at the University at time of registration.

Arboriculture and Park Management

First Year

Arboriculture S-0 (Orientation—Field Training)—One week prior to school opening — No credit.

First Semester

(Fifteen Weeks Resident Instruction)	Crs.
Agronomy S-1 (Soil Management)	3
Agrostology S-5 (Basic Factors, Construction and Maintenance of Fine Turf Areas)	3
Arboriculture and Park Management S-1 (Principles and Practices)	4
¹ Botany S-1 (Introductory Botany)	3
² English S-1 (Business English)	3
Landscape Operations S-1 (Tree Identification)	3
Speech S-1	2
Physical Education S-1 (a, b)	—

¹One-half of class takes Botany

²One-half of class takes English

Second Semester

(Eight Weeks Resident Instruction followed by Five Months Placement Training)	Crs.
Agricultural Engineering S-1 (Power Units)	2
Arboriculture and Park Management S-2 (Principles and Practices)	2
Entomology S-4 (Insects and Related Pests)	2
Horticulture S-14 (Plant Propagation)	2
Plant Pathology S-2 (Plant Diseases)	2
Recreation S-1 (Introduction to Recreation)	2
Physical Education S-2 (a)	—

Second Year

First Semester

(Fifteen Weeks Resident Instruction)	Crs.
Arboriculture and Park Management S-7 (Municipal, Tree and Park Problems)	3
Forestry S-1 (Forest Measurement)	4
Landscape Operations S-7 (Topographical Mapping)	3
Psychology S-1 (Applied General Psychology)	3
<i>Electives</i> (2 of 3)	
Entomology S-5 (Horticultural Insects)	3
Forestry S-3 (Applied Silviculture)	4
Plant Pathology S-3 (Forest and Shade Tree Pathology)	3

Second Semester

(Fifteen Weeks Resident Instruction)	Crs.
Agricultural Economics S-3 (Accounting Principles)	4
¹ Botany S-1 (Introductory Botany)	3
² English S-1 (Business English)	3
Landscape Operations S-8 (Grading and Construction)	3
¹ Botany for students who have not had Botany.	
² English for students who have not had English.	
<i>Electives</i> (3 of 6)	
Agricultural Engineering S-7 (Structures and Utilities)	3
Arboriculture S-8 (Private Tree Business, Tree Laws and Herbicides)	4
Horticulture S-4 (Orchard Pruning)	2
Landscape Operations S-12 (Shrub Identification)	3
Park Management S-2 (Administration and Personnel)	3
Wildlife Management S-2 (Management of Wildlife)	2

Arboriculture and Park Management S-1. (Principles and Practices) I.

A study of tree care. Laboratory periods devoted to field practices and park lay-out problems. Professional organizational literature required. Laboratory charge \$2.00.

2 class hours and 1 3-hour laboratory period.

Credit, 4.
MR. KING.

Arboriculture and Park Management S-2. (Principles and Practices) II.

Continuation of S-1. Laboratory charge \$2.00.

2 class hours and 1 3-hour laboratory period.

Credit, 2.
MR. KING.

Arboriculture and Park Management S-7. (Municipal, Tree and Park Problems) I.

Municipal programs and surveys dealing with tree, park and utility problems. Laboratory charge \$2.00.

1 class hour and 1 4-hour laboratory period.

Credit, 3.
MR. KING.

Arboriculture S-8. (Private Tree Business, Tree Laws and Herbicides) II.

Aspects of private tree companies, laws and ordinances concerning trees, and phases of weed control related to the profession.

2 class hours and 1 4-hour laboratory period.

Credit, 4.
MR. KING.

Park Management S-2. (Administration and Personnel) II.

Basic problems of administration, financing of parks and land use philosophy.

2 class hours and 1 2-hour laboratory period.

Credit, 3.
MR. KING.

DAIRY TECHNOLOGY

Head of Department: PROFESSOR DENZEL J. HANKINSON. ASSOCIATE
PROFESSOR POTTER, ASSISTANT PROFESSOR EVANS.

A major program of study in the Department of Dairy and Animal Science.

The two-year course in dairy technology provides the student with an understanding of the handling and processing of milk and its products from the time the milk leaves the cow until it reaches the consumers' table. Students electing this course are preparing themselves for future work in the processing of dairy products and its related fields.

All dairy technology courses are given in Flint Laboratory. The building is well equipped with adequate facilities to provide classroom instruction in dairy processing. Commercial scale operations exist in processing milk and ice cream.

Job Opportunities

Skilled workers in wholesale and retail dairy plants including laboratory technicians, pasteurizer operators, ice cream mix makers, freezer operators, cheese-makers, salesworkers, and by-products manufacturers; also dairy equipment and supply salesmen, fieldmen and Dairy Herd Improvement Association testers. Such training supplemented with sufficient practical experience may lead to positions such as assistant plant superintendents and plant managers.

Field trips will be required during the two years at an estimated cost of \$20 per student.

While working in the dairy laboratories, white suits and rubber footwear are required at an estimated cost of \$10.

Dairy Technology

First Year

First Semester

(Fifteen Weeks Resident Instruction)	
Agricultural Economics S-1 (Practical Economics)	3
Bacteriology S-1 (Bacteriology and Rural Hygiene)	3
Dairy Technology S-1 (General Dairying)	3
Entomology S-3 (Structural Pests)	2
Food Science and Technology S-3 (Special Products)	2
Mathematics S-1 (General Course)	2
Practical Science S-7 (Primarily Chemistry)	2
Speech S-1	2
Physical Education S-1 (a, b)	-

Second Semester

(Eight Weeks Resident Instruction followed by Five Months Placement Training)	
Agricultural Economics S-4 (Elements of Bookkeeping)	3
Agricultural Engineering S-12 (Utilities and Food Facilities)	3
Dairy Technology S-2 (Plant Equipment and Sanitation)	2
Dairy Technology S-12 (Starters and Cultured Dairy Products)	1
Home Economics S-2 (Elementary Nutrition)	2
Practical Science S-8 (Primarily Physics)	1
Physical Education S-2 (a)	-

Second Year

First Semester		Second Semester	
(Fifteen Weeks Resident Instruction)	Crs.	(Fifteen Weeks Resident Instruction)	Crs.
Agricultural Economics S-13 (Business Management)	3	Agricultural Economics S-22 (Dairy Marketing)	3
Agricultural Engineering S-13 (Refrigeration, Heating and Air Conditioning)	3	Agricultural Engineering S-16 (Dairy Equipment)	3
Animal Science S-9 (Special Dairy Cattle Course)	3	Dairy Technology S-4 (The Fluid Milk Industry)	4
Dairy Technology S-3 (The Ice Cream Industry)	5	Dairy Technology S-8 (Dairy Bacteriology)	4
Dairy Technology S-5 (Evaluation of Dairy Products)	1	Dairy Technology S-10 (Concentrated Dairy By-Products)	2
Dairy Technology S-7 (The Cheese Industry)	2	Food Science and Technology S-2 (Fundamentals of Food Preservation)	3
English S-1 (Business English)	3		

Dairy Technology S-1. (General Dairying) I.

An introduction to the dairy products processing industry with emphasis on the composition and properties of milk in relation to the various major dairy products. Laboratory charge \$2.00.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. EVANS.

Dairy Technology S-2. (Plant Equipment and Sanitation) II.

The principles of cleaning and sanitization in relation to the production of high quality dairy products.

1 class hour and 2 2-hour laboratory periods.

Credit, 2.

MR. POTTER.

Dairy Technology S-3. (The Ice Cream Industry) I.

The modern methods of manufacturing ice cream and related products as influenced by ingredients of the mix, processing, and packaging.

2 class hours and 2 3-hour laboratory periods.

Credit, 5.

MR. POTTER.

Dairy Technology S-4. (The Fluid Milk Industry) II.

A consideration of the essentials in producing a high quality fluid milk from the care on the farm, through plant processing procedures and distribution.

2 class hours and 2 2-hour laboratory periods.

Credit, 4.

MR. EVANS.

Dairy Technology S-5. (Evaluation of Dairy Products) I.

The principles and practice of grading and evaluating dairy products based upon flavor and other sensory product characteristics. Laboratory charge \$2.00.

1 2-hour laboratory period.

Credit, 1.

MR. EVANS.

Dairy Technology S-7. (The Cheese Industry) I.

The principles involved in the manufacture of the main varieties of cheese.

1 class hour and 1 3-hour laboratory period.

Credit, 2.

MR. EVANS.

Dairy Technology S-8. (Dairy Bacteriology) II.

A study in the application of microbiological principles and laboratory techniques to the quality control of milk and other dairy products. Laboratory charge \$2.00.

2 class hours and 2 2-hour laboratory periods.

Credit, 4.

MR. EVANS.

Dairy Technology S-10. (Concentrated Dairy By-Products) II.

The principles involved in the production of butter, concentrated and dried dairy products.

1 class hour and 1 3-hour laboratory period.

Credit, 2.

MR. POTTER.

Dairy Technology S-12. (Starters and Cultured Dairy Products) II.

The importance of microorganisms in dairy fermentations as related to the production of cultured dairy products such as buttermilk, sour cream, and cheese.

1 class hour and 1 3-hour laboratory period.

Credit, 1.

MR. EVANS.

FOOD DISTRIBUTION

Head of Department: PROFESSOR JOHN BLACKMORE. PROFESSOR BELL,
PROFESSOR LEED, ASSOCIATE PROFESSOR FITZPATRICK, ASSOCIATE PROFESSOR
RHOADES, ASSISTANT PROFESSOR CALLAHAN, ASSISTANT PROFESSOR LEE,
ASSISTANT PROFESSOR SPINDLER, ASSISTANT PROFESSOR MARION.

There is a growing demand for well-trained people to fill managerial positions in retail food firms and related businesses. The Food Distribution program is designed to provide the required training. It combines course work in business management with specialized and technical training in food sciences and economics. The instruction program includes the buying, handling, warehousing, packaging and merchandising of food products. Store operations and management are studied. Case studies from the retail food industry are used extensively as are field trips and visiting authorities from leading firms in the field.

Main emphasis in the program is on training for retail food store management which in turn can lead to executive positions such as district supervisor, buyer, merchandiser, and staff positions such as personnel manager, advertising manager, etc. In addition, basic training is given for positions in related businesses, including wholesaling, jobbing, commission and brokerage operations, food manufacturers representative, and for positions with government inspection and regulatory agencies.

Entrance Qualifications

Applicants should have good records in English, General Sciences and Elementary Mathematics.

Enrollment Limitation

Each entering class is limited to 20 persons selected on the basis of scholastic preparation, initiative and intelligence. Experience in the food industry is also valuable.

Food Distribution Club

This is a student organization which carries on a program of professional and social activities. It also provides a means for acquainting students with prospective employers who participate in club activities.

Transfer to the University

The Department also offers a four-year program in Food Distribution. Stockbridge students who maintain a B average or better may apply for transfer. Passing of suitable examinations and the offering of a background of high school courses required for University admission are also required. (See Optional Courses).

Food Distribution

First Year

First Semester

(Fifteen Weeks Resident Instruction)	
Agricultural Economics S-1 (Practical Economics)	Crs. 3
Agricultural Economics S-3 (Accounting Principles)	4
Bacteriology S-1 (Bacteriology and Rural Hygiene)	3
Food Products S-1 (Dairy and Poultry Products)	3
Mathematics S-1 (General Course)	2
Practical Science S-7 (Primarily Chemistry)	2
Physical Education S-1 (a, b)	-

Second Semester

(Fifteen Weeks Resident Instruction followed by Three Months Placement Training)	
Agricultural Economics S-2 (World's Food Supply)	Crs. 2
Agricultural Economics S-8 (Accounting Principles)	4
Agricultural Economics S-12 (Salesmanship and Sales Management)	3
English S-1 (Business English)	3
Horticulture S-32 (Produce Merchandising)	3
Speech S-2	2
Physical Education S-2 (a, b)	-

Second Year

First Semester

(Fifteen Weeks Resident Instruction)	
Agricultural Economics S-17 (Food Merchandising)	Crs. 3
Agricultural Economics S-19 (Marketing Economics and Research)	3
Agricultural Engineering S-13 (Refrigeration, Heating and Air Conditioning)	3
English S-3 (Report Writing)	3
Restaurant and Hotel Management S-13 (Personnel Management)	3
Psychology S-1 (Applied General Psychology)	3

Second Semester

(Fifteen Weeks Resident Instruction)	
Agricultural Economics S-10 (Business Law)	Crs. 3
Agricultural Economics S-18 (Food Store Management)	3
Agricultural Economics S-20 (Food Distribution Problems)	2
Agricultural Engineering S-14 (Food Packaging and Handling)	3
Animal Science S-8 (Meats and Meat Products)	3
Food Science and Technology S-2 (Fundamentals of Food Preservation)	3

Agricultural Economics S-1. (Practical Economics) I. and II.

A study of basic economic principles applied to the business firm, farm household and the market. (Second semester course is a 2-hour, 2-credit course).

3 class hours

Credit, 3.
STAFF.

Agricultural Economics S-2. (World's Food Supply) II.

Economic geography of world's food supply with special emphasis on South East Asia, Soviet Union and North America.

2 class hours.

Credit, 2.
MR. JEFFREY.

Agricultural Economics S-3. (Accounting Principles) I. and II.

Deals with systematic recording, classifying, analyzing and interpreting business transactions. Emphasis is on comprehension of available financial data and potential use in management decisions.

3 class hours and 1 2-hour laboratory period.

Credit, 4.
MR. SPINDLER.

Agricultural Economics S-4. (Elements of Bookkeeping) II.

An eight week course for Dairy and Turf freshmen designed to acquaint the student with fundamentals of the double-entry system of bookkeeping. 3 class hours and 2 2-hour laboratory periods.

Credit, 3.

MR. CALLAHAN.

Agricultural Economics S-8. (Accounting Principles) II.

Topics studied include payrolls, taxes, partnerships, corporations, cost systems, budgeting and statement analysis. Stressed are principles, disciplined logic, and broader business knowledge to improve management decisions.

3 class hours and 1 2-hour laboratory period.

Credit, 4.

MR. SPINDLER.

Agricultural Economics S-10. (Business Law) II.

This course will cover contracts, sales, property law, and the uniform commercial code. Case examples are used to illustrate principles involved.

3 class hours.

Credit, 3.

MR. RHOADES.

Agricultural Economics S-12. (Salesmanship and Sales Management) II.

An intensive analysis of the fundamentals of personal selling appropriate to selling goods, services and ideas. Elements of sales management and advertising are also discussed. Practice sales presentations are given in class.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. MARION.

Agricultural Economics S-13. (Business Management) I. and II.

Course content emphasizes the relationship of economics to business ownership, organization and operation in the United States.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. CALLAHAN.

Agricultural Economics S-15. (Farm Management) I.

Economic principles are applied to the organization and operation of a farm business. Practical management problems of dairy and livestock farms are analyzed in laboratory periods.

3 class hours and 1 2-hour laboratory period.

Credit, 4.

MR. LEE.

Agricultural Economics S-16. (Farm Management) II.

Economic principles are applied to the organization and operation of a farm business. Practical management problems of poultry, fruit and vegetable farms are analyzed in laboratory periods.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. LEE.

Agricultural Economics S-17. (Food Merchandising) I.

Principles and concepts of retail food store merchandising. Includes analysis of factors affecting consumer purchasing: store layout and design, product location, space allocation, and inventory control, pricing, margins, promotion, etc. (One field trip is required at an approximate cost of \$5.00 per student).

3 class hours.

Credit, 3.

MR. MARION.

Agricultural Economics S-18. (Food Store Management) II.

Principles of retail food store operation and management for maximum efficiency and productivity of: capital, facilities, equipment and personnel. Budgeting, analysis of operating data, establishing policies and standards, employee training, etc. (One field trip is required at an approximate cost of \$5.00 per student).

3 class hours.

Credit, 3.

MR. MARION.

Agricultural Economics S-19. (Marketing Economics and Research) I.

Basic principles of marketing and marketing facilities with particular application to food products. Elements of marketing research are considered, emphasizing consumer research and evaluation of consumer acceptance.

3 class hours.

Credit, 3.

STAFF.

Agricultural Economics S-20. (Food Distribution Problems) II.

Discussions by guest lecturers from the food industry on management problems. Papers are assigned on important problems in the retail or wholesale segment of the food industry.

1 3-hour class.

Credit, 2.

STAFF.

Agricultural Economics S-22. (Dairy Marketing) II.

This course considers characteristics of the movement of milk from farms into consumers' homes. Class pricing, state and federal regulations and distribution problems are studied.

3 class hours.

Credit, 3.

STAFF.

Optional Courses.

Special section of English and Mathematics will be arranged for students who wish additional course work in these fields. They are designed to prepare students for transfer to four-year programs but are not limited to this use.

HORTICULTURE

Head of Department: FRANKLIN W. SOUTHWICK. PROFESSOR BOICOURT,
ASSISTANT PROFESSOR JESTER, ASSISTANT PROFESSOR GODDARD IN
FLORICULTURE; ASSOCIATE PROFESSOR WEEKS, MR. ANDERSON IN POMOLOGY;
ASSISTANT PROFESSOR MAYNARD, ASSISTANT PROFESSOR TUTTLE IN
VEGETABLE CROPS.

Horticulture, the production and marketing of flowers, fruits and vegetables, is a major industry in Massachusetts. It offers a wide range of job opportunities in the specialized area of training provided to Stockbridge School students who major in either the Floriculture or the Fruit and Vegetable Crops Sections.

Excellent facilities for instruction are available in commercial type greenhouses, well equipped laboratories, a wide range of plant material, available land and modern equipment at the Horticulture Research Center Farm in Belchertown, the South Deerfield Farm and on the University campus. In addition, a number of excellent nearby commercial operations are utilized in providing the student with practical information on operation and management problems.

The courses offered emphasize the basic principles of plant growth which underlie sound cultural practices and the economic principles which bear upon the marketing procedures and the business side of the specialized interest of the student.

Job Opportunities

For Floriculture majors excellent job opportunities for men and women are available as skilled workers in commercial greenhouses and on private estates; as wholesale and retail florists; in floral arrangement work, designers and decorators in retail stores; as salesmen for florists and home garden supplies; as sales agents or operators of garden centers and in many instances the opportunity to start in business for themselves.

For Fruit and Vegetable Crop majors there is a wide variety of jobs, including skilled workers on fruit or vegetable farms as foremen, operators or owners; employees on private estates and institutions; salesmen for various supplies, equipment and machinery companies; private and state produce inspection work; wholesale and retail sales with various market agencies and in many business and industry operations dealing with produce.

Field trips will be required in a number of courses during the two years at an estimated cost to the student of from \$15.00 to \$25.00.

Horticulture Floriculture

First Year

First Semester

<i>(Fifteen Weeks Resident Instruction)</i>	
Agronomy S-1 (Soil Management)	3
Horticulture S-1 (Plant Science)	3
Horticulture S-3 (Greenhouse Management)	4
Landscape Operations S-3 (Tree and Shrub Identification)	3
Speech S-1	2
Physical Education S-1 (a, b)	-

Second Semester

<i>(Eight Weeks Resident Instruction followed by Five Months Placement Training)</i>	
Agronomy S-2 (Fertilizers)	<i>Crs.</i> 2
Entomology S-4 (Insects and Related Pests)	2
Horticulture S-2 (Plant Science)	2
Horticulture S-6 (Greenhouse Construction and Heating)	2
Horticulture S-8 (Annual Plants)	2
Horticulture S-10 (Green Plants)	1
Landscape Operations S-4 (Landscape Maintenance)	1
Physical Education S-2 (a)	-

Second Year

First Semester

<i>(Fifteen Weeks Resident Instruction)</i>	
Agricultural Engineering S-1 (Power Units)	<i>Crs.</i> 3
English S-1 (Business English)	3
Horticulture S-11 (Commercial Floriculture)	3
Horticulture S-13 (Floral Design)	3
Horticulture S-15 (Plant Propagation)	3

Second Semester

<i>(Fifteen Weeks Resident Instruction)</i>	
Agricultural Economics S-13 (Business Management)	<i>Crs.</i> 3
Horticulture S-20 (Herbaceous Perennial and Annual Plants)	3
Horticulture S-22 (Floriculture Literature)	2
Plant Pathology S-4 (Florists' Crops Diseases)	3

OPTIONS

Retail

Agricultural Economics S-3 (Accounting Principles)	4
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Growing

Entomology S-7 (Florists' Crops Insects)	3
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OPTIONS

Retail

Agricultural Economics S-8 (Accounting Principles)	4
Horticulture S-24 (Floral Design)	3

Growing

Horticulture S-16 (Horticultural Marketing)	3
Horticulture S-26 (Commercial Floriculture)	3

Floriculture majors primarily interested in the retail phase of the industry will take the retail options during the second year and those primarily interested in growing or production will take the growing option.

Horticulture Fruit and Vegetable Crops

First Year

First Semester

<i>(Fifteen Weeks Resident Instruction)</i>	
Agricultural Economics S-1 (Practical Economics)	<i>Crs.</i> 3
Agronomy S-1 (Soil Management)	3
English S-1 (Business English)	3
Horticulture S-1 (Plant Science)	3
Horticulture S-5 (Deciduous Orchards)	3
Horticulture S-7 (Commercial Vegetable Production)	3
Physical Education S-1 (a, b)	-

Second Semester

<i>(Eight Weeks Resident Instruction followed by Five Months Placement Training)</i>	
Agronomy S-2 (Fertilizers)	<i>Crs.</i> 2
Entomology S-4 (Insects and Related Pests)	2
Horticulture S-2 (Plant Science)	2
Horticulture S-4 (Orchard Pruning)	2
Horticulture S-12 (Greenhouse Vegetables)	2
Plant Pathology S-2 (Plant Diseases)	2
Physical Education S-2 (a)	-

Second Year

First Semester		Second Semester	
(Fifteen Weeks Resident Instruction)	Crs.	(Fifteen Weeks Resident Instruction)	Crs.
Agricultural Engineering S-13 (Refrigeration, Heating and Air Conditioning)	3	Agricultural Economics S-16 (Farm Management)	3
Entomology S-5 (Horticultural Insects)	3	Agricultural Engineering S-1 (Power Units)	3
Horticulture S-9 (Small Fruits)	3	Horticulture S-16 (Horticultural Marketing)	3
Horticulture S-17 (Systematic)	3	Horticulture S-18 (Fruit Pest Control)	3
Mathematics S-1 (General Course)	2	Horticulture S-28 (Commercial Vegetable Culture)	3
Speech S-1	2	Horticulture S-30 (Orchard Management)	4

Horticulture S-1. (Plant Science) I.

A study of the classification and structure of plants.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. TUTTLE.

Horticulture S-2. (Plant Science) II.

A study of the physiological functions in plants with particular emphasis on the influence of environmental factors on these processes.

3 class hours.

Credit, 2.

MR. MAYNARD.

Horticulture S-3. (Greenhouse Management) I.

A study of the factors affecting the growth of plants in greenhouses and how they are related to greenhouse management practices.

3 class hours and 1 2-hour laboratory period.

Credit, 4.

MR. GODDARD.

Horticulture S-4. (Orchard Pruning) II.

The theory and practice of pruning deciduous fruit plants. Principles and techniques involved in repair grafting and top working are considered.

1 class hour and 2 2-hour laboratory periods.

Credit, 2.

MR. ANDERSON.

Horticulture S-5. (Deciduous Orchards) I.

Principles and practices involved in the establishment and maintenance of deciduous orchards.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. ANDERSON.

Horticulture S-6. (Greenhouse Construction and Heating) II.

A study of the types of construction of glass and plastic greenhouses. Particular attention is given to location, exposure, heating and ventilation of greenhouses.

2 class hours and 1 2-hour laboratory period.

Credit, 2.

MR. GODDARD.

Horticulture S-7. (Commercial Vegetable Production) I.

A study of commercial vegetable farm practices and problems including: propagation, weed control, irrigation, plant nutrition, and management.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. MAYNARD.

Horticulture S-8. (Annual Plants) II.

A study of bedding plants which are commonly used in commercial floriculture and garden center work. Culture, uses, marketing methods and identification are considered.

2 class hours and 1 2-hour laboratory period.

Credit, 2.

MR. JESTER.

Horticulture S-9. (Small Fruits) I.

Principles and practices governing the establishment and management of small fruit plantings.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. ANDERSON.

Horticulture S-10. (Green Plants) II.

A study of the more important foliage plants, the factors governing their production, and their use in homes and public buildings.

1 class hour and 1 2-hour laboratory period.

Credit, 1.

MR. GODDARD.

Horticulture S-11. (Commercial Floriculture) I.

The greenhouse production of a variety of important crops is considered in detail. Modern methods of production and management are stressed.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. JESTER.

Horticulture S-12. (Greenhouse Vegetables) II.

A study of the production of vegetables, mushrooms, and early vegetable plants in greenhouses and other forcing structures.

2 class hours and 1 2-hour laboratory period.

Credit, 2.

MR. TUTTLE.

Horticulture S-13. (Floral Design) I.

The principles and techniques used in commercial floristry are discussed and practiced using professional materials and supplies. Various types of arrangements are considered. Laboratory charge \$6.00.

2 3-hour laboratory periods.

Credit, 3.

MR. JESTER.

Horticulture S-14. (Plant Propagation) II. Arboriculture and Park Management.

A study of the principles of plant propagation, both sexual and asexual, with major emphasis being placed on woody plants.

2 class hours and 2 2-hour laboratory periods.

Credit, 2.

MR. GODDARD.

Horticulture S-15. (Plant Propagation) I.

Principles and practices for most methods of plant propagation such as seedage, cuttage, graftage, layerage and divisions.

2 class hours and 1 2-hour laboratory period. Credit, 3.
MR. BOICOURT AND MR. GODDARD.

Horticulture S-16. (Horticultural Marketing) II.

A study of the marketing procedures and practices of commercial flower, fruit, and vegetable growers.

2 class hours and 1 2-hour laboratory period. Credit, 3.
MR. TUTTLE.

Horticulture S-17. (Systematic) I.

A technical study of the horticultural classification of fruits and vegetables.

2 class hours and 1 2-hour laboratory period. Credit, 3.
MR. MAYNARD OR MR. TUTTLE.

Horticulture S-18. (Fruit Pest Control) II.

A study of pest control methods, materials and equipment used in the production of fruit crops.

2 class hours and 1 2-hour laboratory period. Credit, 3.
MR. ANDERSON.

Horticulture S-19. (Fruit Growing for Non-Majors) I.

The growing of tree and small fruits for home use. Problems relating to plant maintenance, and selection of planting stock, varieties and sites are stressed.

2 class hours and 1 2-hour laboratory period. Credit, 3.
MR. ANDERSON.

Horticulture S-20. (Herbaceous Perennial and Annual Plants) II.

A study of important plant families and their use as ornamental plants for home, park and business.

2 class hours and 1 3-hour laboratory period. Credit, 3.
MR. BOICOURT.

Horticulture S-22. (Floriculture Literature) II.

Library reading and study on assigned subjects in the field of Floriculture. Oral and written reports.

1 class hour and 1 2-hour laboratory period. Credit, 2.
STAFF.

Horticulture S-24. (Floral Design) II.

A detailed study of the more intricate commercial floral designs and techniques. Vase arrangements and wedding designs are emphasized. Laboratory charge \$6.00.

2 3-hour laboratory periods. Credit, 3.
MR. JESTER.

Horticulture S-26. (Commercial Floriculture) II.

The greenhouse production of major crops (Carnations, Chrysanthemums, Poinsettias and Lilies) is considered in detail. Modern methods of production and management are stressed.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. JESTER.

Horticulture S-28. (Commercial Vegetable Culture) II.

A study of the production practices and problems involved in growing the individual vegetable crops.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. TUTTLE.

Horticulture S-30. (Orchard Management) II.

A discussion of recent technical developments as they apply to commercial orcharding in the Northeast. Research literature review is an important part of this course.

3 class hours and 1 2-hour laboratory period.

Credit, 4.

MR. ANDERSON AND STAFF.

Horticulture S-32. (Produce Merchandising) II.

A study of the practices, principles, and regulations involved in the buying, packaging, and storing of fruits and vegetables in retail outlets.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. TUTTLE.

LANDSCAPE OPERATIONS

Head of Department: PROFESSOR RAYMOND H. OTTO. PROFESSOR PROCOPIO, ASSOCIATE PROFESSOR MOSHER, ASSISTANT PROFESSOR HAMILTON, ASSISTANT PROFESSOR CAVEN, MR. WHITNEY.

The constantly increasing interest in more intensive development of both public and private grounds has created a demand for men trained to handle the varied problems in landscape construction and maintenance. This curriculum is designed to acquaint the student with these phases of landscape operations and to give him the basic knowledge and the most recent developments in those areas of learning on which the solutions to these problems depend.

The courses within the department deal with the study of drafting-room practices and field techniques necessary for the landscape development of grounds, including the measuring and grading of land surfaces, construction of walks, drives, terraces and walls and the laying out of such landscape elements. Additional courses deal with identification of woody plants, their use in landscape development and the programming of their handling and maintenance on grounds and in nurseries.

Courses in other departments deal with plant growth, soils, fertilizers and plant pests; with the identification and maintenance of herbaceous plants and turf grasses; with fruit growing; with shade tree maintenance; and with plant propagation. Courses in business English, speech and elementary accounting round out the student's training.

In addition to the formal course work the student is expected to spend the five months between his first and second years as an employee of a person or firm in some phase of landscape operations. This placement period normally is from the first of April to the first of September. While on placement the student is required to compile certain reports which will call his attention to the relevant aspects of landscape operations.

Financial obligations over and above those listed under General Information include drafting equipment, amounting to approximately \$25.00, and field trips with a total estimated cost of \$30.00.

Job Opportunities

Alumni of this department hold positions as plant propagators, foremen or superintendents for nurseries; gardeners, foremen or superintendents on private estates, public parks, cemeteries, botanical gardens and various other public and private institution grounds; foremen with landscape contractors and real estate developers; owners of their own landscape firms, nurseries and garden centers; salesmen for seed and nursery concerns.

Landscape Operations

First Year

First Semester		Second Semester	
(Fifteen Weeks Resident Instruction)	Crs.	(Eight Weeks Resident Instruction followed by Five Months Placement Training)	Crs.
Agronomy S-1 (Soil Management)	3	Agronomy S-2 (Fertilizers)	2
Agronomy S-5 (Basic Factors, Construction and Maintenance of Fine Turf Areas)	3	Agrostology S-6 (Application of Basic factors to Practical Problems)	2
English S-1 (Business English)	3	Entomology S-4 (Insects and Related Pests)	2
Horticulture S-1 (Plant Science)	3	Horticulture S-2 (Plant Science)	2
Landscape Operations S-1 (Tree Identification)	3	Landscape Operations S-4 (Landscape Maintenance)	1
Mathematics S-1 (General Course)	2	Plant Pathology S-2 (Plant Diseases)	2
Physical Education S-1 (a, b)	-	Physical Education S-2 (a)	-

Second Year

First Semester		Second Semester	
(Fifteen Weeks Resident Instruction)	Crs.	(Fifteen Weeks Resident Instruction)	Crs.
Arboriculture and Park Management S-1 (Principles and Practices—Lectures only)	2	Agricultural Economics S-13 (Business Management)	3
Entomology S-5 (Horticultural Insects)	3	Arboriculture and Park Management S-2 (Principles and Practices—Lectures only)	2
Horticulture S-15 (Plant Propagation)	3	Horticulture S-20 (Herbaceous Perennial and Annual Plants)	3
Landscape Operations S-7 (Topographical Mapping)	3	Landscape Operations S-8 (Grading and Construction)	3
Landscape Operations S-13 (Small Property Development)	3	Landscape Operations S-10 (Nursery Practices and Management)	3
Speech S-1	2	Landscape Operations S-12 (Shrub Identification)	3

Landscape Operations S-1. (Tree Identification) I.

Study of evergreen and deciduous trees used in landscape work, their distinguishing characters and culture, with special reference to nursery and planting practice.

2 class hours and 2 1-hour laboratory periods.

Credit, 3.

MR. HAMILTON.

Landscape Operations S-3. (Tree and Shrub Identification) I.

Study and identification of evergreen and deciduous trees and shrubs used in landscape work.

1 class hour and 2 2-hour laboratory periods.

Credit, 3.

MR. MOSHER.

Landscape Operations S-4. (Landscape Maintenance) II.

This course is in preparation for placement and takes up the programming for such horticultural practices as pruning, planting, winter protection, and pest control, as related to gardens and nurseries.

2 class hours.

Credit, 1.

MR. MOSHER.

Landscape Operations S-5. (Forest Tree Identification) I.

Study of the principal North American Forest trees, their botanical classification, distinguishing features and geographical distribution.

1 class hour and 2 2-hour laboratory periods.

Credit, 3.

MR. WHITNEY.

Landscape Operations S-7. (Topographical Mapping) I.

Practice in the use of simple surveying instruments as tapes, compasses, and levels used in the measurement of land surfaces, and the application of these instruments in landscape construction. Laboratory charge \$2.00.

1 class hour and 2 2-hour laboratory periods.

Credit, 3.

MR. CAVEN AND MR. WHITNEY.

Landscape Operations S-8. (Grading and Construction) II.

Continuation of Landscape Operations S-7, including problems in landscape grading, establishing grades and setting stakes for landscape development from working drawings. Laboratory charge \$2.00.

1 class hour and 2 2-hour laboratory periods.

Credit, 3.

MR. CAVEN AND MR. WHITNEY.

Landscape Operations S-10. (Nursery Practices and Management) II.

Nursery management procedures and the programming of nursery practices are studied through the development of a nursery program and visits to several nurseries. Field trips, including the Nurserymen's Short Course at the Waltham Field Station are required. Estimated total cost \$25.00. Open to Landscape Operations majors only.

1 class hour and 1 4-hour laboratory period.

Credit, 3.

MR. MOSHER.

Landscape Operations S-12. (Shrub Identification) II.

Study of shrubs and woody vines, both evergreen and deciduous, to enable the student to recognize the plants used in ornamental plantings and to familiarize him with the handling of these plants both in nursery practice and landscape work.

1 class hour and 2 2-hour laboratory periods.

Credit, 3.

MR. HAMILTON.

Landscape Operations S-13. (Small Property Development) I.

This course investigates the current trends in landscape development of small properties. Special attention will be focused on planting design. Open to Landscape Operations majors only. Laboratory charge \$2.00.

3 2-hour laboratory periods.

Credit, 3.

MR. PROCOPIO.

POULTRY SCIENCE

Head of Department: PROFESSOR THOMAS W. FOX. PROFESSOR SMYTH,
PROFESSOR MELLEN, ASSOCIATE PROFESSOR ANDERSON, ASSISTANT PROFESSOR
GROVER, MR. DENISON.

There are excellent opportunities in the poultry industry for men and women with proper training. Graduates from this department have taken their places as leaders in the industry and have filled them capably. Some of them own their own breeding farms, manage or assist in the management of commercial egg farms, while others are employed in those industries which are closely allied with the production and marketing of poultry products.

Six specialized courses and two general courses are offered by this department. Those students who specialize in poultry production take all six of the specialized courses. The general course is designed to give the students specializing in other branches of agriculture and horticulture the fundamental principles underlying a successful commercial poultry operation.

The facilities for practical instruction in poultry science include quarters and equipment in Stockbridge Hall for efficient classroom teaching and demonstrations.

The University Poultry Farm, the practical laboratory, comprises classrooms and laboratories which provide facilities for practice in incubation, brooding, feeding, processing of poultry meat and eggs and the fundamentals of poultry management.

The University flock of about 1,500 adult birds consists principally of White Plymouth Rocks, Single Comb Rhode Island Reds, Barred Plymouth Rocks, Single Comb White Leghorns. The largest flocks of approximately 150 birds are used primarily for practical experiments and demonstrations in housing, feeding, breeding and management. Equipment includes several types of modern incubators; many styles of coal, gas, hot water, and electric brooders and chick batteries for brooding and rearing approximately 5,000 chicks. A flock of several hundred turkeys is maintained.

The practical phases of commercial poultry production are stressed in the courses offered.

Job Opportunities

Excellent employment opportunities with poultry production units, hatchery operations, wholesale and retail poultry marketing organizations, poultry cooperatives, equipment companies, allied industry, e.g. feed and drug, breeding farms, are available.

Poultry Science

First Year

First Semester		Second Semester	
(Fifteen Weeks Resident Instruction)	Crs.	(Fifteen Weeks Resident Instruction followed by Three Months Placement Training)	Crs.
Agronomy S-1 (Soil Management)	3	Agricultural Economics S-2 (World's Food Supply)	2
Animal Science S-9 (Special Dairy Cattle Course)	3	Agricultural Economics S-3 (Accounting Principles)	4
Bacteriology S-1 (Bacteriology and Rural Hygiene)	3	Agricultural Engineering S-7 (Structures and Utilities)	3
Dairy Technology S-1 (General Dairying)	3	Agronomy S-2 (Fertilizers—1st half of semester)	2
Poultry Science S-1 (Introductory Poultry Management)	3	Entomology S-12 (Livestock and Forage Crop Insects—2nd half of semester)	2
Practical Science S-7 (Primarily Chemistry)	2	Poultry Science S-12 (Specialties)	2
Speech S-1	2	Practical Science S-8 (Primarily Physics)	2
Physical Education S-1 (a, b)	—	Physical Education S-2 (a, b)	—

Second Year

First Semester		Second Semester	
(Fifteen Weeks Resident Instruction)	Crs.	(Fifteen Weeks Resident Instruction)	Crs.
Agricultural Economics S-1 (Practical Economics)	3	Agricultural Economics S-10 (Business Law)	3
Agricultural Engineering S-3 (Machinery)	3	Agricultural Economics S-16 (Farm Management)	3
English S-1 (Business English)	3	Agricultural Engineering S-1 (Power Units)	3
Mathematics S-1 (General Course)	2	Agronomy S-4 (Field Crops)	3
Poultry Science S-5 (Marketing)	3	Poultry Science S-4 (Feeding)	3
Poultry Science S-7 (Breeding)	4	Poultry Science S-8 (Advanced Poultry Management)	3
Veterinary Science S-1	3		

Poultry Science S-1. (Introductory Poultry Management) I.

An introduction to and the basic management practices of the poultry industry by enterprises, e.g. market eggs, hatching eggs, broilers and meat production.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. DENISON.

Poultry Science S-4. (Feeding) II.

A study of the scientific principles of nutrition. Rations, properly balanced for various purposes, are formulated and different methods of feeding are discussed.

3 class hours.

Credit, 3.

MR. ANDERSON.

Poultry Science S-5. (Marketing) I.

The preparation of eggs and poultry products to meet the requirements of the northeastern markets. Grades, prices and reports are studied in conjunction with different marketing methods.

A one-half day class trip is required. Estimated cost, \$2.00.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. DENISON.

Poultry Science S-7. (Breeding) I.

The mechanism of heredity and variation in poultry. The role of selection and breeding systems in genetic improvement of production traits.

3 class hours and 1 2-hour laboratory period.

Credit, 4.
MR. FOX.

Poultry Science S-8. (Advanced Poultry Management) II.

Principles of poultry business management. Designed to give the student a comprehensive view of all phases of the poultry industry.

3 class hours.

Credit, 3.
MR. DENISON.

Poultry Science S-9. (Poultry Products) I.

Quality standards, market classification, handling and storage, and major distribution channels of poultry products. One-half semester with Dairy Technology.

2 class hours and 1 2-hour laboratory period.

Credit, 3.
MR. DENISON.

Poultry Science S-10. (General Poultry Husbandry) II.

A survey of the importance of the poultry industry to animal agriculture and the production management systems and practices currently used.

2 class hours and 1 2-hour laboratory.

Credit, 3.
MR. DENISON.

Poultry Science S-12. (Specialties) II.

Turkeys, ducks, geese, and game birds are considered. Breeding, incubation, feeding, rearing, management, marketing, housing and disease control methods and practices are studied. Most of the course is devoted to the study of turkeys.

1 class hour and 1 2-hour laboratory period.

Credit, 2.
MR. SMYTH.

RESTAURANT AND HOTEL MANAGEMENT

Head of Department: PROFESSOR WILLIAM B. ESSELEN. PROFESSOR IN CHARGE,
RESTAURANT AND HOTEL MANAGEMENT: DONALD E. LUNDBERG. ASSISTANT
PROFESSOR COURNOYER, ASSISTANT PROFESSOR WRISLEY.

In 1938, at the request of the Massachusetts Hotel Association, New England Club Managers, Boston Stewards Club, and the Massachusetts Restaurant Association, a two-year program of instruction in Food Management and Hotel Management was established.

The need for courses in restaurant and hotel administration arises from (1) the vocational opportunities flowing out of an industry so important in the economic life of Massachusetts and the country as a whole, and (2) the encouragement of this training on a professional level by the able and forward-looking leaders of the hotel and restaurant profession.

The program is designed to meet the needs of young men and women preparing for management positions in the many types of food service operation. Graduates fill positions in industrial and commercial restaurants, hotels, catering businesses, private and public clubs and in many other types of food service operations.

Application of principles learned in the classroom is encouraged throughout the program. Actual case problems and field trips (costing approximately \$25.00 per year) are a part of the curriculum. Men prominent in the field are invited to speak on subjects of special interest and discuss current operating problems. Practice work gives further opportunity to prepare for supervisory positions following graduation. Additional experience is required through summer employment in hotels and restaurants.

Students are selected on the basis of personality, personal appearance, scholastic record, willingness to work and expressed interest in the field. Students who select Restaurant and Hotel Management as a major should have completed a full high school course and must present their school record at interview.

Various scholarships sponsored by the hotel and restaurant industry are available to deserving students. For further details see section on Scholarships in front of catalogue.

On May 16, 1963, the name of this program was changed from Food Management to Restaurant and Hotel Management by action of the Board of Trustees.

Restaurant and Hotel Management

First Year

First Semester		Second Semester	
(Fifteen Weeks Resident Instruction)	Crs.	(Fifteen Weeks Resident Instruction followed by Three Months Placement Training)	Crs.
Agricultural Economics S-3 (Accounting Principles)	4	Agricultural Economics S-8 (Accounting Principles)	4
Food Products S-1 (Dairy and Poultry Products)	3	Agricultural Engineering S-12 (Utilities and Food Facilities)	3
Home Economics S-1 (Basic Food Principles)	3	Food Science and Technology S-2 (Fundamentals of Food Preservation)	3
Mathematics S-1 (General Course)	2	Home Economics S-2 (Elementary Nutrition)	2
Practical Science S-7 (Primarily Chemistry)	2	Practical Science S-8 (Primarily Physics)	2
Restaurant and Hotel Management S-3 (Food Service Management)	3	Restaurant and Hotel Management S-2 (Commercial Cookery)	3
Restaurant and Hotel Management S-5 (Guest Lectures)	1	Speech S-2	2
Physical Education S-1 (a, b)	-	Physical Education S-2 (a, b)	-

Second Year

First Semester		Second Semester	
(Fifteen Weeks Resident Instruction)	Crs.	(Fifteen Weeks Resident Instruction)	Crs.
Agricultural Engineering S-13 (Refrigeration, Heating, and Air Conditioning)	3	Agricultural Economics S-1 (Practical Economics)	3
Bacteriology S-3 (Food Sanitation)	3	Agricultural Engineering S-18 (Food Service Space and Equipment Organization)	3
Psychology S-1 (Applied General Psychology)	3	Animal Science S-8 (Meat and Meat Products)	3
Restaurant and Hotel Management S-7 (Merchandising)	2	English S-1 (Business English)	3
Restaurant and Hotel Management S-9 (Hotel Practice)	3	Restaurant and Hotel Management S-8 (Laws of Innkeeping)	3
Restaurant and Hotel Management S-13 (Personnel Management)	3	Restaurant and Hotel Management S-10 (Seminar)	2
Restaurant and Hotel Management S-15 (Guest Lectures)	1	Restaurant and Hotel Management S-12 (Restaurant and Hotel Accounting)	3

Restaurant and Hotel Management S-2. (Commercial Cookery) II.

Experience in production of foods in large quantity, use of steam and power equipment, menu making for institutions; computation of costs, menu pricing.

1 class hour and 1 4-hour laboratory period.

Credit, 3.

MR. LUNDBERG.

Restaurant and Hotel Management S-3. (Food Service Management) I.

The management of the steward's department of a hotel or institution, comprising the purchasing, storage, and issuing of foods, beverages, and supplies with the proper records and controls to keep in connection therewith.

3 class hours.

Credit, 3.

MR. WRISLEY.

Restaurant and Hotel Management S-5 and S-15. (Guest Lectures) I.

Delivered by representatives and leaders in the field of Hotel, Food Management and allied fields.

1 class hour.

Credit, 1.

THE DEPARTMENT.

Restaurant and Hotel Management S-7. (Merchandising) I.

Organization and function of the hotel sales department. Media used most profitably by hotels, resorts, and restaurants. Methods used to obtain public recognition and good will of guests.

2 class hours.

Credit, 2.

MR. COURNOYER.

Restaurant and Hotel Management S-8. (Laws of Innkeeping) II.

A consideration of the legal problems of the innkeeper and allied institutions including taxation.

3 class hours.

Credit, 3.

MR. COURNOYER.

Restaurant and Hotel Management S-9. (Hotel Practice) I.

Elements of hotel management.

3 class hours.

Credit, 3.

MR. WRISLEY.

Restaurant and Hotel Management S-10. (Seminar) II. 1

Survey of current food service literature and reports. Outside speakers on selected professional topics.

2 class hours.

Credit, 2.

MR. WRISLEY.

Restaurant and Hotel Management S-12. (Restaurant and Hotel Accounting) II.

Practice with special journals used in hotels. Various systems and methods of food and beverage cost accounting are reviewed with special emphasis on their use as aids in management decisions.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. WRISLEY.

Restaurant and Hotel Management S-13. (Personnel Management) I.

Analyzing, simplifying, and evaluating the job; recruiting, selecting and placing employees; training and rating employees; defining and measuring morale; fire and accident prevention; organizing personnel relations; increasing cooperation.

3 class hours.

Credit, 3.

MR. LUNDBERG.

TURF MANAGEMENT

Head of Department: PROFESSOR WILLIAM G. COLBY. ASSISTANT PROFESSOR TROLL, ASSISTANT PROFESSOR ZAK, MR. WADDINGTON.

There is an immediate need for skilled supervisors and assistants to park, cemetery, and recreation area superintendents. Municipal and private golf clubs are expecting that their superintendents shall be trained in turf maintenance. Every city and large town offers splendid opportunities for the private business horticulturist who is especially well trained to "take care of the lawn."

As the many proposed memorial parks, play fields, public buildings and golf courses are being constructed and completed, the demand for specialists in turf maintenance will be increased and the number of replacements needed annually will be large.

This course is arranged and taught in such a manner that a student who has completed the work will be well qualified to accept a position as assistant or the actual superintendency of a small park, cemetery, or golf course, or to establish a business in his community.

Laboratory and field exercises give practical experience and demonstrations. Good equipment is supplemented by loans from manufacturers and supply houses. The supporting courses are strong and have been carefully chosen for their close alliance to the problems of turf maintenance and general estate work.

Each student's placement training and special interest will be considered in his chosen field, whether it be park, cemetery, golf course, or private business, and professional men will visit the classes to give of their experiences. Every student will be required to keep a record of work done, results obtained, and observations made during the placement training period, for use during the senior year.

Job Opportunities

Assistant to superintendents or as an actual superintendent on golf course, cemetery, park, or with a commercial nursery or landscape service company, also with golf course construction companies and equipment supply dealers.

At least one field trip will be required during the second semester of the senior year. The total cost of such a trip or trips to each student will not exceed \$20.

Turf Management

First Year

First Semester	<i>Crs.</i>	Second Semester	<i>Crs.</i>
(Fifteen Weeks Resident Instruction)	3	(Eight Weeks Resident Instruction followed by Five Months Placement Training)	3
Agronomy S-1 (Soil Management)	3	Agricultural Economics S-4 (Elements of Bookkeeping)	3
Agrostology S-1 (Basic Factors and Uses of Turf Areas)	3	Agronomy S-2 (Fertilizers)	2
English S-1 (Business English)	3	Agrostology S-2 (Construction and Maintenance of Turf Areas)	2
Horticulture S-1 (Plant Science)	3	Entomology S-6 (Turf Insects)	1
Landscape Operations S-3 (Tree and Shrub Identification)	3	Plant Pathology S-2 (Plant Diseases)	2
Speech S-1	2	Physical Education S-2 (a)	-
Physical Education S-1 (a, b)	-		-

Second Year

First Semester	<i>Crs.</i>	Second Semester	<i>Crs.</i>
(Fifteen Weeks Resident Instruction)	3	(Fifteen Weeks Resident Instruction)	3
Agricultural Engineering S-1 (Power Units)	3	Agricultural Economics S-10 (Business Law)	3
Agricultural Engineering S-9 (Drainage, Irrigation and Soil Conservation)	3	Agricultural Engineering S-3 (Machinery)	3
Agrostology S-3 (Turf Maintenance as a Business)	3	Agrostology S-4 (Practical Problems)	3
Arboriculture and Park Management S-1 (Principles and Practices—Lectures only)	2	Arboriculture and Park Management S-2 (Principles and Practices—Lectures only)	2
English S-3 (Report Writing)	3	Horticulture S-20 (Herbaceous Perennial and Annual Plants)	3
Landscape Operations S-7 (Topographical Mapping)	3	Landscape Operations S-8 (Grading and Construction)	3

Agrostology S-1. (Basic Factors and Uses of Turf Areas) I.

Starting with an appreciation of the grass plant, the course carries the fine turf grasses from seed through uses. Identification of seed and vegetative growth. The limits of tolerance and factors affecting them are studied and correlated with the adaptation of the species to the user's specifications for various conditions.

1 class hour and 2 2-hour laboratory periods.

Credit, 3.

MR. WADDINGTON.

Agrostology S-2. (Construction and Maintenance of Turf Areas) II.

The student will adapt factors determined in the first semester to the practical construction of new turf areas and maintenance of existing turf. Fertilizing, controlling disease, clipping, watering, etc.

1 class hour and 1 2-hour laboratory period.

Credit, 2.

MR. TROLL.

Agrostology S-3. (Turf Maintenance as a Business) I.

This course is primarily for those students desiring to become professional turf growers such as superintendents of golf courses, cemeteries, or parks. The cultural costs as well as the monetary costs are studied. Equipment, fungicides, insecticides and herbicides are evaluated. Experiences gained during summer placement are thoroughly discussed.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. TROLL.

Agrostology S-4. (Practical Problems) II.

Use of popular and technical journals as a guide to advanced and up-to-date information on turf culture is stressed. Field trips to research stations, sod farms and business organizations serving the turf field develop a broad understanding of turfgrass work. Practical problems on turf and equipment maintenance serve to summarize material of preceding courses for the turf major.

2 class hours and 1 2-hour laboratory period.

Credit, 3.
MR. TROLL.

Agrostology S-5. (Basic Factors, Construction and Maintenance of Fine Turf Areas) I.

At the completion of this course the student should have a knowledge and appreciation of the requirements for the growing of lawns and sports turf.

He will have considered the construction of turf areas; seed identification, selection and sowing; identification of turf grasses and their soil and fertilizer preferences, correct cultural practices and control of turf pests and diseases.

This course is for arboriculture and park management and landscape operations majors.

1 class hour and 2 2-hour laboratory periods.

Credit, 3.
MR. ZAK.

Agrostology S-6. (Application of Basic Factors to Practical Problems) II.

The interrelationships between grasses and their uses, and soil management problems is stressed. This gives the student a more thorough understanding of the nature of practical turfgrass work, the diagnosis and treatment of problem situations.

This course is for landscape operations majors only.

1 class hour and 1 2-hour laboratory period.

Credit, 2.
MR. WADDINGTON.

WOOD UTILIZATION

Head of Department: PROFESSOR ARNOLD D. RHODES. PROFESSOR GATSLICK,
ASSISTANT PROFESSOR HOADLEY.

The manufacture and distribution of the material processed from forest-grown trees comprise the field of wood utilization. More specifically it includes consideration of such items as lumber, veneer and plywood, ties, poles, pulpwood and fuelwood, but especially lumber and the many items fabricated from it. In contrast to the "forester" who is concerned mainly with growing forests and with other activities associated with the management of forest and land, the wood utilization graduate works with the wood after the trees are grown and harvested and are ready for conversion into useful products.

The field of wood utilization is a broad one with many aspects including such activities as primary manufacture of lumber from logs, re-manufacture, air seasoning and kiln drying operations, gluing, machining, and finishing in the fabrication of other products, merchandising of lumber at the wholesale and retail levels, and the preservative treatment of posts, poles and other items. Because of its dense population, the Northeast is a major wood-consuming area and the seat of many wood-distributing and wood-using concerns. The wood utilization graduate is therefore prepared for vocational employment in such enterprises as sawmills, wood processing and fabricating industries, and both wholesale and retail lumber yards and sales organizations.

The curriculum provides a foundation for these fields through basic study of the fundamental nature and properties of wood, with courses dealing with the processing and application of wood for specific areas of use. The program is further strengthened by appropriate course work in English, mathematics, economics and business practice. Summer placement training between the freshman and senior years offers valuable contact with some phase of the wood-using industries.

Entrance Requirements

Preparation in mathematics through elementary algebra and plane geometry is necessary.

Enrollment Limitation

Each entering class is limited to 20 men selected on the basis of scholastic preparation and sound purpose.

Facilities

Located at the Holdsworth Natural Resources Center, the Department has completely modern facilities for classroom instruction and laboratory exercises in the anatomy and properties of wood, together with equipment for machining, drying, finishing and preservation work. In addition, the Department operates a sawmill and dry-kiln at the nearby Mt. Toby Forest. Training at the University is augmented by field trips to wood-using enterprises in the central Massachusetts area.

Placement Training

The program of study requires that the student spend the summer between his freshman and senior years in suitable placement training. Although this summer work must involve some aspect of wood utilization, the breadth of the overall field enables the student to choose work in a phase of forest products most nearly consistent with his personal interest. Placement may, however, necessitate working at considerable distances from home and the student should be prepared for this possibility.

Additional Expenses

In addition to the regular expenses of the school program the student is required to purchase an accident insurance policy (about \$18.00), available through the University at the time of registration. Departmental expenses for required field trips and personal laboratory equipment and supplies should not exceed \$15.00 per year.

Forestry Club

This is a student organization for which all students of forestry and wood utilization, both Stockbridge and University, are eligible. Programs for the most part are professional in nature and present valuable information not otherwise available to students.

Transfer to the University

The Department offers a four-year curriculum in forestry with an option in wood technology. Stockbridge students who maintain a B average or better may transfer to the University program by passing examinations prepared for this purpose, provided also that the student has the background of high school subjects required for University admission.

Wood Utilization

First Year

First Semester

(Fifteen Weeks Resident Instruction)	Crs.
Agricultural Economics S-1 (Practical Economics)	3
Horticulture S-1 (Plant Science)	3
Landscape Operations S-5 (Forest Tree Identification)	3
Mathematics S-3 (Review Mathematics)	3
Wood Utilization S-1 (Wood Anatomy and Identification)	3
Physical Education S-1 (a, b)	-

Second Semester

(Fifteen Weeks Resident Instruction followed by Three Months Placement Training)	Crs.
Agricultural Economics S-3 (Accounting Principles)	4
Agricultural Engineering S-7 (Structures and Utilities)	3
English S-1 (Business English)	3
Speech S-2	2
Wood Utilization S-2 (Lumber Manufacturing and Properties)	5
Physical Education S-2 (a, b)	-

Second Year

First Semester

(Fifteen Weeks Resident Instruction)	Crs.
Agricultural Economics S-13 (Business Management)	3
Agricultural Engineering S-1 (Power Units)	3
English S-3 (Report Writing)	3
Wood Utilization S-11 (Forest Products Other Than Lumber)	3
Wood Utilization S-13 (Wood Seasoning and Preservation)	4

Second Semester

(Fifteen Weeks Resident Instruction)	Crs.
Agricultural Economics S-8 (Accounting Principles)	4
Agricultural Economics S-10 (Business Law)	3
Agricultural Economics S-12 (Salesmanship and Sales Management)	3
Practical Science S-8 (Primarily Physics)	2
Wood Utilization S-12 (Secondary Wood Processing)	5

Wood Utilization S-1. (Wood Anatomy and Identification) I.

The structure of the wood of commercial American species; importance of anatomical structure to properties and use of wood; identification based on anatomical features.

2 class hours and 1 3-hour laboratory period.

Credit, 3.

MR. HOADLEY.

Wood Utilization S-2. (Lumber Manufacturing and Properties) II.

The manufacture, processing and grading of lumber; properties of wood involved in the use of lumber; laboratory field trips to local wood-using industries.

3 class hours and 1 4-hour laboratory period.

Credit, 5.

MR. HOADLEY.

Wood Utilization S-11. (Forest Products Other Than Lumber) I.

The primary and secondary products of American forests (exclusive of lumber), their manufacture, economic importance and potential.

3 class hours a week.

Credit, 3.

MR. GATSLICK.

Wood Utilization S-12. (Secondary Wood Processing) II.

Principles and methods of machining, gluing and finishing wood in the secondary wood-manufacturing industries.

3 class hours and 1 4-hour laboratory period.

Credit, 5.

MR. GATSLICK.

Wood Utilization S-13. (Wood Seasoning and Preservation) I.

The seasoning and preservative treatment of wood; materials, equipment, and applied techniques.

2 class hours and 1 4-hour laboratory period.

Credit, 4.

MR. GATSLICK.

RELATED SUBJECTS

Agricultural Engineering S-1. (Power Units) I. and II.

Principles of operation of internal combustion engines and electric motors. Emphasis on mobile or portable power units. Agricultural tractors, second semester. Non-crop production units emphasized in first semester. Laboratory charge \$3.00.

2 class hours and 1 2-hour laboratory period.

Credit, 2 or 3.

MR. E. JOHNSON.

Agricultural Engineering S-3. (Machinery) I. and II.

Principles of equipment and machinery operation, maintenance, selection and minor repair. Agricultural production equipment emphasized in first semester. Non-crop production equipment emphasized in second semester. Prerequisite: Agricultural Engineering S-1. Laboratory charge \$3.00.

1 class hour and 2 2-hour laboratory periods.

Credit, 3.

MR. C. JOHNSON.

Agricultural Engineering S-7. (Structures and Utilities) I. and II.

Materials and methods of light construction; functional planning; sketching and layout; integral utility planning; water supply; waste disposal; lighting; electric power and environmental control. Prerequisite: Mathematics S-1 or Mathematics S-3. Laboratory charge \$2.00.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. COLLINS.

Agricultural Engineering S-9. (Drainage, Irrigation and Soil Conservation) I. and II.

Principles of design, management practices and equipment performance as related to planning and layout of systems. Use of the level; preparing layouts in drawings and in the field. Prerequisite: Mathematics S-1. Laboratory charge \$2.00.

2 class hours and 1 3-hour laboratory period.

Credit, 3.

MR. PIRA.

Agricultural Engineering S-12. (Utilities and Food Facilities) II.

Basic principles of electricity including units, terms and their relationships; distribution, wiring, fusing, materials and system planning. Also principles of electric motors, lighting, water supply and waste disposal. Prerequisite: Mathematics S-1. Laboratory charge \$2.00.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. C. JOHNSON.

Agricultural Engineering S-13.
(Refrigeration, Heating and Air Conditioning) I.

Course deals first with basic principles of refrigeration, air flow and temperature and humidity relationships. Principles then applied to selecting equipment and planning systems for refrigeration, ventilation, heating and air conditioning of food facilities. Prerequisite: Agricultural Engineering S-12. Laboratory charge \$1.00.

2 class hours and 1 2-hour laboratory period.

Credit, 3.
 MR. PIRA.

Agricultural Engineering S-14. (Food Handling and Packaging) II.

Principles, practices, materials of packaging and unitizing foods. Materials handling equipment and systems applied to food distribution; processing plant, transportation, warehouse and retail stages. System planning and layout. Prerequisite: Agricultural Engineering S-13. Laboratory charge \$2.00.

2 class hours and 1 2-hour laboratory period.

Credit, 3.
 MR. FITZGERALD.

Agricultural Engineering S-16. (Dairy Equipment) II.

For majors in Dairy Technology. Principles and practices involved in the selection, arrangement and operation of equipment for processing, preserving and handling milk products. Instrumentation and process controls; plant layout. Prerequisite: Agricultural Engineering S-13. Laboratory charge \$2.00.

2 class hours and 1 2-hour laboratory period.

Credit, 3.
 MR. E. JOHNSON.

Agricultural Engineering S-18.
(Food Service Space and Equipment Organization) II.

Problems of planning, equipping and operating commercial food service facilities. Designs and floor plans for efficient operation and use of space; equipment selection, installation, management and maintenance. Prerequisite: Agricultural Engineering S-13. Laboratory charge \$1.00.

2 class hours and 1 2-hour laboratory period.

Credit, 3.
 MR. FITZGERALD.

Agronomy S-1. (Soil Management) I.

Every agricultural interest is vitally concerned with the soil, its adaptations and its management for plant production. This course treats of the selection of suitable soils for the special purpose of agriculture, horticulture and floriculture.

Laboratory includes training in the use and interpretation of the maps of the U.S. Soil Survey and in tests of soil texture, organic matter and soil acidity. Practical field work will be given in judging the crop adaptation and value of soils.

As a field project the student will be required to make a study of some farm, nursery or florist's plant, from the standpoint of soil conditions and methods of soil management in relation to the enterprise as a whole. Laboratory charge \$2.00.

2 class hours and 1 3-hour laboratory period.

Credit, 3.

MR. ZAK, MR. MICHELSON,
MR. SOUTHWICK.

Agronomy S-2. (Fertilizers) II.

The origin, manufacture, purchase and use of commercial fertilizer materials. A study will be made of the interpretation of fertilizer formula, analysis and guarantee. Special attention will be given to the newer concentrated fertilizer materials and to those produced from atmospheric nitrogen. The laboratory work will give practice in the identification of fertilizer materials, in the calculation of fertilizer formulas, and in the preparation of fertilizer mixtures.

2 class hours and 1 2-hour laboratory period.

Credit, 2.

MR. ZAK, MR. MICHELSON,
MR. SOUTHWICK.

Agronomy S-4. (Field Crops) II.

The lecture hours of this course will be devoted to presentation of the most successful methods of fertilizing, cultivating, harvesting, and storing the field crops grown in New England. Special attention will be given to the choice of the best adapted varieties for the production of hay, pasture, corn, potatoes, and root crops.

The laboratory work will include the study of corn and potato varieties, identification of grass and weed species, and studies of purity and germination. Field observations of growing crops will be included as the season permits.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. SOUTHWICK.

Bacteriology S-1. (Bacteriology and Rural Hygiene) I.

Basic fundamentals of microbiology and the problems of applied bacteriology in health, agriculture, and industry. Milk, water supply, sewage disposal, and food production are considered.

3 class hours.

Credit, 3.

MRS. REINISCH.

Bacteriology S-3. (Food Sanitation) I.

An introduction to basic bacteriological techniques, such as, use of the light microscope, staining methods, estimating bacterial density in water, milk, meats. Lectures, films, and reading assignments are integrated with the laboratory assignments to give the student a basic understanding of the

morphological and cultural characteristics of bacteria. The cultural characteristics are related to sound practices of food sanitation. Laboratory charge \$4.00.

3 class hours.

Credit, 3.

MRS. REINISCH.

Botany S-1. (Introductory Botany) I. and II.

Structure, function and reproduction of plants with primary emphasis on the flowering plants. Students in the Stockbridge School are enrolled in the regular Introductory Botany course in the University and meet in special laboratory sections of that course. Laboratory charge \$3.00.

2 class hours and 1 3-hour laboratory period.

Credit, 3.

MR. PUTALA.

English S-1. (Business English) I. and II.

Training and practice in writing various types of letters and reports with some review work in fundamentals of grammar and composition.

3 class hours.

Credit, 3.

MRS. DUBOIS OR MR. BELCK.

English S-3. (Report Writing) I.

A discussion and writing course concerned with planning and setting up different kinds of reports and articles.

3 class hours.

Credit, 3.

MRS. DUBOIS OR MR. BELCK.

English S-4. (English Composition) I. and II.

Training in effective composition; readings.

3 class hours.

Credit, 3.

MRS. DUBOIS OR MR. BELCK.

Entomology S-3. (Structural Pests) I.

A course for majors in dairy technology, food distribution, food management, and others, designed to acquaint students with the common structural pests (household, stored food, etc.) and how to prevent and eradicate them. Laboratory charge \$2.00.

1 class hour and 1 2-hour laboratory period.

Credit, 2.

MR. SWEETMAN.

Entomology S-4. (Insects and Related Pests) II.

A course for freshmen in landscape operations, floriculture, arboriculture and park management, and horticulture devoted to an introduction to insect recognition, development, damage and control. The course is basic to a

further study of specific pests and their control for those who will take Entomology S-5 or S-7. A summer collection of important pests may be required. Laboratory charge \$2.00.

2 class hours and 1 2-hour laboratory period.

Credit, 2.

MR. WHEELER.

Entomology S-5. (Horticultural Insects) I.

Seniors in horticulture, landscape operations and arboriculture and park management who have completed Entomology S-4, go on to a more detailed study of important pests; their damage, life histories, environment, and distribution and to an understanding of the principles and practical methods of controlling those pests. Laboratory charge \$2.00.

1 class hour and 2 2-hour laboratory periods.

Credit, 3.

MR. WHEELER.

Entomology S-6. (Turf Insects) II.

A course designed to acquaint the student with the principal pests of turf. General introduction to entomology, followed by study of specific pests of turf.

1 class hour and 1 2-hour laboratory period.

Credit, 1.

MR. HANSON.

Entomology S-7. (Florists' Crops Insects) I.

A study of insect and related pests of greenhouse and garden plants for floriculture majors. It is devoted to recognition of the pests encountered, types of damage, life histories, associations with the environment, and important aspects of their control. Laboratory charge \$2.00.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. WHEELER.

Entomology S-12. (Livestock and Forage Crop Insects) II.

The recognition, biology and control of important insect and related pests affecting livestock and forage crops. Studies of specific pests and controls, including the proper use of chemicals, follow a brief consideration of some fundamentals of entomology. For last half of semester. Laboratory charge \$2.00.

3 class hours and 1 2-hour laboratory period.

Credit, 2.

MR. WHEELER.

Food Products S-1. (Dairy and Poultry Products) I.

A study of the principles involved in the packaging, storage, grading, selection and distribution of dairy and poultry products in relation to food distribution and management. Laboratory charge \$2.00 (Dairy).

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. POTTER, Dairy.
MR. DENISON, Poultry.

**Food Science and Technology S-2.
(Fundamentals of Food Preservation) II.**

A survey is made of the causes of food spoilage and the methods used in preserving foods. Sources, preservation and marketing of the major food groups is discussed. Laboratory charge \$2.00.

2 class hours and 1 2-hour laboratory period.

Credit, 3.

MR. HAYES.

Food Science and Technology S-3. (Special Products) I.

The class and laboratory exercises in this course are planned to meet the needs of students majoring in dairy technology. General principles of food preservation and their application to the subject of dairying are discussed in class exercises. Crushed fruits, fruit juices, syrups, flavored syrups and other products which are utilized in the dairy trade are manufactured and tested.

1 class hour and 1 2-hour laboratory period.

Credit, 2.

MR. LEVINE.

Forestry S-1. (Forest Measurement) I.

Measurement of standing timber in the forest; scaling practices and measurement of primary products cut from trees; forest mapping.

2 class hours and 1 4-hour laboratory period.

Credit, 4.

MR. MAWSON.

Forestry S-3. (Applied Silviculture) I.

Growing wood as a forest crop: cleaning, thinning, improvement cutting, and pruning in immature forests; harvest cuttings; forest establishment; logging slash disposal; forest protection.

2 class hours and 1 4-hour laboratory period.

Credit, 4.

MR. ABBOTT.

Home Economics S-1. (Basic Food Principles) I.

A study and application of basic scientific principles of food preparation techniques. Laboratory charge \$6.00.

2 class hours and 1 3-hour laboratory period.

Credit, 3.

MRS. McCULLOUGH.

Home Economics S-2 "A". (Elementary Nutrition) II.

A general survey of the fundamental principles of nutrition, nutritive value of foods, the requirements and planning of an adequate dietary for the normal person.

3 class hours.

Credit, 2 or 3.

MRS. COOK.

Home Economics S-2 "B". (Elementary Nutrition) II.

A comprehensive study of the fundamental principles of nutrition, nutritive value of foods, the requirements and planning of an adequate dietary for the normal person.

3 class hours.

Credit, 3.

MRS. JOHNSON.

Mathematics S-1. (General Course) I.

This course provides a thorough drill in those fundamentals which are used in practical arithmetic. Fractions, ratio and proportion, percentage, formulas of area and volume, graphs, logarithms, and the use of the slide rule will be studied.

2 class hours.

Credit, 2.

THE DEPARTMENT.

Mathematics S-3. (Review Mathematics) I.

The simple mathematics used in wood utilization; arithmetic, plane geometry, certain trigonometric functions, use of the slide rule.

3 class hours.

Credit, 3.

THE DEPARTMENT.

Mathematics S-4. (Elementary College Algebra) I. and II.

A review of elementary algebra and a more thorough study of such topics as quadratic equations, exponents and radicals and progressions.

3 class hours.

Credit, 3.

THE DEPARTMENT.

Physical Education for Men.**Physical Education S-1a, S-1b, S-2a, S-2b. I. and II.**

Aim of the course is to inculcate in the student an adequate knowledge of, a sufficient technique in, and a wholesome attitude toward physical education activities through the medium of individual, dual, and team sports. Each student must demonstrate his ability to swim.

3 class hours.

Credit, 0.

STAFF.

Physical Education for Women.**Physical Education S-1a. I.**

Students are required to pass a safety test in swimming. Except for this requirement all unrestricted students may select any activity which is offered. Fall season: archery, field hockey, folk dance, golf, lacrosse, life-saving, modern dance, swimming, tennis, volleyball.

3 class hours.

Credit, 0.

STAFF.

Physical Education S-1b. I.

Winter I season: badminton, ballroom dance, basketball, body mechanics, bowling, diving, fencing, folk dance, gymnastics, life-saving, modern dance, swimming, synchronized swimming, tap dance, trampoline, volleyball.

3 class hours.

Credit, 0.
STAFF.

Physical Education S-2a. II.

Winter II season: same as in course S-1b.

3 class hours.

Credit, 0.
STAFF.

Physical Education S-2b. II.

Spring season: archery, folk dance, golf, lacrosse, life-saving, modern dance, softball, swimming, synchronized swimming, tennis, volleyball.

3 class hours.

Credit, 0.
STAFF.

Plant Pathology S-2. (Plant Diseases) II.

A survey course dealing with the nature, cause, and general procedures of plant disease control. The profound influence environment exerts on plant disease, the role played by insects in their transmission and the major classes of plant pathogens, fungi, viruses and bacteria are briefly considered.

3 class hours.

Credit, 2.
MR. AGRIOS.

Plant Pathology S-3. (Forest and Shade Tree Pathology) I.

Nature, cause and control of the principal types of diseases of trees, including decay of forest products, and of standing and structural timbers.

2 class hours and 1 2-hour laboratory.

Credit, 3.
MR. BANFIELD.

Plant Pathology S-4. (Florists' Crops Diseases) II.

A study of the major diseases of greenhouse and garden plants for floriculture majors. Included are recognition, damages, environmental effects, and control principles. Laboratory charge \$2.00. (Not offered 1963-64).

3 class hours first half of semester.

1 class hour and 2 2-hour laboratory periods second half of semester. Credit, 3.
MR. AGRIOS.

Practical Science S-7 and S-8. I. and II.

A two semester course in the theory and application of the sciences, chiefly chemistry (first semester) and physics (second semester). The course is designed to give an introduction to scientific thought and phenomena by lectures, demonstrations, assigned readings and problems. Practical applications and problems are stressed.

2 class hours.

Credit, 1 or 2.
MR. HUNTING.

Psychology S-1. (Applied General Psychology) I.

3 class hours.

Credit, 3.
MR. D. W. ABBOTT.

Recreation S-1. (Introduction to Recreation) II.

Fundamental concepts, current status, and established principles of recreation as a social force. Field trip.

3 class hours.

Credit, 2.
MR. RANDALL.

Speech S-1 and S-2. I. and II.

Theory and practice in expository speaking for business and professional purposes.

2 class hours.

Credit, 2.
THE DEPARTMENT.

Veterinary Science S-1. I.

For students majoring in animal and poultry sciences. Conservation of the health of animals is the keystone of successful animal production. This course acquaints students with the causes, development, control, eradication, and prevention of diseases of economic importance to the livestock and poultry industries.

3 class hours.

Credit, 3.
MR. SMITH.

Wildlife Management S-2. (Management of Wildlife) II.

Fundamental ecology and principles of wildlife management with emphasis on habitats and management practices.

2 class hours.

Credit, 2.
STAFF.

DIRECTORY OF INFORMATION**A. The University**

Those desiring University catalogs and other pamphlets giving full information relative to entrance requirements, courses of study, expenses, opportunities for student labor, and so forth, and those with questions regarding admission to the university, either to the freshman class or to advanced standing, should address Marshall O. Lanphear, Registrar of the University of Massachusetts, Amherst, Mass.

B. The Graduate School

Questions relating to courses offered leading to the degrees of Master of Science and Doctor of Philosophy, admission and work required, should be addressed to Director of the Graduate School, University of Massachusetts, Amherst, Mass.

Please forward with your application the following: (1) a letter of recommendation from your Guidance Director; (2) a letter written in long hand giving your reasons for wanting to attend Stockbridge; (3) a transcript of your high school or preparatory school grades; and (4) the certificate of residence form to be found on the next page, if lower Massachusetts tuition rate is claimed.

FORM I

**APPLICATION FOR ENROLLMENT
IN THE
STOCKBRIDGE SCHOOL OF AGRICULTURE**
(Type or Print Information)

Name.....Date

City or
Town.....Street..... State.....

Present Occupation..... Age.....

School or College Attended:
Name of School..... Year Graduated.....

City or

Town..... Are you a Veteran trainee?

Indicate by a check mark the course in which you desire to register. Do not check more than one.

- | | |
|--------------------------------------|------------------------------------|
| 1. Animal Science | 6. Landscape Operations |
| 2. Arboriculture and Park Management | 7. Poultry Science |
| 3. Dairy Technology | 8. Restaurant and Hotel Management |
| 4. Food Distribution | 9. Turf Management |
| 5. Horticulture | 10. Wood Utilization |

Floriculture

Fruit and Vegetable Crops

References:—I am personally acquainted with the above applicant, and know.....
to be of good moral character, industrious, studious, and physically capable.

(Please Print)

1. Name.....Position.....

Address

2. Name.....Position.....

Address

(Two references are required and should not be members of your own family).

Mail this blank to FRED P. JEFFREY, Director of the Stockbridge School of Agriculture.
UNIVERSITY OF MASSACHUSETTS, AMHERST, MASS.

Important.—Be sure to file residence certificate if State tuition rate is claimed.

The University of Massachusetts charges a tuition fee of \$300 a semester to students who are not residents of Massachusetts. In order to satisfy the University authorities that an applicant is entitled to state tuition of \$100 a semester, they require a statement signed by the clerk of the city or town in which the applicant resides, certifying to the fact that the parent or guardian of the applicant is a legal resident of said city or town. Where the guardian is certifying to this statement, it will be necessary for him to furnish copies of his appointment by the court. Such a statement may be made on the form below. If this is not presented when the student registers, the Treasurer has no option but to collect tuition on the above basis. When requesting the City Clerk to sign this certificate, an applicant for admission to the University should give the name and address of the parent or legal guardian unless he himself is of legal age.

FORM II

CERTIFICATE OF RESIDENCE

This is to certify that I am the father.....mother

legal guardian..... of
Student's Name

Signed

This is to certify that on the date specified below (Insert name of parent or guardian)

.....is a legal resident of.....
Parent's Name

....., Massachusetts.
Town or City

Signed
Town or City Clerk

Date

Mail this blank to FRED P. JEFFREY, Director of the Stockbridge School of Agriculture,

UNIVERSITY OF MASSACHUSETTS, AMHERST, MASS.

This certificate must be filed with application blank if lower tuition rate for citizens of Massachusetts is to be secured.

UNIVERSITY OF MASSACHUSETTS
TUITION EXPENSES

As a state institution, the University of Massachusetts offers a low rate of tuition to all students entering from the Commonwealth. Eligibility for admission under the low residential rate is determined in accordance with the following policy established by the Board of Trustees.

1. A student must present evidence satisfactory to the treasurer of the University that his domicile is in the Commonwealth of Massachusetts in order to be considered eligible to register in the University as a resident student. This means that he must have established a bona fide residence in the Commonwealth with the intention of continuing to maintain it as such.

2. The domicile of a minor shall follow that of the parents unless such minor has been emancipated. In case of emancipation, the student in addition to the requirements of these regulations respecting residence shall present satisfactory proof respecting emancipation. Minors under guardianship shall be required to present in addition to the certification of the domicile of the guardian, satisfactory documentary evidence of the appointment of the guardian.

3. No student shall be considered to have gained residence by reason of his attendance in the University nor shall a student lose residential preference during his continuous attendance at the University.

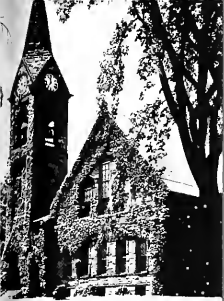
4. The residence of a wife shall follow that of the husband.

5. The prescribed form of application for classification as to residence status must be executed by each student. Misrepresentation of facts in order to evade the payment of out-of-state tuition shall be considered sufficient cause for suspension or permanent exclusion from the University.

6. Discretion to adjust individual cases within the spirit of these rules is lodged with the President of the University.

Other University of Massachusetts Catalogues:

- ① Undergraduate Catalogue
 - ② General Information Bulletin
 - ③ Graduate School Catalogue
 - ④ Summer School Catalogue
-
-



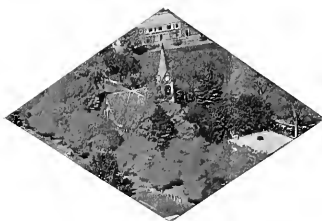
UNIVERSITY OF MASSACHUSETTS REPORT OF THE PRESIDENT

1962 - 1963

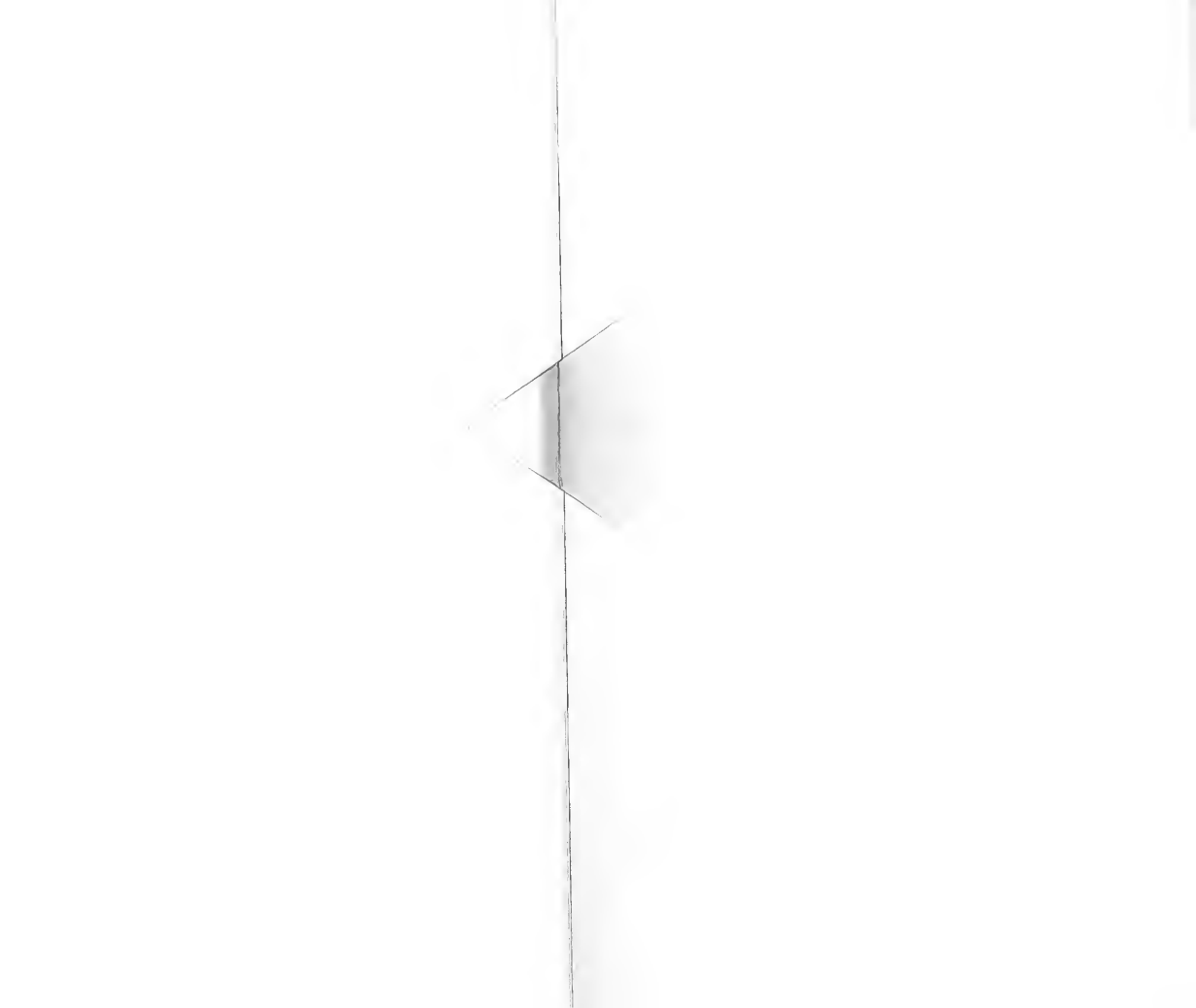
CENTENNIAL



1863



1963





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IN MEMORIAM

PHILIP FERRY WHITMORE

1892 — 1962

Member of the Board of Trustees, 1929 - 1962

Seated at table, starting from left: Robert D. Gordon, representing Governor Peabody; Most Reverend Christopher J. Weldon; Harry C. Solomon; Alfred L. Frechette; Fred C. Emerson; Joseph P. Healey; Leo F. Redfern; Frank L. Boyden; John W. Lederle; Alden C. Brett; John W. Haigis; George L. Pumphret; Calvin H. Plimpton; Edmund J. Croce; Hugh Thompson; Harry D. Brown; Frederick S. Troy.

Seated at left, behind table: Owen B. Kiernan; Dennis M. Crowley. Standing (l. to r.): Gilbert L. Woodside, University Provost; Charles H. McNamara; and Kenneth W. Johnson. Members of the Board not shown in picture: Mrs. Kathryn F. Furcolo, Miss Victoria Schuck, Ernest Hoftzyer, and J. John Fax.



TO THE PEOPLE OF THE COMMONWEALTH OF MASSACHUSETTS

*This report is presented as a summary
of the events and accomplishments
of the University's Centennial Year.*

*The report officially covers the academic year 1962-1963
but also incorporates material dealing with
Centennial-related events occurring both before and after
the period of the academic year.*

*We hope that from these pages the citizens of Massachusetts
may take increased pride in an institution
which, in the largest measure, they have built
for the education of their sons and daughters.*

*It is wholly fitting therefore that we dedicate
this report to the people of Massachusetts
and renew our pledge to maintain the high standards
that an enlightened Commonwealth must always
demand of those who serve it.*

John W. Lederle
President

December 30, 1963



REPORT OF THE PRESIDENT

Amid the clamors of crisis heard throughout the world the University of Massachusetts observed an anniversary. Born at a time when guns of war brought havoc into "hearts and hearthstones all over this broad land," the University in the era of the Cold War marked its one hundredth year as a place of higher learning.

During this year the campus community did not "pause" merely to celebrate, to congratulate itself on a milestone routinely reached. Instead, this was a time for discussion and debate, analysis and review, probing and planning. Deeply involved in the life of contemporary America and America's struggles in the world at large, the institution called upon national leaders and important thinkers in many vital fields to pose the questions and clarify the issues that affect a university's heart as a living force in the society of man.

The themes discussed during this Centennial Year served to reemphasize what a university is for. They indicated anew that a university exists to help men and women to greater self-fulfillment, even in contexts of crisis.

In the Centennial Year of 1962-63 the University of Massachusetts emerged from its own major crisis and began looking to the future in a new spirit of maturity and responsible freedom. Before 1962 the University was hampered in its fiscal operations by controls exercised by state agencies outside the campus. Such controls barred the continued building of a first-rate faculty and incurred delays at a time when flexibility and expeditious development of programs were prime necessities.



After careful and industrious work by a legislative Special Commission on Budgetary Powers at the University of Massachusetts, the General Court enacted legislation granting greater self-management powers to the University's trustees. Executive approval was given on July 11, 1962, and the University embarked on its second century with new confidence that it could take its place as an equal in the great community of public institutions of higher learning serving the country's millions of young people.

Enactment of the fiscal self-management law demonstrated, first and foremost, that the people of Massachusetts and their representatives in the legislature would not gamble with the most important commodity any society can produce — the fund of native intelligence and potential in its youth. The legislation assured the democratic right of qualified young men and women to pursue the highest possible goals in education. This "right of

"A century is the measuring rod of history, and its passage gives us special reason to pause for reflection."

*Dr. Glenn T. Seaborg, Chairman
U. S. Atomic Energy Commission
Charter Day
April 29, 1963*



opportunity" has been given to tremendously increasing numbers since the signing of the Morrill Land-Grant Act on a July day more than a century ago.

Massachusetts has for many years been a source of educational excellence — but until recently mostly because of the great private colleges and universities within the state's boundaries. With the University's new birth of freedom, the Commonwealth must now see the opening of a new page of excellence, as reflected in the will of the people to honor only the best for their sons and daughters in the state's chief facility of higher education.

A TIME FOR GROWTH

How did the University of Massachusetts grow in its Centennial Year? As with all public universities in this explosive era, we must begin with the increase in numbers and consider a new and highly significant prospect they imply for the future. As against 7,000 students in 1961, the University enrolled 7,676 in the year beginning September, 1962. Applications for admission to the freshman class totalled 6,930 for 1,922 available places. In 1961 there were 6,521 applicants for approximately the same number of places, indicating that applications increased by 6.3 per cent in only one year.

With more than 90 per cent of the 351 cities and towns of Massachusetts represented in the undergraduate student body, it is obvious that the University is now, quantitatively speaking, a principal resource of higher education for the entire Commonwealth. But fully as important is the fact that the State University today, far more than ever before, is being listed on admissions applications as the enthusiastic first choice of applicants. Coupled with available evidence that the academic profile of the University's freshmen ranks at the top among state institutions in New England and nationally, this means that the University is recognized as a major educational facility both quantitatively and qualitatively by the growing number of applicants seeking higher education.

These trends reflect the quiet revolution occurring in this state. Because the private colleges and universities have limited capacity for expanding their physical plants sufficiently to accommodate all applicants whom they

would ordinarily consider qualified, many Massachusetts students seeking college education look elsewhere. For a number of years a certain percentage of such students would list the University of Massachusetts as something other than first choice, and many would enroll in public institutions outside the state. The present trend, supported by responses to a questionnaire sent to parents of members of the freshman class, indicates that applicants are increasingly turning to the University of Massachusetts first — and for qualitative reasons.

All of this is encouraging, but it is not discussed here as a matter of institutional self-praise. Rather, it points up the magnitude of the responsibilities falling on the University in its second century. Any interpretation of current trends will immediately suggest the great new role the State University will play in the years ahead. Although it has enjoyed a reputation for quality throughout its entire history, it is only recently and by virtue of the numbers associated with it that the University has begun to have impact on the very life of the Commonwealth.

During the next 20 years or so, therefore, when the graduating classes will have up to 5,000 or more members, there will be an infusion of University-educated persons into every phase of life in the Commonwealth — even granted that many students will leave the state upon graduation. Planning the University's program for the future thus becomes a much more complex task than any facing a private college or university within the state. It is far from irresponsible to believe that such plans must be based upon the University's becoming the educational heart of the Commonwealth.

To think in lesser terms is to be unrealistic about the future and its demands. The only adequate thing to do is to formulate the best possible plans, establish quality programs, and maintain a timetable which will make the University equal to a tremendous task that will be thrust upon it if we do not now accept it as a long-range responsibility.

In these beginning days of the University's second century, therefore, numbers take on a meaning that they have not had before. The population explosion has affected not only the physical aspects of growth. Uniquely in the Commonwealth of Massachusetts it has also, in all probability, determined the kind of state university that must evolve in the decades ahead.

Saturday morning on campus



THE UNIVERSITY TODAY

What was the University of Massachusetts in its Centennial Year? Under conditions of vital growth and increasing stature, the University:

- Enrolled 7,676 students (6,250 undergraduates, 975 graduate students, and 451 students in the two-year Stockbridge School of Agriculture).

- Offered almost 1,000 courses in an academic program assigned to two colleges (College of Agriculture and College of Arts and Sciences) and six schools (Business Administration, Education, Engineering, Home Economics, Nursing, and Physical Education).

- Provided academic work in 45 departments, including — besides baccalaureate programs — opportunities in approximately 40 fields for master's degrees and 20 fields for doctorate degrees in the Graduate School.

- Carried a staff of more than 2,200 employees, with more than 650 of these full- or part-time faculty members.

- Maintained a beautiful campus of about 950 acres and more than 90 major buildings in Amherst, plus other important installations throughout the state, the entire plant having a replacement value of more than \$100 million.

- Conducted a research program in which sponsored projects aggregated more than a million dollars per year, and planned for careful growth and development in this area consistent with the general educational aims of the institution.

- Continued to develop as one of the leading universities in the nation in the employment of electronic data processing equipment for more efficient and economical handling of administrative procedures.

- Maintained many outstanding and often unique projects, such as a faculty-student committee for the recruitment of superior students (SCOPE — Standing Committee on Promising Entrants); the Four-College Cooperation Program conducted with the University's academic neighbors — Amherst, Smith and Mount Holyoke Colleges; the Four-College Hampshire Inter-Library Center for special research materials, located on the University campus; *The Massachusetts Review*, distinguished journal of the arts, literature and public affairs; a University Press Committee for publication of scholarly and creative works written by faculty members and others; the student-sponsored Distinguished Visitors Program; an outstanding Concert Series conducted under the recently established Fine Arts Council; a new and vital University Theatre; the Alumni Memorial Lectureship; the Dis-

tinguished Professorship of Practical Politics established under Ford Foundation auspices; and a growing number of specialized bureaus and interdisciplinary institutes, the newest of the latter being the Institute of Agricultural and Industrial Microbiology and the Institute of Environmental Psychophysiology.

- Conducted a variety of programs designed to encourage student excellence, including the Senior Honors Program; the seminar-type Honors Colloquia, which this year permitted superior students from all three pre-senior classes to participate; advanced placement; and other independent study programs.

- Acted as a conference center for professional, civic, scientific and other groups interested in having seminars and workshops in an academic setting on an attractive campus. This year the number of participants in conference activities on campus reached a new high of 20,000.

The summary above is not at all complete, but it should reflect the essential vitality and creativity of the University as a modern American facility of higher education. Change is implied in almost every category listed above — change in the sense of creative development. Under its general Centennial theme — “Toward Higher Learning More Widely Disseminated” — words spoken by Justin Smith Morrill at the ceremonies commemorating the 25th anniversary of the founding of the Massachusetts Agricultural College — the University in its one hundredth year sought not merely to expand, but to grow where it was needful to grow, curtail wherever it was not, and bring a better balance where there was disproportion.

Probably the most significant development in the latter category was the more vigorous emphasis placed upon the University's programs in the arts and humanities. The historical dominance of scientific studies at Land-Grant institutions has resulted, as it has on the University of Massachusetts campus, in excellent curricula in the pure and applied sciences — and one can only be immensely proud of the work accomplished in these areas. Unfortunately, however, the arts and humanities have too often had far less impact on the general cultural development of students at public universities. Fortunately, at the University of Massachusetts there has always been a core of outstanding teachers in the humanities whose influence on student thinking supplied the needed balance. We continue to have such teachers; and if our faculty salary scale can be kept at nationally competitive levels, we will add greater and greater numbers of them in the future. There remains a very real danger,

however. It lies in neglecting to plan, develop and nourish activities and programs having specific cultural importance.

During the Centennial Year there were many hopeful signs that the University was indeed providing the means of balance. Curricularly, there was an appropriate increase or significant revision of course offerings in the humanities and the arts. Such adjustments have been largely effected to give students a living curriculum, rather than one based on outmoded scholarly concepts or a now-stagnant academic tradition.

A viable curriculum was thus the first consideration in the effort to maintain balance in 1962-63. But during this anniversary year there were other evidences of cultural growth. In the University's building program, a new Fine Arts Center was planned to provide an appropriate facility for the teaching and practice of art in its many forms. Also, the Department of Art brought a number of outstanding exhibits to the campus and embarked on an art acquisition program of its own that has already greatly enriched the University by providing a collection of paintings, sculpture, and other important art objects.

New developments in the areas of drama and music are also bringing greater cultural depth and substance to our general program. The highly successful productions presented by the University Theatre, along with the lectures and workshops conducted by our theatre staff at high schools throughout Massachusetts, are significant evidence of the University's importance in the area of cultural “outreach.” Soon, too, the University will have a symphony orchestra as well as other musical organizations and facilities where the composer and the performer may have freedom to work and to contribute to the arts in our society.

Other important instruments for cultural growth are *The Massachusetts Review*, started by faculty at the University and now in its fourth year, and the newly established University Press Committee which in 1962 published its first book, a volume of poetry (called *A Curious Quire*) containing original poems by four members of the Department of English and lithographs by a member of the Department of Art. In addition, of course, there are growing numbers of major lectures, exhibits, dramatic and musical productions by off-campus groups, and other cultural events.

The University will continue to support and to further all of these activities, and to initiate others which will give richer cultural opportunities to our students, faculty, and to the public at large.

... the system of the past



First consideration . . .

... a viable curriculum



As a progressive educational institution, the University moved not only to make needed adjustments in academic emphasis, but also to engage in new programs reflecting its deepening relationship with the society in which it exists. One of the most important of the new programs, initiated by legislation in 1962, was that of a state medical school to be operated within the structure of the University. While many problems will have to be solved before the University can grant its first Doctor of Medicine degree, it is encouraging that legislative actions affecting the new facility indicate that the people of Massachusetts want a first-rate medical school, and not simply one that will siphon off mediocre pre-medical students and leave the better students to the well-established medical colleges.

With this beginning in medicine, the University during 1962-63 continued to review the desirability of establishing other professional schools and various service facilities for industry, labor, government, agriculture, and urban development. While the University must take time to plan carefully and well, there is little doubt that, with adequate public support and understanding, programs will be organized that will have a major long-range effect on Massachusetts progress in each of the areas listed above.

At the same time that it contemplated greater service within the Commonwealth, the University maintained programs in the international field. Its heritage is such that, of all American public universities, it stands among the earliest pioneers in international cooperation through the far-reaching work of the University's third president, Colonel William Smith Clark, who traveled to Japan in 1876 and helped in the founding of Hokkaido University in Sapporo. The exchange program conducted by the University of Massachusetts with its far-eastern sister institution, particularly after World War II, has been a model of international cooperative activity. As a tribute to this strong tie of goodwill, Hokkaido University was represented at Charter Day exercises at the University of Massachusetts by its President, the eminent Dr. Harusada Suginome, and its Dean, Dr. Seijin Nagao, who with their wives traveled the long distance from Japan to honor the American university's Centennial.

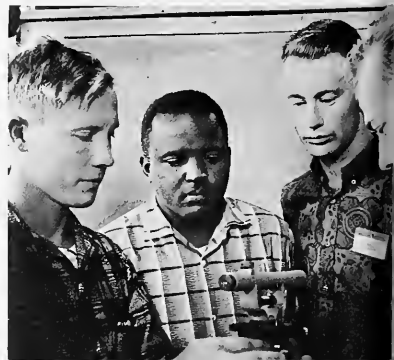
This deeply rewarding association with Hokkaido reflects the pattern of constructive cooperation which the University is maintaining in international

projects. During 1962-63 one of the major programs undertaken was the founding of a school for girls in the African nation of Uganda. Sponsored by the Agency for International Development, the school was planned by Dr. Albert W. Purvis, Dean of the School of Education.

Participation of the University in Peace Corps training activities resulted in a highly successful program. Involving trainees from all parts of the country, the project was carried out by utilizing many departments and support facilities (like the Language Laboratory) to realize a comprehensive objective having great importance in the people-to-people program conducted by the United States Government.

Also in the international field, the University's Bureau of Government Research conducted a six-week project in public finance for major governmental officials from the Republic of the Congo. Carried out under an arrangement with the Agency for International Development of the U. S. Department of State, the program provided classroom work and field studies in municipal and state finance procedures for seven high-ranking officers from the African country.

Direct participation of the University's faculty in teaching, study and research abroad continued as in previous years under Fulbright and other programs designed to provide overseas opportunities for American scholars and teachers. Perhaps the farthest cooperative assignment was undertaken by University personnel in Nyasaland. An extension education program, the project was initiated by the College of Agriculture under a contract entered into by the Agency for International Development, the University, and the Government of Nyasaland.



*Where help
is needed —
a helping hand:
Peace Corps
trainees at UM*

THE DEVELOPING PROGRAM

A university is the sum of the operations of all of its parts. During the Centennial Year significant advances and accomplishments were sustained in each of the colleges, schools and administrative and service departments. A general summary of these evidences of progress follows.

CURRICULUM

As this Report indicated earlier, the University must maintain a curriculum that reflects the institution's involvement in the most pressing concerns of its time. Offerings on both the undergraduate and graduate levels have therefore undergone careful re-examination in the interests of shaping the strongest possible curriculum.

The thoroughness of such re-examination is indicated by the continuing increase and enhancement of offerings in departments of the College of Arts and Sciences. The College of Agriculture during this period reorganized its entire curriculum in order to equate the instructional program with the educational needs of its students. By combining a solid foundation in science with the humanities and social sciences, together with technical training in the student's major, the College now provides its students with a better basis upon which to achieve professional goals.

The Schools of Business Administration and Home Economics, both of which effected major curriculum changes prior to 1962, continued to study their programs for possible further improvements. The School of Nursing made several changes during the year providing for extension of the program requirements in the humanities and social sciences, increased opportunity for inclusion of elective and general education courses, implementation of upper division clinical curriculum for 1963-64 through utilization of the clinical resources in the greater Springfield area, and enrichment of course offerings in the nursing major through the use of the team teaching approach.

In the School of Engineering the first Bachelor of Industrial Engineering degree was awarded at the June, 1963 Commencement. Also, an important Engineering Freshman Orientation program was instituted to provide students with fundamental knowledge needed to keep up in a rapidly advancing field. Offered on a voluntary basis just before the opening of the fall semester, the program is supported by the Charles F. Kettering Foundation and the

University. The School of Education in April, 1963 underwent a thorough scrutiny of its teacher education program by the Visiting Committee of the National Council for Accrediting Teacher Education. Several months later the Council announced that the program of the School of Education was accredited on both the bachelor's and master's levels. The School of Physical Education has also received national accreditation of its major program from the N. C. A. T. E. Following a national trend, the Reserve Officers Training Program, the first two years of which have been compulsory for male students, was placed on a voluntary basis effective September, 1963, after action by the Board of Trustees in January of that year.



*Teacher, artist, scientist —
for each, the major requirements
are interest, concern, commitment*



GRADUATE SCHOOL

The most significant accomplishment of the Graduate School was the granting of 235 advanced degrees, including 28 doctorates, during the academic year 1962-63.

New Ph. D. degree programs were established in English and history. Also, under the Four-College Cooperation Program which the University conducts with its academic neighbors, Amherst, Smith and Mount Holyoke Colleges, Ph. D. programs were established in geology, philosophy, and German. These additions bring the number of Ph. D. programs to 21.

The University's Board of Trustees also approved four new master's degrees: Master of Science in Accounting, Master of Science in Finance, Master of Science in Industrial Engineering, and Master of Science in Physical Education. This brings the number of departments offering the master's degree to a total of 41.

In January, 1963, the University's Master of Business Administration program was accredited by the American Association of Collegiate Schools of Business. The University was the only state university in New England to receive accreditation in this program.

The scope of the dean's responsibilities was extended with the appointment in August, 1962 of Dr. Edward C. Moore to head the Graduate School and to serve in the new capacity of Coordinator of Research. Dr. Moore succeeds Dr. Gilbert L. Woodside, Dean of the Graduate School from 1950 to 1961, who became Provost of the University in the latter year.

RESEARCH COUNCIL

Industrial research projects in 1962 were being carried out under the sponsorship of 35 different industries. More than 70 research projects have been supported by the U. S. Department of Agriculture; the Office of Education of the Department of Health, Education and Welfare; the U. S. Atomic Energy Commission; the Department of the Interior; the National Science Foundation; the Public Health Services of the National Institutes of Health; and the Massachusetts Department of Public Works. Faculty research projects supported from University Trust Funds included more than 50 projects involving research in the humanities and the social sciences as well as in the physical and biological sciences. These funds have also provided support for the University Press Committee and *The Massachusetts Review*.



Selection of books recently published by members of the faculty. In addition to 18 books published during the Centennial period, approximately 350 articles by faculty members appeared in a large variety of periodicals.

ADMINISTRATION

"The development of the individual and the nation demand that education at every level and in every discipline be strengthened and its effectiveness enhanced . . . Clearly the goal is to bring every state nearer the present standards of the best."*

In the spirit of these words the Massachusetts General Court in July, 1962 granted greater self-management authority to its State University. It is a pleasure to report that, after a full year's operation under these broader powers the University has been able to make substantial progress in maintaining "the present standards of the best" for Massachusetts youth. While a number of difficulties inevitably remain, these are minor compared to the overriding evidence of improvement in personnel procedures, administrative efficiency, and resource utilization.

The University's strengthened capacity to recruit outstanding persons to its faculty and staff is clearly one of the most important advantages of the new authority granted the University. The ability to allocate salaries according to priority requirements, particularly at the upper faculty levels, has already brought excellent results in the recruitment and retention of first-rank personnel.

**Goals for Americans; The Report of the President's Commission on National Goals*, New York, 1960, p. 6.

In the complex area of purchasing and procurement the University has moved a long step forward in organizing its procedures according to modern principles of management. During 1962-63 these procedures resulted in earlier deliveries of goods and services and greater assurance that specifications were in accordance with requirements of the using departments. This has made for better performance in teaching and research activities, and improved morale among members of the faculty and staff.

The granting of greater self-management powers has also resulted in a more mature policy on faculty and staff travel. Attendance of personnel at regional and national conferences has led to direct benefits to the teaching, research, extension and administrative programs of the University. Also, contributions by faculty members at off-campus seminars and forums have brought wider recognition of the University than would otherwise be possible.

On campus, there have been important improvements in regulations and procedures affecting the health and safety of the student body and other members of the University community. Chief among these has been the establishment of traffic patterns and parking regulations according to a newly organized plan. In addition, the University has instituted up-to-date fire prevention and safety programs, sanitation control, and civil defense facilities.

In all of the areas mentioned above, the chief advantage afforded the University under "fiscal autonomy" is the assurance of on-the-spot attention to major University concerns by those who are best able to exercise appropriate responsibility. The freedom inherent in the grant of these powers is predicated on the proper discharge of responsibility and full public accountability for all actions taken in the University's interest. This policy, with its requirement that the University in all its operations be as a book, constantly open to public inspection, will continue to be the first principle under which the University will proceed into its second century of service.

PHYSICAL PLANT

During 1962-63 the University was given important properties which greatly enhanced the value of the physical plant and provided for the establishment of significant new educational resources. In April, 1962, the Massachusetts Fruit Growers' Association purchased the Peter Hanifan farm in Belchertown and turned it over to the University for use as a horticultural research center, where work progressed during 1962-63. The farm, consisting of 215 acres of land and a number of buildings, was given to the University in



Soon to be completed: new School of Business Administration building

Front and rear views of addition to Hasbrouck Physics Laboratory



recognition of a long and successful period of cooperation between fruit growers and the University's College of Agriculture.

In June, 1963, the University was given the 90-acre Stephen Peabody estate on Nantucket Island for establishment of a new research center in marine biology and related fields. The property was presented as a gift of the Nina Haven Charitable Foundation established by the late Stephen Peabody for the support of work in education.

During 1962-63 the University's building program on the campus in Amherst provided a number of excellent new structures for the use of a greatly increased student body. The third section of the Justin Morrill Science Center was completed, and plans were firmed for the beginning of work on the fourth section.

Under auspices of the University of Massachusetts Building Authority, two handsome dormitories were dedicated during the Centennial Year. On November 16, 1962, Gorman House was dedicated as a memorial to Edwin Daniel Gorman (1912-1961), who as a Representative from Holyoke in the Massachusetts General Court made outstanding contributions to the development of education in the Commonwealth. Another men's dormitory, Brett House, was dedicated on December 9, 1962, as a tribute to Alden Chase Brett '12, long-time member of the University's Board of Trustees and one of his alma mater's most loyal, energetic and devoted sons.

A four-dormitory complex on the hill east of the campus continued under construction. A high-rise complex, the completed units will provide an attractive living center for 1300 students.

Holdsworth Hall, a new natural resources center for work in forestry and in wildlife and fisheries biology, neared completion in the summer of 1963. The building, named for Professor Emeritus Robert P. Holdsworth, pioneer forester and conservationist, was scheduled for dedication in the fall of 1963.

The handsome new physical education building for men — one of the finest facilities of its kind in the country — also neared completion at the

close of the Centennial Year. The structure will bear the name of Dr. Frank L. Boyden, beloved Headmaster of Deerfield Academy for more than six decades and current Chairman of the University's Board of Trustees.

On the south side of the campus, work continued on the beautiful School of Business Administration building, a much needed facility which will provide dramatic architectural interest at this entrance-point to the campus. Nearer the central part of the campus, the large addition to Hasbrouck Physics Laboratory was also under construction, with completion scheduled for January, 1964.

□ □ □



Frank L. Boyden Physical Education Building

PATTERN FOR THE FUTURE

What will the University of Massachusetts be like in its second century? This is one of the most important questions confronting the people of Massachusetts today. There is no doubt that in recent years a new awareness of the need for education has impelled the Massachusetts public to assure a more reasonable level of support to our educational effort. More and more, there has been the realization that education is like food, and that a society that lacks it perishes. Along with this has come the understanding that high-quality education cannot be picked up at "sale" prices at the corner supermarket. The shopper in the academic market place who believes that there can be such a thing as a bargain-basement education is suffering under a dangerous delusion — dangerous to himself and dangerous to the society in which he lives. Whether it is our elementary or secondary schools, our community colleges, our technical institutes, our state colleges or our state university, the brand of education we want must be clearly marked "Best Only."

The hard practical fact is that all callings, all professions in modern society demand the best — not tolerable competence or minimal proficiency, but the most creative use of mind possible by human beings.

This means that the old phrase "getting an education" must become obsolete, along with its implication of picking up a license qualifying one to do a particular job with never any post-graduate taxing of learning capacity. Many an alumnus has found that, after graduation, a harsher day often dawns, and the knowledge that filled the bill yesterday is no longer good enough today. Thus, the pious but stubbornly unfulfilled hope of many graduates that "it sure would be good to go back for some refresher work" is now a mandatory national concern.

Obviously, our universities must be ready for the many who are interested in taking the road back in order to move forward. The arbitrary limiting of educational effort to one's younger years, coupled with the fallacy that the college or university is a place where one learns fundamentals only, must give way to a more important definition of the role of an institution of higher learning.

The American university must shift itself to a new point of vantage in our scheme of things: it must be at the very center of all creative, social, cultural



Needed above all — "the most creative use of mind possible by human beings . . ."



and professional activity. Above all, it must forever abandon the notion that it is a "terminal" institution — terminal if all you want is a bachelor's degree, terminal if you make it to the master's, and terminally terminal if you stick it out to a doctorate. The university in America must always be devoted to beginnings — the beginnings of new knowledge for all who are qualified to have it and who, like Justice Holmes at the age of 90, feel there is indeed a great deal more that they can learn.

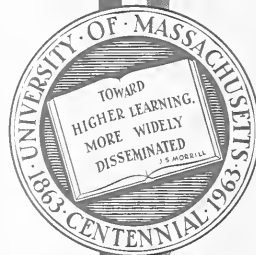
This is the kind of institution that the University of Massachusetts should be in its second century. It should serve not only the youth of the Commonwealth, although that is paramount, but adults as well. The University must become a resource of total service to the entire citizenry of the state.

The factors calling for such a university are compelling, arising as they do out of the massive ferment of our society. The problems of burgeoning urbanization, technological change, population mobility, and increasing "leisure" time — all these reflect the need for a creative and broad-based national program of continuing education. Ultimately such a program must emerge from the great network of public universities in the United States. In so urbanized and industrialized a state as Massachusetts, there must be immediate planning in this vital area.

In its Long-Range Planning Report (1962) the University made its first recommendations along these lines. Although a specific program will have to wait until full consultation is accomplished with all interested parties, the University has accepted in principle the establishment of a "strong and solidly based program of university outreach . . . (utilizing) all academic resources and extended with a sense of genuine commitment" to the people of the Commonwealth.

Activities feasible under such a program include an evening division of the University; a center for continuing education in which conferences, seminars, special courses and institutes could be scheduled; services and special events designed to enhance the social and cultural welfare of the Commonwealth; regular visitations by University faculty members to cities and towns for workshops and forums on matters of major civic interest; and other similar activities.

All of this is predicated on our firm conviction that the citizen is not a good citizen unless throughout his lifetime he maintains a parallel function as a student. In this, the public university must assume a much broader role so that resources for systematic, continuing learning are available by common right to all who are qualified to use them.



HIGHLIGHTS OF THE CENTENNIAL YEAR...

- OPENING CENTENNIAL CONVOCATION
- CHARTER DAY
- THE CENTENNIAL IN BRIEF



*"The imperative must be
the achievement of excellence..."
John J. McCloy giving principal
address at Opening
Centennial Convocation*

OPENING CENTENNIAL CONVOCATION

October 4, 1962

Amid the sound of workmen's hammers beating out the story of physical expansion on campus, Dr. James T. Nicholson '16, as Centennial Chairman, came before the thousands gathered on the east terrace of the Student Union and officially inaugurated the one hundredth anniversary observance.

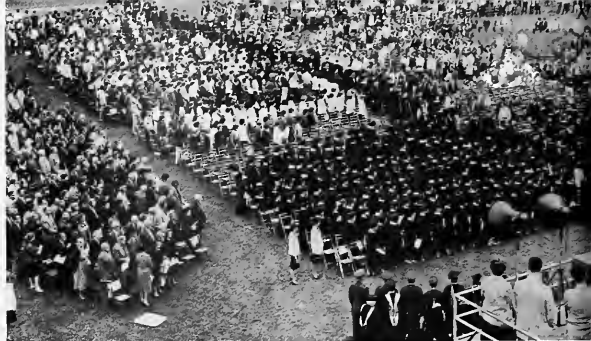
One of the country's most distinguished public servants in the cause of world-wide humanitarianism, Chairman Nicholson urged the building of a University "vastly surpassing in depth and breadth of achievement the extent of its physical growth — a University ever growing in service to the needs of the people of the Commonwealth and of the Nation — a University characterized, to an ever increasing degree, as a wellspring of not only intellectual, but also of moral greatness."

With these words the University formally began its one hundredth year as a major public resource of higher education. And in its new era the institution was immediately caught up in history, in the pressures and challenges of the world of the later 20th century.

As main speaker at the Convocation, John J. McCloy, chairman of the United States General Advisory Commission on Disarmament, declared that, in confronting the problems of the years ahead, the Land-Grant colleges are well-equipped to meet the new needs of an emergent era.

Mr. McCloy warned, however, that "neither an 'ivory tower' nor 'filling station' role befits the present or the future. The constant stress on basic knowledge and instruction in fundamental principles in all fields will be the demand of the future as it has been in the past. There is no room for narrow compartmentalization in any institution which strives to be . . . a university in the best sense. Perhaps with their emphasis on the application of knowledge, the Land-Grant (institutions) can better lead the way toward the demonstration of newer and more effective educational procedures than can some of their sister institutions."

But whatever their emphasis, Mr. McCloy asserted, "the imperative must be the achievement of excellence." Good teachers and quality teaching being the chief requirements, Mr. McCloy urged that "the tradition of excellence in teaching continue to have priority, for only by its maintenance can we hope to produce that mixture of knowledge and character which is in such fruitful demand in this country . . ."



Academic procession: Opening Centennial Convocation

Mr. McCloy's talk was preceded by a colorfully impressive academic procession. Seated in the audience were alumni, students, faculty, administration, members of the University's Board of Trustees, legislators and government officials, and many other citizens. A special reserved section contained hundreds of members of the Class of 1963, the Centennial Class.

Greetings from the Commonwealth were extended by His Excellency, Governor John A. Volpe. The address of welcome was given by Dr. Frank L. Boyden, Chairman of the University's Board of Trustees. Following Mr. McCloy's address, honorary degrees were conferred on the University's distinguished guests by President Lederle. The Convocation's principal speaker, Mr. McCloy, received the degree of Doctor of Laws. In addition, the degree of Doctor of Humane Letters was awarded to each of the presidents of the three private colleges participating with the University in the Four-College Cooperation Program. The recipients were: Richard Glenn Gettell of Mount Holyoke College, Thomas Corwin Mendenhall of Smith College, and Calvin Hastings Plimpton of Amherst College.

The opening Centennial Convocation was also the occasion for inaugurating a Distinguished Teacher Award to be granted to a member of the University's faculty on an annual basis in recognition of the need for excellence in teaching. The first award was presented to Dr. William H. Ross, Professor of Physics. Established by the Board of Trustees, the award was made possible through the generosity of Dr. Clifford B. Cherry of Los Angeles and the late Dr. Kathryn B. Cherry. The award will continue to be granted hereafter at the Convocation opening each academic year.

*Recipient of the first
Distinguished Teacher of the Year award:
Professor William Ross of the
Department of Physics, shown on right
in business suit*



*Honorary degrees went to:
Mount Holyoke College President Richard Glenn Gettell (left),
Smith College President Thomas Mendenhall (middle),
and Amherst College President Calvin Hastings Plimpton (right)*



*Charter Day Speaker:
AEC Chairman Glenn Seaborg*



CHARTER DAY
April 29, 1963

The public university as one of the chief vehicles of the continuing revolution in American education — this was the recurring theme sounded in speech after speech at Charter Day activities held on a bright, sunny April 29th.

The University's total involvement in the demands of the present and future was recognized as fully as its past was honored. After the formal opening of the Charter Day Convocation by Centennial Chairman James T. Nicholson '16, President Lederle in his opening remarks told the overflow audience that Charter Day celebrated "not alone the growth and development of an educational enterprise which is, on this day, a century old. We are gathered here to honor the spirit of learning itself, and the growth and development of free men as they strive in the ageless quest for a greater order of humanity, a greater wisdom, a greater realization of their own capacity for achieving the fulfillment of humankind's highest aspirations."

Dr. Lederle then read the most important congratulatory message received by the University on the occasion of its Centennial Charter Day. In a letter sent from the White House, President John Fitzgerald Kennedy extended "to the students, alumni, faculty, trustees and administration of the University of Massachusetts, heartiest congratulations on one hundred years of progress and accomplishment . . . Yours should be a proud campus as you celebrate the culmination of this progress on your Charter Day. The record of your achievements is a worthy one, reflecting the spirit and dedication of all of the pioneering Americans who have contributed to our society by advancing

the cause of public higher education . . . I take great pleasure in commending all those participating in your Charter Day and the rededication that it symbolizes. There is every evidence that in the years ahead the University of Massachusetts will further increase its stature and influence not only in the Commonwealth, but also throughout the whole fabric of American education."

The principal address, entitled "Public Higher Education and the National Good," was delivered by Dr. Glenn Seaborg, Chairman of the U. S. Atomic Energy Commission. Dr. Seaborg told an overflow audience gathered in the auditorium of the Women's Physical Education Building that it is "essential that our public institutions of higher learning continue to grow in strength and capacity in the years ahead."

Dr. Seaborg asserted that "the challenge of the future to the University of Massachusetts — and, indeed, to all of higher education — is unprecedented in the history of learning. You must double your enrollment in a little more than a decade. all the while striving to increase the quality of learning. The nature of our world calls upon you to produce . . . a new and wiser breed of men and women."

This breed, Chairman Seaborg said, "must see and comprehend larger horizons than men have ever known. They must know the total world and yet have the foundation for the special skills the world requires. They must cherish old values — especially our humane, liberal heritage of freedom — and be able to perceive and preserve these values in a constantly changing world. They must have the flexibility to welcome change, in order to cope with an environment that more than ever tests man's capacity to adapt. They must understand the enormous new power of man, its sources and its potentials; and they must know how to use it with wisdom and restraint. They must come closer than ever before to the real practice of the philosophy that all men are brothers."

This — Dr. Seaborg said — "is a tall order. But these are tall times. The people of Massachusetts have contributed more than their share of leadership to the American Revolution, to the Industrial Revolution, and to the Scientific Revolution. Through the University of Massachusetts, I am sure they will bear their full share of responsibility in meeting the primary challenge of our time — the fullest possible democratization of higher education."

The colorful Charter Day program, held before an audience that included hundreds of delegates of other institutions of higher learning, reached one of its highpoints with the conferring of honorary degrees on the University's distinguished guests. The degree of Doctor of Laws was awarded to four



*Centennial honors for:
James K. Pollock (top)
Charles F. Avila (center)
George Meany (bottom)*



Charter Day audience



outstanding Americans: Mr. Charles F. Avila, President of the Boston Edison Company; Mr. George Meany, President of the AFL-CIO; Dr. James Kerr Pollock, Murfin Professor of Political Science at the University of Michigan; and Dr. Seaborg. In a surprise ceremony, Dr. Harusada Sugimoto of Hokkaido University conferred the degree of Meiyu Hakushi (Doctor of Laws) on President Lederle in honor of the long and rewarding association between the University of Massachusetts and her sister institution in Japan.

Reflective moment during Convocation — (l. to r.) Board Chairman Frank L. Boyden, State Senate President John E. Powers, President Lederle, Governor Endicott Peabody, and U. S. Senator Edward M. Kennedy



CHARTER DAY LUNCHEON

At the Charter Day Luncheon, His Excellency Governor Endicott Peabody issued a strong challenge to participants in the Centennial program: "Let each of us, in our own area of concern, leave this Centennial celebration with a resolve: To encourage and support the education of our young people as the cornerstone of a strong and free society."

Asserting that "the culture of the mind and of the spirit is man's first line of defense for the preservation of his liberties," the Governor said that in the battle of "freedom versus slavery . . . being waged on the stage of the world, the way in which we educate our children may well be the deciding factor in determining the victor."

The Governor pointed out that "our rapidly expanding population requires that we educate vastly greater numbers of students on the university level than was even dreamed of only a decade or two ago. It is up to our public universities to meet the educational demands of an unchained democracy. Free, or at least low cost, education is one of the noblest traditions of our democracy and our Commonwealth. Public education is the people's education."



More than 600 guests of the University hear Governor Peabody's Charter Day Luncheon address in Student Union Ballroom

CHARTER DAY SYMPOSIUM

In the afternoon symposium, Mr. George Meany, Mr. Charles Avila, and Professor James Pollock joined with Dean Edward C. Moore of the University's Graduate School (as moderator) in a discussion of "Public Higher Education and the National Need."

Mr. Meany, in a hard-hitting talk, took the nation to task for not making a high enough commitment to public education. Mr. Meany called for massive federal support of higher education. "I believe that it should be the proper concern of our society as a whole that every young person is educated to the full extent of his ability. We are not talking about an expenditure; we are talking about an investment, an investment in our most valuable resource, an investment in our future."

The distinguished labor leader said, however, that there will still be many who cannot go to college because they cannot afford to. "This means that we must bring college to the students in the form of junior colleges, community colleges and branches of universities. A number of states have made great strides along this road in recent years, among them your own state. Future legislation should be designed to encourage the process."

Mr. Meany told the afternoon audience in Bowker Auditorium that "the labor movement expects of higher education that it be available; available to young people whether or not they have high incomes and unusual intelligence; available to the whole community in terms of leadership for economic and social progress; available to working people to help them do better as union members, as producers and as citizens."

Boston Edison President Charles F. Avila, speaking on the response of public higher education to the needs of business, urged educators to "see your responsibility for teaching a thought process — a habit of reasoning — by which your students would be capable of contributing solutions to the problems we face."

Explaining that much of what is learned in university courses becomes inadequate before the end of a professional lifetime, Mr. Avila said, "This points up the vital need for continuous updating in the educational process. Here at the University of Massachusetts during the past century there has been demonstrated a great capacity to adapt to change. This university has been able to serve the varying needs of a society that has moved in one hundred years from the relatively primitive phase of the Industrial Revolution to today's highly complex development. We must be ready to respond

to the even greater challenge of the future.”

Mr. Avila asserted that “if man is to prosper in the highly technological setting which he inhabits, then our universities must develop more sophisticated educational techniques. The new scholar of our era will probably be the person whose expertise lies in his ability to work out the methods by which human gains can be made at the same time that human adjustments are made to new conditions.”

Professor James Pollock praised American colleges and universities for their contributions to a nation whose governmental establishment has become vastly complex. Professor Pollock declared that “the response of higher education in general and of public education in particular to the needs of government . . . has not only been good . . . it has been indispensable. There is much to be said for the thesis that our whole society is not only conditioned by but also utterly dependent upon the quality of our educational system.”

The eminent political scientist said that “in a free society this means more than training technicians. It means the development of a feeling of civic responsibility; it means the training of democratic leaders and free, independent citizens who, at all levels of government, will conduct and criticize, maintain and change, public policy.”

Professor Pollock concluded that “the contributions of our educational system in developing free and responsible citizens must be recognized and admired. In the development of leaders, higher education can take particular satisfaction. I have lived long enough and seen enough to say with a good deal of satisfaction that successive generations of university graduates have been absorbed in all walks of life, but notably have provided local communities, our states, and the nation with trained and responsible leadership. I am well aware of the aberrations, but I can strongly document what it has meant to America to have produced leaders in thought and action equal to the requirements of the times.”

“Equal to the requirements of the times”—in effect each speaker during this milestone event in the University’s history had asked the institution to be just that. As the day closed, the discussion continued—among students, members of the faculty, visiting graduates, and friends of the University. No one minimized the difficulty of the challenges immediately ahead. And no one believed that simple sentiment or academic nostalgia, although appropriate on anniversaries such as this, could substitute for the kind of hard thought that would be needed as the University began the mission of a second century of service.

The Commonwealth of Massachusetts

By His Excellency

ENDICOTT PEABODY

Governor

A PROCLAMATION

1963

WHEREAS, The University of Massachusetts in this year is celebrating the Centennial of its founding, and

WHEREAS, This University has in the past one hundred years effectively served the Commonwealth and the nation by preparing for life many thousands of liberally educated and highly trained men and women, and

WHEREAS, The University of Massachusetts, dedicated to excellence in higher education, in this its Centennial year looks forward hopefully to ever-increasing service to the Commonwealth and the nation in the years ahead;

NOW, therefore, I, ENDICOTT PEABODY, Governor of the Commonwealth of Massachusetts, do hereby proclaim as

UNIVERSITY OF MASSACHUSETTS CENTENNIAL WEEK

April 29 through May 5, 1963

and urge all the citizens of the Commonwealth, to give due recognition to this observance.



GIVEN at the Executive Chamber in Boston, this ninth day of April, in the year of our Lord one thousand nine hundred and sixty-three and of the Independence of the United States of America, the one hundred and eighty-seventh.

By His Excellency the Governor,
ENDICOTT PEABODY.

KEVIN H. WHITE,
Secretary of the Commonwealth.

God Save The Commonwealth of Massachusetts

CENTENNIAL IN BRIEF

FEBRUARY 14, 16, 1962 Resolutions congratulating the University on the occasion of its Centennial Observance adopted by the Massachusetts House of Representatives on February 14 and by concurrence of the Senate on February 16.

MAY 6, 1962 Jonathan Baldwin Turner Day (held in Templeton, Massachusetts) . . . tribute to one of the pioneers of the Land-Grant movement . . . sponsored jointly by the University's Centennial Committee and the Bicentennial Committee of the Town of Templeton, where Turner was born . . .

JUNE 10, 1962 The University's pre-Centennial Commencement . . . Federal Judge Thurgood Marshall tells more than 350 degree candidates and an audience of thousands that the whole process of American education "can and will be used in the ever continuing march toward freedom so that every man in this country may stand before the law equal to every other man . . ."

JULY 2, 1962 One hundredth anniversary of signing of Morrill Land-Grant Act held in National Archives, Washington, D. C. . . . University represented by Dr. James T. Nicholson '16, UM Centennial Chairman . . .

SEPTEMBER 16, 1962 Three murals, painted by artist Phyllis Gardner and depicting three stages of University's development, unveiled at ceremonies in Student Union . . .

OCTOBER 4, 1962 Opening Centennial Convocation . . .

OCTOBER 11, 1962 Conference of New England Association of Colleges and Secondary Schools . . . Main speaker: Arthur S. Adams, former President of American Council on Education, Asa S. Knowles, President of Northeastern University, and President Lederle also address delegates. Chairing the conference; Bertram H. Holland '29, Headmaster of Brookline High School and President of NEACSS.

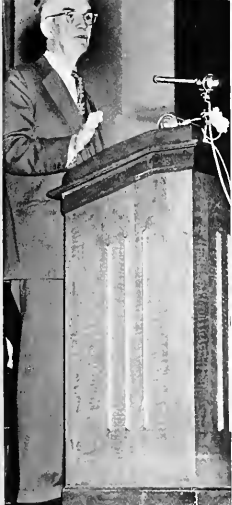
OCTOBER 12-13, 1962 Centennial Homecoming Weekend . . . largest number of graduates ever to return for an Alumni Homecoming pay tribute to University's 100th anniversary . . .



President David D. Henry of University of Illinois: main speaker at Turner Day ceremonies

The setting for the Opening Convocation





Murray D. Lincoln
speaking at Centennial
Honors Convocation
of the College of Agriculture

Centennial Year exhibit:
Horticultural Show



OCTOBER 25, 1962 College of Agriculture Centennial Honors Convocation . . . Murray D. Lincoln '14 — philanthropist, public servant, humanitarian — tells Convocation audience that Americans “must continue the Revolution of 1776 by distributing abundance around the world. There is a ferment going on in the world that we in America have caused. We did it by showing how people, properly organized and properly led, could eliminate all the age-old curses of mankind” . . . But much remains to be done in underdeveloped countries, and “someday we are going to find out how to organize this world on a peace and plenty program” . . .

NOVEMBER 2-4, 1962 Horticultural Show attracts close to 15,000 people . . . Celebrating its own 50th anniversary, the Show is designed around a Centennial theme . . .

NOVEMBER 2-3, 1962 Sophocles' *Oedipus Rex* . . . first production of new University Theatre . . .

NOVEMBER 14-16, 1962 Conference on “The Volunteer in Today's Culture” . . . sponsored by Massachusetts Co-operative Extension Service and Sears-Roebuck Foundation . . .

NOVEMBER 16, 1962 Centennial Legislators' Day . . . large contingent of Massachusetts lawmakers inspect campus during 100th year anniversary . . . Dedication of Edwin Gorman House in memory of distinguished Representative from Holyoke who was a leading spokesman for education in the Commonwealth . . . Main speaker: John F. Thompson, Speaker of the Massachusetts House of Representatives . . .

DECEMBER 1, 1962 Alumni Adelpia Seminar . . . “How to Improve the Academic Atmosphere in an Expanding University” . . . wide-ranging discussion by students, faculty, administrators and guests . . . published proceedings to serve as basis for future programs . . .

DECEMBER 1-3, 1962 Alumni War Memorial Lectureship presents Philip Roth, William Manchester and Ralph Ellison in discussion of “The Novel and the American University” . . . one of a series of Centennial lectures . . .

DECEMBER 6, 1962 School of Physical Education Centennial Colloquium . . . three-part parley on health, physical education and recreation in the Sixties . . .

DECEMBER 9, 1962 Dedication of Alden Chase Brett House . . . tribute to distinguished member of Class of 1912 who continues to serve cause of education as member of University's trustees . . .

DECEMBER 15, 1962 Menotti's "Amahl and the Night Visitors" presented as Centennial offering of UM Opera Workshop . . .

DECEMBER 6-20, 1962 First exhibit under auspices of new UM Art Acquisition Fund.

JANUARY 11-13, 1963 Centennial Winter Carnival . . . Theme: "These Wonderful Years" . . . An estimated 43,000 people come to campus to view snow sculptures and attend special events . . .

JANUARY 26, 1963 Special Centennial Scholarship presented to University in honor of anniversary by UM Maintenance Staff . . .

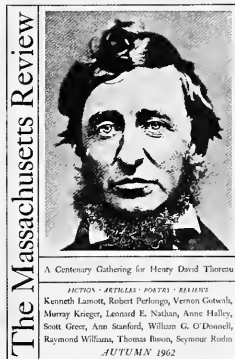
FEBRUARY 4, 1963 Special issue of *Massachusetts Review* honors Centennial with a centenary review of the life and work of Henry David Thoreau . . .

FEBRUARY 14, 1963 *The University of Massachusetts: A History of One Hundred Years* . . . Official history of UM, written by Professor Harold Cary, is published . . .

FEBRUARY 22, 1963 By special invitation of the new Governor of Massachusetts, His Excellency Endicott Peabody, UM Chorale presents program at Governor Peabody's Washington Day reception . . .

FEBRUARY 27-28, 1963 Colloquium held under Distinguished Visitors' Program on "Federal Aid to Education" . . . Participants include U. S. Senators William Proxmire and Clifford Case, Author Russell Kirk, President Francis Horn of the University of Rhode Island, Dr. Martin Lichterman of New England Board of Higher Education, and Louis M. Lyons '18, distinguished journalist . . .

MARCH 5, 1963 English Department Centennial Lecture . . . Richard Kain: "On the Modern Novel" . . . one of a series of English Department talks held during observance . . .



Centenary tribute to Thoreau

Students meet Senator: (l. to r.) Lee Ann Mansell '64, Lloyd David '63, and John Burke '64 greet U. S. Senator William Proxmire, participant in Distinguished Visitors' Colloquium on Federal Aid to Education



MARCH 8-10, 1963 International Weekend . . . Theme: "A Country Called Europe" . . . Keynote speaker: George R. Kaplan '47, Specialist in International Relations, Bureau of European Affairs, U. S. Department of State . . .

MARCH 14, 1963 Major conference presented by Student Senate on Women's Affairs . . . "Centennial Focus on Women" . . . Speech delivered by keynoter Dr. Pauline Tompkins, General Director of the American Association of University Women, is later published in May 18, 1963 issue of *Saturday Review* . . .

MARCH 27-28, 1963 "Family Life Conference" . . . sponsored by Massachusetts Co-operative Extension Service in honor of UM Centennial . . .

APRIL 4, 1963 President Lederle and other members of staff report to Massachusetts Congressional delegation in Washington on progress of UM in its 100th year . . . general problems affecting public higher education also discussed . . .

APRIL 9, 1963 Governor Endicott Peabody proclaims April 29 - May 5, 1963 as University of Massachusetts Centennial Week . . .

APRIL 16, 1963 Choral groups from Amherst, Smith, Mount Holyoke and the University combine for Four-College Centennial Serenade . . .

APRIL 19, 1963 Top officials and educators attend Governor's Conference on Rural Land Use . . .

APRIL 29, 1963 Centennial Charter Day . . .

APRIL 30, 1963 Student Leaders Night . . . Special award initiated on this Centennial occasion to honor faculty member who contributes most to helping students engaged in extracurricular activities . . . Centennial Year award goes to Mr. Albert Madeira of English Department . . .

MAY 9, 1963 Centennial Honors Day Convocation . . . Dr. John W. McConnell, President of the University of New Hampshire, speaks on "Only a Phi Beta Kappa Key and a Handful of Little Poems" . . . hundreds of students receive honors . . .



Meeting in Centennial Year conference are representatives of industry and education who form advisory committee of new Institute of Agricultural and Industrial Microbiology

In native costume: Wives of Dean and President of Hokkaido University, Mrs. Seijin Nagao and Mrs. Harusada Suginome, at Charter Day Convocation



MAY 12, 1963 Centennial Float Parade . . . sponsored by Student Centennial Committee . . . thousands of people line Amherst streets as parade gives colorful salute to UM's 100th anniversary . . .

JUNE 7-8, 1963 Centennial Alumni College . . . Theme: "The Essentials of Excellence" . . . Problems of quality at an expanding University are discussed before large alumni audiences . . . Report of Centennial Committee on University Development is presented and becomes basis for future planning . . .

JUNE 8, 1963 At Associate Alumni Luncheon, Senate President John E. Powers is given special citation for his "twenty-five years of devoted public service and leadership in The Great and General Court." Alumni Medals are awarded to James T. Nicholson, class of 1916, former executive vice-president of the American Red Cross and the University's Centennial Chairman; Dr.

Centennial medals for seven outstanding graduates: (l. to r.) Gordon Smith, Louis M. Lyons, James T. Nicholson, Robert D. Gordon (President of Associate Alumni who presented medals), Conrad L. Wirth, Harold M. Gore, Sergius J. Bernard, and Maxwell H. Goldberg.



Maxwell H. Goldberg, class of 1928, Commonwealth Professor Emeritus of English and Executive Director of the Centennial; Harold M. Gore, class of 1913, Professor Emeritus of Physical Education; Conrad L. Wirth, class of 1923, Director of the National Park Service; Gordon P. Smith, class of 1947, vice president of the management consultant firm of Booz, Allen and Hamilton; Louis M. Lyons, class of 1918, Curator of the Nieman Foundation at Harvard University; and Sergius J. Bernard, class of 1930, superintendent and principal of the Bridgewater-Raynham Regional High School.

JUNE 9, 1963 Centennial Year Commencement . . . Largest graduating class in history hears Ambassador John Kenneth Galbraith give address on "Our Quarrel with Success" . . . Members of Centennial Class receive diplomas . . . President Lederle confers honorary degrees on Adele Addison, noted soprano, Doctor of Humane Letters; Robert C. Gunness, executive vice

Rank upon rank of degree candidates line up before start of Centennial Year Commencement. In background is Mark's Meadow School, part of the University's School of Education.



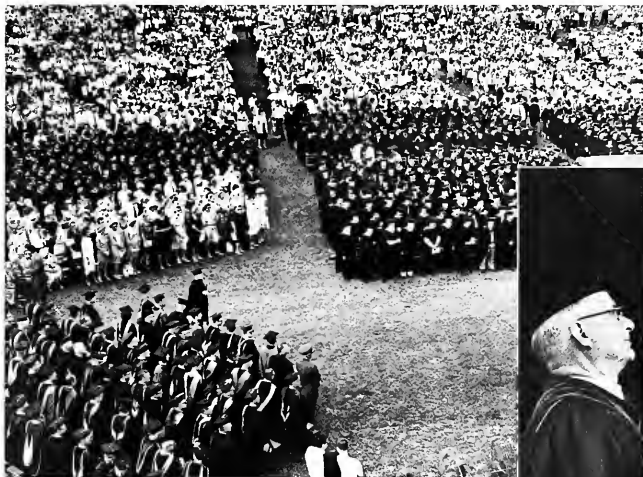
president of Standard Oil of Indiana, Doctor of Science; Leona Baumgartner, Assistant Secretary of State, Head of the Office of Human Resources and Social Development, Agency for International Development, Doctor of Science; Erwin D. Canham, Editor of the Christian Science Monitor, Doctor of Humane Letters; U. S. Senator Leverett Saltonstall, Doctor of Laws; and J. Kenneth Galbraith, author and economist, Doctor of Laws.

JUNE 16-19, 1963 Workshop: New England Board of Higher Education . . . local arrangements by UM Office of Institutional Studies . . . Theme: "Academic Effectiveness" . . .

AUGUST 25-30, 1963 Meeting of the American Institute of Biological Sciences . . . More than 4,000 members and their families attend national meeting . . . Largest conference ever held on campus . . .



Floral display in Boston Common honors University's Centennial



Bright sun shines down on largest Commencement audience in history of University

Recipient of Associate Alumni Award: State Senate President John E. Powers



Chief Marshal Harold Cary reaches high to place hood on honorary degree recipient J. Kenneth Galbraith, main speaker at Commencement



APPENDIX

WHERE THEY COME FROM

(September, 1963)

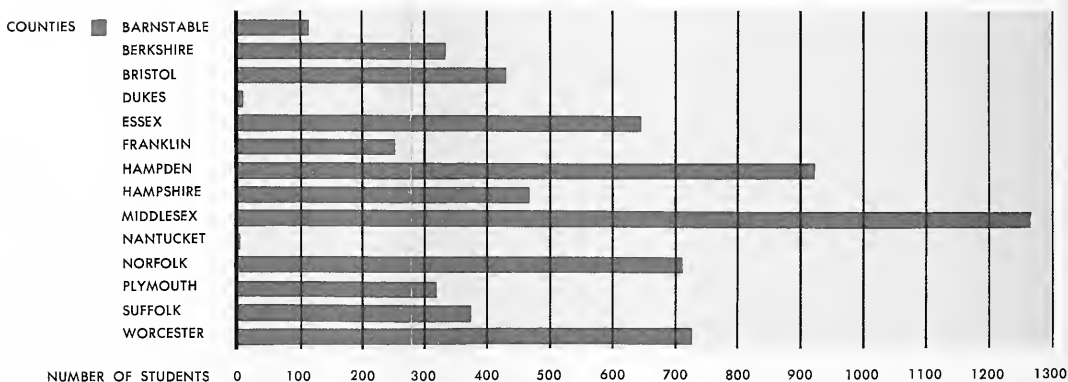
Of a total of 351 cities and towns in the Commonwealth, 323 or 92 per cent are represented in the four-year undergraduate enrollment. For every three students enrolled, two come from the eastern part of the Commonwealth and one from the western part. This is generally proportionate to distribution of population in Massachusetts (East-West division determined by a line drawn north and south through the approximate center of Worcester).

Of the 6,576 undergraduates registered the first semester, 68.5 per cent come from the metropolitan areas of Boston, Springfield - Holyoke, Worcester, New Bedford, Brockton, Lawrence, Fall River, and Lowell.

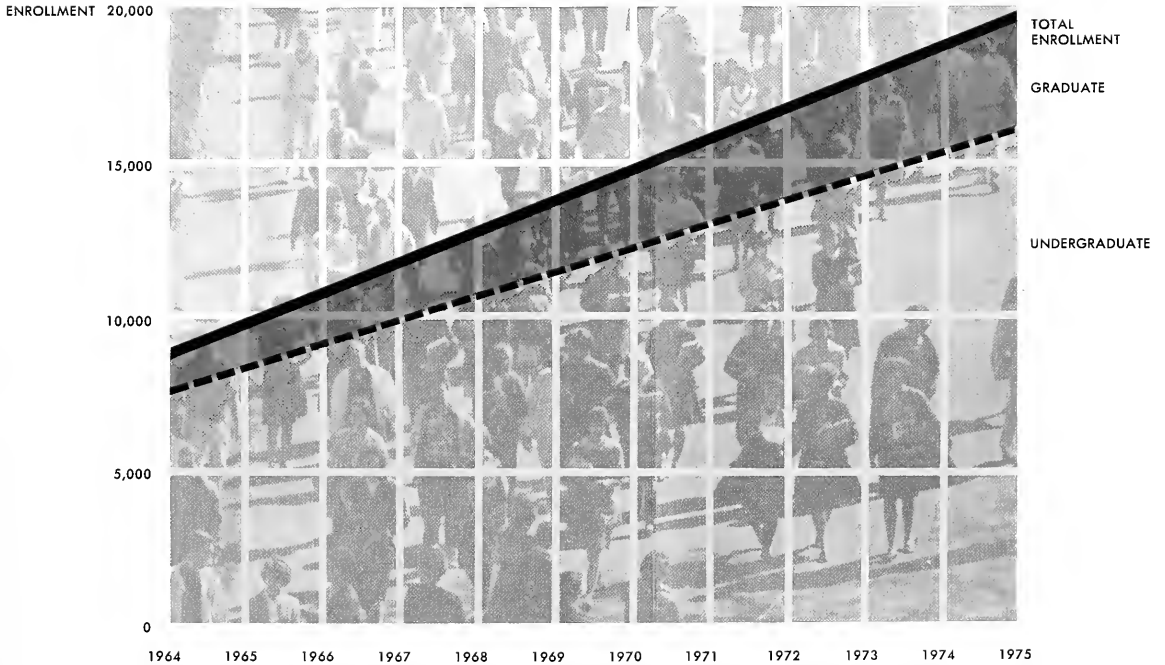
MASSACHUSETTS UNDERGRADUATE STUDENTS FROM METROPOLITAN AREAS

AREA	NUMBER OF STUDENTS	INCREASE OR DECREASE	PERCENTAGE GAIN OR LOSS FROM 1962
BOSTON	2,449	270	12.4
BROCKTON	153	15	10.9
FALL RIVER	86	-7	-7.5
LAWRENCE	108	10	10.2
LOWELL	82	15	22.4
NEW BEDFORD	192	37	23.9
SPRINGFIELD - HOLYOKE	1,089	159	17.1
WORCESTER	342	21	6.5
TOTAL	4,501	520	13.1 (AVG.)
NON-METROPOLITAN AREAS	2,075	163	8.5

REPRESENTATION BY MASSACHUSETTS COUNTIES



PROJECTED ENROLLMENTS AT THE UNIVERSITY OF MASSACHUSETTS



REPORT OF THE TREASURER

WHERE THE OPERATING DOLLAR COMES FROM . . .

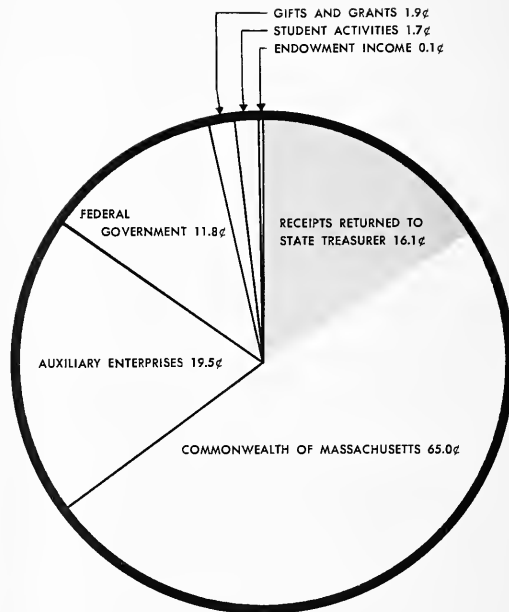
For the fiscal year 1963 the University received from all sources \$19,171,772 for operating purposes. Of this, a total of \$12,471,282 was appropriated by the Commonwealth, amounting to 65 cents out of each operating dollar.

However, the University returned to the State Treasurer, as required by the State Constitution, \$3,102,464 representing collections for student tuition, board and room, and sundry sales and services. Thus, the net cost to the taxpayer was only \$9,368,818 or 48.9 cents out of each operating dollar.

The following sources provided the balance of the operating dollar: Federal government 11.8 cents, student activities 1.7 cents, auxiliary enterprises (dining halls, etc.) 19.5 cents, gifts and grants 1.9 cents, and endowment income 0.1 cent.

1963

SOURCE OF FUNDS	TOTAL AMOUNT	PERCENT OF TOTAL
COMMONWEALTH OF MASSACHUSETTS:		
FUNDS PROVIDED BY UNIVERSITY RECEIPTS		
TUITION	\$ 1,536,665.22	8.0
RESIDENCE HALLS	1,285,979.93	6.7
SALES AND SERVICES	279,818.91	1.4
SUB-TOTAL	\$ 3,102,464.06	16.1
NET FUNDS PROVIDED BY TAXPAYER	9,368,818.34	48.9
TOTAL	\$12,471,282.40	65.0
FEDERAL GOVERNMENT	2,252,535.52	11.8
STUDENT ACTIVITIES	332,391.45	1.7
GIFTS AND GRANTS	369,325.43	1.9
AUXILIARY ENTERPRISES	3,725,764.94	19.5
ENDOWMENT INCOME	20,472.95	0.1
TOTAL RECEIPTS	\$19,171,772.69	100.0



HOW IT IS SPENT . . .

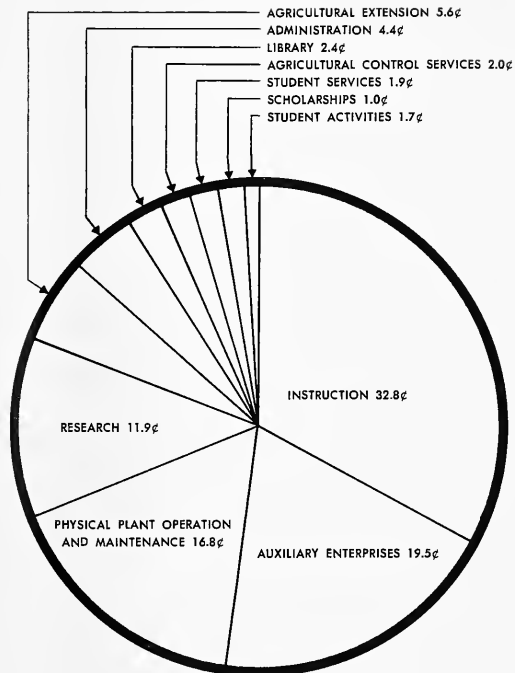
Direct instructional costs naturally represented the largest single operating expenditure requiring \$6,301,211 (or 32.8 cents of each dollar) out of total expenditures of \$19,171,772. Research and library, expenditures closely related to instructional costs, required 11.9 and 2.4 cents respectively of the operating dollar. Agricultural extension services and state agricultural control services required 5.6 cents and 2.0 cents each.

Operating and maintenance of the physical plant and residence halls accounted for 16.8 cents of the dollar. Nineteen and a half cents of every dollar went toward auxiliary enterprises (dining hall operations, etc.) and 1.7 cents into student activities. The remainder of the operating dollar was expended as follows: administration 4.4 cents, student personnel services 1.9 cents, and scholarships 1.0 cent.

The chart on the right shows that of the 32.8 cents spent for direct instructional costs, a total of 29.9 cents (91 per cent) was provided by state appropriations. The remainder — 2.9 cents (9 per cent) — was provided by the Federal government and from gifts and grants.

1963

HOW SPENT:	TOTAL AMOUNT	PERCENT OF TOTAL
INSTRUCTION:		
STATE FUNDS	\$ 5,744,641.37	29.9
FEDERAL FUNDS	473,720.85	2.5
GIFTS AND GRANTS	82,849.28	0.4
TOTAL INSTRUCTION	\$ 6,301,211.50	32.8
LIBRARY	469,166.74	2.4
RESEARCH	2,285,568.04	11.9
AGRICULTURAL EXTENSION	1,067,613.45	5.6
STATE AGRICULTURAL CONTROL SERVICE	388,026.39	2.0
PHYSICAL PLANT AND RESIDENCE HALLS	3,213,875.73	16.8
ADMINISTRATION	840,269.42	4.4
STUDENT SERVICES	356,963.87	1.9
SCHOLARSHIPS	190,921.16	1.0
STUDENT ACTIVITIES	332,391.43	1.7
AUXILIARY ENTERPRISES	3,723,764.94	19.5
TOTAL DISBURSEMENTS	\$19,171,772.69	100.0







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