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UNIVERSITY OF MAINE Catalog for 1974

UNIVERSITY OF MAINE
BULLETIN
ORONO, MAINE 04473

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ACADEMIC YEAR

INFORMATION IN THIS CATALOG COVERS 1973-74

The information contained in this catalog covers rules, regulations, curricula, and programs for the 1973-74 academic year. The University reserves the right to make changes at any time.

APPROVED CALENDAR FOR 1973-74

ORONO CAMPUS

FALL SEMESTER 1973

Registration of all students who have not completed it by mail	Sat. -8:00 A.M. - 3:30 P.M.	Sept.	1
Classes begin	Tues. - 8:00 A.M.	Sept.	4
Midsemester reports due (covering first half semester)	Fri. - 12:00 Noon	Oct.	19
Registration for spring semester	Mon. - Fri.	Nov.	5-9
Associate and baccalaureate degree requests for December completion of requirements due in Registrar's Office	Thurs. - 12:00 Noon	Nov.	15
Thanksgiving recess begins	Wed. - 12:00 Noon	Nov.	21
Classes resume	Mon. - 8:00 A.M.	Nov.	26
Graduate theses due	Fri. -4:30 P.M.	Dec.	7
Classes end	Sat. - 12:00 Noon	Dec.	15
Final examinations begin	Mon. - 8:00 A.M.	Dec.	17
Final examinations end	Sat. - 12:00 Noon	Dec.	22
Christmas recess begins	Sat. - 12:00 Noon	Dec.	22

SPRING SEMESTER 1974

Registration of all students who have not previously registered	Sat. - 8:00 A.M. - 3:30 P.M.	Jan.	12
Classes begin	Mon. - 8:00 A.M.	Jan.	14
Associate and baccalaureate degree requests for May completion of requirements due in Registrar's Office	Fri. - 12:00 Noon	Feb.	15
Winter recess begins	Sat. - 12:00 Noon	Feb.	16
Classes resume	Mon. - 8:00 A.M.	Feb.	25
Midsemester reports due (covering first half semester)	Fri. - 12:00 Noon	Mar.	8
Spring recess begins	Sat. - 12:00 Noon	Mar.	30
Classes resume	Mon. - 8:00 A.M.	Apr.	8
Graduate theses due	Fri. - 4:30 P.M.	May	3
Classes end	Sat. - 12:00 Noon	May	11
Final examinations begin	Mon. - 8:00 A.M.	May	13
Final examinations end	Sat. - 12:00 Noon	May	18
Class Day (to be announced)			
Commencement (to be announced)			

SUMMER CAMP

Forestry (tentative)	Start—Mon. - May 20	End—Sat., June 29
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SUMMER SESSIONS

Three-week session (tentative)	Start—Mon., May 20	End—Fri., June 7
	Mon., June 17	Fri., July 5
	Mon., July 8	Fri., July 26
	Mon., July 29	Fri., Aug. 16
Six-week sessions (tentative)	Start—Mon., June 17	End—Fri., July 26
	Mon., July 8	Fri., Aug. 16
Eight-week Evening session (tentative)	Start—Mon., June 17	End—Fri., Aug. 9
Associate and baccalaureate degree requests for August commencement due in Registrar's Office	Fri. 12:00 Noon	July 12
Graduate theses due (tentative)	Fri., 4:30 P.M.	Aug. 9
Commencement exercises (tentative)	Fri., 7:45 P.M.	Aug. 16

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BOARD OF TRUSTEES

BOARD OF TRUSTEES

LAWRENCE MARK CUTLER, M.D., Chairman 31 Grove Street, Bangor 04401
Term expires May 26, 1975

JEAN SAMPSON (MRS. RICHARD W.), Vice Chairman 45 Labbe Avenue
Term expires May 26, 1975 Lewiston 04242

LUCIA M. CORMIER Shore Acres, Cape Elizabeth 04107
Term expires October 21, 1977

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Term expires June 28, 1979 Brunswick 04011

STANLEY J. EVANS, M.D. 336 Mount Hope Avenue
Term expires May 26, 1974 Bangor 04401

STEPHEN THOMAS HUGHES Box 141A, West Auburn
Term expires May 26, 1976 Road, Auburn 04210

CARROLL R. MCGARY, *ex officio* State House, Augusta 04330

JAMES H. PAGE 57 Sweden Street, Caribou 04736
Term expires May 26, 1974

KENNETH H. RAMAGE Paradise Street
Term expires October 20, 1978 Bethel 04217

CARLTON DAY REED, JR. Day's Ferry, Woolwich 04579
Term expires July 8, 1977

NILS Y. WESSELL 630 5th Avenue, Room 2550,
Term expires October 20, 1978 New York, N. Y. 10020

CLERK OF THE BOARD: MARGARET R. DEXTER

UNIVERSITY OF MAINE

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DIRECTOR OF COUNSELING CENTER. CHARLES O. GRANT, FERNALD HALL.

DIRECTOR OF COOPERATIVE EXTENSION SERVICE. Edwin Hill Bates, 101 Winslow Hall.

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DIRECTOR OF EQUAL EMPLOYMENT OPPORTUNITY. JoAnn M. Fritsche.

DIRECTOR OF INSTITUTIONAL RESEARCH, STUART L. RICH, ACTING DIRECTOR, ALUMNI HALL.

DIRECTOR OF MEMORIAL UNION AND ARTHUR A. HAUCK AUDITORIUM. David M. Rand.

DIRECTOR OF PHYSICAL PLANT. Parker G. Cushman, 113 Service Building.

DIRECTOR OF PUBLIC INFORMATION AND CENTRAL SERVICES. Howard Arthur Keyo, PICS Building.

DIRECTOR OF PURCHASES. Murray R. Billington, Service Building.

DIRECTOR OF RESIDENCE AND DINING HALLS. H. Ross Moriarty, Wells Commons.

DIRECTOR OF STUDENT AID AND COORDINATOR OF ADMISSIONS AND STUDENT AID. John E. Madigan, East Annex.

DIRECTOR OF STUDENT HEALTH CENTER. Dr. Robert Alexander Graves, Infirmary.

EXECUTIVE DIRECTOR, GENERAL ALUMNI ASSOCIATION. Lester Nadeau, Alumni Center.

* A complete list of teaching personnel is given in the back of this catalog.

OFFICERS OF ADMINISTRATION

OFFICERS OF DIVISIONS OF THE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES. Kenneth W. Allen, Acting Dean, 100 Stevens Hall.

COLLEGE OF BUSINESS ADMINISTRATION. William Stanley Devino, Dean, Stevens Hall, South.

COLLEGE OF EDUCATION. James J. Muro, Acting Dean, 151 Shibles Hall.

COLLEGE OF LIFE SCIENCES AND AGRICULTURE. Frederick E. Hutchinson, Dean, 16 Winslow Hall.

SCHOOL OF FOREST RESOURCES. Fred B. Knight, Director, Nutting Hall.

SCHOOL OF HUMAN DEVELOPMENT. Margaret Elizabeth Thornbury, Director, 24 Merrill Hall.

COLLEGE OF TECHNOLOGY. Eldred Wilson Hough, P.E., Dean, 101 Barrows Hall.

TECHNICAL INSTITUTE DIVISION. Robert Barlow Rhoads, Associate Director, 208 Boardman Hall.

GRADUATE SCHOOL. FRANKLIN PAUL EGGERT, Dean, Winslow Hall.

SUMMER SESSION. Edward W. Hackett, Jr., Director, Merrill Hall.

CONTINUING EDUCATION DIVISION. Edward W. Hackett, Jr., Director, Merrill Hall.

COOPERATIVE EXTENSION SERVICE. Edwin Hill Bates, Director, 100 Winslow Hall.

MAINE AGRICULTURAL EXPERIMENT STATION. Frederick E. Hutchinson, Director 105 Winslow Hall.

MAINE TECHNOLOGY EXPERIMENT STATION. 106 Boardman Hall.

DEPARTMENT OF INDUSTRIAL COOPERATION. Richard Conrad Hill, Director, 110 Boardman Hall.

OFFICERS OF THE DEPARTMENTS

AGRICULTURAL ENGINEERING. Professor Norman Smith, 2 Agricultural Engineering Building.

AGRICULTURAL AND RESOURCE ECONOMICS. Associate Professor Kenneth E. Wing, 206 Winslow Hall.

ANIMAL AND VETERINARY SCIENCES. Professor Stanley D. Musgrave, Hitchner Hall.

ANTHROPOLOGY. Professor Richard Gibbs Emerick, 52 South Stevens.

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- ART. Professor Vincent Andrew Hartgen, Carnegie Hall.
- BIOCHEMISTRY. Professor Frederick Herbert Radke, 231 Hitchner Hall.
- BOTANY AND PLANT PATHOLOGY. Professor Gary Allen McIntyre, 315 Deering Hall.
- CHEMICAL ENGINEERING. Professor Edward George Bobalek, 275 Aubert Hall.
- CHEMISTRY. Professor James Langdon Wolfhagen, 261 Aubert Hall.
- CIVIL ENGINEERING. Professor Wayne A. Hamilton, 101 Boardman Hall.
- ECONOMICS. Professor John Donald Coupe, 12A South Stevens.
- ELECTRICAL ENGINEERING. Professor Richard Cushing Gibson, 101 Barrows Hall.
- ENGLISH. Professor Robert Hunting, Stevens Hall.
- ENTOMOLOGY. Professor Geddes Wilson Simpson, 306 Deering Hall.
- FOOD SCIENCE. Professor John Matthew Hogan, 102B Holmes Hall.
- FOREIGN LANGUAGES AND CLASSICS. Professor Josef Roggenbauer, 201A Little Hall.
- FOREST RESOURCES. Director Fred B. Knight, Nutting Hall.
- GEOLOGICAL SCIENCES. Professor Harold W. Borns, Jr., 111 Boardman Hall.
- GENERAL ENGINEERING. Professor Matthew McNeary, 122 East Annex.
- HISTORY. Professor William H. Jeffrey, 170 Stevens Hall.
- HUMAN DEVELOPMENT. Director Margaret Elizabeth Thornbury, 24 Merrill Hall.
- JOURNALISM. Associate Professor Alan R. Miller, 101A Lord Hall.
- MATHEMATICS. Professor John Carl Mairhuber, Shibles Hall.
- MECHANICAL ENGINEERING. Professor John R. Lyman, 209 Boardman Hall.
- MICROBIOLOGY. Professor Darrell Bradford Pratt, Hitchner Hall.
- MILITARY SCIENCE. Lt. Col. Anton F. Mayer, Armory.
- MUSIC. Professor Robert Chandler Godwin, Lord Hall.
- PHILOSOPHY. Professor Jefferson White, The Maples.
- PHYSICAL EDUCATION AND ATHLETICS. Professor Harold Scott Westerman, Memorial Gymnasium.
- PHYSICS. Professor Henry O. Hooper, Clarence E. Bennett Hall.
- PLANT AND SOIL SCIENCES. Professor Rollin C. Glenn, 114 Deering Hall.
- POLITICAL SCIENCE. Professor Eugene Alberto Mawhinney, 11 Stevens Hall, North.
- PSYCHOLOGY. Professor Stanley Stewart Pliskoff, 301A Little Hall.
- SOCIOLOGY. ASSOCIATE PROFESSOR CARLETON S. GUPTILL, STEVENS HALL, SOUTH.
- SPEECH. Professor Wofford Gordon Gardner, 310 Stevens Hall.
- ZOOLOGY. Associate Professor Julian F. Haynes, Murray Hall.

OFFICERS OF ADMINISTRATION

OFFICERS OF THE ADMINISTRATION

University of Maine at Bangor

ACTING DIRECTOR, Constance H. Carlson, Auburn Hall.

DEAN OF INSTRUCTION, Constance H. Carlson.

DIRECTOR OF ADMISSIONS AND COUNSELING, Joseph M. Fox, Student Services Building.

DEAN OF STUDENTS, Philip O. McCarthy, Student Services Building.

CORRESPONDENCE

Inquiries should be directed as indicated below:

General administrative matters.....President, Howard R. Neville
Scholarship records.....Registrar, George H. Crosby

Admission to the freshman class and to
advanced standing (Orono).....Director of Admissions, James A. Harmon

Financial affairs of students.....Business Manager, Alden E. Stuart

College of Arts and Sciences.....Kenneth W. Allen, Acting Dean,
of the College.

College of Business Administration.....Dean of the College, William S. Devino

College of Education.....James J. Muro, Acting Dean of the College.

College of Life Sciences and Agriculture.....Dean of the College, Frederick
E. Hutchinson

College of Technology.....Dean of the College, Eldred W. Hough

University of Maine at Bangor:

Acting Director, Constance H. Carlson, Bangor.

Graduate School and Scholarships available for graduate
students.....Dean of Graduate School, Franklin P. Eggert

Summer Session for teachers and college students.....Director Edward W.
Hackett, Jr., Merrill Hall.

Continuing Education Courses.....Edward W. Hackett, Jr., University of Maine,
14 Merrill Hall, Orono

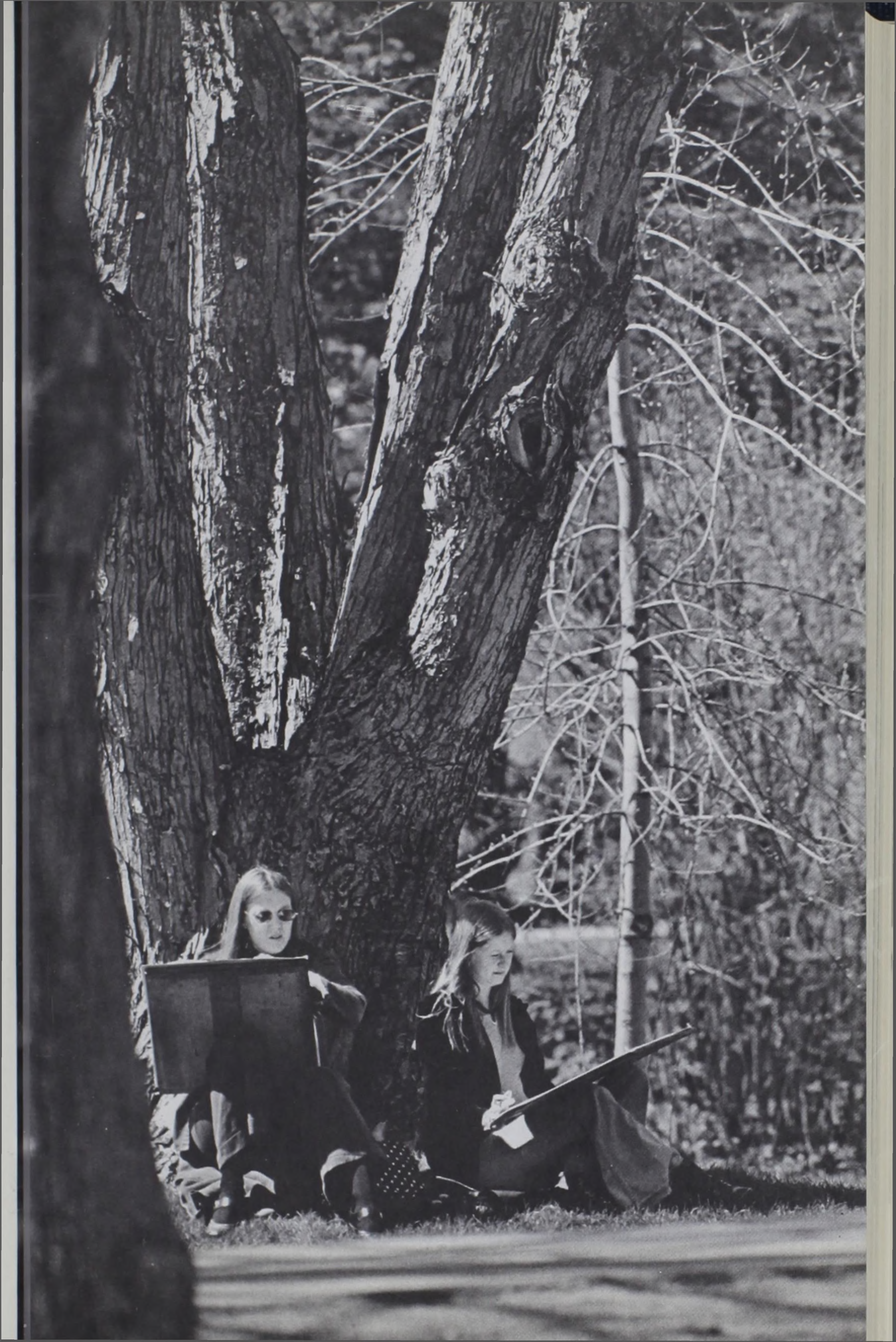
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Senior and alumni placement.....	Placement Director, Philip J. Brockway
Financial assistance.....	Director of Student Aid, John E. Madigan
Dormitory rooms for women.....	Manager, Women's Housing, Erna D. Wentworth
Dormitory rooms for men, rooms in private homes, and apartments.....	Housing Coordinator, Vernon C. Elsemore
Foreign students.....	John E. Madigan, Adviser
Conferences and conventions.....	John R. Benoit, Conference Coordinator

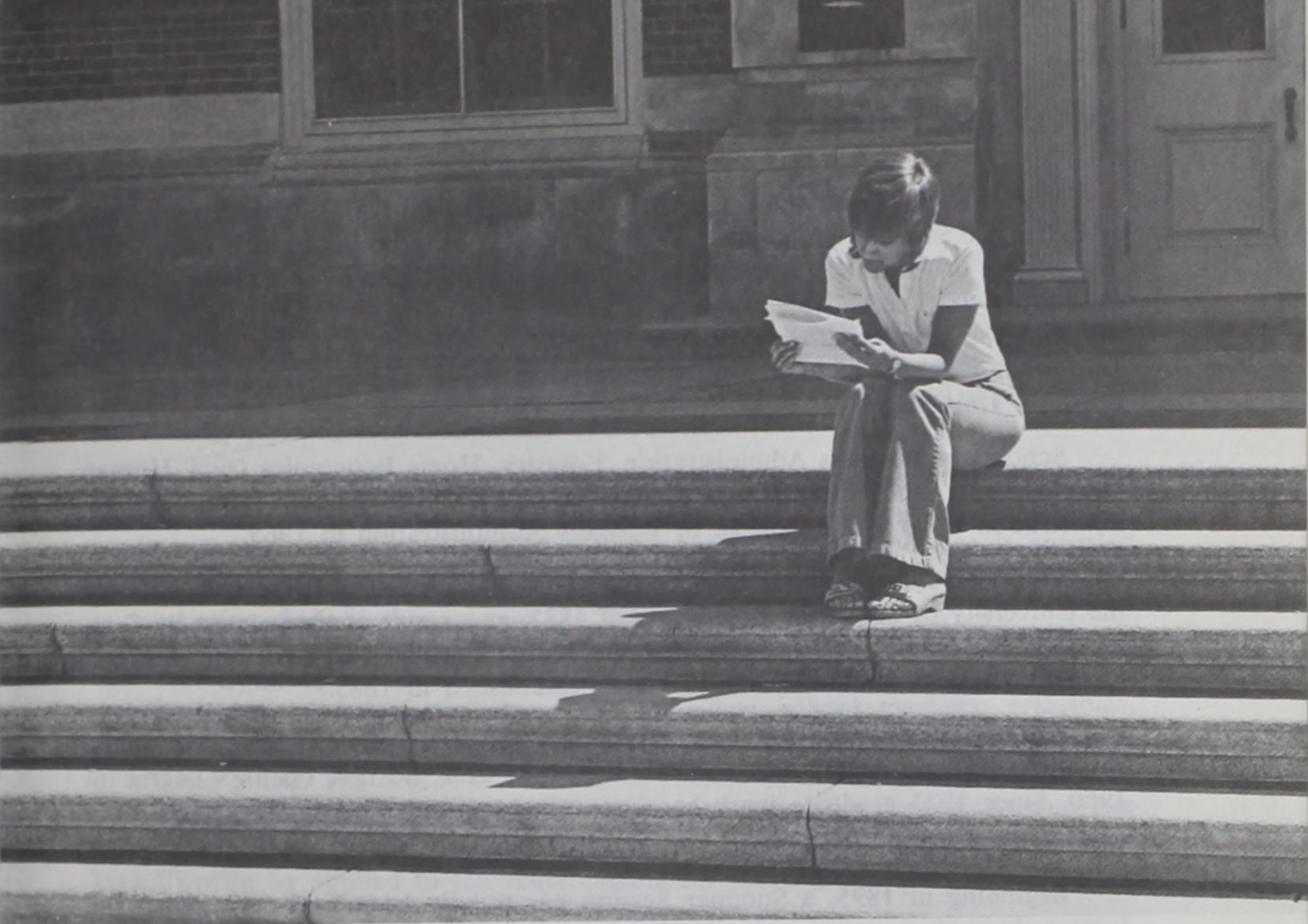
UNIVERSITY OF MAINE SYSTEM

The University of Maine is a statewide system of public institutions of higher education. It is operated by a single Board of Trustees, which is appointed by the Governor. The chief academic and administrative officer for the system is the Chancellor, who is responsible to the Board of Trustees.

The system has university centers at Orono and Portland-Gorham, four-year colleges at Fort Kent, Presque Isle, Machias, and Farmington, and operates community colleges at Augusta and Bangor.







General Information

The information in this catalog pertains only to the activities and programs at Orono and Bangor.

The University of Maine at Orono is located about halfway between Kittery, the most southerly town in the state, and Fort Kent on the northern boundary. It is on U. S. Route 2A, approximately eight miles from Bangor, the third largest city of the state. The University campus is about a mile from the business section of Orono, an attractive town of about 10,000 population, and borders the Stillwater River, a branch of the Penobscot.

History—The University at Orono was established originally as the State College of Agriculture and the Mechanic Arts under the provisions of the Morrill Act, approved by President Lincoln in 1862. The next year the State of Maine accepted the conditions of the Act and in 1865 created a corporation to administer the affairs of the college. The original name was changed to the University of Maine in 1897.

The institution opened September 21, 1868, with 12 students and two faculty members. Dr. Merritt Caldwell Fernald was appointed acting president. By 1871 curricula had been arranged in agriculture, civil engineering, mechanical engineer-

UNIVERSITY OF MAINE

ing, and elective. From these curricula the Colleges of Agriculture, Technology, and Arts and Sciences gradually developed. Women have been admitted since 1872. The School of Education was established in 1930 and became the College of Education in 1958. The University operated a College of Law from 1898 to 1920. After this unit was discontinued in 1920, the University did not offer law courses until 1961 when a School of Law, located in Portland, was added through a merger with Portland University.

Schools of Business Administration, Forestry, Home Economics (now Human Development), and Nursing were established in 1958. The School of Business Administration became the College of Business Administration in 1965.

The Maine Agricultural Experiment Station was established as a division of the University by act of the Legislature of 1887, as a result of the passage by Congress of the Hatch Act. It succeeded the Maine Fertilizer Control and Agricultural Experiment Station, which had been established in 1885.

Graduate instruction has been given by various departments for many years. The first master's degree was conferred in 1881 and the first doctor's degree in 1960. Since 1923 graduate work has been a separate division in the charge of a dean.

Beginning in 1895, a Summer Session has usually been held each year. The former six-week program was extended to nine weeks in 1961 and to 12 weeks in 1962. This session is designed for teachers, school administrators, and for college students who desire to accelerate their work.

The institution has been served by the following presidents: The Rev. Charles Frederick Allen, Dr. Merritt Caldwell Fernald, Dr. Abram Winegardner Harris, Dr. George Emory Fellows, Dr. Robert Judson Aley, Dr. Clarence Cook Little, Dr. Harold Sherburne Boardman, Dr. Arthur Andrew Hauck, Dr. Lloyd H. Elliott, Dr. Edwin Young, and Dr. Winthrop C. Libby.

Policy Statement—It is the policy of the University of Maine at Orono and Bangor that no discrimination on the grounds of race, color, religion, sex, or national origin will exist in any area of the University. The University's policy includes, but is not limited to, the requirements of Federal Executive Orders 11246 and 11375, as amended, Titles VI and VII of the Civil Rights Act, as amended, and Title IX of the Higher Education Act of 1972.

Organizations of the University—The University is controlled by a 15-member Board of Trustees. The Board of Trustees has supreme authority in all matters pertaining to the University, and all policies applying to the University as a whole must be approved by the board. Administrative units of the University of Maine at Orono include the College of Arts and Sciences, Life Sciences and Agriculture, Business Administration, Education, and Technology; University of Maine at Bangor; Graduate School, Summer Session, Office of Research and Public Service, Cooperative Extension Service, Maine Agricultural Experiment Station, Maine Technology Experiment Station, Continuing Education Division, and Department of Industrial Cooperation. Each division regulates those affairs which concern itself alone.

GENERAL INFORMATION

THE COLLEGE OF ARTS AND SCIENCES offers curricula in an approved field of concentration or in any of the following subjects: Anthropology, Art, Biology, Chemistry, Economics, English, French, Latin, Geological Sciences, German, Political Science, (option in Public Management) History, International Affairs, Journalism, Mathematics, Medical Technology, Music, Modern Languages, Nursing, Philosophy, Physics, Psychology, Romance Languages, Sociology, Spanish, Speech, Theatre and Zoology. A limited number of students are permitted to pursue an individually planned interdisciplinary curriculum.

THE COLLEGE OF BUSINESS ADMINISTRATION offers professional training in business subjects complemented by course requirements in the arts, humanities, social sciences, and mathematics. The degree of bachelor of science is awarded to those who successfully complete the requirements with a major concentration in accounting, finance, management, or marketing.

THE COLLEGE OF EDUCATION offers during the academic year professional training for prospective elementary and secondary school teachers, principals, guidance counselors, physical education instructors, and supervisors and teachers of art and music. The degree of bachelor of science in education is given to those who have successfully completed the requirements for the degree. Appropriate work taken through the Summer Session and Continuing Education Division may likewise be applied to the requirements for the degree.

THE COLLEGE OF LIFE SCIENCES AND AGRICULTURE offers programs leading to the bachelor of science degree in the following fields: Agricultural and Resource Economics, Agricultural Engineering, (jointly with the College of Technology), Agricultural Mechanization, Forest Engineering (jointly with the School of Forest Resources) Animal and Veterinary Sciences, Microbiology, Biochemistry, Biology, Botany, Entomology, Forestry, Human Development, Natural Resource Management, Plant and Soil Sciences, Recreation and Parks (jointly with the College of Education) and Wildlife Management. Minor programs of study are available in Agricultural Education, International Agricultural Development, Food Science, and Journalism. It also offers preprofessional programs in Agricultural Education, Veterinary Science, Dairy Manufacturing, and Food Processing. Two-year technical training programs leading to a degree of associate in science are offered in Resource and Business Management (with options in Food Industry Management, Agricultural Business Management, and Resource Management), Animal Technology, Medical Technology, Landscape and Nursery Management, Merchandising, Food Service Management, and Forest Management.

THE COLLEGE OF TECHNOLOGY offers degree programs in Agricultural Engineering (jointly with the College of Life Sciences and Agriculture), Chemical Engineering, Pulp and Paper Technology, Chemistry, Civil Engineering, Electrical Engineering, Engineering Physics and Mechanical Engineering. Post baccalaureate programs leading to a certificate are available in Pulp and Paper Management. Two-year programs are also offered through the Technical Institute Division of the college in Civil Engineering Technology, Electrical Engineering Technology, part of a four-year program in Pulp and Paper Technology.

THE GRADUATE SCHOOL offers programs of study leading to the degrees of Master of Arts, Master of Science, Master of Engineering, Master of Arts (Teaching

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of Foreign Languages), Master of Education, Master of Agricultural and Resource Economics, Master of Business Administration, Master of Community Development, Master of Library Service, Master of Mechanical Engineering, Master of Music, Master of Public Administration, Doctor of Philosophy and Doctor of Education. Programs leading to the Ph.D. degree are available in animal nutrition, chemical engineering, chemistry, civil engineering, forest resources, history, oceanography, physics, plant science, general and experimental psychology, clinical psychology, and zoology. Doctor of Education programs are available in guidance and counseling, in the language arts, in social studies education and in science education.

THE CONTINUING EDUCATION DIVISION (CED) provides a source of continuing education for mature and qualified persons who wish to supplement an earlier education. A variety of degree credit courses, non-degree credit courses, special short courses, and conferences are available in the late afternoon, in the evening and on Saturday. Courses offered by means of the Division may be for degree credit or for non-degree credit.

Students in CED classes have many varied backgrounds and interests. Most of them carry on full-time occupations, have graduated from high school some time ago, and have determined for themselves the need for earning a degree or for specific courses to be used for personal or occupational development. The programs offered are designed to prepare adults to meet the challenge of change in today's world, to provide experiences in learning which will lead to fuller and richer life, and give people of Maine an opportunity for life-long continuing education.

THE SUMMER SESSION offers a wide variety of courses designed to meet the needs of educators, regularly enrolled college students, and those who seek cultural and professional growth in specific fields.

Teachers, counselors, supervisors, and school administrators will find that this 12-week period of study provides an unusual opportunity for professional improvement. Workshops, conferences, and seminars specially designed for those engaged in the education professions are offered.

Regularly enrolled students of the University of Maine and other collegiate institutions likewise find an opportunity to accelerate their undergraduate programs, to make up work that they may have missed during the regular school year, or to secure additional credits in anticipation of their individual needs.

Adults not engaged in formal degree study or teaching who desire to attend the session for general purposes may do so providing all prerequisites, if any, are met.

TRIGOM—The University of Maine at Orono is a charter member of the The Research Institute of the Gulf of Maine (TRIGOM). This is a nonprofit co-operation established as a consortium to carry out research and projects related to oceanography. UMO also is a member of a Canadian consortium which gives it access to The Huntsman Laboratory in New Brunswick.

NEAPQ—The New England-Atlantic Provinces-Quebec Center, (NEAPQ), located at 76 Fogler Library, was established in 1968 at the University of Maine at Orono to promote and coordinate the University's Canadian-American studies

GENERAL INFORMATION

and programs related to the New England-Atlantic Provinces-Quebec region. It sponsors or assists with regional conferences, and exchanges of personnel with Canadian universities. It also encourages the development of regional and Canadian courses at the University of Maine at Orono, and helps to promote strong Fogler Library collections for these areas. For information on graduate and undergraduate courses relevant to the program, contact the director at Fogler Library.

Office of Research and Public Services—This office has the responsibility for planning, coordinating and administering the programs of research and public services of the University of Maine at Orono. The objective is accomplished through procedures designed to:

- A. Coordinate the research and public service efforts of the colleges and other units of UMO with the goal of developing effective interrelationships between staffs, functions and projects.
- B. Develop long-range goals and objectives for the research and public service programs of UMO and provide faculty and staff members with the opportunity to contribute to planning, establishing and implementing such goals.
- C. Provide increased opportunity for faculty and staff members to participate in programs of research and public service by promoting multidisciplinary and interdisciplinary approaches to solving identified problems. Comprehensive and timely information on grant support is made available on a continuing basis. Organized research and public service units at UMO include the following:

THE MAINE LIFE SCIENCES AND AGRICULTURAL EXPERIMENT STATION maintains its offices and principal laboratories at Orono. Experiment farms include Highmoor Farm at Monmouth, Aroostook Farm at Presque Isle, Chapman Farm at Chapman, and Blueberry Farm at Jonesboro.

THE MAINE TECHNOLOGY EXPERIMENT STATION, established in 1915, makes investigations for various state and municipal departments, and on request furnishes scientific information to industries. The station maintains offices and laboratories in Boardman Hall.

THE DEPARTMENT OF INDUSTRIAL COOPERATION (DIC), a part of the Office of Research and Federal Relations, coordinates the work of the University in contract agreements with state and industrial organizations. The Department is located in Boardman Hall.

THE COOPERATIVE EXTENSION SERVICE is an educational agency representing the University of Maine and the U.S. Department of Agriculture. Educational and informational assistance in a broad range of subjects is provided to individuals, families and organized groups in rural and urban areas of the state.

County Extension Associations are the sponsoring organizations of the Extension program in each county. They function under the leadership of an executive committee with the assistance of local community leaders.

Extension Service personnel include state and area specialists, administrative staff, and Extension agents. The latter, who make up the major part of the staff, are located in each county, usually at the county seat, and carry out work with the assistance of specialists in agriculture, home economics, 4-H and other youth education, and resource development. Extension agents also provide general information about other programs and services of the University of Maine, the U.S. Department of Agriculture and other agencies serving the people of Maine.

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MAINE TECHNICAL SERVICE PROGRAM assists business and industry to acquire and use scientific and engineering information more effectively.

THE BUREAU OF LABOR EDUCATION conducts programs for union and non-union employee groups covering most requested subjects, but focused on effective employee organization practices and community participation.

THE BUREAU OF PUBLIC ADMINISTRATION provides in-service training for Maine municipal and state government officials, does research in areas of interest to such officials and otherwise supplies information on these and related activities to persons engaged or interested in government.

TITLE I HEA provides federal matching funds to encourage and support public and private universities, colleges, and junior colleges to use their facilities and personnel, through research and teaching, to help solve problems of community living with emphasis on new concepts, approaches, and programs.

THE OFFICE OF GRANT SUPPORT provides assistance to faculty and staff in developing proposals and seeking outside funding for research, instruction, and service projects. The office, with headquarters in Coburn Hall, provides liaison with federal funding agencies and private foundations.

NEW ENGLAND CENTER FOR CONTINUING EDUCATION is a consortium of the six state universities established for the purpose of focusing the resources of institutions of higher education on common problems in the region. Workshops, institutes, conferences and other informal study programs—ranging from one day to several weeks—are sponsored throughout the year. The University of Maine has a special responsibility in the field of resource development.

THE FACULTY RESEARCH FUND—The University Trustees have set aside two permanent funds—the Dr. Thomas U. Coe Fund, \$123,000, and the William H. Weppeler Fund for Faculty Research, \$168,000—the income to be used each year by the faculty for carrying on any scholarly activity. From time to time some additional funds are made available to the Faculty Research Funds Committee for the same purpose. This committee meets three times a year, in November, January and May. Applications for grants from these funds should be addressed to the Secretary, Faculty Research Funds Committee.

FACULTY SUMMER RESEARCH GRANTS—A program of support to provide a limited number of grants to underwrite faculty research projects during the summer. Recipients are selected on the basis of information supplied in a proposal which explains the research project to be conducted during the period for which the grant is made. The Research Funds Committee serves as a screening committee to evaluate the proposals. Application information may be obtained from the Secretary, Faculty Research Funds Committee.

THE CENTER FOR ENVIRONMENTAL STUDIES was created in 1970 at the University of Maine at Orono to encourage and promote University interest in and interdisciplinary cooperation in environmental research, teaching, and public service, including physical, biological, and social aspects.

THE LAND AND WATER RESOURCES CENTER stimulates and coordinates the research, training, and educational activities in water resource disciplines, including

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select aspects of soils and lands. Information and education services include sponsorship of seminars, forums and workshops. The Center is advised by a body of civic leaders, scientists and administrators representing four companies, four universities, three service organizations, 10 state agencies, and five federal agencies.

THE IRA C. DARLING CENTER FOR RESEARCH, TEACHING AND SERVICE is the Marine Laboratory of the University of Maine at Orono. Located on Wentworth Point on the Damariscotta River in Walpole, Maine, the Darling Center has approximately 10,000 square feet of laboratory space available for faculty and graduate marine research. Dormitory space accommodates 12 year-round staff members. Summer quarters are available for an additional 16. A steel and concrete pier provides access by vessels drawing up to 15 feet. A 34-foot, diesel-powered workboat, a 34-foot, diesel-powered research catamaran, and a number of outboard boats are used for inshore and nearshore field work. Through cooperative arrangements with other institutions, faculty and students have access to offshore and open ocean areas. The library, a branch of the Fogler Library at Orono, contains several thousand volumes and an extensive reprint collection. Laboratory space for visiting investigators is available by arrangement. Summer courses in marine invertebrate zoology and ichthyology are offered.

THE CONFERENCES AND INSTITUTES DIVISION (CID), established in 1973, coordinates public service short courses, workshops, seminars, conferences, and institutes. The CID office is located at 128 College Avenue, UMO.

Buildings—Orono Campus—The following are dormitories and dining facilities:

ANDROSCOGGIN HALL (1963), capacity 248. Named for the county having the sixth largest number of regular full-time students enrolled at the University at the time of its construction.

AROOSTOOK HALL (1963), capacity 179. Named for the county having the fifth largest number of regular full-time students enrolled at the University at the time of its construction.

BALENTINE HALL (1914-1916), capacity 107. Named in honor of the late Elizabeth Abbott Balentine, secretary and registrar of the University, 1894-1913.

CHADBOURNE HALL (1948), capacity 156. Named for Dr. Ava Harriet Chadbourne, professor emerita of education.

COLVIN HALL (1930), capacity 48. Named in honor of the late Caroline Colvin, professor emerita of history and government and the first dean of women at the University. It became a cooperative dormitory for women in 1961.

CORBETT HALL (1947), capacity 228. Named in honor of the late Lambert Seymour Corbett, formerly professor of animal industry and dean of men.

CUMBERLAND HALL (1961), capacity 260. Named for the county having the second largest number of regular full-time students enrolled at the University at the time of its construction.

DUNN HALL (1947), capacity 228. Named in honor of the late Charles John Dunn, formerly Chief Justice of the Supreme Judicial Court of Maine and treasurer of the University from 1909 to 1923.

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ESTABROOKE HALL (1940), capacity 172. Named in honor of the late Kate Clark Estabrooke, a former superintendent of the first women's dormitory, the Mount Vernon House.

GANNETT HALL (1959), capacity 260. Named in honor of James Adrian Gannett, registrar emeritus.

HANCOCK HALL (1965), capacity 265. Named for the county having the seventh largest number of regular full-time students enrolled at the University at the time of its construction.

HANNIBAL HAMLIN HALL (1911), capacity 89. Named for the late Hon. Hannibal Hamlin of Hampden and Bangor, the first president of the Board of Trustees.

HART HALL (1955), capacity 233. Named in honor of the late John Norris Hart of Orono, dean of the University and professor of mathematics and astronomy.

HILL TOP (1967-68) is a dining hall having the capacity to serve 900 persons cafeteria style. It also contains a small library and reading rooms. The dining hall serves Knox, Oxford and Somerset Halls.

KENNEBEC HALL (1961), capacity 180. Named for the county having the third largest number of regular full-time students enrolled at the University at the time of its construction.

KNOX HALL (1967), capacity 285. Named for the county having the tenth largest number of full-time students enrolled at the University at the time of its construction.

OAK HALL (1937), capacity 96. Named for the late Hon. Lyndon Oak of Garland, a long-time member and president of the Board of Trustees.

OXFORD HALL (1967), capacity 285. Named for the county having the eighth largest number of full-time students enrolled at the University at the time of its construction.

PENOBSCOT HALL (1960), capacity 180. Named for the county having the largest number of regular full-time students enrolled at the University at the time of its construction.

SOMERSET HALL (1967), capacity 285. Named for the county having the ninth largest number of full-time students enrolled at the University at the time of its construction.

STEWART COMMONS (1963) is a dining hall having a capacity for serving 800 persons cafeteria style. This dining hall serves Androscoggin, Cumberland and Gannett Halls. Named for the late John E. Stewart, dean emeritus of men, 1928-1969.

STODDER HALL (1956), capacity 170. Named in honor of the late Mrs. Anne E. Stodder of Bangor, a benefactress of the University. Its dining hall serves 700 students.

THE UNIVERSITY CABINS (1945), capacity 42 men students. These are co-operative units.

UNIVERSITY PARK (1961) is a family housing development that provides apartments for 120 families (24 three-bedroom, 48 two-bedroom and 48 one-bedroom apartments).

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WELLS COMMONS (1958) is a dining hall having a capacity for serving 1500 persons cafeteria style. This dining hall serves Corbett, Dunn, Hannibal Hamlin, Hancock, Hart and Oak Halls. Named for William C. Wells, dormitory manager and director of residence and dining halls, 1939-1972.

YORK HALL (1962), capacity 260. Named for the county having the fourth largest number of regular full-time students enrolled at the University at the time of its construction. Its dining hall serves 700 students.

The following are used mainly for administration and instruction.

AGRICULTURAL ENGINEERING BUILDING (1938) houses the Agricultural Engineering Department and its laboratories for teaching and research.

ALUMNI HALL (1901), contains administrative offices and studios for Educational Television. It received its name because of contributions made by alumni to supply a part of the funds for its erection.

ALUMNI MEMORIAL, consisting of an Indoor Field, Armory, and Gymnasium, was erected as a memorial to the Maine men who died in the service of their country in the Spanish-American War and World War I and is a gift of alumni, students, faculty, and friends of the University. The Indoor Field (1926), one of the largest in the country, provides ample facilities for indoor track, winter baseball practice, and military drill. The Armory (1926) houses offices and classrooms of the military unit, including an indoor rifle range. The Gymnasium (1933) contains the offices of the Department of Physical Education and Athletics, equipment and rooms for handball, boxing, wrestling, and corrective exercise, shower and locker rooms, and an auditorium with a seating capacity of approximately 3,000, used for basketball, lectures, student assemblies, banquets, and dances. The swimming pool, gymnastics and wrestling areas were added in 1971. Swimming pool and diving facilities are olympic size. The pool spectator gallery seats 500.

AUBERT HALL (1914), houses the Departments of Chemistry, Sanitary Engineering and the heavy equipment laboratories of Chemical Engineering. It was named in honor of the late Alfred Bellamy Aubert, professor of chemistry from 1874 to 1909. A wing was added in 1940 to increase facilities. Two additional wings were added in 1958 and additional renovations were completed in 1968. The Gottesman Computation and Analysis Laboratory, a part of the Department of Chemical Engineering, is located in Aubert Hall.

BARROWS HALL (1963), contains offices, classrooms and laboratories for the Department of Electrical Engineering. It was named for the late William Edward Barrows, formerly professor and head of the Department of Electrical Engineering.

CLARENCE E. BENNETT HALL (1959), contains offices, classrooms, and laboratories of the Department of Physics. It was named in honor of Dr. Clarence E. Bennett, professor emeritus of physics and chairman of the department for over 30 years.

BOARDMAN HALL (1949) houses the Department of Civil Engineering, Department of Geological Sciences, Department of Mechanical Engineering, Technology Experiment Station laboratories, and Department of Industrial Cooperation. It was named in honor of the late Dr. Harold Sherburne Boardman, Dean of Technology and President of the University from 1925 to 1934.

CARNEGIE HALL, the former library building erected in 1906 through the generosity of Andrew Carnegie, is now devoted to the Department of Art. It was named in honor of the original donor.

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COBURN HALL (1888) houses offices of the Office of Research and Public Services, which includes the office of the Vice President for Research and Public Services, Bureau of Public Administration, Land and Water Resources Center, Office of Grant Support, Special Programs Division, and Title I. Other offices housed in Coburn but not a part of the Office of Research and Public Services are the Credit Union and Teacher Placement. Coburn Hall was named for the late Hon. Abner Coburn, a former president of the Board of Trustees and benefactor of the University.

CROSBY LABORATORIES (1938) contain the laboratories of the Department of Mechanical Engineering. It was named for the late Hon. Oliver Crosby, Class of '76, who bequeathed \$100,000 for its construction.

DEERING HALL (1949) contains the Department of Agronomy, Botany, Entomology and Horticulture, also part of the facilities for the Agricultural Experiment Station and the Cooperative Extension Service. It was named in honor of the late Dr. Arthur L. Deering, dean of agriculture, who served the University from 1912-1957.

EAST ANNEX (1947) houses the Department of General Engineering, Student Placement Bureau, Personnel Office, Office of Student Aid, and provides classrooms and offices for the several colleges. The building, formerly a unit of the naval base at Sanford, was erected on the campus by the Bureau of Community Facilities of the Federal Works Agency.

FERNALD HALL (1870) the oldest building on the campus, contains offices of the personnel deans. It also houses a small snack bar operated by University Stores. It was named for the late Dr. Merritt Caldwell Fernald, president of the University from 1879 to 1893.

FOGLER LIBRARY (1942-1947) was erected and furnished with the aid of a fund-raising campaign by alumni, faculty, students and friends of the University. The completion in 1950 of the main reading room has increased the seating capacity of the library to 570. The library was named in 1962 in honor of Dr. Raymond H. Fogler, a former president of the Board of Trustees.

HAUCK AUDITORIUM (1963) was erected and furnished with the aid of a fund-raising campaign by alumni, faculty, students and friends of the University. It contains an auditorium providing seating for 600 persons, stage facilities and the University Store. It was named in honor of Dr. Arthur A. Hauck, president emeritus, who served the University as president from 1934 to 1958.

HITCHNER HALL (1959) contains offices, laboratories, and classrooms for the Departments of Bacteriology, Biochemistry, and Animal and Veterinary Sciences for programs in instruction, research and Extension. It was named for the late Dr. E. Reeve Hitchner, professor emeritus of bacteriology.

HOLMES HALL (1888) is used by the Maine Agricultural Experiment Station for its administrative offices, and Departments of Chemistry and Food Sciences. It received its name from the late Dr. Ezekiel Holmes, writer, editor, and pioneer in Maine agriculture.

JENNESS HALL (1971) contains classrooms, offices and laboratories of the Department of Chemical Engineering, including research facilities for environmental studies, microscopy, fiber and materials sciences, and chemical process development. It was named in honor of Dr. Lyle C. Jenness, formerly professor and head of the Department of Chemical Engineering from 1947 to 1966. It also holds the

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offices of the University of Maine Pulp and Paper Foundation, of which Dr. Jenness is executive secretary.

LENGYEL HALL (1963) contains offices, classrooms and a gymnasium for the Department of Physical Education, women. It was named for Helen Anna Lengyel, professor emerita of women's physical education.

CLARENCE C. LITTLE HALL (1965) houses the Departments of Foreign Languages and Psychology. Contains four general purpose lecture rooms and offices for faculty of College of Arts and Sciences. It was named in honor of the late Dr. Clarence Cook Little, formerly professor of zoology and president of the University from 1922 to 1925.

LORD HALL (1904) contains offices and laboratories for the Department of Music on the first and second floors of the east wing, and for the Department of Journalism, the Maine Campus newspaper, and the Prism (yearbook). It was named for the late Henry Lord, a former president of the Board of Trustees.

MEMORIAL UNION (1953) is a memorial to the University of Maine men who died, and a tribute to all who served, in World War II. It is the gift of alumni, students, non-alumni faculty, and friends. This union is the center of student activities and recreational programs on the campus. It has a Memorial Room, meeting rooms, lounges, offices, snack bar, game room, bowling alleys, offices for the director of religious affairs and for student organizations, faculty-alumni lounge and dining room which serve the University community. Additional meeting rooms were added in 1961.

MERRILL HALL (1931) is used for work in Home Economics. Also houses offices of Continuing Education Division. It was named for the late Dr. Leon S. Merrill, dean of the College of Agriculture from 1911 to 1933.

MURRAY HALL (1967) is used by the College of Arts and Sciences for its Department of Zoology. It contains offices, seminar rooms, undergraduate and graduate student laboratories. It was named in honor of Dr. Joseph Magee Murray, Dean of the College of Arts and Sciences from 1941 to 1966.

NUTTING HALL (1968) contains offices, laboratories and classrooms of the School of Forest Resources. It was named in honor of Albert D. Nutting, director of the School of Forest Resources from 1958-71.

ROGERS HALL (1928) houses administrative offices of the Department of Animal Sciences and contains research laboratories in animal nutrition and related work. It was named in honor of Dr. Lore Rogers, Class of '96, chief of search laboratories (retired), Bureau of Dairy Industry, U. S. Department of Agriculture.

SHIBLES HALL (1961) contains facilities for the College of Education and, on the top floor, for the Department of Mathematics of the College of Arts and Sciences. The Audio-Visual Services and laboratories for teacher training are located in this building. It was named in honor of Mark R. Shibles, dean of the College of Education from 1947-1971.

STEVENS HALL (1924), with two wings constructed in 1933, contains accommodations for the Colleges of Arts and Sciences and Business Administration. It was named in honor of the late Dr. James S. Stevens, for many years dean of the College of Arts and Sciences.

WINGATE HALL (1892) contains administrative offices, the office of the Registrar, Data Processing Center, the University Computing Center, and the University

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Planetarium. It was named for the late William P. Wingate, a former president of the Board of Trustees.

WINSLOW HALL (1909) is used by the College of Life Sciences and Agriculture, the Cooperative Extension Service, Department of Agricultural and Resource Economics, and houses the Graduate School Office. It was named for the late Edward B. Winslow, a former president of the Board of Trustees.

Other buildings include the President's House, Horticultural Greenhouses, Dairy Barns and Milk House, Federal Office Building, Poultry Buildings, Stock Judging Pavilion, Machine Tool Laboratory, Maples, Agricultural Engineering Shop Building, Observatory, Student Health Center, Alumni Center, University Public Information and Printing Office, the Central Heating Plant, Service Building, Entomology, several residences occupied by faculty members, and various farm buildings and Security Building.

FRATERNITY HOUSES—The following fraternities have houses on or near the Orono campus: Beta Theta Pi, Delta Tau Delta, Kappa Sigma, Lambda Chi Alpha, Phi Kappa Sigma, Sigma Chi, Sigma Nu, Theta Chi, Phi Eta Kappa, Alpha Gamma Rho, Alpha Tau Omega, Phi Gamma Delta, Phi Mu Delta, Tau Epsilon Phi, Tau Kappa Epsilon, Sigma Alpha Epsilon, and Sigma Phi Epsilon.

RESIDENCE AND DINING HALLS—Five complexes of residence and dining halls serve the students. These consist, in general, of a dining hall around which are clustered residence halls for both men and women. At the far south end of campus, York dining hall serves York residence hall (men and women), Aroostook (men), Kennebec (women), Estabrooke (graduate students). In south center, Stodder cafeteria serves the Stodder residence hall (men and women), Balentine (women), Chadbourne (men and women) and Penobscot (women). In the center of campus, Wells Commons serves Hart (women), Corbett (men), Dunn (men), Hancock (women), Hannibal Hamlin (men) and Oak Hall (men). Two complexes are located in the northeast section where East Commons serves Gannett (men), Androscoggin (women), and Cumberland (men), and the newest complex is clustered around Hill Top Cafeteria. Here are located Knox (men and women), Oxford (men and women), and Somerset (men and women).

COLVIN HALL is the cooperative women's residence where students prepare and serve their own meals and do the general house work in the unit, thus reducing their costs. The University Cabins, with accommodations for four male students each, provide housekeeping facilities.

The privilege of living in a University residence hall is granted to those undergraduate students who are registered for a minimum of 12 credit hours per semester. In special cases such as student teaching, second semester seniors, etc., the Vice President for Student Affairs may grant permission for them to continue to reside in a residence hall.

Graduate students who are enrolled in full-time study for the academic year have the privilege of residing in the University facilities provided for them.

Residents of the dormitories are furnished meal tickets good for 14 or 21 meals per week. Non-residents may buy meals in any dining hall on a transient basis or may purchase a semester meal ticket.

At the University of Maine at Bangor, women in two-year courses live in Belfast Hall. Augusta, Ellsworth, Rockland, and Lewiston Halls will be occupied by two-year men students. Meals for these students are served in Brewer Hall, the dining room close to the residence halls.

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Freshman students are required to live in one of the residence halls, except that the Director of Residential Life may authorize off-campus residence in exceptional cases.

Students are expected to reside within the system for a complete semester. If they leave, they are subject to a refund policy as set forth in the Residence Halls contract.

Residents of the dormitory system are furnished bed linen each week without extra charge. They furnish their own towels, pillows, blankets, and any decorative features such as rugs, bureau scarfs or drapes.

Temporary housing is furnished as a convenience to students who find it difficult or impossible to leave the campus for the Thanksgiving, mid-year, and spring recesses. No accommodations are available during the Christmas recess.

ATHLETIC FACILITIES—The University's facilities for athletics and physical education on the Orono campus include the Memorial Gymnasium, the Memorial Indoor Field House, the Helen A. Lengyel Gymnasium, the Stanley M. Wallace Pool, gymnastics and wrestling areas.

The athletic fields for men include 14 tennis courts, two baseball fields, a football stadium, three football practice fields (one of which is illuminated for evening practice), a quarter-mile cinder track, hammer and discus fields, fields for intramural sports, a four-mile cross country course, skiing facilities, and three soccer fields.

The Helen A. Lengyel Gymnasium has a gym floor and a large recreation room which are used by the department for intramural activities in team and individual sports, recreational games, and club activities, as well as for classes. The building includes an indoor archery range, a first aid room, and a remedial gymnasium, which is also used for folk, modern, and square dancing classes.

The women's athletic field is located at the south end of the campus near the women's residences. It has a hockey field, practice area and an archery range and four tennis courts. In season, the field is also used for soccer, speedball, and softball.

University Farms—The University Farms include approximately 900 acres of land used primarily for a dairy operation. One farm adjoins the campus; others are located in the Stillwater section of Old Town.

The campus farm includes a modern dairy barn housing an outstanding herd of registered dairy cattle representative of the leading breeds. A sizable poultry laying flock, and a flock of sheep are also maintained on the campus farm. A herd of registered beef cattle located off campus is also a part of the total farm operation.

The farms serve several purposes. They are utilized for student instruction, as laboratories for agricultural courses, and as demonstration projects for Extension programs. Research projects are continuously in progress in various segments of the operation. Milk and eggs produced on the farm are utilized by the University dormitory system.

The Dwight D. Demeritt Forest—The Dwight D. Demeritt Forest, totaling 1,750 acres and located in the Stillwater-Old Town area, is administered by the School of Forest Resources for student instruction, project demonstration, and research. An additional two acres are operated as a forestry nursery. Indian Township, a tract of 17,000 acres is managed by the School of Forest Resources for

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summer instructional purposes. Headquarters for the summer training is the Robert I. Ashman Forestry Camp on Long Lake, near Princeton. In 1964 Harold Worthen gave to the University of Maine 250 acres of forest land in the town of LaGrange, Maine to be administered by the School of Forest Resources.

Woodland Preserve—The Woodland Preserve, consisting of two tracts of woodland and marsh totalling approximately 33 acres in the southeast corner of the Orono campus, was established by action of the board of Trustees in 1967 to provide the University community with a nearby area for the scientific study and observation of the ecology and natural evolution of forest and marsh.

Computing and Data Processing Services—The Computing Center supports the instructional, research, service, and administrative needs of the University system. Academic offerings in the area of computer science are outlined on page 76. Courses in digital computer programming are offered by the Departments of Mathematics, Chemical Engineering, and General Engineering, the latter including analog work. Non-credit courses and seminars are available to establish competencies necessary to make effective use of computing facilities. Packaged programs are available for most commonly used statistical work and consulting programmers are available to advise on computability.

University facilities include:

The IBM 370 in Wingate Hall; current configuration is a model 145 with 512 bytes of main memory, six 3330 disk drives and three 3420 tape units (with 9-channel drives at 800 and 1600 recording density). Operating systems supported are VM/370, MORE POWER DOS (Maine On-line Remote Entry and Power Spooling and Disk Operating System), and OS (IBM Operating System).

Typewriter based terminals (2741 and ASCII devices) are installed at all locations of the University and additional units are available for short term use. Intermediate speed (3780) terminals are in operation at Portland and Gorham.

An off-line CALCOMP Model 936 Drum Plotter is available in Wingate Hall, with widths of approximately 36" and 15", increment size of 0.002 inch and three pens.

The Gottesman Computation Center in Jenness Hall is a unit of the Department of Chemical Engineering. The IBM 1800 is particularly well adapted to process control work and is being used to monitor remote data acquisition. The facility includes a 16K word memory, two 2310 disk drives and off-line printer. The operating system is a modified TSK. An EAI MINIAC analog computer can be operated independently or as an input to the 1800. The Center also operates a Varian 620/I industrial control computer with 8K word memory.

The IBM 1230 in Wingate Hall is a part of the Testing and Counseling Service. This equipment can be used to convert test and questionnaire responses into a medium for further analysis on any of the other facilities.

Arrangements have been made for terminal and line services to external computers where desirable.

The Libraries—The University Libraries serve the intellectual needs of the students and faculty and stimulate the use of library materials for research and recreational reading. The libraries contain more than 500,000 volumes and receive some 3,300 periodicals. They are the regional depository for northern New England for U.S. Government publications and have a file of maps for the Army Map

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Service. They also are a selective depository for Canadian government publications. They extend these resources to other libraries through interlibrary loan service, to visiting scholars, and to citizens of the state whenever they can do so without interfering with local needs. Periodical articles and similar materials not available for lending may often be photocopied, subject to copyright regulations.

The University of Maine Art Collection—The University of Maine Art Collection in Carnegie Hall contains materials depicting the history of art through all ages. More than 10,000 photographs and color reproductions, and more than 20,000 slides of art masterpieces are available, on occasion, to students and faculty for study and loan. Through generous gifts in recent years the collection contains some 1700 original sculptures, paintings, and graphic arts by outstanding American and European artists: Inness, Homer, Hassam, Marin, Hartley, Sprinchorn, Keinbusch, Wyeth, Pleissner, Kingman, Peirce, Picasso, Matisse, Rouault, Hamabe and others. Almost all of these works are hung in public areas throughout the campus.

The University of Maine Program of Exhibitions—Throughout the academic year and during the Summer Session the Department of Art presents each month eight different art exhibitions: four in Carnegie Hall and one each in the Fogler Library, the photo salon of the Memorial Union Building, the Hauck Auditorium Lobby, and the lobby of Alumni Hall. Special exhibits are arranged from time to time in the East and Wells Commons lounges, library reference room and in the Maine Christian Association Building. All exhibits, open without charge, display only original art, with special preference given to professional artists and craftsmen living or working in Maine.

The University of Maine Traveling Exhibitions—As a service to the state each year, the Department of Art arranges and circulates 100 different exhibitions of original art throughout the schools and academies of Maine. There is no charge for these exhibitions, but reservations must be made before Sept. 30 for each academic year. All inquiries should be addressed to Professor Vincent A. Hartgen, Chairman, Department of Art.

Scientific Collections—The following collections are located on the Orono campus:

BOTANY—The herbarium in Deering Hall includes several collections, the most important of which is the one made by the late Rev. Joseph Blake and presented to the University by Mr. Jonathan G. Clark of Bangor. The late Professor F. L. Harvey left to the herbarium the general collections accumulated during his connection with the University. Other important collections are Collin's Algae of the Maine Coast, Halsted's Lichens of New England, Halsted's Weeds, Ellis and Everhart's North American Fungi, Cook's Illustrative Fungi, Underwood's Hepaticae, Cummings and Seymour's North American Lichens, and Bartholomew's Fungi Columbiana.

The herbarium has been enriched recently by the personal collections of Mrs. Frank Hinckley, Helen Paine Scoullar, Charles Curtis, Henry Wilson Merrill, Maynard Quimby, Louise Coburn, Sue Gordon, Ralph C. Bean, George B. Rossbach, K. P. Jansson and Glen D. Chamberlain. Numerous centuries of *Plantae Exsiccatae Grayanae* are significant additions. Sixty-five thousand herbarium sheets are available.

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Approximately three acres of land extending southward from the Heating Plant and between the Forest Nursery and the Stillwater River were assigned to the Department of Botany for the establishment of a Botanical Plantation in the autumn of 1934. The first three plantings were made in conjunction with Maine Day of 1935. At present, more than 300 species of trees and shrubs have been introduced. This area was recently named the Fay Hyland Botanical Plantation. Many species of ferns and flowering plants have also been included.

ENTOMOLOGY—A small area partly enclosed by trees of the Botanical Plantation and near the southern boundary of the Forest Nursery forms a site for a small University apiary. This apiary has approximately five colonies that are used for pollination studies.

The Edith M. Patch aphid collection, housed in Deering Hall, is one of the outstanding aphid collections in North America. An outstanding collection of grasshoppers is probably the second most extensive collection in New England. Local mosquitoes and blackflies are well represented, as are solitary bees associated with blueberries.

These are major portions of the insect collection maintained by the University of reference purposes in dealing with inquiries concerning insect pests sent in by citizens of Maine.

GEOLOGY—The geological collections of minerals, rocks, and fossils are housed in Boardman Hall.

ZOOLOGY—These collections, located in Murray Hall, consist of a working collection of bird skins, a display of bird mounts, and study collections of various groups of both vertebrates and invertebrates. An important part is formed by the Anson Allen Collection of Invertebrates and of Maine Birds, presented by Mrs. Mattie Munson; the Eckstorm Collection of Birds, presented by Mrs. Fannie H. and Mrs. P. F. Eckstorm; and the bird skin collection of the Portland Society of Natural History-Maine Audubon Society, one of the oldest of its kind in the country and consisting of 3,844 study skins, form an important part of the whole.

Observatory and Planetarium—The Observatory and Planetarium are operated by the Observatory staff for the Department of Mathematics and Astronomy. These facilities are used both in support of astronomy courses, and in programs open to the public. The Observatory houses a Clark refractor, and is open on a general basis every clear night of the academic year. Groups may visit the Planetarium on the second floor of Wingate Hall by making arrangements, in advance, through Public Information and Central Services.

The University of Maine Anthropology Museum—The Department of Anthropology has established an Anthropology Museum on the third floor of South Stevens Hall. The museum serves not only as a teaching aid for students in the department but also as an additional cultural facility for the campus and the community. Through the generosity of many interested persons the collection includes material relating to the American Indians, Africa, the Arctic and Oceania. There are also special teaching exhibits on weapon and tool development, fossil man and race, as well as special sections on Maine Indians and Maine prehistory. Loan collections from other institutions sometimes are exhibited. The museum is open to the public whenever the University is open. Regular hours are Monday through Friday, 8 a.m. to 4 p.m. The museum can be opened for groups at other times by appointment.

GENERAL INFORMATION

University Publications—The following are included in the various bulletins and reports regularly issued by the University of Maine at Orono:

UNIVERSITY OF MAINE BULLETIN is issued about 40 times a year to give information to students, faculty, alumni, and the general public.

UNIVERSITY OF MAINE STUDIES are research works published under the direction of the Maine Studies Committee. A price list may be obtained from the Bulletin Room, Public Information Building, U of M, Orono. Orders and exchanges should be sent to the Bulletin Room.

LIFE SCIENCES AND AGRICULTURE EXPERIMENT STATION PUBLICATION include technical and popular bulletin and miscellaneous reports in which are contained the results of research studies; and Official Inspections which contains the results of inspections of feeding stuffs, fertilizers, agricultural seeds, fungicides and insecticides, and foods and drugs. A report of progress is issued periodically as Research in The Life Sciences. A free copy of each publication is available upon request.

COOPERATIVE EXTENSION SERVICE BULLETINS AND CIRCULARS are issued by the Cooperative Extension Service on a wide variety of subjects relating to agriculture, home economics, youth education, resource development and public affairs. Maine residents may secure a list of available bulletins and circulars upon request to the Mail Room, PICS Building, U of M, Orono.

THE MAINE ALUMNUS, an illustrated magazine of campus and alumni news University of Maine at Orono who subscribe, and to those making donations to the Annual Alumni Fund.

MAINE LAW REVIEW is a continuation of the former *Maine Law Review* last published in 1920. It was revised as a student activity in 1962 and is published by the students at the University of Maine School of Law, located in Portland.

Student publications are described in a section of this catalog called "Student Activities."

Counseling Center—The Counseling Center provides assistance to students with academic, vocational, personal and emotional concerns.

Counseling and psychotherapy are the most frequently used services. Opportunities for psychological evaluation, psychiatric evaluation and consultation, and self-improvement programs in such areas as interpersonal relationships and study skills are available. The Center maintains an educational-occupational information library, including college and graduate school catalogs representative of many types of school and geographical locations. Students may drop in to use these materials at any time. In order to help answer a student's questions about himself, the counselor may use interest inventories, aptitude tests and personal preference inventories. Tests for admission to graduate schools and for employment purposes also are administered by the Center. There is a minimum fee for most testing of this type.

The Center staff provides a variety of consultation and educational programming designed to help prevent the development of problems requiring individual help, and to assist in creating an educational environment more conducive to student growth.

All students, freshmen through graduate, on the Orono and Bangor campuses of the University, are eligible for the services of the Center free of charge. Students are often seen by appointment, which can be made by coming to the Center or by telephone. All visits are confidential. The main office of the Counseling Center is at

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101 Fernald Hall, and most initial contacts will be made here. Psychological and psychiatric services also are provided at the Health Center.

Office of Career Planning and Placement—Through this office the University offers career planning and placement assistance to undergraduate and graduate students, alumni, and employers in both teaching and non-teaching fields. Established as the Placement Bureau in 1935 in cooperation with the General Alumni Association, the office provides the following services:

- 1) Counsels and assists students and alumni in career planning.
- 2) Notifies registrants of suitable employment opportunities.
- 3) Assists candidates in preparing and presenting effective applications.
- 4) Cooperates with employers in their search for qualified personnel.
- 5) Informs employers of available candidates, of new academic fields, and of other pertinent developments and trends.
- 6) Develops career information for University men and women in both new and traditional fields of opportunity.
- 7) Assists students in locating summer vacation employment.

The office schedules for students each year an extensive and informative on-campus interviewing program with representatives from both teaching and non-teaching fields.

The College Teacher Division serves candidates for master and doctoral degrees interested in employment in college and university positions.

Presently employed alumni teachers are offered assistance in maintaining continuous records of achievement to facilitate professional advancement by the Alumni Teacher Placement Division located in Coburn Hall.

No charge is made to students, alumni, or employers for the services of the Office.

Office of Student Aid—The Office of Student Aid processes applications for scholarships, University loans, loans under the Higher Education Act, Educational Opportunity grants and a variety of part-time and summer jobs both on and off the campus. Detailed information on student aid will be found by consulting the index.

Foreign Student Adviser—The University maintains an office for the information and assistance of all students who are not citizens of the United States.

The University wants each international student to have the best possible educational and personal experience while he is in the United States and especially while at the University.

The Foreign Student Adviser's Office assists students in understanding the administrative regulations of the institution; local, state and national laws; accepted standards of conduct; and expectations and reactions of those he will encounter while in a new cultural environment.

All international students including those with "F" student or "J" exchange student status must report to the Foreign Student Adviser's Office as soon as convenient after arrival on campus. Advice concerning immigration regulations, necessary forms, etc., is available so that international students may remain in the United States as long as is properly necessary to achieve their educational goals.

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Health Service—The Student Health Center is organized and operated for the benefit of students. Supervision of medical care and health needs afforded by a family physician is the goal of this program. Insofar as possible, all aspects of a personal doctor-patient relationship are preserved. The following services are offered at no charge to eligible students:

- 1) Twenty-four-hour emergency care, including weekends when the University is in session; emergency visits by the physician when necessary.
- 2) Consultations with staff physicians and surgeons for diagnosis and treatment during regular clinic hours.
- 3) Limited dispensing of medicines on an out-patient basis.
- 4) Routine immunization, allergy injections, etc.
- 5) Limited diagnostic laboratory tests, x-rays, and physical therapy.
- 6) Preseason physical examinations for various athletic activities, pre-employment physical examinations, and other routine physical examinations.
- 7) Coordination of the Health Insurance Program to insure maximum benefits to students when illness requires hospital treatment or consultation with physicians not on the Health Center Staff.
- 8) Supervision of the University environment to minimize exposure of students to health hazards.
- 9) The Counseling Center maintains offices at the Health Center. Emergency contact with Counseling Center staff can be made through contacting the Health Service. See full description of services provided under the heading for Counseling Center.

To meet these goals, a new Student Health Center was completed in 1968, consisting of out-patient clinics, laboratory, x-ray, physiotherapy facilities and pharmacy. A 32-bed licensed hospital is a part of the Health Center. Charges are made for in-patient hospital care. These charges are covered by the student health and accident insurance and by most other insurance carriers under which a student might be covered as a dependent of an insured parent. Coverage for college hospital care under insurance plans of parents should be determined from the parents' insurance agent before deciding not to take out the student plan. The staff consists of five full-time physicians, two clinical psychologists, a surgical consultant, a psychiatric consultant, and adequate nursing and technical help.

Religious Affairs—Subject to the approval of the president and the Board of Trustees, the Committee on Religious Affairs serves as the policy-making group in the area of religion at the University of Maine. It oversees the activities of the Religious Affairs Forum (RAF) and functions as the official body through which the faith groups are related to the administration of the University.

Six religious groups provide opportunities for worship, study, conversation, and witness: The Episcopal Church at the Maine campus for Episcopal students, Hillel Foundation for Jewish students, Maine Christian Association for Protestant students, and Our Lady of Wisdom Chapel and the Newman Apostolate for Roman Catholic students. The chaplains are available for counseling or instruction. The Intervarsity Christian Fellowship, an approved student organization, meets weekly in the Memorial Union. The Christian Science Organization meets for study and worship each week in the Drummond Chapel of the Union Building.

The Religious Affairs Forum is the coordinating agent of the recognized faith groups and religious activities of the campus and is governed by a cabinet of representatives from the student members of these groups.

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LOCAL CHURCHES AND SYNAGOGUES—The churches and synagogues of Orono, Old Town, and Bangor always welcome the attendance of University students. A small meditation room, the Drummond Chapel, is in Memorial Union.

Activities concerned with religious affairs are coordinated through the Office of the Dean of Student Activities and Organizations.

Use of Laboratory Apparatus—Many laboratory courses involve instruction in and the use of various types of power equipment and laboratory apparatus. The University takes every precaution to provide competent instruction and supervision of such courses. It is expected that students will cooperate by following instructions and exercising caution. In case an accident does occur, resulting in personal injury, the University can assume no responsibility except for medical care that is provided by the Student Health Service. Student Health and Accident Insurance is recommended.

Registration—Undergraduates at the Orono campus will register in accordance with the following:

FRESHMEN—All members of the incoming freshman class are required to attend, during the summer preceding the beginning of classes, any one of several freshman orientation sessions at the Orono campus. The dates when these are held each year are furnished incoming freshmen and their parents. It is strongly urged that parents plan to attend the orientation program with their sons and daughters.

During the orientation period, registration is accomplished for the fall semester. Also, information is distributed concerning arrangements in connection with the beginning of classes, arrival at dormitories, etc., in September.

UPPERCLASSMEN—In the fall, upperclassmen will be required to register by mail prior to, or in person on, the day specified or to present written evidence that they have been allowed by their dean to register late. Upperclassmen must communicate in advance with the dean of their college giving their reason for wishing to register late, and have received from him written permission to do so.

Academic advisers are assigned all students for help in planning their educational programs, to ensure their meeting graduation requirements, for counsel and guidance in academic work, and for advice about study or classwork problems. *The final responsibility for fulfilling degree requirements, however, rests with each student.*

Degrees—The University awards the following degrees:

Associate of Arts (A.A.) in, with the major field designated, to those who complete the appropriate two-year curriculum at Bangor.

Associate of Science (A.S.) in (major field) to those who complete the two-year curriculum in the College of Life Sciences and Agriculture, Technology or appropriate two-year curriculum at Bangor.

Bachelor of Arts (B.A.) with specification of the major subject, to those who complete a four-year curriculum in the College of Arts and Sciences.

Bachelor of Arts in Special Studies (B.A. Spec. Stud.) to those who complete this four-year curriculum in the College of Arts and Sciences.

Bachelor of Music (B. Mus.) to those who complete the prescribed four years' work in the College of Arts and Sciences.

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Bachelor of Science (B.S.) to those who complete the prescribed work of four years in the Colleges of Business Administration, Life Sciences and Agriculture, or Technology.

Bachelor of Science in Education (B.S. in Ed.) is conferred upon students who complete the prescribed work in the College of Education.

Bachelor of Arts or of Sciences (B.S. or B.A.) (Pre-professional Study) for those who have continued work in certain professional schools after three years' undergraduate work at Orono.

A Five-Year Certificate in Pulp and Paper Management is issued which embraces a Bachelor of Science degree and a year's collateral study in the Pulp and Paper Management curriculum.

On the periodic lists submitted to the University Trustees, efforts are made to include each student who has completed degree requirements in the session immediately preceding the awards. Inadvertent omission of names may be guarded against by submitting an *Application for Degree* card to the Registrar's Office prior to the published deadlines for this purpose. In the absence of a request card, a diploma will be awarded showing the student's name as it appears on the most recent registration.

A minimum residence of one year is required for the attainment of any bachelor's degree. This regulation refers to the senior year. Two exceptions to this regulation were approved by the Trustees in 1968:

(1) Exceptions may be made for students who have already completed *three or more years at the University at Orono* who may be given permission by their academic dean, when there is sufficient and valid reason, to complete the senior year elsewhere under the general supervision of their Orono dean's office.

(2) Students who have completed a minimum of *three years of work at the University at Orono* and who have been admitted to an accredited professional school of medicine, dentistry, veterinary medicine, or divinity, either directly or after intervening military service, may qualify for the appropriate bachelor's degree at the University of Maine at Orono upon receipt of the professional degree, provided that their collegiate dean at Orono approves. This policy is retroactive. Inquiries about degrees awarded under this exception should be addressed to the Registrar.

BACCALAUREATE DEGREES WITH DISTINCTION are conferred at commencement for the following attainments in rank.

Seniors having an average grade of 3.50 or above will be graduated with highest distinction, 3.25 to 3.49 with high distinction and 3.00 to 3.24 with distinction if they meet the criteria listed below.

The average grade is based on the work of the first three and one half years which must include at the time of graduation three years of resident study at the University of Maine at Orono. Candidates must take their senior year at the University of Maine at Orono.

DEGREES WITH HONORS, WITH HIGH HONORS, OR WITH HIGHEST HONORS are awarded to seniors who successfully complete the Honors Program.

VALEDICTORIAN AND SALUTATORIAN. At the June commencement, the two highest ranking baccalaureate degree candidates are designated class valedictorian (highest) and salutatorian (next highest). This rank is based upon the first seven

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semesters' attendance, all of which must have been in resident instruction at the University of Maine at Orono.

The following advanced degrees or certificates are offered by the Graduate School:

Master of Arts (M.A.) and Master of Science (M.S.) with designation of the major subject or field.

Master of Agricultural and Resource Economics (M.A.R.E.).

Master of Business Administration (M.B.A.).

Master of Community Development (M. Comm. Dev.).

Master of Education (M.Ed.).

Master of Engineering (M.E.) with departmental designation.

Master of Library Service (M.L.S.).

Master of Mechanical Engineering (M.M.E.).

Master of Music (M. Mus.).

Master of Public Administration (M.P.A.).

The Certificate of Advanced Study (C.A.S.) with a planned program.

Doctor of Education (Ed.D.).

Doctor of Philosophy (Ph.D.) with designation of major field.

Grading System—Grades at the University are given in terms of letters as follows. (For purposes of comparison these letters carry the following arbitrary values for undergraduate students: A=4, B=3, C=2, D=1, E=0; for graduate students both D and E grade=0.)

Passing undergraduate grades: A, high honors; B, honors; C, satisfactory, successful, and respectable meeting of the course objectives; D, low level passing; Q, passed for degree credit on a *Pass-Fail* basis.

Passing graduate grades: A, high honors; B, honors; C, may be considered satisfactory by specific approval of student's advisory committee. *Acceptable*, applied to satisfactory theses only.

Failing grades: E, failed.

F, failed *Pass-Fail* course. (Does not affect grade point average).

L, registered for course. Non-attendance reported, no withdrawal on file. Equivalent to an E.

Y, dropped with grade of E.

Progress grade: R, final grade deferred (Primarily for theses).

Deficiency grades: X, absent from final examination; Z, deficiency in course work. Recorded initially as *, the asterisk denoting a deficiency. May be made up within periods stated in Handbook.

Non-credit grades: H, audited course; P, passed non-credit course or, when noted, withdrew passing; W, dropped without penalty.

Each college sets its own graduation requirements in terms of grades or grade points.

Candidates for associate and baccalaureate degrees must: (a) receive passing grades in all courses required by the major department, at a grade point level specified by the department or college (in no event less than 1.8, and usually at least 2.0); and (b) accumulate the number of degree hours specified by the college for the curriculum pursued. Details are given under each college's listing.

The degree hours are the sum of the course credit hours of those courses which may be counted toward a degree, provided a passing grade has been received.

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The accumulative average is the quotient of the grade points divided by the total hours, carried to two decimal places. The grade points are the product of the course credit hours and the numerical value of the letter grade: A=4, B=3, C=2, D=1, E=0. The total hours are the sum of the course credit hours from all courses except those taken on a Pass-Fail basis. Pass-Fail registrations do not affect the grade point average.

Degree requirements for graduate students are given in the Graduate School catalog.

Grade Reports—Students who are of legal age (18) or older may request at any registration period that “no copies of correspondence concerning my relationship with the University or performance records be sent to my parents or guardians.” Otherwise, grade reports are sent to the parents of all undergraduate students at the end of each semester; progress reports are sent to the parents of freshmen at the middle of each semester, and parents are notified whenever a student is placed on, continued on, or removed from probation.

Considerable care is taken to ensure that course registrations and grades entered on a student's permanent record are accurate. Any student who, upon receipt of a semester final grade report, suspects an error has been made should take the matter up immediately with the Registrar's Office. Records are assumed to be correct if a student does not so report to the Registrar's Office within six months of the completion of a course. At that time portions of the record are committed to microfilm, which cannot be emended.

Some Student Regulations—Much information of interest to students is contained in the *Student Handbook* available in the Student Affairs Office. A few policies of general interest are given here.

It is assumed that all students entering the University are willing to subscribe to the following: *A student is expected to show, both within and outside the University, respect for order, morality, and the rights of others, and such sense of personal honor as is demanded of good citizens.*

The University requires certain standards of academic performance and of general good character for admission; if these are not maintained, the University suspends or dismisses the student. Every effort is made to provide adequate academic and personal counseling for all students, with the aim of enabling them to successfully complete their courses of study.

MOTOR VEHICLES—*Freshmen are not permitted to have or operate motor vehicles at the University of Maine.* This regulation prohibits a freshman from keeping an automobile on the campus or in Orono or vicinity. Students are expected to observe the spirit as well as the letter of the regulation and the cooperation of parents is solicited in the operation of the rule. Exceptions may be made by the Security Registrar in cases of freshmen who commute daily from their homes.

Upperclass students are allowed to have and to operate motor vehicles on the campus, but all such vehicles must be registered in the office of Mr. Edward McLaughlin, Security Registrar, Police and Security Office, and bear an official University sticker. There is a registration fee of \$1.00.

DISMISSAL AND SUSPENSION—Students may be dismissed or suspended from the University for unsatisfactory work (academic dismissal* or suspension), for misbehavior (disciplinary dismissal or suspension), or for mental or physical health

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problems (administrative disenrollment). Dismissed students* are ineligible to *apply* for readmission for one year from date of dismissal; suspended students may apply for readmission effective upon termination of suspension. Dismissed students* are ineligible to register for credit or non-credit in any division of the University for one year following dismissal; suspended students for the duration of the suspension.

**Exception: First (fall) semester freshmen* dismissed in January for low grades (academic dismissal) may apply for readmission effective the end of the ensuing spring semester, without waiting for an entire year to elapse.

WITHDRAWAL—Students who desire to withdraw from the University for any reason must secure a withdrawal slip from the Registrar's Office and have it completed. Failure to do so may result in failing grades being recorded in all courses at the end of a semester. Additionally, withdrawal after the final date of the "withdrawal with penalty" period set by the University as detailed in student regulations, except for approved emergency reasons, will also result in failing grades.

INDEBTEDNESS TO THE UNIVERSITY—Bills are due no later than the registration day for each session. Unpaid and overdue balances in a student's account at the University Business Office result in the withholding of grade reports, transcripts, and graduation until satisfactory arrangements can be made with the Bursar or Business Manager. When tuition and/or room and board payments for a semester already in progress remain unpaid beyond the due date without acceptable arrangements for payment having been made, a student's academic registration may be cancelled and dormitory occupancy terminated. Further registration may be denied until the account is current.

PHYSICAL EXAMINATION—The University requires that all entering students, freshman, transfer, graduate, and special, have a physical examination, tuberculin skin test and also chest x-ray if required by a Student Health Center physician. Physical examinations and tuberculin tests may also be required of students seeking readmission to the University.

THE UNIVERSITY POLICE—The Department of Police and Security provides complete police service to the University community. This is available on a 24-hour basis. The University Police Department is primarily a service organization, eager to assist the students, faculty and staff in any way possible. Among the services rendered are: ambulance, passport photographs, job applicant fingerprinting, firearms safekeeping, and information.

The University police strive to set the example in the police field so that the student is exposed to competent, thorough police protection. Both graduate and undergraduate students are appointed by University Police to work with the department. The department's duties include, but are not limited to, the protection of life and personal liberties, protection of property, enforcement of University regulations and state statutes, traffic and parking control, and the prevention of crime. The department works with other University departments and maintains liaison with local, state, and federal law enforcement and public safety agencies. Each staff member is a trained, licensed ambulance attendant.

Responsibility for Personal Property—*The University does not under any circumstances assume responsibility for loss of or damage to personal property through fire, theft, or other causes. Persons desiring protection against possible loss or damage should purchase appropriate insurance unless it is found that parents already have desired coverage by means of a family policy.*

GENERAL INFORMATION

THE UNIVERSITY HONORS PROGRAM

General—The University Honors Program is open to all qualified undergraduate students in the University. Its purpose is twofold: (1) to introduce students of high scholastic potential to the major areas of knowledge—mathematics and science, social studies, literature, philosophy, and fine arts—through individual reading and small group discussion; and (2) to develop their skills to as high a degree as possible in the field in which they choose to concentrate.

The program in the freshman and sophomore years is the same for all colleges and is administered by the Honors Council. Its task is the orientation of the student to the broad perspectives of the academic world.

The programs for the junior and senior years vary somewhat from college to college and are administered by the Honors Committee of each college. Their task is to sharpen and focus the student's abilities in his own field of specialization.

Content—Students who are designated as Distinguished Maine Students, as well as a limited number of other highly qualified students (see page 38), may begin honors work in the fall semester of the freshman year in a seminar in which a limited number of books, chosen to cover the major intellectual disciplines, are discussed under the leadership of a faculty member. In the spring semester other qualified freshmen join the program. Honors work in the semester consists of a colloquium in which readings concerned with the seminal ideas of Western civilization are discussed by students with a faculty leader. The sections of the freshman seminar and colloquium are limited to 12 to 14 students each.

During the sophomore year, honors work is based on small group tutorials, each group consisting of three or four students. Each group meets weekly with a tutor for the discussion of books and ideas from the honors reading list. Every group does substantial reading in three or four major areas of thought each semester.

In the junior year the student begins his concentration in his major field. His work in honors may be a course of study under tutorial supervision designed to acquaint him with his major field, or, at the option of his college Honors Committee, he may take an interdisciplinary seminar in one semester of the year.

For the senior year, a thesis or research project, within or closely related to his field of primary interest, is the major part of his Honors Program. A final comprehensive examination before a faculty board tests the student's accomplishments in both objectives of the program: breadth of knowledge and depth of specialization within his major field.

Degree—The degree of honors awarded—Honors, High Honors, Highest Honors—depends upon three factors: the student's accumulative average over seven semesters; the quality of his senior thesis or project; his performance on the comprehensive examination. In order to receive a degree with Honors, a student must have a minimum of four semesters work in the Honors Program, including both semesters of the senior year, and at least one semester of sophomore group tutorials.

Entry—Selected entering freshmen are invited to enter the program on admission to the University; others are admitted at the end of their first semester. In addition, a substantial number of students are admitted at the beginning of the sophomore year, some at mid-years in the sophomore year, and a small number at the beginning of the junior year.

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Admission—Students are recommended for the Honors Program by the Honors Committee of the college in which they are registered and admitted to the freshman and sophomore programs by the Honors Council. To be eligible for consideration for the Honors Program, a student should normally have a point average of 3.0 or better, have high C.E.E.B. test scores, and show curiosity, initiative, and intellectual flexibility in the work he has done. Students wishing to join the Honors Program should consult the secretary of their college Honors Committee: Life Sciences and Agriculture, Prof. Homer B. Metzger, 207 Winslow Hall; Arts and Sciences, Professor R. B. Thomson, 15 North Stevens; Business, Associate Professor Jean Goodman, 20 South Stevens; Education, Professor G. H. Davis, 132 Shibles Hall; Technology, Professor R. C. Hill, 112 Boardman Hall.

Council—The University Honors Council, consisting of the Vice President for Academic Affairs as chairman, Professors Hill, Davis, Metzger and Thomson, and Associate Professor Goodman, administers the common program of the first two years and coordinates the work of the College Honors Committees. All questions in regard to the University Honors Program should be addressed to Professor Thomson, 15 North Stevens, Director of the University Honors Program.

Descriptions of honors courses will be found in the Arts and Sciences section of the catalog.

STUDENT GOVERNMENT

Student government at UMO has recently been reconstituted and as such is coordinated by the president and vice president of the student body. Student Government has access to any and all university offices; however, in time of jurisdictional dispute, it would report to the Office of the Dean of Student Affairs. The Student Activities Fee is distributed through the Finance Committee, which is composed of the presidents of all major boards and governmental organizations representing student needs and desires at UMO. The purpose of this structure is to make best use of the activities fee, and to insure student participation in the decision-making process at UMO.

The Student Government is a geographically apportioned body representing all students. The Student Government reports recommendations concerning students to the Orono Council of Colleges, UMO president, and the system-wide University of Maine organization of student governments, the board of trustees, and the chancellor. The president of the Student Government is the president of the student body. He or she is responsible for about 200 student appointments to various University committees concerned with such areas as discipline, residence hall rules, student-faculty relations, calendar, traffic, and many more. The Student Government is also responsible for the approval of all new student organizations.

This year several new boards have been established to serve the students. These are the Student Activities Board, Student Services, and Community Action Board as well as a council for each college to handle academic problems. It is hoped that the new structure will be more efficient than the old one and will allow for more student participation. Anyone interested in any aspect of student government from planning concerts to implementing new academic programs should stop in at 12 Lord Hall and get acquainted with the system and the people in it.

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The Student Government at UMO sponsors an Emergency Loan Fund created from the funds of the defunct Goodwill Chest. The loans are made available to individual students and student organizations for cases of necessity. The need is determined by the Emergency Loan Fund Committee, or, in the case of loans under \$50, by the committee chairperson.

Loans are requested by written statement including the amount needed, reason for loan, and plans for repayment. These loans are interest free for a period of 30 days. Delinquent debts shall be assessed an interest at a rate of one percent on principal, compounded monthly. Exceptions may be granted by the committee.

LEGAL AID—The Student Government sponsors legal aid for students four hours each week. A lawyer is available to answer questions, give advice and referrals, and initiate preliminary investigation of student grievances.

OFF-CAMPUS HOUSING ASSISTANCE—A complete file of available housing in the greater Orono area is open to all students 24 hours a day in the Student Government Center, 12 Lord Hall. These files give in-depth descriptions of apartment conditions and landlord relationships. They were updated in the spring, 1973. Also available is a Tenant's Handbook, citing local and state laws and services provided in the area for community residents.

THE MEMORIAL UNION, completed in 1953, is the community center for all members of the University family—students, faculty, administration, and guests. Expressed in its broadest terms, the purpose of the Union is synonymous with the goals of the University. Students today are taught to be questioners, skeptics, seekers of truth and critics of what they see and experience. The Union provides an out-of-class atmosphere for students to question and pursue truth.

Uniquely, the Union is for students and directed by students. The success of the Union in accomplishing its objectives is directly proportional to the quality of ideas contributed to the program by those students providing leadership. The Memorial Union Activities Board (MUAB) is the undergraduate organization that accepts the challenge of creating a varied and meaningful program. Program areas encompass social and recreational, cultural and intellectual. Students who are interested in membership in MUAB are encouraged to make their interest known at the MUAB offices on the second floor.

Facilities within the Union are meeting rooms, lounges, snack bar, dining facilities, and game rooms. Also, the Drummond Chapel gives students of all faiths an opportunity for spiritual meditation.

Scholastic Honor Societies—These groups recognize attainment and promise in the academic field by selecting for membership undergraduates whose accumulative point averages are not lower than 3.0 after completing five or more semesters of college work or 3.3 after completing less than five semesters. The date indicates when the chapter was established at the University.

PHI KAPPA PHI (1900)—All colleges

TAU BETA PI (1911) Engineering

PHI BETA KAPPA (1923)—College of Arts and Sciences

ALPHA LAMBDA DELTA (1970)—Freshman Women

OMICRON NU (1931)—Home Economics

KAPPA DELTA PI (1932)—College of Education

SIGMA XI (1948)—Scientific research

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Student Organizations—A complete descriptive listing of departmental and professional honor societies, departmental clubs, and other student organizations appears in the *Student Handbook*. Copies are available at the Dean of Student's office.

Musical Organizations—Students have many opportunities to continue their musical training and experience, either through the degree programs in music (details of these programs are listed under the College of Arts and Sciences and the College of Education), or through participating in any of the several organizations either for credit or non-credit. There are also smaller instrumental ensembles for the more advanced musicians.

For a description and course numbers of the following musical organizations, see the music courses listed in the College of Arts and Sciences section of this catalog.

UNIVERSITY SINGERS—U of M's most select choral organization; 52 mixed voices selected from applicants who have had considerable singing experience. This group sings extensively on the campus and throughout the state during the school year. The literature it performs embraces all periods of music history—Renaissance through the most recent contemporary. Touring itinerary frequently includes appearances outside the state.

UNIVERSITY ORCHESTRA—Composed of students for the purpose of preparing and performing standard orchestral repertoire. At least two concerts are presented annually. The spring concert features student soloists in a concerto program.

ORATORIO SOCIETY—A choral organization of approximately 75 singers specializing in performing larger works with orchestra and soloists.

CONCERT BAND—A well-balanced unit of 75 students carefully selected from the Orono campus that performs the finest available band literature. Both music and non-music majors are invited to audition; there are three rehearsals per week. The regular activities of the Concert Band include formal winter and spring concerts, a state band clinic, and a spring concert tour.

MARCHING HUNDRED—U of M's elite marching band of 100 musicians plus majorettes, "Honeybears," and drum major. Personnel are chosen from the Concert Band, Varsity Band, and incoming freshmen. Rehearsals begin shortly before the opening of the fall term.

CHAMBER SINGERS—A small group of mixed voices specializing in vocal music especially written for this performing medium. Several appearances during the year, both on and off campus.

Varsity Band—Plays good band music on a more informal basis; a training group for the Concert Band. The Varsity Band provides music at home basketball games in addition to at least one off-campus game.

UNIVERSITY CHORUS—Primarily for the inexperienced singer who wishes to acquire sufficient background for participation in other choral organizations.

ENSEMBLES: BRASS, WOODWIND, STRING—Limited participation by qualified students for study and performance of chamber music written especially for small ensembles.

20TH CENTURY ENSEMBLES—An improvisational group concentrating on instrumental music of the 20th century.

GENERAL INFORMATION

Maine Masque Theatre—As the University Theatre, it is an integral part of the academic and co-curricular program of the Department of Speech. The theatre provides an opportunity for all students to participate in every aspect of theatrical production, including stage and house managing, lighting, costuming, acting, directing, publicity, scenery, properties, and makeup. As a contribution to the cultural growth of the University community, the theatre offers productions which cover the full range of dramatic expression. Membership in the Maine Masquers, a local theatre honor society, may be gained through participation in the theatre's program.

Debate and Forensics—The University forensic program provides opportunities for experience in debate, discussion, extemporaneous speaking, oral interpretation, and original oratory. The program, under the administration and supervision of the Department of Speech, is open to all undergraduate students. Representatives participate in intercollegiate competition with major colleges and universities from the entire United States. Membership in the Maine Debating Council and Pi Kappa Delta may be obtained through participation in forensic activities.

Radio and Television—Students from the entire University have an opportunity, through working on stations WMEB-FM and WMEB-TV, to participate in all phases of radio and television broadcasting. With studios in 275 Stevens Hall, WMEB-FM is operated with a faculty manager and student staff as an integral part of the academic and co-curricular program of the Department of Speech. WMEB-TV, operated by the Maine Public Broadcasting Network, has studios in Alumni Hall. The varied program enables the student to gain valuable experiences in engineering, programming, announcing and writing.

Student Publications—The University's regular student publications are:
THE MAINE CAMPUS, a newspaper published weekly.

THE PRISM, an illustrated annual.

MARSHROOTS, a literary magazine published semi-annually.

The Student Publication Committee, a joint faculty-student group, is the publishing board for all the University's student publications.

Social Fraternities and Sororities—The following fraternities and sororities have chapters at the University. The figures in parentheses are the dates they were established.

FRATERNITIES—National: Beta Theta Pi (1879), Kappa Sigma (1886), Alpha Tau Omega (1891), Phi Kappa Sigma (1898), Phi Gamma Delta (1899), Sigma Alpha Epsilon (1901), Sigma Chi (1902), Theta Chi (1907), Delta Tau Delta (1908), Lambda Chi Alpha (1913), Sigma Nu (1913), Phi Mu Delta (1923), Alpha Gamma Rho (1924), Tau Epsilon (1929), Sigma Phi Epsilon (1948), Tau Kappa Epsilon (1948), Kappa Delta Phi (1968), Delta Upsilon (1970). Local Phi Eta Kappa (1906).

SORORITIES—National: Alpha Omicron Pi (1908), Phi Mu (1912), Delta Delta Delta (1917), Pi Beta Phi (1920), Chi Omega (1921), Delta Zeta (1924), Alpha Chi Omega (1958), Alpha Phi (1963), Alpha Delta Pi (1968), Sigma Kappa (1968).



Admission

All correspondence concerning undergraduate admission at the Orono campus should be addressed to the Director of Admissions, University of Maine, Orono, Maine 04473. Applicants interested in the Bangor campus should write directly to the Director of Admissions, University of Maine at Bangor, Bangor, Maine 04401.

Applicants for admission to the Graduate Division should write to the Dean of the Graduate School, Winslow Hall, University of Maine, Orono, Maine 04473.

A Social Security number is required of all U.S. applicants. Foreign students will be assigned a similar number.

ADMISSION TO THE FRESHMAN CLASS

The approval of candidates for admission is on a selective basis. The University is interested in candidates whose preparatory program, scholastic achievement, aptitudes, interests, character, health, and established study habits give definite promise of success in a senior college program. The University admits men and women, both residents of Maine and non-residents; it reserves the right to terminate admissions whenever the capacity of the University to care properly for the students has been reached.

The candidate is required to submit a carefully answered questionnaire concerning favorite studies, school activities, community interests, hobbies, choice of college course and other matters bearing upon preparation for a college program. This information is required so that the University may better guide the student in selecting courses of study best suited to his individual abilities, aptitudes, and interests.

All four-year degree candidates are required to submit the scores on the College Entrance Examination Board Scholastic Aptitude Test (S.A.T.), and the scores on three C.E.E.B. Achievement Tests. (For details, see section concerning the C.E.E.B. which follows.)

Candidates for admission to the freshman class should file their applications in the fall of the year prior to the date they plan to begin their studies

The required application forms (which are revised each summer) may be obtained by writing to the Director of Admissions on or after Sept. 15. *A non-refundable application fee of \$10 is required of all applicants.* Applicants must apply for admission prior to March 1 for equal consideration with other candidates. Applications received after this date will be marked "Late" and considered only as classroom and dormitory capacities allow.

Candidates for the freshman class normally are accepted for the opening of the academic year in September. (It is not our policy to admit transfer freshmen in the middle of the academic year.) The priority of the housing assignment is based primarily on the date of formal acceptance by the Committee on Admissions. *Certificates of admission issued prior to the completion of the current school year may be rescinded if the final report in June is unsatisfactory.*

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SCHOLASTIC APTITUDE AND ACHIEVEMENT TESTS

All candidates for admission to four-year degree programs and the associate degree programs in Engineering Technology at the Orono campus are required to take the Scholastic Aptitude Test (S.A.T.) and three Achievement Tests administered by the College Entrance Examination Board. Candidates are urged to take the November, December and/or the January tests. The Achievement Tests should include English composition, [Level I Mathematics is also required of all engineering candidates] and two other tests of the candidate's choice, or as recommended by the Director of Admissions. Veterans need only take the Scholastic Aptitude Test (S.A.T.).

Candidates for the two-year technical programs in the College of Life Sciences and Agriculture (Orono) are required to take the Scholastic Aptitude Test only.

High school juniors are encouraged to take achievement tests in *non-continuing subjects* on the May testing date. Guidance counselors should be consulted prior to registering for such tests.

Arrangements to take the C.E.E.B. Tests should be made by writing to the College Entrance Examination Board, P.O. Box 592, Princeton, New Jersey, for application forms and information. *Arrangements must be made at least one month before the testing date.* Application forms and information may be obtained from high school guidance counselors.

The College Entrance Examination Board will administer tests on each of the following dates:

Saturday, November 3, 1973 (S.A.T. only)

Saturday, December 1, 1973 (S.A.T. and Ach's)

Saturday, January 12, 1974 (Ach. Tests only)

Saturday, February 2, 1974 (S.A.T. only)

Saturday, April 6, 1974 (S.A.T. only)

Saturday, May 4, 1974 (Ach. Tests only)

Saturday, June 22, 1974 (S.A.T. only)

Official test reports from the Education Testing Service are required.

ADVANCE PLACEMENT

In certain subjects, candidates who have completed advanced work in secondary schools may apply for advanced placement and credit at the University of Maine. Candidates interested in advanced placement and credit must take one or more of the Advanced Placement Tests or the C.L.E.P. (College Level Examination Program) tests, administered by the College Entrance Examination Board. Each case will be considered individually on its own merits.

Information concerning our C.L.E.P. policies may be obtained from the Admissions Office.

Candidates who have had training and/or experience in certain professional or semi-professional fields may apply for advanced placement and credit at the University of Maine at Orono. Candidates interested in such placement and credit may take either appropriate standardized tests, such as those prepared by the College Entrance Examination Board (College Level Examination Program—C.L.E.P.), or examinations especially developed by the academic unit concerned.

VETERANS ADMINISTRATION INFORMATION

Mrs. Alice F. Harkins is prepared to help veterans and children of disabled and deceased veterans. Requests for information concerning Veterans Administration educational benefits should be forwarded to the Registrar's Office, Wingate Hall, University of Maine, Orono, Maine 04473.

Former students of the University as well as prospective students should submit their applications for admission to the University to the Director of Admissions. Applications for a Candidate of Eligibility should be made at a Regional V.A. Office.

For information on other matters concerning veterans affairs contact the Dean of Student Activities, Memorial Union.

SPECIAL LIVING ARRANGEMENTS (ORONO CAMPUS)

Applications for residence in Colvin Hall, women's cooperative dormitory, and the University Cabins for men, should be included with the application for admission. The necessary forms (financial aid) may be obtained from the Director of Admissions or from the Director of Student Aid, East Annex, Orono.

Unmarried freshman students shall live in one of the University housing units unless they can live at home. Exceptions to this rule are seldom considered by the University. Students requesting such exceptions must indicate this fact on the application card. In addition, the student must write a separate letter (to be sent along with the application) explaining in detail his housing plans, the reason for requesting an exception to the rule and the name and address of the person with whom he wishes to live.

FINANCIAL AID AND SCHOLARSHIPS

Applications for financial grants, loans under the National Defense Education Loan Plan, for participation in the Work-Study Program under the Economic Opportunity Act of 1964, and assistance under the Higher Education Act of 1965 may be obtained from the Admission Office or from the Office of Student Aid. Parents or legal guardians of all applicants for financial aid are required to file a Parents' Confidential Statement with the College Scholarship Service. Forms and information are available in each local high school. Requests for aid will be reviewed by the committee after the applicant has been formally notified of acceptance by the Director of Admissions. The University financial aid form should be filed before March 1, and preferably at the time the admission application is filed.

The University participates in the College Scholarship Service (CSS) of the College Entrance Examination Board. Participants in CSS subscribe to the principle that the amount of financial aid granted a student should be based upon financial need. The CSS assists college and universities and other agencies in determining the student's need for financial assistance. Entering students seeking financial assistance are required to submit a copy of the Parents' Confidential Statement (PCS) form to the College Scholarship Service, designating the University of Maine at Orono as one of the recipients. The PCS form may be obtained from a secondary school or the College Scholarship Service, P.O. Box 176, Princeton, New Jersey 08540 or P.O. Box 1025, Berkeley, California 94704. This form should be completed by January 1.

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Upperclass students may apply annually during designated periods for all types of financial assistance. Applications and PCS forms are available at the Office of Student Aid.

Part-time work opportunities, both on-campus and off-campus, are available to students. From applications filed each year, the Office of Student Aid refers students to suitable job openings as they are received. A satisfactory academic standing must be maintained during the working period. Freshman students are not encouraged to undertake part-time jobs that require an excessive amount of time.

A specially prepared brochure entitled Financial Aid is available from the Director of Student Aid upon request. Detailed descriptions of all types of financial aid programs are included.

**MINIMUM REQUIREMENTS FOR ADMISSION
COLLEGE OF ARTS AND SCIENCES**

English	4 units
Foreign Language	2 units in one language
Algebra	2 units
Plane Geometry	1 unit
History or Social Science	1 unit
Electives†	6 units
<hr/>	
Total	16 units

† Chemistry is recommended as an elective for Science, Medical Technology and similar curricula, and required for the Nursing program.
† ½ unit in Trigonometry is recommended for students who plan to major in Mathematics or Science.

COLLEGE OF BUSINESS ADMINISTRATION

English	4 units
Algebra	2 units
Plane Geometry	1 unit
History or Social Science	1 unit
Electives	8 units
<hr/>	
Total	16 units

COLLEGE OF EDUCATION

(Includes curriculum in Physical Education)

English	4 units	
Three units from one and two units from another of the following		
{ Foreign Languages		} 5 units
Mathematics		
Natural Sciences		
Social Studies		
Electives	7 units	
<hr/>		
Total	16 units	

United States History, Natural Sciences, and two units of Mathematics are recommended. Algebra I and II and Plane Geometry are required of those students who wish to prepare for teaching mathematics or science.

COLLEGE OF LIFE SCIENCES AND AGRICULTURE

1. Animal Sciences, Plant and Soil Sciences, Agricultural and Resource Economics, Agricultural Engineering, Agricultural Mechanization, Biological Sciences, School of Forest Resources.

English	4 units
Algebra	2 units
Plane Geometry	1 unit
Trigonometry (Agric. Engineering only)	½ unit or its equivalent
Science	2 units (one of which must be chemistry or physics)
History or Social Science	1 unit
Electives	5½-6 units
<hr/>	
Total	16 units

II. School of Human Development

English	4 units
Mathematics	2 units (at least 1 yr. of algebra)
Science	1 unit (chemistry recommended)
History or Social Sciences	1 unit
Electives	8 units
<hr/>	
Total	16 units

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III. Two-Year Technical Division (Orono campus only):
Candidates for admission to the Two-Year Technical Programs in Life Sciences and Agriculture must have graduated from high school and must complete the C.E.E.B. Scholastic Aptitude Test. (C.E.E.B. Achievement Tests are not required). A student should have two units of high school mathematics, one of which must be algebra. A candidate for the program in Forest Management should have completed algebra 1 and 2 and plane geometry. Students who contemplate transfer to the regular four-year curriculum must satisfy requirements for the College of Life Sciences and Agriculture.

COLLEGE OF TECHNOLOGY

I. English	4 units
Foreign Languages	— —(Two or more units in one language recommended but not required)
Algebra	2 units
Trigonometry	½ unit or its equivalent (not required for two-year engineering technology programs—See below)
Plane Geometry	1 unit
Chemistry or Physics	1 unit
History or Social Science	1 unit
Electives	6½-7 units
<hr/>	
Total	16 units

In addition to these course requirements, applicants must further qualify themselves by satisfactory performance on the Level I Mathematics Achievement Test administered by the College Entrance Examination Board.

II. Two-Year Engineering Technology Division (Orono campus only): Candidates for admission to one of the Two-Year Engineering Technology Programs must have completed the same courses as required of the four-year degree candidates with the exception of trigonometry. Also, candidates are required to complete the C.E.E.B. Scholastic Aptitude Test and three Achievement Tests (English Composition, Level-I-Math., and Physics or Chemistry).

ADMISSION OF SPECIAL AND SHORT COURSE STUDENTS

In exceptional cases, and when space permits, a mature person who presents satisfactory evidence of ability to benefit from work of a special college program may be admitted to the University as a special student. Such students are not candidates for degrees but will be registered in the college where the principal courses in their program are taught. Application forms may be obtained from the Director of Admissions.

ADMISSION TO THE CONTINUING EDUCATION COURSES

The University of Maine has undertaken a broadened program of adult education at various locations throughout Maine. This program includes credit courses, non-credit courses, short, and conferences as appropriate.

The categories of admission under the programs in Continuing Education are:

1. Degree Program Admission—Regular admission requirements are in effect for both undergraduate and graduate degree applicants. Applications should be filed with the Director of Admissions (undergraduate degree status) or with the Dean of the Graduate Division.
2. Special Students—Special students are those who have not made formal application for degree status but are interested in registering for courses through the Continuing Education Division (C.E.D.). These students must satisfy prerequisites for any course in which they enroll.

Many special students have the long range objective of earning a baccalaureate degree. Others have short range objectives and enroll in courses that offer vocational or cultural interests.

Students planning a degree program are required to arrange an appointment with a C.E.D. administrator to formulate future academic plans. Students whose objectives are more short range are strongly urged to arrange an appointment at the C.E.D. office.

Information and application forms may be obtained by writing the Director, Continuing Education, Merrill Hall, University of Maine, Orono, Maine 04473.

FORMER STUDENTS

Former students who desire to return to the Orono campus must file an early application (at least six weeks prior to the opening of classes) for readmission with the Director of Admissions. The applicant must arrange for official transcripts and catalogs to be forwarded to the Director of Admissions from all schools and colleges attended since leaving the University. A readmission application form may be obtained from the Admissions Office.

The request for readmission by a former student is reviewed and acted upon by the Academic Standing Committee in the college to which the student has applied.

ADMISSION BY TRANSFER

The admission of transfer students is necessarily carefully controlled. Admission is on a selective basis.

A student desiring to transfer to the University of Maine at Orono from another college of recognized standing must file an early application with the Director of Admissions—at least five months prior to the semester he plans to enter. This request must include a statement of the name and address of all schools and colleges attended as well as information indicating the desired curriculum.

The applicant must arrange for official transcripts and catalogs to be forwarded from all previously attended junior colleges, colleges, and universities to

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the Director of Admissions, University of Maine, Orono, Maine 04473. Students who have been dismissed from another college for any reason are not eligible for consideration for one year.

The evaluation of transcripts of academic work completed at institutions previously attended must be accepted as final at the time of enrollment.

NEW ENGLAND REGIONAL COOPERATION

New England's six states are working together to increase the number and variety of educational opportunities for the young people of the region. Under this cooperative program, qualified New England residents are given preferential admission at other state institutions in certain specialized programs not available within their own state. Students accepted in these programs are also granted the benefit of in-state or resident tuition and fees which are considerably lower than those usually charged out-of-state students. This plan makes available to the residents of the region a wider variety of programs at low cost—without additional funds being spent to duplicate specialized staff and expensive facilities in each state.

Each institution has designated which of its programs are to be offered on a regional basis and maintains control over its own courses and programs. The undergraduate programs begin at the freshman level. Other regional programs are available at the graduate level or for certain professional curricula.

Information may be obtained from high school guidance officials, from the New England Board of Higher Education, 40 Grove Street, Wellesley, Mass., 02181; or by writing to the directors of admission at the six New England state universities.

The New England Association of Schools and Colleges accredits schools and colleges in the six New England states. Membership in one of the six regional accrediting associations in the United States indicates that the school or college has been carefully evaluated and found to meet standards agreed upon by qualified educators. Colleges support the effort of public school and community officials to have their secondary schools meet the standards of membership.

Financial Information

STUDENT EXPENSES

The student expenses outlined in the following paragraphs are the anticipated charges for the academic year 1973-74. Changing costs may require an adjustment of these charges.

Tuition and Fees for the Academic Year*

Regular Students	Residents of Maine	Non-Residents of Maine
Tuition	\$550.00	\$1650.00

Estimate of Student Expenses

A partial list of necessary expenses for a semester is indicated below. It includes only items which are fairly uniform for all students.

Rates for One Semester	Residents of Maine	Non Residents of Maine
Tuition	\$275.00	\$825.00
Board and Room (University Dormitories) (7-day meal plan)	595.00	595.00
	<hr/> \$870.00	<hr/> \$1420.00

Textbooks, personal laboratory equipment, etc., are not furnished by the University and are estimated to cost from \$90 to \$160 per year.

A *student* fee for the support of student governmental organizations is now levied by the University and is incorporated in the semester bills.

The University provides a student health and accident insurance plan on a voluntary basis for 12 months following fall registration. The insurance is charged to every fully enrolled student on the fall semester bill.

Matriculation Fee—This fee of \$15 is required of all students registering for the first time who are candidates for a degree. It must be paid as part of the first term bill.

Payment of Bills—All University bills, including those for rooms and board in University buildings, are due and payable on or before registration day for each semester. An academic year consists of two semesters, fall and spring.

* The financial requirements of the University, changing costs, state and legislative action and other matters may require an adjustment of these charges and expenses. The University reserves the right to make such adjustments to the estimated charges and expenses as may from time to time be necessary in the opinion of the Board of Trustees up to the date of Final Registration for a given academic term. The applicant acknowledges this reservation by the submission of an application for admission or by registration.

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Installment Plans—Students and parents who prefer to pay their educational costs on an installment basis may do so. The University has made arrangements with Academic Service Management, Inc. for the following plan which may be used by both student and parent. An application for the installment plan must be obtained from the Business Office, Alumni Hall. The application and a \$20 participation fee (non-refundable) is to be mailed to AMS, 170 Broadway, Pawtucket, R. I. 02860, on or before June 1, 1973. AMS will bill the parent or student in ten (10) equal installments for the total yearly cost of education at the University. The total cost of this plan is \$15 per year. There are no other costs.

	Maine Resident	Non-Resident
Tuition	\$550.00	\$1,650.00
Insurance	25.00	25.00
Student Fee	12.00	12.00
Yearbook	8.00	8.00
Total for off-		
campus students	595.00	1,695.00
Room and Board	1,190.00	1,190.00
Total for students		
living on campus	\$1,785.00	\$2,885.00

Sample payment for a Maine resident living in a dormitory

June 1, 1973—Participation Fee	15.00
June 8, 1973	178.50
July 8, 1973	178.50
Aug. 8, 1973	178.50
Sept. 8, 1973	178.50
Oct. 8, 1973	178.50
Nov. 8, 1973	178.50
Dec. 8, 1973	178.50
Jan. 8, 1974	178.50
Feb. 8, 1974	178.50
Mar. 8, 1974	178.50

Sample payments for a non-resident living in a dormitory

June 1, 1973—Participation Fee	15.00
June 8, 1973	288.50
June 8, 1973	288.50
Aug. 8, 1973	288.50
Sept. 8, 1973	288.50
Oct. 8, 1973	288.50
Nov. 8, 1973	288.50
Dec. 8, 1973	288.50
Jan. 8, 1974	288.50
Feb. 8, 1974	289.50
Mar. 8, 1974	288.50

FINANCIAL INFORMATION

All incidental and additional charges must be paid directly to the University. Any refunds will be paid by the University directly to the parent or student.

Additional information may be obtained by writing the University of Maine, Business Manager, Alumni Hall, Orono, Maine.

Freshman Charges—The following table shows the fixed charges for the fall semester for freshmen:

	Residents of Maine	Non-Residents of Maine
Tuition	\$275.00	\$825.00
Room and Board (University Dormitories)* (7-day meal plan)	595.00	595.00
Freshman Orientation Period* *	32.00	22.00
Matriculation Fee	15.00	15.00
Insurance	25.00	25.00
	<hr/> \$932.00	<hr/> \$1,482.00

For freshmen who do not room and board in University dormitories, the charge is \$337 for residents of Maine and \$887 for non-residents.

Under certain circumstances, courses may be auditioned by qualified individuals. A tuition charge of the usual rate is made for an 'audit' registration unless a student is already registered full-time. Matriculated students register for a course on an audit basis through an academic adviser and academic dean. Others should consult the Admissions Office for instructions and specific prior approval.

All fully-enrolled students may avail themselves of the services provided by the University Health Service. Students registered for 10 or more semester hours are admitted without charge to athletic events and the Concert Series. Generally students registered for less than 10 hours may purchase tickets for these events.

Room and Board—The charge for room and board in the permanent dormitories for the fall semester, 1973, is \$595. The charge for room and board in Hannibal Hamlin Hall for the fall semester, 1973, is \$595. These costs are based on the 7-day meal plan. A 5-day meal plan is available for \$30 less per semester.

In the cooperative dormitories for women, the charge for room and board is based upon student effort in management and operation, and is at less than regular rates.

All University dormitories are closed to students during scheduled vacation periods.

Miscellaneous—A fee of \$10 is charged a student who registers after the prescribed day of registration.

The prescribed gymnasium uniform for women costs approximately \$25. Information regarding the uniform and where it may be purchased will be sent to incoming students during the summer.

* See statement under Room and Board.

* * Maximum (may vary according to room and board provided)

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The fees for students registered in Applied Courses in Music are indicated in the catalog section on Music.

Deposits—A deposit of \$25 is due when the applicant is notified of acceptance by the Director of Admissions. If a dormitory room is required, an additional \$25 is due. These deposits will be applied toward the student's account when he registers. (They should not be confused with the matriculation fee of \$15, which is a non-refundable charge.)

If a freshman, transfer, or readmission applicant notifies the Director of Admissions of withdrawal prior to June 1, the deposits will be refunded. *The deposits are forfeited in case of withdrawal after June 1.*

All upperclassmen desiring to live in a dormitory must pay a room deposit of \$25 during the spring in order to assure that rooms will be reserved for them in the fall. This deposit will be deducted from the fall semester bill. If it is found that dormitory accommodations are not desired the deposit will be refunded if the Housing Office is notified by August 1. If notice is not given by that date the deposit will be forfeited.

Locks for gymnasium lockers may be secured from the Physical Education Department and must be returned at the end of the spring semester. No deposit is required, but a charge of \$2.50 is made if the lock is not returned at the end of the year.

Refunds—Students leaving the University before the end of a semester will receive refunds. Tuition payment refunds will be paid as follows:

Educational and General Programs (Other than Summer Session)

1. **Tuition**—Tuition may be refunded in accordance with the scale and provisions set forth below for students withdrawing during the first nine weeks of a term.

- a. **Scale**—Attendance period is counted from first day of class and includes weekends and holidays. The refund will be reckoned from the date on which the student notifies the Registrar.

	Refund Percentage
1st and 2nd weeks	80%
3rd and 4th weeks	60%
5th and 6th weeks	40%
7th, 8th, and 9th weeks	20%
Over 9 weeks	No Refund

- b. **Provisions**

- (1) A student enrolled in a full-time program who drops or adds a course and continues to be in a full-time program will have no financial adjustments of tuition.
- (2) In no case will tuition be reduced or refunded because of voluntary absence from classes.
- (3) Tuition adjustments attributable to involuntary absence, e.g., extended illness and military service, will be processed by the respective campus on a case by case basis.

FINANCIAL INFORMATION

2. **Fees**—University fees are not refunded.

A room and board refund, approximately the cost of raw food, will be made for each day remaining in the semester.

Summer Forestry Camp—The charges for Summer Forestry Camp (near Princeton, Maine) described in the catalog section on Forestry are

Registration Fee	\$5.00
Tuition	\$150.00

Room and board and course fee Fy 19 S are assessed in addition to the above charges.

Rules Governing Residence

A student is classified as a resident or a non-resident for tuition purposes at the time of admission to the University. The decision, made by the appropriate campus Business Manager, is based upon information furnished by the student's application and any other relevant information. No student once having registered as an out-of-state student is eligible for resident classification in the University, or in any college thereof, unless he has a bona fide domiciliary of the state for at least a year immediately prior to registration for the term for which resident status is claimed. This requirement does not prejudice the right of a student admitted on a non-resident basis to be placed thereafter on a resident basis provided he has acquired a bona fide domicile of a year's duration within the state. Attendance at the University neither constitutes nor necessarily precludes the acquisition of such a domicile. For University purposes, a student does not acquire a domicile in Maine until he has been here for at least a year primarily as a permanent resident and not merely as a student; this involves the probability of his remaining in Maine beyond his completion of school. In general, members of the Armed Forces and their dependents are normally granted in-state tuition rates during the period when they are on active duty within the State of Maine.

Subject to the provisions of the preceding paragraph, the domicile of an unmarried minor follows that of the parents or legally appointed guardian. The bona fide year-round domicile of the father if living, otherwise that of the mother, is the domicile of such a minor, but if the father and the mother have separate places of residence, the minor takes the domicile of the parent with whom he lives or to whom he has been assigned by court order. If neither of the parents is living, the unmarried minor takes the domicile of his legally appointed guardian.

Subject to the provisions of the first paragraph, an adult student, defined for purposes of these rules as one who is either married or 18 years of age or older, will be classified as a resident of Maine if he or she completed 12 continuous months of domicile in Maine immediately preceding registration for the term for which resident status is claimed.

Subject to the provisions of the first paragraph, if a non-resident student has a spouse who has a residence in Maine, the student shall be deemed to have a residence in Maine.

To change resident status, the following procedures are to be followed:

- A. Submit "Request for Change of Residence Status" form to the Business Manager. If the Business Manager's decision is considered incorrect

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- B. The student may appeal the Business Manager's decision in the following order
1. Vice President for Finance and Administration—
where applicable
 2. President
 3. Vice Chancellor for Business and Financial Affairs—
University of Maine, Chancellor's Office
(This decision must be considered final.)

In the event that the campus Business Manager possesses facts or information indicating a change of status from resident to non-resident, the student shall be informed in writing of the change in status and will be given an opportunity to present facts in opposition to the change. The student may appeal the Business Manager's decision as set forth in the preceding paragraph.

No application will be considered for change after September 1 for the fall semester and January 1 for the spring semester.

All changes approved during a semester will be effective the beginning of the next semester; none are retroactive.

In all cases, the University reserves the right to make the final decision as to the resident status for tuition purposes.

Communications

Communications with reference to financial affairs of students should be addressed to the Business Manager of the University of Maine at Orono. Matters concerning all types of financial assistance should be referred to the Director of Student Aid.

STUDENT AID

The University of Maine at Orono-Bangor administers a variety of assistance programs to help students finance their education. It is fundamental principle of financial aid that students' first resources must be their own earning capacity, followed by the income and assets of their immediate families. A student who believes these resources will be inadequate should not hesitate to apply for aid. Applications may be obtained at any time by request to either the Admissions Office or Student Aid Office at Orono. Independent students and married students should consult with the Student Aid Office before applying to be certain that their special circumstances are considered.

All awards, including scholarships, are made solely on the basis of need, without regard to race, sex, religious beliefs, place of origin or academic capability. Some endowed scholarship funds specify that certain criteria of eligibility be met. These funds may be reviewed by referring to the University of Maine at Orono Scholarship and Loan Directory.

To enable the University to make proper judgment as to the amount and kind of assistance a student needs, a financial statement must be filed, along with the application for assistance. If a student is an applicant for admission to the freshman class he may obtain a Parents' Confidential Statement from his high school or by writing to College Scholarship Service, Box 176, Princeton, N. J. 08540. Students already enrolled, graduate students, and other applicants must

FINANCIAL INFORMATION

file a Parents' Confidential Statement or a Student Financial Statement available at the Student Aid Office, 107 East Annex, University of Maine, Orono, Maine 04473, or Admissions and Counseling Building, Student Services Center, University of Maine, Bangor, Maine 04401. Financial statements and applications must be filed each year whether or not the student has filed previously. The usual application deadline for an academic year is March 1. Financial statements should be mailed to the College Scholarship Service four to six weeks prior to the March 1 date to assure their arrival at the University before the deadline.

UNIVERSITY SCHOLARSHIPS—These are based primarily on need, but academic potential may be an additional criterion. Scholarships awarded through the Student Aid Office are primarily for undergraduates. Graduate students should apply through the Graduate School or the chairmen of their respective departments.

FEDERAL SCHOLARSHIPS (Supplementary Educational Opportunity Grants)—Only undergraduates are eligible. These are grants made available by the University of Maine from federal funds to students who meet certain low family income standards. Grants range from \$200 to \$1,000 per year and are renewable upon reapplication as long as need continues.

Other types of federal grants may also be available by direct application to the Office of Health, Education and Welfare in Washington, D. C. Inquire at your high school guidance office or the University Student Aid Office.

INDIAN SCHOLARSHIP PROGRAM—Assistance in the form of tuition and room and board is available to residents of Maine (one year or more) who are on a tribal census or who had a parent or grandparent on such a tribal census of a North American Indian tribe. Contact the Student Aid Office for further details.

NURSING SCHOLARSHIP PROGRAM—The Department of Health Manpower provides funds to the University of Maine for a Nursing Scholarship Program. Awards are made on the basis of need, as determined by the Parents' Confidential Statement. Under this program the maximum award that can be made to a student is \$1,500 per year. Nursing students on the Orono campus should apply for this scholarship assistance through the Orono Student Aid Office. (See corresponding Nursing Loan Program below.)

LAW ENFORCEMENT PROGRAM—This federally funded program provides assistance for students who are presently or who plan to be employed by a publicly funded local, state, or federal law enforcement program. Up to \$1,800 a year may be borrowed by students who, during their course of study, earn 15 semester credits in subjects "directly related" to law enforcement. These students must intend to pursue full-time employment in a law enforcement agency at the completion of their studies. The total loan may be cancelled at the rate of 25% per year for service in such an agency. Grants also are available for full- or part-time students who are currently employed in a full-time capacity by a law enforcement agency.

FEDERAL WORK-STUDY PROGRAM (Summer and Part-Time)—With the assistance of federal funds, the University is able to provide many employment opportunities either on the campus or in various off-campus agencies both in Penobscot County and, in many cases, in the student's home community, even in other states. Some of these jobs provide work experience directly related to the student's educational objective, while at the same time providing regular income for educational expenses. Students are limited to 15 hours per week during the school

UNIVERSITY OF MAINE

term but may work 40 per week during the summer or other school vacations. Eligibility is based on need, and earnings must be related to total educational costs. Incoming freshmen (after acceptance) are eligible to apply for summer work before their freshman year.

Cooperative Housing Units (Orono)

COLVIN HALL—This is a cooperative dormitory for women students, housing approximately 50 undergraduate women. Residents do light housekeeping and help prepare food, resulting in substantially reduced costs.

CABINS—The University operates 10, four-man cabin units for men. A modest per person rental charge is made for each semester. It covers the cost of all utilities and basic furniture. Members of each cabin unit provide and prepare their own meals and perform all housekeeping chores.

University Loans

University loans are awarded to students for educationally related expenses, usually on the basis of need. Repayment begins after graduation. Moderate interest charges are specified at the time the loan is made. Repayment schedules are established by the student and the Business Office.

State Guaranteed Loan Program

Accepted entering freshmen and currently enrolled students may apply for loans under this program through commercial banks, credit unions or other lending institutions, preferably in their home community.

While individual bank policies vary as to amounts of loans allowed, federal regulations limit loans to a \$2,500 annual maximum. The total accumulative outstanding loan may not exceed \$7,500 for an undergraduate or \$10,000 for a graduate student.

The interest rate is 7% per year. Some students may be eligible to have the federal government pay this 7% yearly to the lending institution while the borrower remains in at least half-time student status. As of March 1, 1973 the University of Maine at Orono Office of Student Financial Aid is required to review the financial need of the parents and/or the student requesting such loan and to recommend the lending institution an amount the student should be permitted to borrow under the federal interest subsidy. The Office of Student Financial Aid currently is using the College Scholarship Service (CSS) needs analysis system. A (CSS) Parents' Confidential Statement or Student Confidential Statement should be filed with the Aid Office in addition to the loan forms obtained from the bank or credit union, only if the applicant wishes to be considered for the federal subsidy.

The form should be filed as per instructions unless the borrower is otherwise instructed by the staff of the Aid Office. The Aid Office will be willing to review any decision made concerning eligibility for interest benefits upon presentation of new information not previously available. If a borrower does not qualify for interest subsidy payments lending institutions may still make a loan available. However, the borrower would be required to pay the yearly 7% interest to the lending institution directly.

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Repayment begins nine to 12 months after the borrower has completed his or her studies. The loan may be deferred for service in the armed services or for Peace Corps or while continuing at least half-time additional study. The repayment period may be five to 10 years on loans of more than \$2,000, and one to five years on loans less than \$2,000. Usually a minimum monthly payment of \$30 will be required.

NATIONAL DIRECT STUDENT LOANS (Formerly Called National Defense Student Loans)—Amounts awarded are based on the student's need. Undergraduates are limited to a maximum of \$5,000 for four years. Graduate students may borrow up to \$10,000 total, including their undergraduate loans. No interest is charged on loans until repayment begins. Ordinarily a repayment period of 10 years is permitted, at an interest charge of 3% on the unpaid balance, beginning nine months after graduation. Grace periods of three years' payment of capital or interest are allowed for military service, Peace Corps service and VISTA service. Also, no payments are required as long as the student remains at least a half-time student at either the graduate or undergraduate level.

Cancellation of the loan amount, plus interest, is granted to those who become full-time teachers in elementary or secondary education in "deprived" areas and to teachers of the handicapped. Cancellation for such teaching service shall be at the rate of 15% for the first and second year, 20% for the third and fourth year and 30% for the fifth year so taught. Teachers in Head Start programs may also receive cancellation benefits but only at the rate of 15% per year up to the total loan amount. An annual 12½% cancellation is granted for military service up to a total of 50% of the amount owed for each year served in an area of hostilities. Loans are awarded on an academic-year basis only and must be reapplied for each year. They are not automatically renewed. These regulations may be changed from time to time by the Office of Education.

NURSING STUDENT LOANS—Nursing students may apply for up to \$1,500 per academic year. Amounts awarded will be based on the student's need. No interest is charged on loans until the repayment period begins. A repayment period of 10 years is permitted with interest of 3% charged on the unpaid balance. Repayment begins nine months after graduation with a period of grace allowed for time spent in full-time graduate study, active duty in military service or Peace Corps service. Cancellation of 10% of the loan plus interest is granted for each year spent after graduation in employment as a full-time professional nurse up to 100% of loan, plus interest, at a rate of 15% for each complete year of service, is possible for students who later choose to work in designated large population centers. Loans are cancelled for death or permanent total disability. Loans are awarded on an academic-year basis only and must be reapplied for each year. They are not automatically renewed.

NOTE: The University's estimate of a student's need is based on an analysis of information supplied on the financial statement. Frequently, various forms of assistance must be combined to meet the student's total need. In the event an applicant receives other assistance after the financial statement is received, the University may be required to adjust the total amount of aid promised to a student. It is the student's responsibility to report receipt of such assistance to the Student Aid Office. All financial aid resources are limited in some way, and it

UNIVERSITY OF MAINE

is our intent to use these resources in such a way that the greatest number will benefit.

In estimating a student's financial need, the University anticipates that incoming freshmen will save between \$300 and \$400 from their summer earnings in the summer prior to their entrance.

LOAN FUNDS

The American Association of
University Women Loan Fund
The Jacob Aggar Loan Fund
The American Institute of Electrical
Engineers Loan Fund
The William E. Barrows Loan Fund
The O. Merrill Bixby Loan Fund
The Boston Alumni Fund
Katherine M. and Walter H.
Bragg Fund*
The Carleton Orchard Fund
The Gordon L. Chapman Loan
Fund
The Class of 1907 Loan Fund
The Class of 1913 Loan Fund
The Class of 1914 Loan Fund
The Class of 1933 Loan Fund
The Class of 1936 Loan Fund
The Class of 1944 Loan Fund
The Frederick W. Conlogue Loan
Fund
The Cumberland County Alumni
Association Student Loan Fund
The Charles D. Darling, Jr.
Memorial Fund
The George P. Davenport Student
Loan Fund
The Delta Chi Alpha Loan Fund
The Delta Delta Delta Loan Fund
The Robert W. DeWolfe Fund*
The Drummond Fund
The Esther Eayres Chapter, Daugh-
ters of American Revolution
Loan Fund
Harry A. Emery (Maine 1906)
Fund*
The Thomas G. Feltman-John E.
Field, Jr. Loan Fund

The John Fils Memorial Fund
The General Loan Fund
The Henry Fairfield Hamilton
Loan Fund
The Maynard A. Hincks Memorial
Fund
The Chester A. Jenkins Loan Fund
The Kappa Psi Loan Fund
The John Fitzgerald Kennedy Me-
morial Loan Fund
The Francis Gregory King Me-
morial Loan Fund
The Kittredge Fund
The H. Walter Leavitt Loan Fund
A.D.T. Libby Loan Fund
The Philip W. Lown Loan Fund
The Maine Alumni Association of
Boston Loan Fund
The Maine Alumni Teachers As-
sociation Loan Fund
The Maine Association of Engi-
neers Loan Fund
The Maine Campus Fund
The Maine State Florists Associa-
tion Loan Fund
The Mrs. Maine Club Loan Fund
The Ralph Packard Loan Fund
The Charles H. Payson Loan Fund
The Phi Eta Kappa Loan Fund
The Milton D. Proctor Loan Fund
The Pulp and Paper Foundation
Loan Fund
The Hope and Helen J. Robinson
Loan Fund
The Schiro Family Loan Fund
The Senior Skull Loan Fund
The Sigma Chi Loan Fund
The Mary S. Snow Memorial
Loan Fund

SCHOLARSHIPS

The Southern New Hampshire
Alumni Loan Fund
The Bertha Joy Thompson Loan
Fund
The George W. Treat Fund
The Ernest A. Turner Loan Fund

The Diong Diek Uong Loan Fund
The Wheelden-Bassett Fund
The Frances D. Young Loan Fund

(* -In University of Maine Foundation)

SCHOLARSHIPS

Trustee Undergraduate Tuition Scholarships

The Merritt Caldwell Fernald
Scholarship
The James Stacy Stevens Scholar-
ship
The Harold Sherburne Boardman
Scholarship
The Leon Stephen Merrill Scholar-
ship
The Charles Davidson Scholarship
The College of Business Adminis-
tration Scholarship

The John Homer Huddilston
Scholarship
The Rising Lake Morrow Scholar-
ship
The Indian Scholarships
The University Scholarships
The Foreign Student Scholarships
The Science Scholarship

Endowed Scholarships

The Agricultural Club Scholarship
The American Welding Society
(Maine Section) Scholarship Fund
Albert E. Anderson Class of 1909
(Law) Fund
The Appreciation Scholarship Fund
The Robert I. Ashman Fund
The Bancroft and Martin Scholar-
ship Fund
The Bangor Business and Profes-
sional Women's Scholarship Fund
The Bangor Daily News Scholar-
ship Fund
Lewis O. Barrows Scholarship Fund
The Harold H. Beverage Award
Fund
Myra Baker Bickford Scholarship
Fund
William Bingham, 2nd, Scholar-
ships
William Bingham, 2nd Scholar-
ships in Honor of Payson Smith
The William H. Boardman Scholar-
ship Fund

James H. Boody Scholarship Fund
The William E. Bowler Scholar-
ship Fund
The Geraldine Brewster Scholar-
ship Endowment Fund
The Edgar W. Brigham Scholar-
ship Fund
The Adelaide G. Bunker Educa-
tional Fund
Harold M. Carr Scholarship
Fund
The Class of 1905 Scholarship
The Class of 1926 Scholarship
Fund
The Class of 1931 Scholarship
The Class of 1932 Winthrop C.
Libby Scholarship Fund
The Class of 1935 Student Aid Fund
The Class of 1940 Student
Emergency Fund
The Class of 1941 Memorial
Scholarship Fund
The Class of 1943 Student Aid
Fund

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The Class of 1954 Scholarship
The Class of 1957 Scholarship
The Class of 1961 Scholarship
The Class of 1968 David R.

Rittenhouse Scholarship Fund
The Albert D. Conley Fund
The Donald P. and Francelia D.
Corbett Fund

Merton C. Corson Memorial Fund
The Walter Joseph Creamer Fund
The Oliver Crosby Scholarship
Fund

The Harold R. Cummings Scholar-
ship Fund
The Vaughn Merrill Daggett
Scholarship Fund

The Frank Conant Day Fund
The C. Walton Deckelman Me-
morial Fund

The Arthur Lowell Deering Fund
The Delta Delta Delta-Frances
Kent Murray Scholarship

The Dwight D. Demeritt Forestry
Award

The Charles Alexius Dickerson
Scholarship Fund
Richard C. Dolloff Scholarship
Fund

The Henry L. and Cora Russell
Doten Fund

The Charles Leslie and Helen H.
Eastman Scholarship Fund
E. Perrin Edmunds Scholarship
Fund

The Lloyd H. and Evelyn E.
Elliot Scholarship Fund

The Joseph and Mollie Emple
Scholarship Fund

The Rachel W. Engel Scholar-
ship Fund

The Harry H. and Ida E. Epstein
Scholarship Fund

The Fred S. N. Erskine Scholarship
Fund

The Joseph Rider Farrington Schol-
arship

The Edward Files Scholarship Fund

The John P. Fitch Scholar-
ship Fund

The Deacon Ephraim Flint Scholar-
ship Fund

The Fort Kent Future Farmers
Scholarship Fund

The Ella Somerville Foster Schol-
arship

The Louis J. Freedman Forest
Management Award

The Harold F. French Fund

The Salomie and Eulalia Gardner
Fund

The Mary French Geyer Scholar-
ship Fund

The Dr. Noel Davis Godfrey Schol-
arship Fund

The Charles B. Gould Fund

The Fred H. and Alice V. Gould
Scholarship Fund

The George Parker Gould Schol-
arship Fund

The Edith L. Greene Scholarship
Fund

The Henry L. Griffin Scholarship
Fund

The Gushee Scholarship Fund

The Eugene Hale Scholarship Fund

The Everett G. Ham Scholarship
Fund

The Henry Fairfield Hamilton
Fund

Allen Crosby Hardison Scholar-
ship Fund

The Helen C. Hardison Scholar-
ship Fund

The Alonzo J. Harriman Scholar-
ship Fund

The Elise R. Hatch Memorial Fund

The Philip R. Hathorne Scholarship

The Helen B. Hemingway Memorial
Fund

The Lillie C. Hemphill Scholarship
Fund

The Benjamin Higer Memorial
Scholarship Fund

The Frederick W. and Marianne
Hill Scholarship

The Linnie P. Hills Fund

The Kenneth W. Hodgdon Fund

SCHOLARSHIPS

The David Dunlap Holmes Scholarship Fund
The Ralph Maynard Holmes Scholarship in Physics
The Hovey Memorial Scholarships
The Will R. Howard Scholarship Fund
Mary L. Hoyt Mathematics Memorial Fund
The Carrol C. Jones Scholarship
The Max Kagan Family Foundation Scholarship Fund
The Kidder Scholarship
The Spofford H. Kimball Scholarship Fund
The Charles E. Knowlton Fund
The Mac and Lillian Lacritz Scholarship Fund
The Fred L. Lamoreau Scholarship Fund
The Ralph W. Leavitt, Sr., Scholarship Fund
The Lucien P. Libby Scholarship Fund
The Winthrop C. and Elizabeth T. Libby Student Assistance Fund
The Limestone Future Farmers Scholarship Fund
The Maine Extension Association Scholarship Fund
The Thomas G. Mangan Scholarship Fund
The John L. McCobb Scholarship Fund
The Marguerite E. McQuaide Scholarship Fund
The Rebecca and Benjamin Mendelson Memorial Scholarship Fund
The Daniel W. Merritt Scholarship Fund
The Marion Farrington Merritt Memorial Fund
The Alma Taylor Milne Fund
The Calvin H. Nealley Scholarships
James Daniel O'Connell Scholarship
Timothy P. O'Connor, '24, Memorial Fund
The Gilbert Crosby Paine Scholarship

The Edward E. Palmer Scholarship
The Perley Burnham Palmer Scholarship Fund
The William Emery Parker Scholarship
The Clifford Spruance Patch Scholarship Fund
The Jean Spruance Patch Fund
The William N. Patten Scholarship Fund
The Charles H. Payson Scholarships
The Ralph H. Pearson Fund
The Franklin H. Phinney Memorial Fund
The Stanley Plummer Scholarship
The Frank P. Preti Scholarship Fund
The Frederick G. Quincy Scholarship Fund
The Henri Raffy Memorial Fund
The Robbins & White, Inc. Scholarship Fund
Round Top Farms Scholarship Fund
The Samuel and Pauline Rudman Scholarship Fund
The Herbert Sargent Student Aid Fund
The Lera B. Saunders Fund
The Arthur E. Silver Scholarship Fund
The Leroy C. Smith Scholarship Fund
J. Robert Smyth Scholarship Fund
The Mary S. Snow Memorial Fund
The Frank Elwyn Southard Fund
The Adelbert W. and Irene K. Sprague Scholarship Fund
The Dean John E. Stewart Memorial Scholarship Fund
The Anne E. Stodder Scholarship Fund
The James and Sarah Striar Scholarship Fund
Richard F. Talbot Scholarship Fund
The Bertha Joy Thompson Scholarship Fund
The James E. Totman Fund
The Nathan Pratt Towne Scholarship Fund

UNIVERSITY OF MAINE

The UMO Athletic Grant-in-Aid and
Scholarship Fund
The University Store Company
Scholarship Fund
Marcus L. Urann Fund
The Mary Maxfield Valentine Me-
morial Scholarship
The Sergeant Walter McClymonds
Wales Scholarship Fund
The Donald S. Walker Scholar-
ship Fund
James C. Wemyss, Jr. Scholar-
ship Fund
The Benjamin T. Weston
Scholarship Fund

The Charles P. Weston Scholarship
Fund
The James F. White Scholarship
Fund
The Mott F. Wilson Scholarship
Fund
The Gerald E. Wing Scholarship
Fund
The Julia E. Winslow Scholarship
Fund
The Charles F. Woodman Fund
The Harold Worthen Forest
Management Fund
The Robert C. Worrick Scholarship

Annual Scholarships

The Alcoa Foundation Scholarship
Award
All-Maine Women Scholarship
The American Agriculturist
Foundation Scholarship
The Army ROTC Scholarships
The Lucius D. Barrows Scholarship
Adelaide C. and Alan L. Bird Annual
Scholarship Trust Fund
The Boston Paper Trade Associa-
tion Scholarships
The Louis Calder Foundation
Scholarships
The Class of 1960 Scholarship
The Class of 1960 Athletic Schol-
arship
The Charles M. Cox Trust Fund
The Walter O. Foster Scholarship
Fund
The General Motors Scholarship
The Graduate "M" Club Scholar-
ships
The Stanley D. Gray Scholarship
Fund
The Homelite Forestry Scholarship
The Knox County Fish and Game
Association Scholarship
The Knox-Lincoln County
Women of Extension Scholarship
The Winthrop C. Libby U of M
Homecoming Scholarship

The Maine Bridge Association
Scholarship Fund
Maine Chapter, American Public
Works Association Scholarship
The Maine Life Scholarship
The Maine Managers' Scholarship
The Maine Potato Growers, Inc.,
Scholarship
The New England Farm and Garden
Association Scholarships
New York Mercantile Exchange
Scholarship
The Northern Division Paper
Industry Management Association
Scholarship
The Velma K. Oliver Phi Kappa
Phi Scholarship
Onward Fund
The Paper Trade Journal Scholar-
ship
Penobscot Alumnae Alpha Delta Pi
Scholarship Award
The Ralston Purina Scholarship
The Retail Lumber Dealers Associa-
tion of Maine Scholarship
The Harrison L. Richardson Schol-
arship
The Senior Alumni Association
Scholarship
The Senior Skull Scholarship

SCHOLARSHIPS

The Carl R. and Laura Smith
Scholarship
The Sophomore Eagles Scholarship
Awards
The Sophomore Owls Scholarship
The Dean John E. Stewart Scholar-
ship
Oscar E. and Dorcas D. Taylor
Annual Scholarship Fund
The Charles Irwin Travelli Schol-
arship Fund
The Marcus L. Urann Scholarship

The Joel J. and Annie H. Walker
Scholarships
The Stanley M. Wallace Scholar-
ship
A Western Electric Company Schol-
arship
The Beatrice Batchelder Wright
Scholarship
The York County Poultry Improve-
ment Association Scholarship
The Zonta Club of Bangor Scholar-
ship

Alumni Association Scholarships

The Androscoggin Valley Alumnae
Scholarship
The Black Bear Club of Rhode
Island Scholarship
The Massachusetts North Shore
Alumni Association Scholarship
The Portland Alumnae Association
Scholarship

The Southern Connecticut Alumni
Association Scholarship

The Southern Penobscot Alumnae
Association Scholarship

The Western Pennsylvania Alumni
Association Scholarship

UNIVERSITY OF MAINE FOUNDATION FUNDS

The Archie A. Adams Scholarship
Fund
The Edwin Wentworth Adams
Scholarship Fund
The Maria S. Appleton Fund
The Hazen H. Ayer Scholarship
Fund
The Dr. Tibor Jalsoviczky Bebek
Memorial Fund
The Hosea B. Buck Memorial Fund
Buxton-Hollis Community Hospital
Fund, Inc.
The Ava H. Chadbourne Fund
The Elwood I. and Hazel P. Clapp
Scholarship Fund
The James W. Clarkson Fund
Class of 1906 Fund
Class of 1909 Scholarship
Class of 1910 Scholarship
Class of 1911 Fund
Class of 1912 Fund
Class of 1915 Student Aid Fund

Class of 1916 Scholarship Fund
Class of 1917 Scholarship Fund
Class of 1918 Fund
Class of 1919 Fund
Class of 1920 Fund
Class of 1920 Scholarship Fund
Class of 1921 Fund
Class of 1922 Fund
Class of 1923 Fund
Class of 1924 Scholarship Fund
Class of 1925 Fund
Class of 1927 Fund
Class of 1928 Fund
Class of 1929 Student Aid Fund
Class of 1930 Fund
Class of 1937 Scholarship
Class of 1938 Students Aid Fund
Class of 1939 Scholarship Fund
Class of 1946 Fund
Class of 1947 Fund
Class of 1949 Scholarship Fund
Class of 1951 Fund

UNIVERSITY OF MAINE

Class of 1952 Fund
Class of 1953 Grant-in-Aid-Fund
Class of 1958 Scholarship
Class of 1962 Sterritt Fund
Arthur C. Clayton Horticultural
Scholarship Fund
Charles E. Crossland Fund
C. Parker Crowell Fund
Eugene Danforth Scholarship Fund
The Robert W. DeWolfe Fund
Leon S. Dixon Scholarship
Fund
Emma Jane Eaton Fund
Harry Emery Fund
James Adrian Gannett Scholarship
Fund
Charles E. Gilbert Scholarship
George P. Gould & Antoinette G.
Torrey Fund
Pearl R. Graffam Scholarship Fund
Greater New York Alumni Associa-
tion Scholarship Fund
Lucy F. Griffin Fund
Clifton A. Hall Scholarship Fund
George E. Hamblen Fund
Robert C. Hamlet Fund
George O. Hamlin Fund
James Norris Hart Scholarship
President Hauck Scholarship Fund
Thelma L. Kellogg Fund
Benjamin C. Kent Fund
Harriet S. Kilby Scholarship
Harland A. Ladd Scholarship Fund
Nathan Levitan Scholarship Fund
Alfred B. Lingley Scholarship Fund

George E. Lord Scholarship Fund
Harold P. Marsh Fund
Sara Mason Scholarship Fund
The Elsie C. Moody Scholarship
Fund
Frank P. Morrison Scholarship
Fund
William A. Murray Fund
Penobscot Valley Alumni Associa-
tion Scholarship
Thomas Allen Perkins Medical
Fund
Harold M. Pierce Fund
Wesley C. Plumer Fund
John Reed '89 Scholarship Fund
Rhode Island Alumni Association
Scholarship
The William F. Scamman Scholar-
ship Fund
Senior Alumni Scholarship Fund
Ben Sklar Scholarship Fund
Anna Strickland Fund
William Jordan Sweetser Fund
The Helen White Tobey Scholar-
ship Fund
Chestina Blaisdell Urann Fund
Viles Family Scholarship Fund
William Wesley Walbridge
Scholarship Fund
Alburney E. Webber, Jr., Scholar-
ship Fund
Ralph Whittier Fund
Dorothy H. and Arthur O. Willey
Fund

University of Maine Pulp and Paper Foundation Funds

The Warren B. Beckler, Jr. Schol-
arship Fund
The Joseph A. Benedetto Scholar-
ship Fund
The Philip S. Bolton Scholarship
Fund
The James A. Cameron Scholar-
ship Fund
The Chisholm Family Fund
The Stuart B. Copeland Fund
The Knud Dahl Scholarship Fund

The Samuel Dauman Scholarship
Fund
Otis G. Fales Scholarship Fund
The Roy K. Ferguson Fund
The Frederick H. Frost Scholar-
ship Fund
The Edward M. Graham Scholar-
ship
The Abel Arthur and Adelaide Scott
Greep Scholarship Fund
The John S. Heuer Fund

SCHOLARSHIPS

The Paul Hodgdon Scholarship Fund
The Harold Holden Fund
The Huyck Scholarship Fund
The Everett P. Ingalls Scholarship Fund
The Everett Keith Mansfield Fund
The Manuel C. McDonald Scholarship Fund
The David C. Murchison Scholarship Fund
The J. Larcom Ober Scholarship Fund

The George Olmsted Scholarship Fund
The Francis E. Pearson Jr. Fund
The Glen T. Renegar Fund
The Margaret Murchie Riegel Scholarship Fund
The Benjamin I. Sheldon Fund
The Elizabeth F. Soderberg Fund
The Elvah L. Soderberg Scholarship Fund
The Diong Diek Uong Scholarship
The Ralph A. Wilkins Scholarship Fund

PRIZES

Endowed Prizes and Awards

Frank B. Bickford and Charles S. Bickford Memorial Prize Fund
The Manfred A. Carter Poetry Prize
The Prize of the Class of 1873
The Milton Ellis Prize
The Claude Dewing Graton Prize

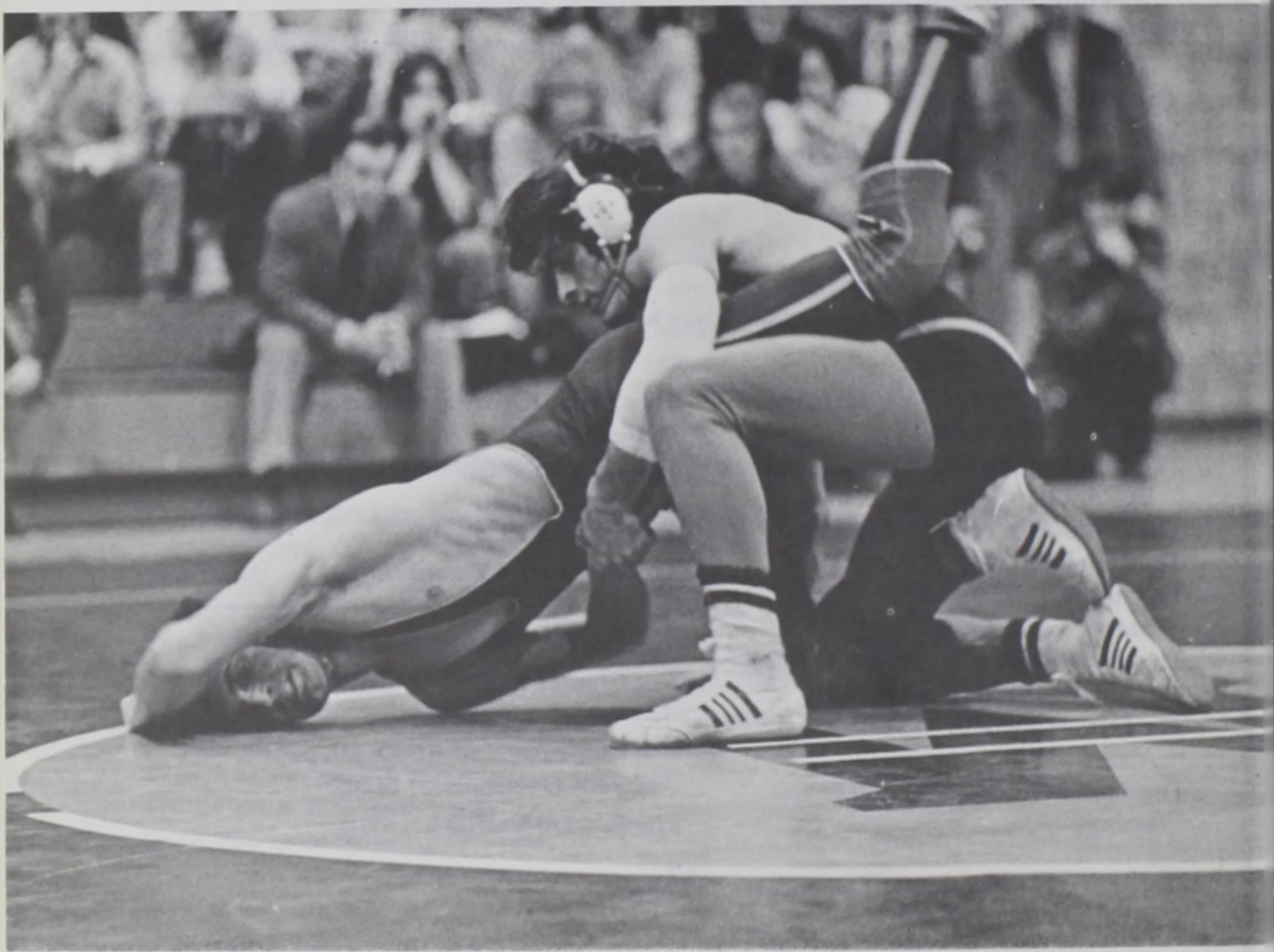
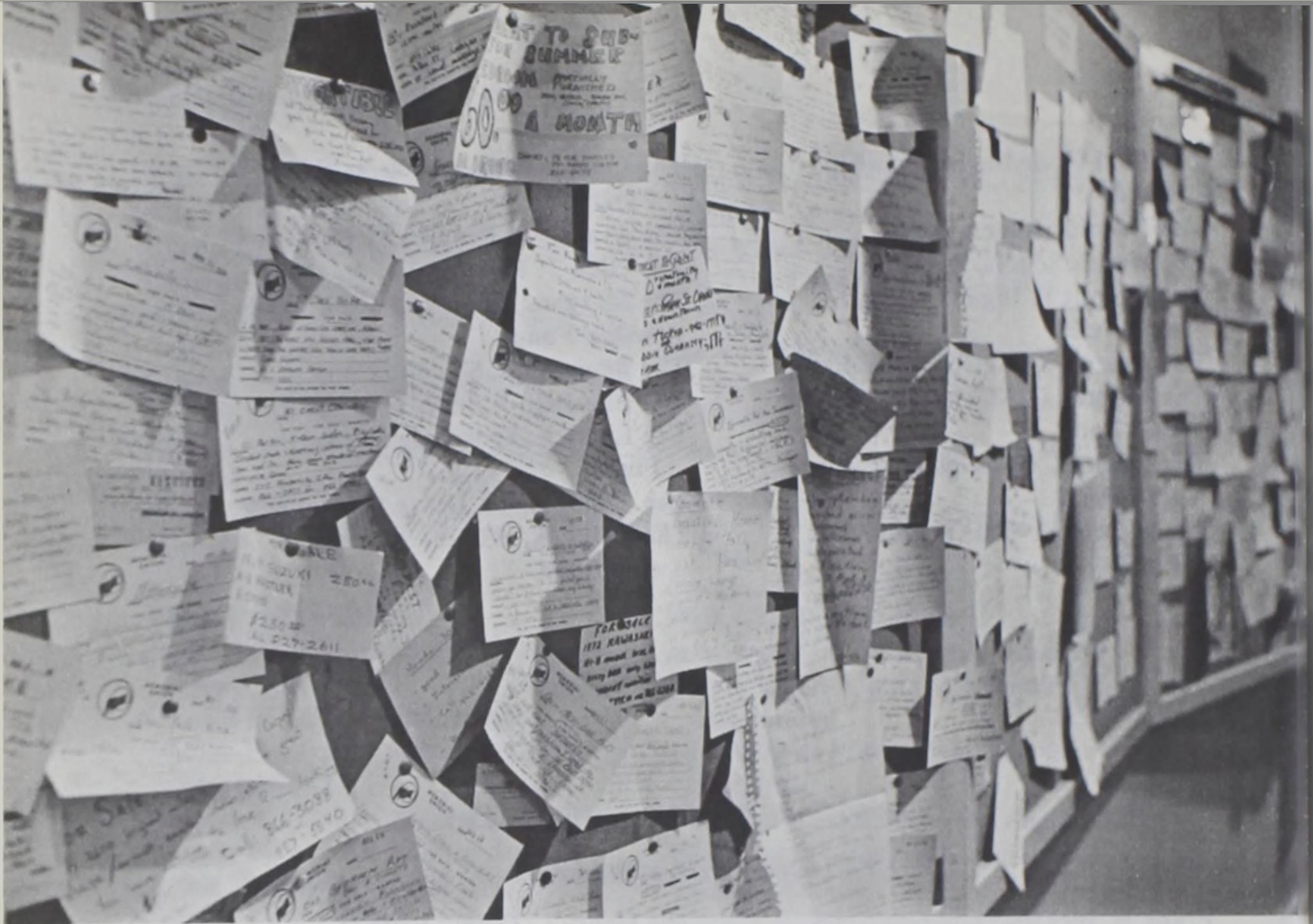
The Henry L. Griffin Prize in English Composition
Maine Hardwood Association Award
The John M. Oak Scholarship Prizes
The John Ferdinand Steinmetz Memorial Award

Annual Prizes and Awards

The Chi Omega Prize
The Dorothy Stone Clark Memorial Prize (Chi Omega)
The Frank H. Dalton Award in Bacteriology
The Delta Zeta Prize in English
The Helen A. Lengyel Award
The Maine Association of Engineers Honor Award
The Scott Paper Company J. Larcom Ober Award for Leadership
The Carl Whitcomb Meinecke Award
The James Gordon Selwood Scholarships

The Sigma Chi Foundation Scholarship Cup
The Interfraternity Singing Contest Trophy
The Charles Rice Cup
The Intramural Plaques

The Harold S. Westerman Award
The Charles A. Rice '17 Sabre Award
The Black Bears of Rhode Island Award University of Maine
The Edward Barrows Award



Collegiate Descriptions

The following pages, under separate college headings, contain descriptive material for each college, its admission requirements, programs offered, and detailed descriptions of all undergraduate courses for both the associate and baccalaureate degrees.

Some departments have also included graduate level courses. However, for a complete description of the Graduate School, its organization, degrees offered, regulations, and detailed course descriptions, see the current catalog of the Graduate School.

Those desiring information about course offerings through the Continuing Education Division and Summer Session should request current publications from these offices in Merrill Hall.

Beginning in the fall of 1972, some students' permanent academic records will show courses with the symbol IDL. This signifies an *Interdepartmental Listing* of courses sponsored by more than one academic department. For example, in the following list of such courses, *IDL 24—Sociology of Rural Life* is shown under Agricultural and Resource Economics as *ARE 24* and under Sociology as *Sy 24*.

Registration symbol	Departments listing the course
IDL 24 - Sociology of Rural Life	ARE, Sy
IDL 43 - Tropical Agriculture	P, AnV
IDL 110 - Introduction to the Study of Linguistics	Ay, Eh, Fl
IDL 129 - The Individual and the Community	ARE, Sy
IDL 130 - Polymer Chemistry	ChE, Ch
IDL 131 - Polymer Structure and Properties	ChE, Ch
IDL 140 - Seminar in Quaternary Studies	Gy, Ay, Bt, S, Zo
IDL 170 - Introduction to Oceanography	Oc, Zo
IDL 201 - Biological Oceanography	Oc, Zo
IDL 208 - Anatomy and Classification of Fishes	Oc, Zo
IDL 211 - Larval Biology of Marine Invertebrates	Oc, Zo
IDL 225 - Mathematical Economics	Ec, ARE
IDL 230 - Econometrics	Ec, ARE
IDL 237 - The Evolution and Development of Canadian Government and Politics	Hy, Pol
IDL 260 - Marine Geology	Oc, Gy
IDL 263 - Marine Benthic Ecology	Bt, Oc, Zo
IDL 264 - Structure and Tectonics of the Ocean Floor	Oc, Gy
IDL 267 - Actinopaleontology	Oc, Gy
IDL 340 - Ecology Seminar	Bt, En, Fy, Zo

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ABBREVIATIONS AND SYMBOLS

ARE	Agricultural and Resource Economics	Hm	Home Management and Housing
AE	Agricultural Engineering	Hr	Honors
Anv	Animal and Veterinary Sciences	Hy	History
As	Astronomy	IDL	Interdepartmental Listing
At	Art	IS	Independent Study
Ay	Anthropology	It	Italian
Ba	Business Administration	Jr	Journalism
Bc	Biochemistry	LSA	General Life Sciences and Agriculture
Bio	Biology		
Bt	Botany	Lt	Latin
Cd	Clothing and Design	Ly	Library Service
Ce	Civil Engineering	Mb	Microbiology
Cf	Child Development and Family Relationships	Mc	Music
Ch	Chemistry	Me	Mechanical Engineering
ChE	Chemical Engineering	Mhe	Man and His Environment
Cp	Comparative Literature	Mg	Mathematics
Ec	Economics	Mt	Military
Ed	Education	My	Modern Society
Ee	Electrical Engineering	Nu	Nursing
Eh	English	Oc	Oceanography
En	Entomology	P	Plants
Fa	Franco-American Civilization	Pa	Pulp and Paper Technology
Fn	Food and Nutrition	Pe	Physical Education
Fo	Folklore	Pl	Philosophy
Fr	French	Ps	Physics
Fs	Food Science	Pol	Political Science
FsA	Freshman Seminar Advising	Py	Psychology
Fl	Foreign Languages	Ru	Russian
Fy	Forest Resources	S	Soils
Ge	General Engineering	Sh	Speech
Gk	Greek	SS	Special Seminar
Gm	German	Sp	Spanish
Gy	Geological Sciences	Sw	Social Work
He	Home Economics Education	Sy	Sociology
		Zo	Zoology

Environmental Studies

The Environmental Studies Center at the University of Maine at Orono has the responsibility for encouraging and promoting University interest and interdisciplinary cooperation in environmental research, teaching and public service. Environmental concerns are considered in many courses in many departments of the University. However, some courses relate more directly to environmental understanding.

The following courses are representative of the University's present academic effort in understanding and bettering the environment of man, including the physical, biological, and social aspects. Complete descriptions of these courses are found under the departmental offerings.

Many of the subject areas indicated in the following course listings may be pursued to greater depth by taking additional courses as indicated in the offerings of the respective departments.

General

Env 100 Topics in Modern Environments

Art

At 5, 6 Art Appreciation and History
19, 20 History of Architecture

COLLEGE OF ARTS AND SCIENCES

Anthropology

Ay 1,2 Introduction to Anthropology
101 Physical Anthropology
141 People and Cultures of the Pacific Islands
150 Hunters and Food Gatherers
151 North American Indian Ethnology
155 Peoples and Cultures of Africa
160 Peoples and Cultures of the Circumpolar Area
161 Ethnological Theory
165 Political Anthropology
166 Economic Anthropology
167 Peasant Societies

Comparative Literature

Cp 11, 12 The Western Tradition in Literature
41, 42 The Drama of the Western World

Economics

Ec 1, 2 Principles of Economics
37 Comparative Economic Systems
138 Economic Development
168 Social Control of Business
172 State and Local Government Finance

English

Eh 9, 10 Modern Literature
21-25 English Literature
43, 44 Survey of American Literature
45 Twentieth Century American Prose and Poetry

Folklore

Fo 1,2 Introduction to Folklore

UNIVERSITY OF MAINE

46	Writers of Maine	Psychology	
270	The American Drama	Py 1,2	General Psychology
292	Literature of Maine and the Atlantic Provinces	130	Social Psychology
Foreign Languages		Sociology	
Fl 201	Introduction to General Linguistics	Sy 24	Sociology of Rural Life
Geological Sciences		110	Social Organization
Gy 1/2	Aspects of the Natural Environment	113	Deviant Behavior
6	Geology for Engineers	114	Social Change
140	Seminar in Quaternary Studies	125	Industrial Sociology
218	Low Temperature-Pressure Geochemistry	126	Sociology of Urban Life
241	Glacial Geology	129	The Individual and the Community
242	Quaternary Environments and Climatic Change	134	Population
257	Genesis of Ore Deposits	135	Human Ecology
258	Ore Deposits Exploration	140	Social Control
		169	Collective Behavior and Social Movements
History		Music	
Hy 10	History of Maine	McH 123	Music of the Twentieth Century
170	America Since 1938	McL 1	Understanding Music
172	Economic History of the United States		
177	History of the Treatment of the American Environment	Philosophy	
199	Contemporary History Problems	Pl 1,2	Philosophy of Modern Life
261	Urban History of the United States	70	Perspectives in Culture
276	Social and Intellectual History of the U.S.	111	Ethics
285	New England History	113	Aesthetics
		123	Philosophical Anthropology
		131, 132	Logic
Journalism		Physics and Astronomy	
Jr 22	Survey of Journalism	Ps 3	Descriptive Physics
25	History of American Journalism	9	Climatology
26	The Press and Society	10	Meteorology
		161	Advanced Meteorology
Modern Society		As 9	Descriptive Astronomy
My 1,2	Modern Society	Political Science	
		Pol 1	American Government
		3	State Government
		133	The American City
		134	Municipal Administration
		151	Public Administration
		158	Public Opinion
		200	City and Regional Planning

ENVIRONMENTAL STUDIES

180	The Science of Social Man	Ed C 142 or 143	Field Course in the
310	Seminar in Social		Earth Sciences
	Organization	144	Basic Field Ecology
313	Seminar in Social	146 or 147	Natural Science
	Disorganization		Education—Coastal
326	Seminar in Formal Or-	148 or 149	Natural Science
	ganization		Education—Inland
329	Seminar in Community	Ed M 357	Education Practicum
	Studies		in Environmental
368-369	Manpower Research		Education
	Seminar	Ed X 163 or 173	Workshop in Con-
			servation Education
		Ed X 198	Special Problems in
			Education—Environ-
			mental Education

Speech

Sh	1	Introduction to Oral
		Communication
	170	Broadcasting and
		Government
	176	Broadcast Programming
		and Criticism
	202	20th Century Public
		Address
	204	Persuasion
	263	American Theatre

COLLEGE OF LIFE SCIENCES
AND AGRICULTURE

General
Mhe 50 Man and His Environment

Agricultural and Resource
Economics

ARE 48	Principles of Agricultural
	Economics
171	Land Resources Economics
186	World Policies for
	Agriculture
24	Sociology of Rural Life
42	World Population
	Resources
129	The Individual and the
	Community

Zoology

Zo	156	Animal Ecology
	168	Limnology
	170	Introductory Oceanography
	201	Biological Oceanography
	212	Polar Ecology
	214	Animal Distribution
	357	Population Dynamics
	362	Estuarine Ecology

COLLEGE OF BUSINESS
ADMINISTRATION

Ba	125	Business Logistics
	150	Financial Institutions
	165	Advertising
	313	Business Cycles and Fore-
		casting
	321	Human Relations in
		Industry

Agricultural Engineering

AE	35	Soil Water Control
	37	Agricultural Engineering
		for Developing Countries
	164	Instrumentation and Con-
		trol Systems
	165	Soil and Water Engi-
		neering

Animal and Veterinary
Sciences

AnV	43	Tropical Agriculture
	45	Animal Science
	218	Population Genetics

COLLEGE OF EDUCATION

Ed B	2	The American School
	3	Growth-Learning Process
	4	The Teaching Process

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Biology

Bio	1	Plant Biology
	51	Interpretation of Biological Statistics
	60	Interaction Between Man and Environment

Botany and Plant Pathology

Bt	1	Plant Biology
	2	The Plant Kingdom
	130	Plant Ecology
	158	Bryology
	164	Aquatic Flowering Plants
	262	Plant Geography
	299	Lake Ecology and Productivity

Entomology

En	26	Introductory Entomology
	211	Insect Ecology
	312	Biological Control of Insects

Food Science

Fs	101	Food Processing Industry, Principles and Problems
	202	Food Industry Quality Control

Microbiology

Mb	21	Introduction to Bacteriology
	30	Fundamentals of Public Health
	122	Microbiology and Man
	201	Marine Bacteriology

School of Forest Resources

Fy	1, 2	Introduction to Forest Resources
	19	Ecology
	48	Natural Resources
	53	Forest Recreation Man- agement
	128	Game Management

School of Human Development

Cf	2	Patterns of Interpersonal Behavior
	111	Family Relationship
Fm	41	Introduction to Food and Nutrition
Hm	81	Home Management Prin- ciples and Theory

Plant and Soil Sciences

S	2	Soil Science
	50	Soil and Water Conser- vation
	52	Land Use Planning— Soil Aspects
	154	Soil-Plant Relationships
P	1	Horticulture
	21	Crop Science

COLLEGE OF TECHNOLOGY

Chemistry

Ch	11, 12	General Chemistry
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Civil Engineering

Ce	28	Highway Engineering Fundamentals
	30	Transportation Engineering
	31	Water Supply Engineering
	61	Engineering Relations
	65	Soil Mechanics
	155	Hydrology
	175	Contemporary Environ- mental Pollution
	200	City and Regional Planning
	205	Traffic Operations and Geometric Design
	230	Water Resources Engineering
	322	Sewage Treatment Theory

Electrical Engineering

Ee	31	Elements of Communi- cation
	97	Environmental Noise Control
	191	Illuminating Engineering
	196	Electro-acoustics
	198A	Noise Control

ENVIRONMENTAL STUDIES

General Engineering		124	Mechanical Design I
Ge 1, 2	Introduction to Engineering Design	160	Heat Transfer
7	Computer Programming for Engineers	167	Direct Energy Conversion
12	Forestry Drawing	181	Turbomachinery
14	Architectural Drawing	186	Power Plants
		187	Mechanical Design II
Mechanical Engineering		191	Heating and Ventilating System Design
Me 21	Materials Engineering and Science	193	Internal Combustion Engines
84	Industrial Management	196	Refrigeration and Air Conditioning

The following courses sample the various aspects of the environment and may be elected by any student. These courses carry no or minimal prerequisites.

General		Social	
Ce 175	Contemporary Environmental Pollution	ARE 42	World Population Dynamics
Env 100	Topics in Modern Environments	At 5	Art Appreciation and History
Fy 48	Natural Resources	Ay 1	Introduction to Anthropology
Mhe 50	Man and His Environment	Ec 1	Principles of Economics
Physical		Jr 22	Survey of Journalism
Gy 1 (1a)	Aspects of the Natural Environment	McH 1	History of Western Music
Ps 9	Climatology	Pl 1	Philosophy and Modern Life
Ps 10	Meteorology	Pol 1	Introduction to Government
S 2	Soil Science	Sh 21	Introduction to Broadcasting and Film
Biological		Sy 135	Human Ecology
Bt 130	Plant Ecology		
Fy 19	Ecology		

The following courses sample the various areas of ecology and may be elected by any student having completed the required prerequisites.

Bt 130	Plant Ecology	Zo 156	Animal Ecology
En 143	Forest Insect Ecology	Zo 168	Limnology
En 211	Insect Ecology	Zo 362	Estuarine Ecology
Fy 19	Ecology	Zo 369	Biological Oceanography
Sy 135	Human Ecology		

Additional information on environmental matters may be obtained by contacting

Environmental Studies Center
Coburn Hall

Computer Science

The development and widespread use of digital computers has created rapidly increasing interest in their uses and capabilities. More than 70 courses in a variety of disciplines explore applications of the computer in the areas covered. Many students become interested in the computer itself and wish to study in depth the characteristics of programming languages operating systems and machinery and the mathematical and electronic concepts which form them.

In order to focus attention on the courses available and to facilitate the offering to additional courses as student needs warrant a Computer Science Committee has been established in the College of Arts and Sciences. Its membership includes representatives of all the colleges.

This section is designed to indicate representative courses in topics of interest in computer science and related areas. Complete course descriptions are found under the departmental offerings.

Structures of Computers and Programming Languages

ChE	150	Analog Computer Programming
ChE	151	Digital Computer and Data Processing Techniques
ChE	252/253	Special Problems in Computer Programming and Systems Analysis
Ee	31	Elements of Communication
Ee	180	Analog and Digital Computer Systems
Ge	7	Computer Programming for Engineers
Ms	81	Computer Programming
Ms	180	Introduction to Computer Science
Ms	181	Topics in Computer Science (operating systems)
Ms	189	Structure of Computer and Assembly Language
†Ms	186	Programming Languages

Mathematical Theory: Numerical and Computational Techniques

Ba	147	Business Data Processing
Fy	172	Planning and Control of Forestry Operations
Ms	180	Topics in Computer Science (semigroups and automata)
Ms	187	Numerical Analysis
Ms	188	Graph Theory
Ms	280	Topics in Computer Science (seminar in Algorithms)
Ms	296	Approximation Theory

Information Systems:

Me	99	Seminar (Information Analysis and Systems Design)
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A student may wish to supplement his background in:

Linear Programming and Operations Research

Ms	155/156	Linear Programming I and II
Ms	157/158	Non-Linear Programming I and II

COMPUTER SCIENCE

Statistics

- Ms 167 Statistical Methods in Research
Ms 168 Design of Experiments

Control Theory

- ChE 154 Elements and Applications of the Theory of Automatic Control
ChE 196 Process Control
ChE 242 Advanced Process Dynamics and Control
Ee 260/261 Pulse and Digital Circuits
Ee 242 Computer Methods in Network Analysis
Ee 273 Sampled Data Control Systems
Ms 196 Control Theory

Project Management

- Ce 101 Planning Engineering Projects
Pa 284 Decision Techniques in Management of Engineering Projects

Education

- EdX 200 Computers in Education





COLLEGE OF ARTS AND SCIENCES

KENNETH W. ALLEN, ACTING DEAN



College of Arts and Sciences

The College of Arts and Sciences provides opportunities for students to acquire knowledge and skill in a variety of fields wherein a cultural emphasis is prominent.

The college is divided into 18 departments and a School of Nursing. All students are required to take work in several of these departments; but, in general, the degree of specialization can vary widely to fit the needs of individuals. Some students may desire to pursue studies in only a few of the major departments, while others may prefer to take work of greater subject-matter range. The college has prepared, for those who desire them, specific programs of study in many pre-professional and vocational fields. See specimen curricula in departmental sections as well as the section on special programs. Considerable flexibility is permitted the student within all these programs.

The college's major objective is to furnish its students with a general cultural background. Within the framework of this background the student will also find much that is of utilitarian value. The college seeks to train men and women in critical intelligence, broad and sympathetic understanding of human needs, and determination of purpose.

Arts and Sciences students who are interested in taking subjects offered in one of the other colleges of the University may do so provided they have fulfilled the necessary prerequisites. In collaboration with the College of Education, this college offers specialized training to prospective teachers.

GENERAL INFORMATION

Admission—The specific requirements for admission are given in full elsewhere in the catalog (see page 43). All deficiencies in entrance requirements must be made up before registering for the junior year. Students who transfer from other colleges with advanced standing must satisfy all admission requirements within a year.

Transfer Credit—No transfer credit will be allowed for courses taken at another institution in which grades below C have been received. Evaluation of courses taken at another accredited institution for which transfer credit is asked rests with the Director of Admissions and the Dean.

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Graduate Requirements—The work of the College of Arts and Sciences leads to the degree of bachelor of arts (B.A.) and bachelor of science (B.S.). The latter degree is awarded in the School of Nursing. All students are required to complete a minimum of 120 degree hours.

In addition, each student must accumulate a total of "grade points" equal to 2.0 times the number of credit hours in which he receives grades. In computing grade points, each hour of A is multiplied by 4, B by 3, C by 2, D by 1, and E by 0.

Specific area requirements are listed in the section, The First Two Years.

Satisfactory work in written English is required throughout the college course.

Students who transfer to this college from another college of the University normally will need two full years of work in the College of Arts and Sciences to satisfy all specific requirements for the bachelor of arts degree.

The First Two Years—During the first two years, the student usually takes basic courses in selected fields. The objective is threefold: (1) to introduce the student to the basic modes of learning; (2) to acquaint him with a variety of fields of knowledge; and (3) to prepare him for work of a distinctly advanced nature, i.e., his major field. On the basis of this rationale, we recommend that students do *not* take more than one course in the same department during their freshman year. To accomplish these objectives, the college has established specific area requirements. Within these areas, there is a choice of courses.

The area requirements follow:

AREA I. FINE AND COMMUNICATIVE ARTS. The one-year requirement may be met from any combination of the following courses consistent with departmental prerequisites as stated in the catalog.

At 3.4	<i>Principles of Art</i>
At 5.6	<i>Art Appreciation and History</i>
At 17/18	<i>Exploring Contemporary Art</i>
At 19.20	<i>History of Modern Architecture and Design</i>
Eh 7.8	<i>Advanced Composition</i>
Eh 77.78	<i>Creative Writing</i>
Mc H 1/2	<i>History of Western Music</i>
Mc H 117	<i>Music of the Baroque Period</i>
Mc H 119	<i>Music of the Classical Period</i>
Mc H 121	<i>Music of the Romantic Period</i>
Mc H 123	<i>Music of the Twentieth Century</i>
Mc L 1-2	<i>Understanding Music</i>
Mc T 1	<i>Fundamentals of Music</i>
Sh 2	<i>Fundamentals of Interpersonal Communication</i>
Sh 3	<i>Fundamentals of Public Speaking</i>
Sh 6	<i>Fundamentals of Interpretation</i>
Sh 11	<i>Introduction to Theatre</i>
Sh 12. 13	<i>Masterpieces of World Drama</i>
Sh 16	<i>Play Production</i>
Sh 17	<i>Fundamentals of Acting</i>
Sh 21	<i>Introduction to Broadcasting and Film</i>
Sh 24	<i>History of Film</i>
Sh 45	<i>Discussion and Inquiry</i>
Sh 47	<i>Debate and Advocacy</i>

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Sh 53	<i>Contemporary American Speakers</i>
Sh 56	<i>Advanced Oral Interpretation</i>
Sh 57	<i>Business and Professional Speaking</i>
Sh 101	<i>Persuasive Speaking</i>
Sh 103	<i>Speech Analysis and Criticism</i>
Sh 107	<i>Argumentation</i>
Sh 109	<i>Theories of Speech Communication</i>
Sh 124	<i>Broadcasting and Film in Society</i>
Sh 161. 162	<i>Theatre History</i>

AREA II. SOCIAL SCIENCES. The one-year requirement of social science may be met from any combination of course offerings of the following departments, consistent with departmental prerequisites as stated in the catalog.

Anthropology

Economics

History (except Hy 1, 2, 7, 8)

Modern Society

Political Science

Psychology

Sociology

Journalism (any of the following courses: Jr 22, Survey of Mass Communications; Jr 25, History of American Journalism; Jr 42, The Foreign Press; Jr 48, Propaganda; Jr 75, Law of Publications)

Students who have not completed a basic one-year high school course in American history are required to take United States History (Hy 3.4).

AREA III. FOREIGN LANGUAGE. The normal requirement will be that the student take (i.e., complete successfully) one year (6 hours) of a foreign language at the University.

Students who have presented two years or more of a high school foreign language for admission will take: (a) one six-hour intermediate course in the language studied in high school, or (b) one six-hour elementary course in a new language.

Finding the appropriate level at which to take a language course is essential for success. During the Summer Freshman Orientation Program, foreign language examinations will be given free of charge to all freshmen in the College of Arts and Sciences for purposes of both placement and credit.

Students planning to satisfy the foreign language requirement by continuing a language taken in high school must take the Language Placement Examination.

Students wishing to start a new language need not take the Placement Examination. However, if they decide at a later date to continue in a language they have already taken, then they must take the Placement Examination at their own expense, through the Testing Center.

For students who score below 550, the examination results will be used to place them in the appropriate level course to complete the language requirement.

Students doing poorly on the examination, but wishing to continue in the language, will be required to take the elementary level course for *no credit*, followed by the intermediate course for credit. Alternatively, they may elect to

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start a new language for credit and satisfy the language requirement in two semesters.

Credit by examination:

(1) If the score on the Placement Examination is between 550 and 670, the student will receive three (3) hours of degree credit equivalent to the first semester of the intermediate course. To complete the language requirement, the student must take the second semester of the intermediate course or one semester of an advanced course.

(2) Students are eligible to receive an additional three (3) credit hours equivalent to the second semester of the intermediate course by skipping the intermediate course and passing, with a grade of C or better, two semesters of language study beyond the intermediate level. (Students taking intermediate courses cannot receive credit for the same courses by examination.)

(3) Students scoring 680 or above will receive six (6) hours of credit equivalent to the intermediate course and the language requirement will be satisfied. It is highly recommended that students continue to take advanced courses in the language for which they have demonstrated such considerable proficiency.

AREA IV. NATURAL SCIENCE AND MATHEMATICS. A minimum of one year of a laboratory science sequence or one year of a mathematics sequence is required of all students. Any one of the following combinations may be used to meet this requirement:

<i>As 15/16</i>	<i>General Astronomy</i>
<i>Bt 1/2</i>	<i>General Botany and Plant Kingdom</i>
<i>Bt 1/Zo 4</i>	<i>General Botany and Animal Biology</i>
<i>Bt 1/Mb 127, 21a</i>	<i>General Botany and General Microbiology with Lab</i>
<i>Ch 11/12</i>	<i>General Chemistry</i>
<i>Ch 13/14</i>	<i>Chemistry Principles</i>
<i>Gy 1/2</i>	<i>Aspects of Natural Environment</i>
<i>Ms 5/6</i>	<i>Elements of College Mathematics</i>
<i>Ms 12/27</i>	<i>Analytical Geometry and Calculus</i>
<i>Ms 13/14/15/16</i>	<i>Mathematics for the Social Sciences and Introduction to Statistical Analysis</i>
<i>Ps 1/2 (Ps 1a/2a)</i>	<i>General Physics</i>
<i>Zo 3/4</i>	<i>Animal Biology</i>
<i>Zo 3/Bt2</i>	<i>Animal Biology and Plant Kingdom</i>
<i>Zo 3/Mb 127, 21a</i>	<i>Animal Biology and General Microbiology with Lab</i>

AREA V. HUMANITIES. The student may elect any two courses from the following departments (see appropriate pages of catalog for course titles and descriptions):

Comparative Literature

English (Except Eh 1, 7, 8, 9, 17, 77, 78, 101 and 102)

Foreign Languages and Classics:

All 100-level courses in Literature and civilization

Also: Cl 1.2, Fl 175, Fr 11.12, Gm 12, Sp 11.12

Fr T10, Fr T15, Fr T179

Gm T10, Gm T15, Gm T58

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Sp T10, Sp T15, Sp T 57.58

Ru T57

Honors 47 and 48

Hours 47 and 48

Philosophy (Except Pl 131-132, Logic I, II)

Students may register for five courses, excluding Mt 1, 2, 3, or 4; however, the actual number carried in any one semester may range from a minimum of 12 credit hours to a maximum of 17. Dean's List students may register for six courses.

Normally not more than six hours may be taken in one subject in either semester of the sophomore year.

PHYSICAL EDUCATION. All students, except veterans, are required to take and pass one year of physical education. Beginning with the class of 1977 one credit hour will be granted for the completion of each semester.

The Last Two Years—On the completion of 53 degree hours, the student, in conference with his adviser and with the approval of the dean, selects his major subject. The department in which the major subject chiefly falls becomes for administrative purposes the student's major department, and the head of that department is responsible for the student before the faculty and must approve the student's registration.

The major curriculum is the nucleus of related courses selected by the student as representing his chief field of interest or major subject. Normally much of the work will fall in one department. The minimum number of credit hours acceptable for a major is set by the department. All students are required to take 120 hours of courses for graduation with at least 72 hours outside of the major. (Not applicable in B.S. in Nursing program).

Selected students may take advanced courses in Military Science and Tactics during their junior and senior years, for which a maximum of 10 credit hours may be received.

Foreign Study—The college encourages students in good academic standing to spend a year (preferably the junior year) in study at selected foreign universities. Depending on the foreign institution attended and the type of courses taken, academic credit for such study will be determined by the dean and the head of the student's major department upon completion of the program. While evidence of satisfactory performance in the form of grades, certificates, etc., is required to obtain degree credit, such grades will not be used in computing the student's accumulative average at the University of Maine. For details students may consult Prof. Josef Roggenbauer in the Department of Foreign Languages or Prof. David Trafford in the Department of History.

Honors Program—These tutorial courses encourage exceptional ability by affording special opportunities for its exercise and to reward high achievement with appropriate recognition. The program stimulates originality, intellectual curiosity, and resourcefulness, and demands a large measure of self-reliance. The student does his work under the supervision of a tutor, whom he meets in conference at regular intervals for informal discussion and advice. The formal recognition, the highest offered in the College of Arts and Sciences, is conferred following a successful completion of the honors program, in the form of graduation honors of three grades; honors, high honors, highest honors.

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Pass-Fail Option—Students enrolled in the College of the Arts and Sciences who have achieved sophomore standing and who have an accumulative grade point average of 2.0 or better are eligible to take *one* course a semester on a Pass-Fail basis. However, courses which are required by the college and courses taken in one's major field or closely related fields may not be taken on a Pass-Fail basis.

A grade of D or better is graded as a Pass. Although Pass grades are not used in computing grade point averages, the credit thus earned is counted for degree credit.

Professional Certificates for Teachers—Certification for secondary school teaching may be earned by students registered in the College of Arts and Sciences. Eighteen hours of basic work (Ed B2, Ed B3, Ed B4, one methods course and student teaching) meets the professional subject requirements for the General Secondary Provisional Certificate, which must be renewed after five years. Student teaching is required for full certification.

In addition to the 18 hours in professional courses, completion of a teaching major of 30 hours in one academic subject commonly taught in secondary schools is required. Candidates for a certificate are also expected to complete at least 18 hours in a second teaching field.

An alternate route to certification is possible by having 50 hours in a teaching area where at least three related academic subjects are represented.

Students planning on teacher certification should ascertain in advance whether their planned combination of major and minor areas are acceptable. Information may be obtained in the dean's office either in the College of Arts and Sciences or in the College of Education.

Medical Technology—This course is offered by the Zoology Department in the College of Arts and Sciences (Orono) in cooperation with the Eastern Maine Medical Center, Bangor, the Central Maine General Hospital, Lewiston, and the Maine Medical Center, Portland. Students electing this program (see page 195) spend three years at the University of Maine, following which they undergo a period of 12 months in training at one of the above hospitals. Students receive the degree of bachelor of arts when they have satisfactorily completed the program. Those students who elect to attend the hospital in Lewiston or Portland for their 12 months in training will graduate at the regular time in June. Those electing the hospital in Bangor will graduate at the end of August. The work at the University also meets entrance requirements of other schools of medical technology which are not affiliated with the University of Maine. A special examination is given nationally, and a certificate in medical technology is issued when this examination is passed.

Public Management Curriculum—This program is designed to train men and women for governmental service in municipal and regional governments.

Bangor Theological Seminary—Regularly enrolled students in the College of Arts and Sciences may register for courses at the Bangor Theological Seminary, not to exceed six credit hours per semester, without payment of additional fees. The College of Arts and Sciences extends a like privilege to students regularly enrolled at the Bangor Theological Seminary. Such registrations must have the approval of the academic deans of both institutions and the instructors involved. Credit for courses so taken will be considered a part of the student's program at the institution where he is enrolled.

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While enrolled at the Bangor Theological Seminary a student may, with the approval of his dean and the admissions office of the University, also register as a special student in the College of Arts and Sciences on the established fee basis for such courses. Work so taken, if it does not substitute for or duplicate courses taken in the seminary program, may be counted as advanced standing credit toward the degree in the event a student later registers for a degree program at the University.

Summer Session—Before students of the College of Arts and Sciences pursue Summer Session courses in any institution other than the University, they must secure the approval of the dean and the chairman of the student's major department if they expect degree credit for such work. A marked bulletin of the institution should be left at the dean's office with a note requesting such credit for the courses selected.

Premedical and Predental Curricula—Medical and dental colleges in general desire students who are not only well prepared in the sciences and mathematics but who are also broadly educated. To the first point they require certain courses in biology, chemistry, mathematics and physics; to the second they recommend a liberal background in the humanities and the social sciences.

In order to meet the minimum requirements of most medical and dental schools students should plan, with the aid of their advisers, to include the following specific courses within the framework of their major program, all to be completed before the senior year.

	*Subject	Credit Hours
†Ch 13/14	General Chemistry	8
Ch 151/152	Organic Chemistry Lecture	6
Ch 161/162	Organic Chemistry Laboratory	4
	Two semesters English Composition or Literature	6
Ps 1/2 or Ps 1a/2a	General Physics	8
†Zo 3/4	Animal Biology	8

*Most medical and dental schools will accept advanced placement in place of one or more of these subjects.

†Either General Chemistry or Animal Biology, or both, should be taken the freshman year.

Many medical schools require or recommend certain additional courses.

Among those most commonly required or recommended are the following:

Calculus
Developmental Biology (Embryology)
Foreign Language (Intermediate level)
Physical Chemistry
Principles of Genetics
Quantitative Analysis

Although most premedical and predental students major in a science, they may major in any of the non-science departments according to their interests. The student would be advised, however, to take a program during the first two years that will allow the greatest possible freedom of choice in later selecting an undergraduate major. The freshman year specimen curricula given for majors in chemistry, physics or zoology will leave many options open. Those who major in a non-

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science department and meet only the minimum science and mathematics requirements should achieve superior grades in order to demonstrate their proficiency in these critical subjects.

Students should be familiar with the admission policies of professional schools to which they plan to apply for admission. They must also meet the special requirements of the undergraduate college and department in which they wish to major.

COURSES OF INSTRUCTION

Courses numbered 1 to 99 are undergraduate courses. They are open to graduate students, but credit earned in these courses may not be used to satisfy advanced degree requirements. Courses numbered 100 to 199 are upperclass undergraduate courses which may be used for graduate degree credit by graduate students if given prior approval by the graduate students' advisory committee. Courses numbered 200 to 299 are graduate courses which may be elected by undergraduate honor students, or those undergraduates whose advancement in the field will permit their taking a graduate level course among graduate students without disadvantage to themselves. Courses numbered 300 to 399 are graduate level courses which may be taken only by students admitted to the Graduate School.

One number is used for a course which is given both fall and spring.

When a dash is used between the two numbers (e.g., 1-2), both semesters must be taken to obtain credit; when a slant is used (e.g., 1/2), the first semester may be taken by itself, but the second cannot be taken unless the first is taken previously; when a period is used (e.g., 1.2), either semester may be taken for credit.

ANTHROPOLOGY (Ay)

PROFESSORS EMERICK (CHAIRMAN) AND IVES; ASSOCIATE PROFESSORS ACHESON AND SANGER; ASSISTANT PROFESSOR ACHESON; TEACHING ASSOCIATE MACKAY

The Department of Anthropology presents a program of study designed to expand the student's awareness and understanding of the biocultural nature of man, the variousness of his behavior and the structure and function of his institutions. It is also designed to acquaint the student with the fundamental concepts and principles as well as the basic research skills of the disciplines for which the department is responsible—anthropology (cultural, physical, linguistics, social anthropology, archaeology) and folklore.

The undergraduate major in the department may select and develop, in consultation with his adviser, a basic curriculum (or a series of courses) which will give him an opportunity to develop his interests and provide him with the background necessary for his future needs. In addition to the following, students in the department must meet the general requirements of the College of Arts and Sciences.

Specific requirements for majors:

When a student declares anthropology as his major he is assigned to an adviser within the department. If the student already has a particular interest in

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some area for which the department is responsible—such as archaeology, social anthropology or folklore—he will be assigned, whenever possible, to an adviser who is most closely identified with such a field.

Majors should expect to take Introductory Anthropology (Ay 1, 2), Basic Theory and Principles in Social and Cultural Anthropology (Ay 115) and at least one course in mathematics, e.g., Logic, Computer Science, Statistics, Surveying, Calculus, or Mathematics.

The department will consider upon consultation with the student through his adviser the granting of up to 6 hours of major credit courses in collateral areas in other departments including Mathematics.

Majors must also take at least one course from each of the following general areas in the department:

- a. Archaeology
- b. Folklore or Linguistics
- c. A world ethnographic area course, e.g., Peoples and Cultures of The Pacific Islands, North American Indian Ethnology, etc.
- d. A functional area course, e.g., Hunters and Gatherers, Peasant Societies, Social Anthropology, Political Anthropology, etc.

The foregoing are to be considered the minimal requirements for a B.A. in Anthropology. Students who wish to explore requirements for graduate study or the professional career aspects of any of the areas for which this department is responsible should consult with their departmental advisers. Such students must expect to take certain additional or more specifically designated courses as approved in consultation with their advisers. For example, students wishing to prepare themselves for a career in prehistoric archaeology should select courses recommended by The Institute for Quaternary Studies; they include: Zo 3/4, Gy 1.2, Gy 242, Zo 156, IDL (Bt) 245, Ay 170, Ay 140. Ms 19 and Ms 169 are also recommended.

Recommended laboratory science courses for anthropology majors are Principles of Geology (Gy 1/2), or Animal Biology (Zo 3/4). Other recommended electives are General Psychology (Py 1), Social Psychology (Py 130), Comparative Anatomy (Zo 133), and Glacial Geology. (Gy 241).

The introductory course Ay 1/2 should be taken during the freshman or sophomore year. Fo 1 and Fo 2 may be taken during the freshman or sophomore years. Ay 115 should be taken in the sophomore or junior years. Any two of the following Fo courses may be counted toward an English major. Fo 1, Fo 2, Fo 134, and Fo 179.

A minimum of 36 hours carrying major credit must be taken. The college has established a 48-hour maximum for all departments.

Students who wish to explore requirements for graduate study or the professional or career aspects of any of the areas for which this department is responsible should consult with their departmental advisers.

Courses in Anthropology (Ay)

1.2. Introduction to Anthropology—The development of man as a bio-cultural phenomenon. Special emphasis on human paleontology and race formation as well as on the nature of culture and such human institutions as social or-

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ganizations, marriage, religion, economics, etc., among primitive people, with some application of derived principles to Western civilization. Required of majors. *Cr* 3.

MR. EMERICK

101. *Physical Anthropology—A lecture course which provides an introduction to methods and findings related to human evolution, primitive behavior, Fossil Man and racial differences. Prerequisite: Ay 1.2 or permission of instructor. *Cr* 3.

STAFF

IDL 110. *Introduction to the Study of Linguistics*—A comprehensive survey of language structure and function with attention to its socio-cultural, psychological, and historical aspects. Designed to provide the student with basic conceptual and technical tools for understanding the phenomenon of language. No previous training in languages or linguistics is required. Course same as Eh, Fl 110. *Cr* 3.

MR. ACHESON

115. *Basic Theory and Principles in Cultural and Social Anthropology*—An intermediate level course concerned with basic ideas and analytical concepts in cultural and social anthropology. The focus will be on the integration of these various key ideas and on understanding their historical antecedents. Emphasis on giving the student practice in applying these principles to specific data through exercises and the reading of key monographs. Three lectures, one recitation each week. Prerequisites: Ay 1.2 or permission. *Cr* 4.

MR. ACHESON

120. *Ethnographic Methods—A study of methods and techniques in ethnography, including a survey of the issues involved in planning and carrying out field studies. Emphasis is on the anthropologist's way of looking at and making a record of human behavior, with practical exercises to reinforce the student's theoretical understanding. Prerequisite: Minimum of 9 hours in Anthropology beyond Ay 1.2, or permission of instructor. *Cr* 3.

MRS. ACHESON

139. *Culture, Society, and the Individual—An introduction to the concepts, theories and techniques involved in anthropological investigations of the relationships of culture, society, and the individual. Prerequisite: Ay 1.2 or permission of instructor. *Cr* 3.

MRS. ACHESON

IDL 140. *Seminar in Quaternary Studies*—A multidisciplinary seminar that is concerned with selected areas of study—physical, biological and anthropological—related to the Quaternary Period. The subject areas of the seminar will vary each semester and it can be taken more than once for credit. Course same as Bt, Gy, S, and Zo 140. Prerequisite: consent of instructor. *Rec* 2, *Cr* 2.

MR. SANGER, MR. DAVIS, MR. DENTON, MR. LOTSE, MR. DEARBORN

141. *People and Cultures of the Pacific Islands*—The problem of migration to and the peopling of the Pacific world will be examined. The development of distinct cultural traditions traced in Australia, Melanesia, Micronesia, and Polynesia. The possibility of transpacific contact with pre-Columbian America will be discussed, as well as the special problems of these Oceanic people in the modern world. Prerequisite: Ay 1.2, or permission of instructor. *Cr* 3.

MR. EMERICK

143. *Peoples and Cultures of South Asia—A descriptive and analytical survey of the cultures of South Asia. Selected representative groups from India, Ceylon, and Pakistan will be considered and discussed. Attention will be focused on traditional cultural characteristics, but their relationship to current problems will also be considered. Ay 1.2 or permission of instructor. *Cr* 3.

STAFF

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144. *Cultures and Societies of North and East Asia—A description and analysis of the people and cultural behavior of North and East Asia with special emphasis on China, Japan, and Korea. Particular attention will be given to cultural geography and population as well as to such topics as kinship and family, values and religion, political organization, economics, and stratification of society. Trends in the contemporary life of these areas will be referred to, but current problems will be subordinated to insight into basic cultural patterns. Ay 1.2 or permission of instructor. *Cr* 3. STAFF

150. *Hunters and Food Gatherers—A survey of the vanishing people whose subsistence economy has remained at the hunting and gathering level. Attention will be focused on selected groups in all major geographical and cultural areas. Both unique and common problems of these people will be dealt with and special emphasis will be placed on ethnohistorical, environmental, and acculturation factors. Prerequisite: Ay 1.2, or permission of instructor. *Cr* 3. MRS. ACHESON

151. *North American Indian Ethnology—An ethnological survey of aboriginal American Indian cultures north of Mexico, but excluding the Eskimo. Emphasis upon cross-cultural comparison through the use of selected ethnographic studies. Formulation of generalizations of geographical and temporal significance, including a consideration of modern developments and problems. Prerequisites: Ay 1.2, or permission of instructor. *Cr* 3. MRS. ARCHESON

152. *North American Indians in the Modern World—An exploration of social and cultural change among North American Indians from the time of earliest white contacts to the present day. Includes an overall historical survey of responses, and a consideration of modern problems and developments in such areas as the reservation system, education, Indian migration to cities, and Indian political movements. Prerequisite: Ay 2 or Ay 151, or permission of instructor. *Cr* 3. MRS. ACHESON

153. *People and Cultures of Mesoamerica*—Study of contemporary peasant societies of Mexico and Guatemala. Short history of these communities since the Spanish Conquest. Comparison of Mestizo and Indian communities; relations between folk societies and urban areas. Special emphasis on current theory concerning Middle American societies. Prerequisite: Ay 1.2 or permission of the instructor. *Cr* 3. MRS. ACHESON

154. *Cultures and Societies of the Middle East—A study of the cultures and societies of the Middle East with emphasis on the Arab World, Turkey, Iran and Afghanistan. Particular emphasis given to religious organization, kinship, political organization, and economics. Special attention to contemporary life and the current problems in the ethnography. Ay 1.2 or permission of instructor. *Cr* 3. MR. ACHESON

155. *Peoples and Cultures of Sub-Saharan Africa—Study of selected societies of Africa. The culture areas of Africa. Emphasis will be placed on an intensive study of societies in differing areas which exhibit important structural principles. Prerequisite: Ay 1.2 or permission of the instructor. *Cr* 3. MR. ACHESON

156. *Islamic Africa—A study of the Muslim peoples and cultures of the Northern and Western parts of Africa. Contrast and comparison of the tribes of the Atlas, the coastal Arabs, the tribes of the Sahara, and tribes of West Africa dominated by Islam. Relationships between Islamic and Pagan peoples. The City, Village and Tribe. Ay 1.2 or permission. *Cr* 3. MR. ACHESON

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IDL 158. *Culture and Economic Development—A study of the interface between cultural anthropology and economics, especially as these disciplines shed light on problems of economic change in the societies of the Third World. Prerequisite: Ec 10 and Ay 2, or permission. *Cr* 3. MR. ACHESON

160. *Peoples and Cultures of the Circumpolar Area*—The development of northern cultures in both the Old and the New Worlds will be traced from pre-historic times to the present. Problems of economics, social structure, and cultural organization will be emphasized. Prerequisite: Ay 1.2, or permission of instructor. *Cr* 3. MR. EMERICK

161. *Anthropological Theory*—A consideration of the major theoretical ideas in anthropology (evolutionary, historical, functional, linguistic) as they have developed to the present time. Using illustrations drawn from the literature, attention will particularly be given to current issues in anthropology theory and their historical roots. Prerequisite: At least 9 hours in Anthropology beyond Ay 1.2, or permission of instructor. *Cr* 3. MRS. ACHESON

163. *Social Anthropology—Basic concepts, principles and problems of modern social anthropology will be presented through the reading of certain key monographs. Prerequisite: Ay 1.2, or permission of the instructor. *Cr* 3. MR. ACHESON

165. *Political Anthropology—Examination of mechanisms and institutions for mediating disputes and allocating public power in selected non-Western societies. Prerequisite: Ay 1.2, or permission of the instructor. *Cr* 3. MR. ACHESON

166. *Economic Anthropology*—Comparative study of production, consumption and exchange in selected non-Western societies. Emphasis will be placed on factors influencing economic decisions in a variety of social and cultural settings. Prerequisite: Ay 1.2 or permission of instructor. *Cr* 3. MR. ACHESON

167. *Peasant Societies—Peasants, neither primitive nor modern, are the majority of humanity. Study of the similarities and differences among and between peasant societies in various parts of the world. A critical examination of the body of anthropological theory concerning peasantry. Prerequisite: Ay 1.2 or permission of the instructor. *Cr* 3. MR. ACHESON

170. *Introduction to Archaeology*—An introduction to the methods of archaeological research. Techniques of excavation and analysis; theoretical basis of methods and fundamental principles; application to specific case studies; interpretation of findings; the use of geological, biographical, geographical and other tools in archaeological research. A one-day compulsory field trip on a weekend to visit local archaeological sites. Prerequisite: Ay 1.2 or permission of the instructor. *Cr* 3. MR. SANGER

171. *Old World Prehistory*—The prehistory of man in the eastern hemisphere from the beginnings of culture through the development of agriculture and urbanism. The development and elaboration of human society as inferred from material remains. Prerequisite: Ay 170, or permission of the instructor. *Cr* 3. MR. SANGER

172. *North American Prehistory—The prehistory of man in North America from his arrival to European contact. A survey of major developments such as the spread of agriculture. Emphasis upon late and post-glacial adaptations to environment. Prerequisite: Ay 170, or permission of the instructor. *Cr* 3. MR. SANGER

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174. *Introduction to Field and Laboratory Methods in Archaeology*—A field and laboratory course designed to introduce excavation and recording techniques in a local archaeological site. Laboratory experience in specimen cataloging, identification, preservation and preparation for analysis. A one-day compulsory field trip on a weekend to visit local archaeological sites. Lab 3 hours one afternoon per week. Permission of instructor only. *Cr* 2. MR. MACKAY

175. *Methods in Archaeology*—A laboratory course in techniques of analysis of archaeological collections and preparation of reports. Prerequisite: junior or senior standing and Ay 174 or Ay 177 and permission: *Rec* 1, *Lab* 3, *Cr* 3. MR. SANGER

176. *Theory of Archaeology—A seminar designed to consider current theoretical approaches to archaeology. Prerequisite: junior or senior standing, Ay 170, and permission. *Cr* 3. MR. SANGER

177. *Field Research in Archaeology*—Introduction to archaeological field techniques by excavation of prehistoric sites in Maine. Intensive training in site survey excavation techniques, recording, analysis and preliminary interpretation of archaeological materials. Prerequisites: Ay 1 and 2 (or equivalent) and permission of instructor. *Cr* 3-6. (Summer only). MR. MACKAY

180. *Sociolinguistics—This course will consider the relationships between language and society, emphasizing societal rules or norms that explain or constrain language behavior and the various functions played by language in human societies. Topics to be considered include speech styles and dialects, languages in contact, bilingualism, and the language problems of developing nations. Prerequisite: Ay 2 or Sy 3 and Ay 110, or permission of the instructor. *Cr* 3. MRS. ACHESON

181. *Language and Culture*—Introduction to the writings of key figures in the field, exploring their broader implications in such areas as non-linguistic communication, semantics, linguistic relativity, structural anthropology, and general problems in "Cognitive Anthropology." Prerequisite: Ay 2 and IDL 110 or permission of instructor. *Cr* 3. MRS. ACHESON

195. *Intercultural Understanding*—This course is conducted as a human relations workshop. The point of view of anthropology, as well as some of the other social and behavioral sciences, is brought to bear upon cultural, ethnic, racial, religious and intergroup conflict in contemporary life. Participants and other resources people will also draw upon their own backgrounds and experiences in an attempt to achieve understanding of and adjustment to such human relations problems. No prerequisites. Summer only. *Cr* 3. MR. EMERICK

197. 198. *Department Projects*—A special project course in Anthropology initially proposed by the student to the instructor and agreed upon by both of them as to content, scheduling and number of credits. Credits arranged: maximum of 3 hours. STAFF

Courses in Folklore (Fo)

1. *Introduction to Folksong*—A survey of the various forms of music and poetry as they exist in folk tradition: epics, ballads, lyrics, work-songs, dance and play-party songs, blues, religious songs, etc. Emphasis will be on listening to field recordings. *Cr* 3, *Lec* 2, *Lab* 2. MR. IVES

1. *Introduction to Folklore*—Survey of the different genres of folklore, with emphasis on belief, custom, and legend. *Cr* 3, *Lec* 3. MR. IVES

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*106. *North American Indian Mythology*—Myths, tales, and legends of selected representative American Indian groups of the United States and Canada, with special emphasis on the Northeast. Prerequisite: permission of the instructor. Cr 3, Lec 3.

MR. IVES

107. *Field Work in Folklore*—Training and experience in the collecting of the materials of folklore, folklife, and oral history, especially through the use of tape recorders. Advance preparations, interviewing techniques, processing of transcripts, and utilization of materials so gathered in writing and research. Tape and equipment will be provided. Prerequisite: permission of instructor. Cr 3.

MR. IVES

*108. *Poet and Performer in a Folk Culture*—A study of the creation, performance, transmission, and function of poetry and other works of art in folk culture. Tradition and individual creativity: their limits, conflicts, and resolution in a number of specific cultures. The theories of such men as Gummere, Boas, Barry, Herzog, Merriam, and Parry and Lord. The general emphasis will be on the place of art and the artist in society. Prerequisite: permission of instructor. Cr 3.

MR. IVES

134. *Folksong in America*—Types and traditions of folksong in America, especially the ballad; English, Scottish, Irish, Spanish, French, and Negro materials. Prerequisite: permission of instructor. Cr 3, Lec 2, Lab 2.

MR. IVES

*179. *Folk Narrative*—A study of the folktale (*Myth*) and such allied forms as jests, tall tales, and various types of hero cycles found in both the Old and the New World. Prerequisite: permission of the instructor. Cr 3.

MR. IVES

197. 198. *Projects in Folklore*—A special project course in folklore initially proposed by the student to the instructor and agreed upon by both of them as to content, scheduling and number of credits. Credits arranged: maximum of 3 hours.

MR. IVES

ART (At)

PROFESSOR HARTGEN, Chairman; ASSOCIATE PROFESSORS DECKER, GHIZ, LEWIS;
ASSISTANT PROFESSOR BROWN

As a division of the College of Arts and Sciences, the curriculum in Art is basically liberal arts, with required courses in the sciences, social studies, languages and humanities dispersed within the student's courses in art appreciation, history, aesthetics and studio. The art program offers a balance between creative studio experience in drawing, painting, graphics and design on the one hand, and lecture and seminar classes in history, criticism and appreciation on the other. Both directions of study may subsequently lead the student toward specialized work in the fine arts, industrial design, advertising, illustration, etc.; or to an advanced degree in research, history, or criticism. No advanced degrees in art are offered at this time. The department designates a minimum of 38 hours and a maximum of 48 hours within its program for the bachelor of arts degree.

The Department of Art, in Carnegie Hall, is adequately equipped with facilities for studio involvement in painting, drawing, printmaking, and sculpture. There

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is a large collection of slides, reproductions, artifacts and original works of art, all of which are employed, in one way or another, in the teaching program. Also, some seven or eight exhibitions of original art, in all media, styles and periods, are brought to the campus each month and displayed in the University's several art galleries. These shows offer the art major a first-hand opportunity to study and evaluate important masterpieces.

Majors in art education follow a curriculum developed in cooperation with the College of Education, leading to the bachelor of science degree in education. Preparation for elementary and secondary level teaching of art is offered here. Registration is in the College of Education.

SPECIMEN CURRICULUM FOR ART

Freshman Year

•At	5	Art Appre. & Hist. (or At. 1)	3-2	•At	6	Art Appre. & Hist. (or At 2) ..	3-2
		Foreign Language require-				ment II	3
		ment I	3			Natural Science and	
		Natural Science & Math.				Math. requirement	4
		requirement	4	Pe	2	(2W) Physical Education	1
Pe	1	(1W) Physical Education	1			Electives	4-5
		Electives	4-5				
			14-16				14-16

Sophomore Year

•At	1	Basic Drawing (or At 5) ...	2-3	•At	2	Basic Drawing (or At 6)	2-3
•At	7	Basic 2-D Design & Color ...	2	•At	8	Basic 3-D Design	2
		Fine Arts requirement (See				Fine Arts requirement	3
		Note)	3			Social Sciences requirement	3
		Social Sciences requirement	3			Electives	5-6
		Electives	5-6				
			15-17				15-17

Junior Year

		Humanities requirement I	3			Humanities requirement II	3
•At	11	Intermediate Drawing	2	•At	12	Figure Drawing	2
•At	9	Introduction to Graphics	2	•At	10	Intro. to Sculpture	2
•At	25	Renaissance Art in Italy or		•At	26	Renaissance Art in Italy or	
		At 27 Northern Renaissance				At 28 Northern Renaissance	
		Art	2			Art	2
•At	21	American Art or At 23 Con-		•At	22	American Art or At 24 Con-	
		temporary Art Forms	2			temporary Art Forms	2
		Electives	3-4			Electives	3-4
			14-15				14-15

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Senior Year

•At	15	Basic Painting	2	•At	16	Painting	2
•At	23	Contemporary Art Forms <i>or</i>		•At	24	Contemporary Art Forms <i>or</i>	
		At 21 American Art	2			At 22 American Art	2
		Masterpieces of Graphic		At	20	Modern Arch. & Design <i>or</i>	
		Arts	3-2			At 32	
At	19	Modern Arch. & Design <i>or</i>				Masterpieces of Graphic Arts ..	3-2
		At 31		At	98	Problems in Art	2-3
At	97	Problems in Art	2-3	At	30	Art Materials & Techniques	3
		Electives	6			Elective	3

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9. Introduction to Graphic Arts—Fundamentals of printmaking through experiences with relief, planographic, intaglio and stencil printing. Prerequisite: At 1/2 or At 7/8. *Lab 4, Cr 2.* MR. DECKER

10. Introduction to Sculpture—Study of sculptural form and expression through clay, plastic, wood, stone, metal. Prerequisite: At 1/2 or At 7/8. *Lab 4, Cr 2.*

11. Intermediate Drawing—Studies in form, space, composition. Experimentation with range of media. Prerequisite: At 1/2. *Lab 4, Cr 2.* STAFF

12. Figure Drawing—Creative drawing based on the human figure. Understanding the human structure and form. Representation of grace and fluidity of the human figure machine. Prerequisite: At 11. *Lab 4, Cr 2.* MR. LEWIS

13. 14. Fundamentals of Painting—Basic introductions to the painting art. Exercises in color, technique and composition. Studio and outdoor subjects. All media. Prerequisite: At 1/2 or permission. (Not open to art majors) *Lab 4, Cr 2.* STAFF

15/16. Basic Painting—Exploration of various painting techniques—oils, acrylics, water media; stress on composition, color and technical mastery of media. Prerequisite: At 11/12. *Lab 4, Cr 2.* STAFF

17/18. Exploring Contemporary Painting—An examination of trends and styles in 20th century painting with emphasis on the arts as a form of human communication. (Not open to art majors.) *Rec 3, Cr 3.* MR. GHIZ

19. 20. Modern Architecture and Design—European-American architecture and design from 19th century to present. Basic styles and concepts in residential, school, church and civic structures. Special emphasis on urban planning and environmental design. Second semester: Packaging, industrial design, advertising and related subjects. *Rec 3, Cr 3.* MR. DECKER

21. 22. American Art—American painting, architecture and sculpture; styles, trends and schools. First semester, from beginning to 20th century; second semester, the 20th century. *Rec 2, Cr 2.* MR. DECKER

23. 24. Contemporary Art Forms—An examination of all modern European and American trends in architecture, sculpture, painting, and the graphic arts. A comparison of the modern "isms." At 5 and 6 are recommended. *Rec 2, Cr 2.* MR. GHIZ

25. 26. Renaissance Art in Italy—The architecture, sculpture and painting of the Italian Renaissance from the 13th to 18th century. First semester: Rome and Florence; the second: Bologna, Venice, and Milan. At 5 and 6 recommended or permission. *Rec 2, Cr 2.* STAFF

27. 28. The Northern Renaissance—Architecture, sculpture and painting in Flanders, France, Germany, Spain, Holland, England from the 14th to 18th century. At 5 and 6 recommended or permission. *Rec 2, Cr 2.* MR. GHIZ

30. Art Materials and Techniques—Materials, methods, and techniques for the professional artist-craftsman. Examination, comparison, and testing of materials and processes of painting, graphics, sculpture, etc. Prerequisite: At 1/2 or permission. Primarily for art majors. *Rec 2, Lab 1, Cr 3.* MR. DECKER

31. 32. Masterpieces of Graphic Arts—Drawings and prints, their techniques and classifications. Collecting, marketing and exhibiting. Masterpieces of all ages and countries. Text, slides. Study of original examples from the collection. *Rec 2, Cr 2.* STAFF

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33/34. Intermediate Graphic Arts—First semester: experience with relief printing and serigraphy. Second semester: intaglio and lithography. At 1/2 and At 7. Lab 4, Cr 2. MR. DECKER

35/36. Advanced Graphic Arts—Advanced experience in printmaking. Relief printing and serigraphy first semester; intaglio, collograph and lithography second semester. Prerequisite: At 1/2 and At 33/34 plus permission of instructor. Lab 4, Cr 2. MR. DECKER

41/42. Commercial Art and Publications Design—The design of booklets, catalogs, magazines, newspapers, posters, etc. Exercises in lettering and layout. Prerequisite: At 1/2 or permission. Lab 4, Cr 2. (Given on sufficient demand.)

51/52. Primitive Art—Fall semester: African and Oceanic art. Spring semester: North American Indian, Eskimo, Precolumbian Mexican and South American art. Rec 3, Cr 3. Permission of instructor. MR. LEWIS

65. 66. Methods and Curricula in Art Education—Contemporary objectives in the teaching of art in the elementary and secondary schools. Selection and planning of materials, techniques, and curricula. Fall: teaching experience in a laboratory setting. Spring: research and crafts. Rec 2, Lab 2, Cr 4. Permission of instructor. MISS BROWN

69. The Teaching of Art—Current methods and materials for the teaching of art in the elementary grades. Theory and actual experience with various two and three dimensional art projects. Junior or senior standing or permission of instructor. Lec 1 and Lab 2, Cr 3. MISS BROWN

81/82. Introduction to Filmmaking—Studio problems in the elementary techniques of filmmaking as an expressive art form. Study of the camera and its function, lighting, editing, composition, sound, and film continuity and structure through production of several short films. Stress on the aesthetics of film through study of some outstanding examples of past and present classics. (Student must pay cost of film and processing; other equipment supplied.) Permission of instructor. Lab 4, Cr 2. MR. LEWIS

97. 98. Problems in Art—Advanced projects for student research and presentation. Undergraduate thesis or exhibition. Cr Ar. Permission of head of the department. STAFF

151. Art Education Workshop and Laboratory—Plan of study, projects and credit arranged. Limited to art education majors. MISS BROWN

CHEMISTRY (Ch)

PROFESSORS WOLFHAGEN (Chairman), BEAMESDERFER, DUNLAP, GOODFRIEND;
ASSOCIATE PROFESSORS BENTLEY, GEORGITIS, GREEN, PATTERSON, RASIAH,
RUSS, WEAVER; ASSISTANT PROFESSORS JENSEN, ZOLLWEG;
MRS. WOLFHAGEN

The student majoring in chemistry in the College of Arts and Sciences is able to complete all requirements for certification to the Committee on Professional Training of the American Chemical Society.

The specimen curriculum listed below is a suggested one, and indicates the minimum requirements. Some variation in the order in which courses are taken is possible. For example, the student might begin with Ms 4.

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Chemistry majors who intend to enter medical school should take Animal Biology during the freshman year; they may wish to postpone Physics until the second year. Also, these students may wish to omit some of the starred courses in order to have a wider choice of electives, in addition to the 18 hours of free electives already available within the normal load of five courses per semester.

Course descriptions are listed under the College of Technology.

A. REQUIRED TECHNICAL COURSES

Freshman Year

		Hours					
Ch	13	Chemical Principles	4	Ch	14	Chemical Principles	4
Ms	12	Analytical Geometry		Ms	27	Analytical Geometry	
		and Calculus	4			and Calculus	4
Ps	1	General Physics	4	Ps	2	General Physics	4
Pe	1	Physical Education	1	Pe	2	Physical Education	1
		Other	3-6			Other	3-6
			<hr/>				<hr/>
			16-19				16-19

Sophomore Year

Ch	151	Organic Chemistry	3	Ch	151	Organic Chemistry	3
Ch	161	Organic Chemistry	2	Ch	161	Organic Chemistry	2
*Gm	1	Elementary German	3 or 4	*Gm	2	Elementary German	3 or 4
Ms	28	Analytical Geometry		*Ms	59	Differential Equations	4
		and Calculus	4			Other	3-6
		Other	3-6				15-18
			15-18				15-18

Junior Year

Ch	140	Quantitative Analysis	4	Ch	169	Physical Chemistry	4
*Ch	185	Chemical Literature	2	Ch	171	Physical Chemistry	
*Gm	3	Intermediate German	3 or 4			Laboratory	2
		Other	6-8	Ch	190	Intermediate Organic	
			15-18			Chemistry Laboratory	3
						Other	6-9
							15-18

Senior Year

Ch	154	Adv. Inorganic Chemistry	3	*Ch	164	Instrumental Analysis	4
Ch	170	Physical Chemistry	4	*Ch	174	Quantum Chemistry	3
Ch	172	Physical Chemistry				Other	8-11
		Laboratory	2				15-18
		Other	6-9				15-18
			15-18				15-18

*Recommended for American Chemical Society Certification. Certain substitutions may be permitted.

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B. OTHER REQUIREMENTS

One course selected from Eh 1, 7, 77, or 78

One course selected from Sh 3, 45, or 47

Ge 7, Ms 169, or equivalent is strongly suggested

Reading knowledge of German or other major foreign language designated by department. German is recommended for ACS certification.

A total of 15 semester hours in social sciences and humanities as defined by the American Chemical Society, including one course in literature. This requirement usually will be satisfied by the requirements of the College of Arts and Sciences. Additionally, Eh 6 in the freshman year is recommended.

ECONOMICS (Ec)

PROFESSORS CLARK, COUPE (Chairman), DEVINO, HUQ; ASSOCIATE PROFESSORS BURKE, DUCHESNEAU, SAVAGE, WILSON; ASSISTANT PROFESSORS DOANE, LUTZ, WIHRY

The student majoring in economics in the College of Arts and Sciences must fulfill all the requirements of the College and also complete the following curriculum:

1. Core Requirements

Ec 10 — Principles of Economics

Ec 132 — Macroeconomics

Ec 173 — Price Theory

Ms 13/14 — Mathematics for Social Sciences

Ms 15/16 — Introduction to Statistical Analysis

Note: (a) It is strongly recommended that majors take Ec 132 and Ec 173 immediately after Ec 10.

(b) Ba 9, Principles of Accounting is recommended for majors.

2. Completion of at least 21 additional hours in economics (Ec) courses. The maximum number of hours in economics courses counting for degree credit—42 hours. The maximum number of hours permitted for degree credit in any other discipline is 18 hours.

Courses in Economics (Ec)

10. Principles of Economics—Analysis of the fundamental characteristics and institutions of modern economic society. Problems analyzed include: inflation, unemployment, poverty, resource allocation, international economic inter-relationships, economic growth and development. Cr 3. STAFF

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21. *Current Economic Problems*—The application of economic reasoning to contemporary domestic and world problems. Problems and possible solutions are analyzed in terms of basic economic principles. Prerequisite: Ec 10. Cr 3.

MR. DOANE

132. *Macroeconomics*—An analysis of the basic forces that cause fluctuations in economic activity. The effects on employment, investment, and business firms are thoroughly treated. Stabilization proposals are examined and evaluated. Prerequisite: Ec 10. Cr 3.

MR. DOANE, MR. SAVAGE

133. *Labor Economics*—A discussion of labor in an industrial society; origins and structure of the labor movement; theories of the labor movement, wages and labor's income; the process of collective bargaining in industrial relations and the development of labor legislation and social security laws. Prerequisite: Ec 10. Cr 3.

MR. CLARK, MR. LUTZ

135. *History of Economic Thought*—A survey of the development of basic economic principles and theories from preindustrial times to the present. Major emphasis is on the Classical School (Smith, Ricardo, and Malthus) and its critics, the development of the Austrian School, the synthesis of Neo-Classicism, and the emergence of macroeconomics. Prerequisite: Ec 10. Cr 3.

MR. HUQ

137. *Comparative Economic Systems*—The structures and operating principles of the major contemporary economic systems are examined and compared. Prerequisite: Ec 10. Cr 3.

MR. LUTZ

138. *Economic Development*—The theories and practices of interregional and international economic development. Special attention is given to development problems of emerging nations. Prerequisite: Ec 10. Cr 3.

MR. BURKE, MR. WILSON

139. *International Trade and Commercial Policy*—The principles and practices of international trade and finance are thoroughly treated. Special emphasis is given to current trends in the international economy and to United States commercial policy. Prerequisite: Ec 10. Cr 3.

MR. BURKE, MR. WILSON

144. *Urban Economics*—Analysis of patterns and processes of growth and structural change within urban areas. Inquiry into the nature and causes of the contemporary crises of urbanized society as reflected in poverty, slum housing, and crime, urban sprawl, traffic congestion, and the pollution of air, soil, and water. Application of tools of economic analysis to public issues such as urban renewal, environmental control, urban housing, urban transportation, financing of urban public services and so on. Prerequisite: Ec 10. Cr 3.

MR. HUQ

145. *Regional Economics*—An analysis of a region (country, state, county, city, etc.) as an economic unit. The economics of location, agglomeration, and interregional trade will be studied. Emphasis will be placed upon introducing the student to empirical tools such as cost—benefit analysis, base studies, input-output tables, and regional accounts. Prerequisite: Ec 10. Cr 3.

MR. WILSON

153. *Money and Banking*—An examination of the American banking and financial system, a study of the monetary theory and policy, and a detailed study of selected subjects in money and banking. Prerequisite: Ec 10. Cr 3.

MR. SAVAGE

IDL 158. *Culture and Economic Development*—A study of the interface between cultural anthropology and economics, especially as these disciplines shed

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light on problems of economic change in the societies of the Third World. Prerequisite: Ec 10, Ay 2, or permission. *Cr* 3. (Same as course Ay 158.) MR. WILSON

168. *Social Control of Business*—A study of the nature and structure of American industry with particular emphasis upon governmental regulation of competition and monopoly. Prerequisite: Ec 10. *Cr* 3. MR. LUTZ

171. *Public Finance and Fiscal Policy*—Public expenditure theory; principles of taxation; the federal budget and alternative budget policies; federal tax policy; fiscal policy for stabilization; federal debt. Prerequisite: Ec 10. *Cr* 3. MR. WIHRY

172. *State and Local Government Finance*—Development of the federal system; fiscal performance; intergovernmental fiscal relations; state and local revenue systems; budgetary practices; state and local debt. Prerequisite: Ec 10. *Cr* 3. MR. WIHRY

173. *Price Theory*—The theory of consumer behavior, markets, the firm, and distribution are treated. Prerequisite: Ec 10. *Cr* 3. MR. DOANE, MR. HUQ, MR. WILSON

174. *Economic Policy*—Current economic problems in national and international levels. Prerequisite: Ec 173. *Cr* 3. MR. CLARK

175. *Industrial Organization*—Emphasis is on determining the relationship between market structure, conduct and performance. Also, the development of a general analytical framework to permit an assessment of performance in existing markets. Current public policy in this area is evaluated in the framework of the above analysis. Prerequisite: Senior standing in Economics. *Cr* 3. MR. DUCHESNEAU

180. *Introduction to Mathematical Economics*—Mathematics is used as a language in presenting concepts of economic theory. Prerequisite: Ec 132, 173; Ms 6 or 12. *Cr* 3. MR. COUPE

Graduate Courses (Ce)

210. *Micro-economic Theory*—*Cr* 3.

211. *Macro-economic Theory*—*Cr* 3

215. *Economics of Human Capital and Education*—*Cr* 3.

220. *Monetary Theory and Policy*—*Cr* 3.

221. *Public Finance and Fiscal Policy*—*Cr* 3.

222. *International Economic Theory and Policy*—*Cr* 3.

223. *Seminar in Labor Economics*—*Cr* 3.

225. *Mathematical Economics*—*Cr* 3.

229. *Readings in Economics*—*Cr* 3.

230. *Econometrics*—*Cr* 3.

235. *Modern Economic Thought*—*Cr* 3.

237. *Studies in Socialist Economics*—*Cr* 3.

238. *Economic Development*—*Cr* 3.

275. *Industrial Organization*—*Cr* 3.

399. *Graduate Thesis*—*Cr* 6.

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ENGLISH (Eh)

PROFESSORS HUNTING (CHAIRMAN), BENNETT, HOLMES, MANLOVE, RANDEL, SPRAGUE, TERRELL, WENCE; ASSOCIATE PROFESSORS HATLEN, HERBOLD; ASSISTANT PROFESSORS ANDERSEN, BAUSCHATZ, BROGUNIER, DENDURENT, M. KENDA, W. KENDA, MACKNIGHT, URBANSKI, WAITE, WICKS, WILSON; INSTRUCTORS BAILEY, BROWNSTEIN, BURNES, DULLEA, MCCORMICK, ROY; GRADUATE ASSISTANTS BUSCH, COLE, GARLAND, FOSTER, HERSHKOWITZ, IRBY, KLEINE, NAZZARO, NOLAN, LARAIA, QUEMERE, ROUNDY, SATTLEMAYER, SIROIS, WARNER

English majors must take a minimum of 36 hours of English. Of these 36 hours, 27 must be taken in the following areas:

Writing:

English 7 3 hours

English literature before 1660: 9 hours

Eh 21, 22, 153, 155, 159, 160, 161, 164; Eh 154, 157, 158

English literature from 1660 to the present: 9 hours

Eh 23, 24, 162, 165, 166, 168, 169, 170, 181, 182, 187, 188

American literature:

Eh 43, 44, 172, 174, 175, 179 6 hours: 3 hours
or other 19th century American literature courses hours at 100-level
prior to 1900; 3
hours at 100-level

NOTES:

1. Certain 200 level courses may be substituted for the 100 level courses listed.
2. All English majors must take at least 15 hours of literature courses on 100 or 200 level.
3. Courses in Comparative Literature at the 100 level may be counted toward the 36-hour minimum requirement in English, with an adviser's permission.
4. Among electives, English majors are strongly urged to choose as many as possible of the following courses: History of England (Hy 155.156);

History of Philosophy (Pl 101, 102, 103, 104); Introduction to Linguistics (IDL 110); Modern Grammars (Eh 121), or the History of the English Language (Eh 167).

English majors will satisfy the Arts and Sciences Humanities requirement with courses other than those in the English Department.

The department offers the Master of Arts degree in English. Candidates for this degree may choose either of two programs: a Thesis Program of 30 hours—24 in course work and 6 of thesis; a Non-Thesis Program of not less than 30 hours of course work. (For further details, see the Graduate School Catalog.)

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The department cooperates with the College of Education in its M.A.T. (Master of Arts in Teaching) program.

In addition, the department participates in an interdepartmental major in Interdisciplinary Studies. The program for English is administered by a department committee. Interested students should see p. 184 of this catalog for details. Information may also be obtained from the department office or the Office of Interdisciplinary Studies, 225 Stevens Hall.

There are somewhat different requirements for an English major who seeks a *Concentration in Creative Writing*. Specifically:

English literature before 1660, Eh 21, 22, 153, 155, 159, 160, 161, or 164; Eh 154, 157, 158	9 hours
English literature from 1600 to the present: Eh 23, 24, 162, 165, 166, 168, 169, 170, 181, 182, 187, 188	9 hours
American literature: Eh 43, 44, 172, 175, 179 or other 19th century American literature courses	6 hours: 3 hours prior to 1900; 3 hours at 100 level
Twelve credit hours from among: Eh 8; Eh 77, Eh 78; Eh 101, Eh 102.	

By the end of the first eight weeks of his final semester, the student is to submit as part of his work a book-length manuscript prepared as if for publication. Preparation and writing of this manuscript may be part or all of the student's work in Eh 101 or Eh 102.

Other courses strongly recommended: Pl 113; Sp 256, Sp 266; Eh 174, Eh 175; Cp 174, Cp 189, Cp 190; Hy 169, Hy 170; a course in the history of American art; and a course in intellectual history.

Courses in Writing

1. College Composition—Intensive practice in expository writing, with reading of illustrative material. Required normally of freshmen. Elective in the College of Arts and Sciences and open to upperclassmen as well as freshmen. *Cr* 3.

Ms. BURNES, Chairman

2. Remedial Composition—A course for students having difficulty meeting acceptable standards of college writing. Prerequisite: permission of the chairman of the course. *Cr* 3.

Ms. BURNES, Chairman

Eh 7. Advanced Composition—Expository Writing—A course for those who wish to develop greater skill in writing, either for their own pleasure or for professional use. Required of Eh majors. *Not* a remedial course. Prerequisite: Eh 1 or equivalent; and permission of course chairman. *Cr* 3.

Ms. BURNES, Chairman

Eh 8. Advanced Composition—Descriptive and Narrative Writing—Like Eh 7, this course is for those who wish to develop greater skill in writing, either for their own pleasure or for professional use. *Not* a remedial course. Prerequisite: Eh 1 or equivalent; and permission of course chairman. *Cr* 3.

MR. HOLMES, Chairman

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17. Advanced Professional Exposition—Supervised practice in clear expository writing of formal reports, professional correspondence, and related materials. Preference given to juniors and seniors for whom the course is a requirement. Not open to English majors in the College of Arts and Sciences. *Cr 3.*

Ms. McCORMICK, Chairman

77. 78. Creative Writing—An advanced course for students of demonstrated ability. Prerequisite: Eh 7 or 8 and permission of instructor. *Cr 3.*

MR. HOLMES, MR. KENDA

101. 102. Directed Writing—Supervised practice in the writing of the novel, drama, short story, poetry, essay, or literary criticism. Individual projects for students with demonstrated ability in writing. Credit earned dependent on amount of writing agreed upon in advance with the instructor. Prerequisite: by permission only. *Cr 1, 2 or 3.*

MR. HOLMES, MISS MACKNIGHT

285. The Theory of Composition—*Cr 3.*

Undergraduate Courses in Literature

4. Introduction to the Drama—Close reading and analysis of about a dozen to fifteen masterpieces of the drama. No A & S senior English majors. *Cr 3.*

STAFF

5. Introduction to Poetry—A systematic progression through the various kinds of poetry (lyric, narrative, elegiac, occasional; the sonnet, the ode, the epic; etc.) and an examination of the techniques (rhythm, pattern, sound, tone, imagery, metaphor, allusion, for example) used by poets of note. Prerequisite: open to freshmen; no A & S senior English majors. *Cr 3.*

MR. ANDERSEN, STAFF

6. Introduction to Fiction—A close reading of six or seven masterpieces of fiction (novel-length) and a selection from the great short stories of our time. Prerequisite: open to freshmen; no A & S senior English majors. *Cr 3.*

MR. WICKS, STAFF

9. Modern Literature—Readings in significant literature of the last half-century. Freshmen only. *Cr 3.*

MR. SPRAGUE, Chairman

21. 22. 23. 24. English Literature Survey—Prerequisite: 3 hours of literature or permission. *Cr 3.*

MR. MANLOVE, Chairman

21. English Literature from Beowulf through Spenser—*Cr 3.*

22. English Literature from Donne through Johnson—*Cr 3.*

23. English Literature from Burns through Arnold—*Cr 3.*

24. English Literature from D. G. Rossetti through Conrad—*Cr 3.*

25. Twentieth Century British Literature—Prerequisite: six hours of literature. *Cr 3.*

MR. TERRELL, MR. BAILEY

43. 44. American Literature—Semester 1: American literature from Colonial times to the American Renaissance. Semester 2: American literature from the Rise of Realism to the present. Prerequisite: 3 hours of literature or permission. Eh majors primarily. *Cr 3.*

MR. RANDEL, Chairman

45. Twentieth Century American Literature—Prerequisite: 6 hours of literature. *Cr 3.*

STAFF

46. Writers of Maine—The Maine scene and Maine people as presented by Sarah Orne Jewett, E. A. Robinson, Edna St. Vincent Millay, Mary Ellen Chase, R. P. T. Coffin, Kenneth Roberts, E. B. White, and others. Prerequisite: 6 hours of literature. *Cr 3.*

MR. DULLEA

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90. *Topics in Literature*—Prerequisite: 6 hours of literature or permission. *Cr* 3.

Fall 1973 semester: Contemporary Fiction

W. KENDA

Spring 1974 semester: Women in the British Novel.

M. KENDA

99. *Existentialism in Fiction*—Religious and atheistic existentialism in British, American, and Continental fiction. Prerequisite: 6 hours of literature, or permission. *Cr* 3.

MR. WILSON

Advanced Undergraduate Courses in Literature

(Graduate students are reminded that courses numbered 100 to 199 may be used for graduate credit only if prior approval has been given by the graduate student's advisory committee.)

153. *Chaucer*—The major focus is on *The Canterbury Tales*, all of which are read in this course. Prerequisite: 6 hours of literature or permission. *Cr* 3.

MR. BENNETT, MR. BAUSCHATZ

154. *Shakespeare Survey*—A study of ten plays, selected to represent the range of Shakespeare's achievement as a playwright. Recommended for non-majors, as well as for those majors who want to meet their Shakespeare requirement with a one-semester course. Not open to students who have taken Eh 157 or 158. Prerequisite: 6 hours of literature. *Cr* 3.

MR. HERBOLD, MR. HATLEN

157. 158. *Shakespeare*—The comedies, history plays and tragedies. Attention is focused on the comedies and histories in the first semester, on the tragedies and romances in the second semester. Prerequisite: 6 hours of literature. *Cr* 3.

MR. HERBOLD, MR. BAILEY, MR. HATLEN

159. *Elizabethan and Seventeenth-Century Lyric Poetry*—Readings from Wyatt through Marvell with special emphasis on Jonson and Donne. Prerequisite: 6 hours of literature or permission; elective other levels. *Cr* 3.

MR. SPRAGUE

160. *Seventeenth Century English Prose*—Readings from Hooker through Bunyan, with special emphasis on the prose of Donne, Bacon, and Browne. Prerequisite: 6 hours of literature or permission. *Cr* 3.

MR. SPRAGUE

161. 162. *British Drama*—Semester 1: Shakespeare's contemporaries, with some attention to the drama before and after Shakespeare. Semester 2: a survey from the Restoration (1660) to 1900. Prerequisite: 6 hours of literature or permission. *Cr* 3.

MR. SPRAGUE

164. *Milton*—The poetry and prose, with attention to the literary and historical background. Prerequisite: 6 hours of literature or permission. *Cr* 3.

MR. HATLEN

165. *Dryden and the Literature of the Restoration Period*—Major works in Restoration literature. *Cr* 3.

MR. MANLOVE

166. *The Age of Swift and Pope*—Prerequisite: freshmen by permission; elective other levels. *Cr* 3.

MR. HUNTING, MR. MANLOVE

168. *Johnson and His Circle*—A study of the major works of Samuel Johnson and his contemporaries: Boswell, Goldsmith, Gibbon, Reynolds, Burke, Garrick, Mrs. Thrale, and Fanny Burney. Some attention given to the beginnings of Romanticism. Prerequisite: 6 hours of literature or permission. *Cr* 3.

MR. MANLOVE

169. 170. *The English Romantics*—The works of the major poets, with some attention to their critical writing and the historical and intellectual context provided by their contemporaries. Semester 1: Blake, Coleridge, and Wordsworth. Semester 2: Byron, Shelley, and Keats. *Cr* 3.

MR. DENDURENT

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172. *The American Renaissance*—The great authors of the United States in the mid-19th century—their works, personalities and social background. Prerequisite: 6 hours of literature or permission. *Cr* 3.

174. 175. *The American Novel*—Semester 1: the novel from Brown to James; semester 2: from Crane to the present. Prerequisite: 6 hours of literature or permission. *Cr* 3. MR. BROGUNIER, MR. RANDEL

179. *American Short Fiction*—A study of genre, form, and theme in representative works of American fiction from Irving to the present. Prerequisite: 6 hours of literature. *Cr* 3. MS. BURNES, W. KENDA

181. 182. *The English Novel*—Semester 1: the principal novelists from the beginnings to Jane Austen; Semester 2: from Dickens to Hardy. Prerequisite: 6 hours of literature or permission. *Cr* 3. MR. HUNTING, M. KENDA

187. 188. *The Victorians*—Semester 1: focus on Tennyson (including the whole of *Idylls of the King*), Browning, and Dickens; Semester 2: Arnold, the Pre-Raphaelites, and Hardy. *Cr* 3. MR. WILSON

190. *Topics in Literature*—Semester 1: literary modes and genres—the romance; Semester 2: literary modes and genres—picaresque fiction. *Cr* 3.

MR. HATLEN, MR. WICKS

199. *Distinguished Lecturer Seminar*—This course, like Eh 190, is intended to supplement, and allow occasional experiments within, the existing curriculum. Normally offered in Summer Sessions only *Cr* 3.

Graduate Courses in Literature (Eh)

- | | |
|---|----------------------------|
| 243. <i>Old English</i> — <i>Cr</i> 3. | MR. BENNETT |
| 244. <i>Beowulf</i> — <i>Cr</i> 3. | MR. BENNETT |
| 245. <i>Studies in Middle English: I</i> — <i>Cr</i> 3. | MR. BAUSCHATZ, MR. BENNETT |
| 246. <i>Studies in Middle English: II</i> — <i>Cr</i> 3. | MR. BAUSCHATZ, MR. BENNETT |
| 254. <i>Pre-Shakespearean Drama</i> — <i>Cr</i> 3. | MR. HERBOLD, MR. SPRAGUE |
| 255. <i>Sixteenth Century Prose and Verse</i> — <i>Cr</i> 3. | MR. SPRAGUE |
| 256. <i>Studies in Shakespeare</i> — <i>Cr</i> 3. | MR. HERBOLD |
| 259. <i>Shakespeare's Contemporaries and Followers</i> — <i>Cr</i> 3. | MR. HERBOLD |
| 260. <i>Restoration Drama</i> — <i>Cr</i> 3. | MR. SPRAGUE |
| 270. <i>The American Drama</i> — <i>Cr</i> 3. | |
| 271. <i>Early American Literature</i> — <i>Cr</i> 3. | |
| 273. <i>The Rise of Realism in America</i> — <i>Cr</i> 3. | MR. BROGUNIER |
| 274. <i>Modern British Literature</i> — <i>Cr</i> 3. | MR. TERRELL |
| 275. <i>Modern American Literature</i> — <i>Cr</i> 3. | MR. HOLMES |
| 292. <i>Literature of Maine and the Atlantic Provinces</i> — <i>Cr</i> 3. | MR. SPRAGUE |
| 325. <i>Bibliography and Methods of Research</i> —Required of all graduate students in English. <i>Cr</i> 2. | MR. SPRAGUE |
| 343. <i>Seminar in American Romanticism</i> — <i>Cr</i> 3. | MR. RANDEL |
| 344. <i>Seminar in American Realism</i> — <i>Cr</i> 3. | MR. RANDEL, MR. BROGUNIER |
| 350. <i>Independent Reading</i> —Prerequisite: 9 hours of graduate work. <i>Cr</i> 1, 2. | STAFF |
| 390. <i>Seminar in the Literature of Medieval England</i> — <i>Cr</i> 3. | MR. BENNETT |
| 391. <i>Sixteenth Century Topics</i> — <i>Cr</i> 3. | MR. HERBOLD |
| 392. <i>Seminar: Seventeenth Century Topics</i> <i>Cr</i> 3. | MR. SPRAGUE |
| 393. <i>Eighteenth Century Topics</i> — <i>Cr</i> 3. | MR. MANLOVE |

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394. *Nineteenth Century Topics*—Cr 3. MR. DENDURENT
395. *Twentieth Century Topics*—Cr 3. MR. HOLMES, MISS MACKNIGHT
399. *Graduate Thesis*—Cr Ar. THE STAFF

Courses in Linguistics and in the History of the English Language

IDL 110. *Introduction to the Study of Linguistics*—A comprehensive survey of language structure and function, with attention to its socio-cultural, psychological, and historical aspects. Designed to provide the student with basic conceptual and technical tools for understanding the phenomenon of language. No previous training in languages or linguistics is required. (This course is the same as Ay 110 and Fl 110 found elsewhere in this catalog.) Cr 3. MR. BAUSCHATZ

121. *Modern Grammars*—Generative-transformational grammar of English, with emphasis on syntax and semantics. Attention is given to the relation of transformational and structural grammar. Prerequisite: IDL 110 or equivalent. Cr 3.

MR. BAUSCHATZ, MR. BENNETT

167. *History of the English Language*—Main aspects of the development of Modern English from Old and Middle English; words and their backgrounds; changes in sound, form, and meaning. Prerequisite: Eh 110, 121, or equivalent. Cr 3.

MR. BAUSCHATZ, MR. BENNETT

250. *Special Problems in Linguistics*—Cr 3. MR. BENNETT

396. *Seminar in Linguistics and Semantics*—Cr 3. MR. BENNETT

Courses in the Teaching of English

184. *Teaching of English in the Secondary School*—A discussion of principles and practices in the teaching of literature, language, and composition, with exercises in theme correction. Prerequisite: 15 hours of literature. Eh 121 or IDL 110 recommended. Cr 3. MISS MACKNIGHT

185. *Workshop for Secondary School Teachers of English*—Lectures by staff and eminent specialists in reading, composition, language, and literature. Designed for experienced secondary school English teachers who want to enrich their backgrounds in their subject matter. Enrollment limited to 25 students. Course given in Summer Session only. Cr 3.

285. *The Theory of Composition*—Cr 3. MS. BURNES

384. *Teaching College English*—Designed to aid graduate students in the learning and using of effective methods of teaching composition and literature. May be repeated for credit. Required of all Graduate Assistants in English. Cr 1.

MS. BURNES

COMPARATIVE LITERATURE (Cp)

A Program in Comparative Literature, administered by a committee of representatives from the Department of English and the Department of Foreign Languages and Classics, offers the following courses:

11. 12. *The Western Tradition in Literature*—A general survey of the major writers in the Western literary tradition, with particular attention to the development of our cultural heritage and the evolution of major literary forms. Semester 1: Homer to the Renaissance. Semester 2: Neoclassicism to the twentieth century. Prerequisite: Eh 1 or equivalent. No freshmen Cr 3. MR. WICKS

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173. 174. Literary Criticism—Readings in literary theory and criticism. Semester 1: Plato to Coleridge; Semester 2: Coleridge to present trends in criticism. Prerequisite: 6 hours of literature or permission. *Cr 3.*

MR. SPRAGUE, MR. ANDERSEN

189. 190. Continental Fiction—The major fiction of Western Europe (France, Germany, Spain, Italy), with emphasis on generic kinds of fiction, particularly the novel. Semester 1: Cervantes to Zola; Semester 2: twentieth century fiction from Mann to Grass and Böll. Prerequisite: 9 hours of literature or permission. *Cr 3.*

MR. WICKS

191. 192. Modern Western Drama—Major dramatists from the end of the nineteenth century to the present. Semester 1: a study of plays by such dramatists as Ibsen, Strindberg, Shaw, Wilde, Chekhov, Hauptmann, Maeterlinck, Wedekind, Pirandello, Claudel, Synge, O'Casey, Giradoux, and O'Neill. Semester 2: a study of plays by such dramatists as Brecht, Lorca, Anouilh, Sartre, Williams, Eliot, Ionesco, Miller, Becket, Duerrnmatt, Genet, Albee, and Pinter. Prerequisite: juniors or seniors, and 6 hours of drama or permission. *Cr 3.*

MR. HERBOLD

193. 194. Fiction of Eastern and Northern Europe—Studies in Russian, Scandinavian and Central European fiction. Semester 1: beginnings to Tolstoy; Semester 2: Tolstoy to the present. *Cr 3.*

MR. TERRELL

Graduate Courses (Cp)

250. Seminar in Classical Literature—*Cr 3.*

251. Seminar in Medieval Literature—*Cr 3.*

252. Seminar in the Renaissance—*Cr 3.*

253. Seminar in Neoclassicism—*Cr 3.*

254. Seminar in European Romanticism—*Cr 3.*

255. Seminar in European Realism and Naturalism—*Cr 3.*

256. Seminar in Twentieth-Century European Literature—*Cr 3.*

299. Special Topics—*Cr 3.*

300. Introduction to Comparative Literature—*Cr 3.*

301. Problems in Comparative Literature—*Cr 3.*

350. Independent Reading—*Cr 3.*

399. Graduate Thesis—*Cr Ar.*

(For further details and for information about the M.A. in Comparative Literature, see the Graduate Catalog.)

COLLEGE OF ARTS AND SCIENCES

FOREIGN LANGUAGES AND CLASSICS

PROFESSORS ROGGENBAUER (Chairman), S. M. GROSS, MILES, O'NEILL, RIOUX, RUSSELL†; ASSOCIATE PROFESSORS GUTMAN, W. R. LUSZCZYNSKI, REID, A. J. SINGERMAN, TATEM; ASSISTANT PROFESSORS BRIMMER, CARROLL, DELPHENDAHL‡, DOCKERY, FRENCH‡, GALBIS, M. L. GROSS, HALL, HAYES, HERLAN, LÓPEZ-MUÑOZ, L. B. LUSZCZYNSKI, PYLES, SMALL, ZOLLITSCH; GRADUATE ASSISTANTS BARNETT, CARROLL, CRIBIER, HANSCOMB, HOYT, JARKOSKI, PALEY, MARX, ROGERS, SCOTT, SYLVESTER, SARDI, TAYLOR, WELCH, WIEGAND

Students may major in the following fields: French, German, Spanish, Romance Languages, Modern Languages, Latin, and International Affairs.

Requirements for majors in modern foreign languages:

1. Demonstration of listening comprehension, oral, reading and writing proficiency, and
2. Demonstration of comprehensive coverage of literature and civilization through successful completion of appropriate course work, or through passing the achievement portion of the GRE, and
3. Accumulation of minimum credits of 30 hours in the subject field beyond the intermediate level, at least 18 (24 hrs. in French) of which must be in courses in the 100 series or above, including 6 hours of the appropriate survey course (Fr 109.110; Gm 109.110; Sp 109.110).

Romance Languages—Majors in Romance Languages are required to take at least 30 hours in literature and related courses in French *and* Spanish beyond the intermediate level, at least 24 hours of which must be in 100 series courses; 12 of these must be in survey courses (Fr 109.110, Sp 109.110) in the two languages.

Modern Languages—Majors in Modern Languages are required to take at least 30 hours in literature and related courses in German and Russian, or in one of the Romance Languages and German, or Russian beyond the intermediate level, of which at least 18 hours must be in 100 series courses; 12 of these must be in survey courses in the languages chosen (Fr 109.110, Sp 109.110, Gm 109.110, Ru 109.110).

Latin—Students electing to major in Latin are required to take 24 hours in the subject matter field beyond the intermediate level. Lt 47.48 should be taken in the junior year or earlier, if possible.

In addition, majors (except for those preparing for teacher certification) are required to complete successfully 18 hours in two or more related disciplines in Arts and Sciences, including other languages and courses in translation offered by the department.

Interdisciplinary Studies—Students may combine a specialization in French, German, Latin, or Spanish, with a program of Interdisciplinary Studies in the

† On leave spring semester 1974.

‡ On leave academic year 1973-74.

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Humanities and Fine Arts. In such cases a program of 24 (instead of 30) hours in French, German, Latin, or Spanish, is combined with 24 hours of related work in Art, English, History, Music, Philosophy, and Speech. For details see p. 184.

with 18 hours of related work in at least 3 of the following categories:

Anthropology: Ay 139; Ay 197.198; Fo 197.198
Economics: Ec 133; Ec 135; Ec 139; Ec 145
History: Hy 10; Hy 159-160; Hy 178; Hy 199
Psychology: Py 90; Py 130
Sociology: Sy 118; Sy 123; Sy 138; Sy 191/192

In addition, students are required to take F.A. 140 and Fr 207.

International Affairs—Students may combine a program of 24 (instead of 30) hours in French, German, or Spanish, with appropriate studies in other fields for a major in International Affairs. For details see p. 135.

Teacher Preparation—Students preparing to teach foreign languages at the secondary or elementary levels should plan on taking the following program of academic studies and professional preparation courses in order to meet the requirements for certification. See p. 218 and p. 219.

1. **Academic studies:** In addition to meeting the major requirements in French, German, Latin, or Spanish, students desiring certification should complete the following:

- (a) 18 hours, including the introductory course, in a second subject commonly taught in high schools. Such subjects include, in addition to other foreign languages, English, speech, economics, history, chemistry, physics, biology, mathematics, home economics, geography, political science, or geology;

or, in the case of French majors only:

- (b) 21 additional hours of studies related to the major, as follows:
 - (1) 6 hours of linguistics and/or phonetics
 - (2) 6 hours of comparative literature, philosophy, and/or fine arts
 - (3) 9 hours of additional work in French language, literature, or civilization.

2. **Professional preparation:**

- (a) 9 hours of basic work
(Ed B 2, Ed B 3, Ed B 4)
- (b) Fl 166—The Teaching of Foreign Languages 3 hours
- (c) Ed M 191—Full-day student teaching 6 hours

Humanities Requirement—Many of the courses in literature and civilization which may be taken to meet the requirements of a major in one or the other of the foreign language fields will also satisfy the Humanities requirement. For a listing of such courses, see p. 83.

Study Abroad—Students majoring in a foreign language are encouraged to spend a summer, a semester, or an academic year in a previously approved program of study at a foreign university as part of their program. Consult the chairman of the department regarding these possibilities. The University of Maine at Orono maintains during the summer a 6-week Overseas Study Program in Pau, France,

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and in Graz, Austria. Up to 6 credits will be awarded for successful completion of the program.

The University is affiliated through the University of New Hampshire and the University of Vermont with a Junior Year Abroad Program in Salzburg, Austria; through CIEE (Council of International Education Exchange) with a year—or semester abroad study program at Rennes, France, and at Seville, Spain.

A regular credit-transfer arrangement exists with the Universities of Avignon, and Aix-en-Provence, France.

Up to 32 credits may be earned through these programs, pending previous consent of the Dean, and the department chairman involved.

Graduate Study—The department also offers work leading to the master's degree in French and German. See the Graduate School catalog, as well as the Summer Session catalog, for special aspects involved when the degree is sought through attendance at summer session.

Curriculum in French	1973/74		1974/75 (tentatively)	
	1	2	1	2
Elementary	1	2	1	2
Intermediate	3	4	3	4
Practical	7	8	7	8
Oral	9	10	9	10
Reading in lit.	11	12	11	12
Play production	-	16	-	16
Diction	-	15	-	-
Linguistics	(99)	IDL 110	(99)	IDL 110
grad.	-	-	-	210
Phonetics	120	-	120	-
History of French Language	-	207	-	-
Methods: teaching*	(Fl 166)	Fl 166	(Fl 166)	Fl 166
research*	Fl 221	Fl 225	Fl 221	-
translation*	Fl 150	-	Fl 151	-
Advanced grammar	(167)	168	(167)	168
Survey: literature	109	110	109	110
civilization	157	158	157	158
heritage*	Fl 175	FA 140	Fl 175	FA 140
Literature: Medievel/Ren.	181	183	-	-
Class/18th cent.	171	173	171	173
19th cent./20th cent.	175	154	177	156
Franco-Can.	-	-	-	FA 296
African French	-	-	-	160
in translation: 20th cent.	T 15	-	-	T 10
18th cent.	-	-	T 179	-

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Grad. Lit.: Renaiss./Med.	-	-	310	208
18th cent./class.	330	320	330	320
19th cent.	-	230	-	350
Special topics: Theatre	-	370	-	-
Novel; Poetry	340	-	360	-
Individual Authors	291	-	292	-
Individual Projects	297	298	297	298
Summer program in Pau, France	97		97	
*Not limited to students of French	197		197	

Curriculum in German	1973/74		1974/75	
Elementary	1	2	1	2
Intermediate	3	4	3	4
Scientific	-	12	-	12
Practical (oral)	7	8	7	8
Diction	15	-	-	-
Play production	-	16	16	-
Survey, literature	-	-	109	110
Civilization	T58/157	-	-	T58/157
Literature: 20th cent.	T15		159	160/T10
18th cent.	-	171	-	-
Classic, rom.	-	-	173	175
19th cent.	177	178	-	-
Adv. grammar	-	167	-	-
Grad. lit.: MHG, lit. of Middle Ages	-	207	208	-
indiv. authors	291	-	-	292
genres	-	290	290	-
indic. projects	297	-	-	298
Summer Program in Graz, Austria	97		97	

Curriculum in Spanish	1973/75		1974/75	
Elementary	1	2	1	2
Intermediate	3	4	3	4
Practical (oral)	9	10	7	8
Reading in lit.	11	12	-	-
Play production	-	16	16	-
Hispanic civil.	T57	-	T58	-
Survey literature	-	-	109	110
Lt./Am. masterpieces	-	-	140	-
Literature: 20th cent.	151	152	-	-
Lt./Am. Novel	-	-	153	154
Adv. grammar & comp.	-	-	-	167
Literature: 19th cent.	-	-	-	177
The Golden Age	180	181	-	-
Lit. in transl.: Lat. Am. Lit.	T10	-	-	-
Cervantes	-	T15	-	T15
Mediev. Sp., Lit. of Middle Ages	-	207	208	-
Indiv. authors	291	-	-	292
Seminar in Lit. topics	-	290	290	-
Indiv. projects	297	-	-	298

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FOREIGN LANGUAGES (FI)

IDL 110. *Introduction to the Study of Language*—A comprehensive survey of language structure and function with attention to its socio-cultural, psychological and historical aspects. Designed to provide the student with basic conceptual and technical tools for understanding the phenomenon of language. No previous training in languages or linguistics is required. (This course is the same as Ay and Eh 110.) Cr 3. MR. GUTMAN

FA 140. *Franco-American Civilization*—An interdisciplinary study of the French heritage in North America. Cr 3. MR. RIOUX

150. 151. *Translation: Theory and Practice*—An introductory course designed for the student who is interested in professional translation from a foreign language into English. Emphasis on theories and problems of translation. Prerequisite: permission of the instructor. Cr 3.

MS. FRENCH, MR. HAYES, MR. LOPEZ-MUÑOZ

166. *The Teaching of Foreign Languages*—Principles and practice of teaching foreign languages. Analysis of current trends and methods. Application of language learning principles to classroom procedures. Theory and practice of language methodologies at different learning levels. Attention to the use of audio-visual devices, including closed-circuit television, and other modern media of instruction and demonstration. For students seeking certification in foreign language teaching. Cr 3. MR. O'NEILL

175. *Contributions of European Linguistic Groups to the American Cultural Heritage*—Designed to acquaint the student with the cultural contributions of European language groups to the development of America, thereby discovering the roots of many American traditions, tracing origins of characteristic (place) names and words to early immigrants; investigating ways in which groups or individuals dealt with the new environment in accordance with their own heritage. In order to study documentary evidence of such a legacy, a reading knowledge of a foreign language is recommended. Cr 3.

MR. ROGGENBAUER, MR. GROSS, MR. PYLES, MR. RIOUX

221. *Seminar in Literary Research Methods*—Literary topics transcending national boundaries will be chosen to provide training in the methods and techniques of literary research for students of French, German and Spanish literature. Required for candidates for the Master of Arts in the Department of Foreign Languages and Classics. Cr 3. MS. RUSSELL

225. *Critical Methodology*—Examination of ideological cases of European critical methods from 19th Century to present. Special attention to concepts of history and structural method. Cr 3. MR. CARROLL

Courses in Translation

Cl 1. 2. *Greek and Latin Literature in English Translation*—The first semester is devoted to Greek literature; the second semester to Latin literature. No knowledge of either language is necessary. This course satisfies the humanities requirement of the College of Arts and Sciences Cr 3. MR. TATEM

Fr T 10. *Contemporary French Novel*—Existentialism to the New Novel; selected works in English translation of leading contemporary French novelists. (Does not count for the French major.) Cr 3. STAFF

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Fr T 15. Twentieth-Century French Theatre—Selected works of leading French playwrights of the 20th century in English translation. (Does not count for the French major.) *Cr 3.* STAFF

Fr T 179. The Age of Enlightenment—Readings in English translation of the political, social, and philosophical writings of Montesquieu, Voltaire, Diderot, Rousseau, and other French writers of the 18th century. May be elected by juniors, seniors, and sophomores with permission. (This course may not be used to meet the requirements of a major or the M.A. degree in French *Cr 3.* STAFF

Gm T 10. 20th Century German Literature in Translation—An introduction to the recent German writings in the drama, novel, and poetry, with special attention to such authors as Kafka, Mann, Brecht, and Grass. (Does not count for the German major.) *Cr 3.* MR. SMALL

Gm T 15. Modern German Theatre in English Translation—A study of German drama from 19th Century Realism to the present. Reading and discussion of works by Hauptmann, Schnitzler, Kaiser, Brecht, Dürrenmatt, Frisch, Grass, Weiss and others. (Does not count for the German major.) *Cr 3.* MR. HALL

Gm T 58. German Civilization in Translation—Readings, discussions, lectures, and oral and written reports on Germany, its people, institutions and culture for the purpose of providing the background essential to an understanding of German literature, thought, and artistic expression. *Cr 3.* MR. ROGGENBAUER

Ru T 57. Soviet Civilization in Translation—Readings, discussions, lectures, and oral and written reports on the Soviet Union, its people, institutions and culture. No knowledge of the Russian language required. Course satisfies the humanities requirement of the College of Arts and Sciences. *Cr 3.* MR. PYLES

Sp T 10. The Contemporary Spanish American Novel in Translation—The major works of Julio Cortázar, Carlos Fuentes, Mario Vargas Llosa, Gabriel García Marquez and José Lezama Lima, and other representatives of the contemporary experimental Spanish American novel. (Does not count for the Spanish major.) *Cr 3.* MS. LUSZCZYNSKI

Sp T 15. Cervantes in Translation—Don Quijote and other major works of Cervantes in English translation. Lectures on his life and times (Does not count for the Spanish major.) *Cr 3.* MR. GROSS

Sp T 57. Spanish Civilization in Translation—Readings, discussions, lectures, and oral and written reports on Spain, its people, institutions, and culture for the purpose of providing the background essential to an understanding of Spanish literature, thought, and artistic impression. *Cr 3.* MR. LOPEZ-MUÑOZ

Sp T 58. Hispanic Civilization (Latin-America)—Readings, discussions, lectures, and oral and written reports on Latin America, its people, institutions and culture for the purpose of providing the background essential to an understanding of Spanish literature, thought, and artistic impression. *Cr 3.* MS. LUSZCZYNSKI

FRENCH (Fr)

1-2. Elementary French—For students with no previous study of French or less than two years in high school. (Audio practice in the laboratory, which carries one extra hour of credit, is highly recommended). *Cr 3. (or 4.)* STAFF

IV-2V. Elementary French-Audiovisual—For students with no previous study of French or less than two years in high school. Emphasis on achieving skills in the spoken language. *Cr 4.* STAFF

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1A-2A. Elementary French (Double Course)—For students with no previous study of French or less than two years in high school. A full year's work will be covered in one semester. *Cr 6.* STAFF

3/4. Intermediate French—For students who have completed Fr 2 or the equivalent in high school as determined by a placement test. Two approaches are available: audio-lingual and emphasis on reading. (Audio-practice in the lab, which carries one extra hour of credit, is highly recommended.) *Cr 3. (or 4.)* STAFF

3V/4V. Intermediate French-Audiovisual—Limited to students who have completed Fr 2 (Audiovisual) or who have achieved a better than average facility in speaking in two or three years of French in high school. Although facility in reading will be an important objective, emphasis will be upon the achievement of a high degree of proficiency in the spoken language. *Cr 4.* STAFF

3A-4A. Intermediate French (Double Course)—For students who have completed Fr 2 or Fr 1A-2A or the equivalent in high school as determined by a placement test. A full year's work will be covered in one semester. *Cr 6.* STAFF

7.8. Practical French—Systematic training in correct usage and in vocabulary building, with written and oral practice. Aims particularly to improve the student's command of writing, as Fr 9.10 concentrates on speaking and Fr 11.12 on reading. Prerequisite: Fr 4 or the equivalent. *Cr 3.* STAFF

9.10. Oral French—A systematic attempt to increase active vocabulary and fluency in spoken French. Techniques used may include dialogues, skits, speeches, and discussions. Prerequisite: Fr 4 or the equivalent. *Cr 3.* STAFF

11.12. Readings in French Literature—For students who wish further practice in reading literary selections before beginning literature courses in the 100 series. Discussion and analysis in French. One section is reserved for readings in Canadian-French literature. Prerequisite: Fr 4 or the equivalent. *Cr 3.* STAFF

‡15. French Diction—The pronunciation of French, with some attention also to the rudiments of structure of the language. Primarily a service course for the theatre and Departments of Music and Speech, e.g., vocalists, actors, radio and television announcers. No prerequisite. *Cr 1.* STAFF

16. French Play Production—Participation in the acting and production of plays in the Foreign language. Prerequisite: permission of the instructor. This course may be repeated for credit another year. *Cr 3.* MR. SINGERMAN

MR. SINGERMAN

99. Applied French Linguistics—The French sound system, spoken grammar, basic concepts of descriptive and general linguistics. This course should be taken by students preparing for teacher certification. *Cr 3.* MR. GUTMAN

109.110. Introduction to French Literature—Important works of French literature from the Middle Ages to the present. Prerequisite: Fr 4 or the equivalent. *Cr 3.* STAFF

120. French Phonetics—A formal study of the French sound system with considerable practice in phonetic transcription. Practical and remedial work in pronunciation. Prerequisite: Fr 4 or the equivalent. *Cr 3.* MR. GUTMAN

‡154. The 20th Century French Novel—Prerequisite: Fr 110 or permission. May be repeated for credit. *Cr 3.* MR. LUSZCZYNSKI

‡ Offered 1973-74

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†156. *The 20th Century French Theatre*—Representative plays of Giraudoux, Anouilh, Cocteau, Montherlant; the "Existential Theatre" of Sartre and Camus; the "Theatre of the Absurd" of Ionesco, Beckett, and Genêt. Prerequisite: Fr 110 or permission. Cr 3. MR. SINGERMAN

157. 158. *French Civilization*—Readings, discussions, lectures, oral and written reports on varied aspects of France, its people, institutions, and culture to provide the background essential to an understanding of French literature, thought, and artistic expression. Prerequisite: Fr 4 or the equivalent. Cr 3. MS. BRIMMER

†160. *Black African Literature in French*—Lectures, readings and discussion of representative novelists, dramatists and poets of Black French Africa from 1930 to the present. Prerequisite: A reading knowledge and permission of the instructor. Cr 3. MR. DOCKERY

167. *Advanced French Grammar*—Designed to provide an adequate foundation in French grammar and syntax for prospective teachers. An intensive analysis and review of advanced grammar and syntax through exercises and translation. Cr 3. MR. RIOUX

168. *Advanced Composition and Stylistics*—A systematic study of the problems of style as seen through composition and translation. Prerequisite: Fr 167 or permission. Cr 3. MR. RIOUX

171. *French Literature of the Seventeenth Century*—Literary trends in French classicism: Descartes, Pascal, Corneille, Racine, Molière, La Fontaine. Prerequisite: Fr 110 or permission. Cr 3. MS. RUSSELL

173. *French Literature of the 18th Century*—Trends in the novel and theatre, with some attention to other prose forms of Enlightenment literature. Readings include works by Voltaire, Montesquieu, Prévost, Diderot, Rousseau, Laclos, Lesage, Marivaux, and Beaumarchais. Prerequisite: Fr 110 or permission. Cr 3. MR. SINGERMAN

‡175. *French Romantic Prose and Poetry*—Lectures, readings, and discussions of representative writers of the Romantic movement, from its 18th century origins to the middle of the 19th century. Prerequisite: Fr 110 or permission. Cr 3. MR. O'NEILL

†177. *The Nineteenth Century French Novel*—Prerequisite: Fr 110 or permission. Cr 3. MR. CARROLL

181. *French Literature of the Medieval Period*—Origin, formation and development of a national literature as seen through the prose, poetry and theater from the beginnings through the 15th century. Prerequisite: Fr 110 or permission. Cr 3. MR. RIOUX

183. *French Literature of the Renaissance*—Representative works by such important writers as Marot, Rabelais, Calvin, Du Bellay, Ronsard, d' Aubigné, Montaigne, Marguerite d'Angoulême. Prerequisite: Fr 110 or permission. Cr 3. MR. RIOUX

Graduate Courses (Fr)

‡207. *History of the French Language*—Cr 3.

208. *Old French Literature*—Cr 3.

†210. *French Linguistics*—Cr 3.

‡ Offered 1973-74

† Offered 1974-75

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‡230. *Social, Political, and Religious Backgrounds of the Early Nineteenth Century in France*—Cr 3.

291. 292. *Individual Authors*—Cr 3.

†296. *Seminar in French-Canadian Literature and Language*—Cr 3.

297. 298. *Projects in French*—Cr Ar.

310. *Seminar in French Renaissance Literature*—Cr 3.

320. *Seminar in French Classicism*—Cr 3.

330. *Seminar in Literature of the 18th Century*—Cr 3.

‡340. *Seminar in the Novel*—Cr 3.

†350. *Seminar in Romanticism*—Cr 3.

†360. *Seminar in Poetry*—Cr 3.

‡370. *Seminar in the Theater*—Cr 3.

399. *Graduate Thesis*—Cr 6.

GERMAN (Gm)

1-2. Elementary German—For students with no previous study of German or less than two years in high school. (Audio practice in the laboratory, which carries one extra hour of credit, is highly recommended.) Cr 3. (or 4)

STAFF

1V/2V. Elementary German-(Audiovisual)—For students with no previous study of German or less than two years in high school. Emphasis on achieving skills in the spoken language. Cr 4.

STAFF

1A-2A. Elementary German-(Double Course)—For students with no previous study of German or less than two years in high school. A full year's work will be covered in one semester. Cr 6.

STAFF

3/4. Intermediate German—For students who have completed Gm 2 or the equivalent in high school as determined by a placement test. Two approaches are available: audio-lingual and emphasis on reading. (Audio practice in the laboratory, which carries one extra hour of credit, is highly recommended.) Cr 3. (or 4.)

STAFF

3V/4V. Intermediate German-(Audiovisual)—For students who have completed Gm 2 (Audiovisual) or who have achieved a better than average facility in speaking in two or three years of German in high school. Although facility in reading will be an important objective, emphasis will be upon the achievement of a high degree of proficiency in the spoken language. Cr 3.

STAFF

3A-4A. Intermediate German-(Double Course)—For students who have completed Gm 2 or Gm 1A-2A or the equivalent in high school as determined by a placement test. A full year's work will be covered in one semester. Cr 6.

STAFF

7. 8. Practical German—A course designed to improve students' comprehension, speaking, and writing. Recommended for German majors as preparation for their language proficiency test. Prerequisite: Gm 4 or equivalent. Cr 3.

STAFF

12. Readings in Scientific German—For students who have completed Gm 3 or equivalent and wish to be able to read scientific articles in German. The second half of the semester will be devoted to individualized readings in the student's special field of interest. Prerequisite: Gm 3 or equivalent. This course can be taken as an alternate to Gm 4; it satisfies the humanities requirements and also

‡ Offered 1973-74

† Offered 1974-75

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serves as preparation for meeting graduate school language requirements. *Cr* 3.

MR. ZOLLITSCH

‡15. *German Diction*—The pronunciation of German, with some attention also the rudiments of structure of the language. Primarily a service course for the theatre and Departments of Music and Speech, e.g., vocalists, actors, radio and television announcers. No prerequisites. *Cr* 1.

STAFF

16. *German Play Production*—Participation in the acting and production of plays in the German language. This course may be repeated for credit another year. Prerequisite: Permission of the instructor. *Cr* 3.

MR. HALL

†109. 110. *Introduction to German Literature*—A survey of the important periods in German literature with readings of representative works. This course satisfies the humanities requirement of the College of Arts and Sciences. Prerequisite: Gm 4 or the equivalent. *Cr* 3.

STAFF

157. *German Civilization*—Readings, discussions, lectures, oral and written reports on Germany, its people, institutions, and culture to provide the background essential to an understanding of German literature, thought, and artistic expression. Prerequisite: Gm 4 or the equivalent. *Cr* 3.

MR. ROGGENBAUER

†159. 160. *German Literature of the 20th Century*—Prose, poetry, and drama by representative writers. *Cr* 3.

MR. SMALL

‡167. *Advanced German Grammar*—Designed to provide a summary in German grammar and syntax for prospective teachers. *Cr* 3.

MR. ROGGENBAUER

‡171. *Enlightenment and "Storm and Stress"*—A survey of representative works of this period with emphasis on Lessing, young Goethe, and Schiller. *Cr* 3.

MR. MILES

†173. *Goethe and Schiller*—Readings and discussion of works by Goethe and Schiller. *Cr* 3.

MR. MILES

†175. *The Romantic School*—A survey of representative authors from Novalis to Eichendorff. *Cr* 3.

MR. MILES

‡177. 178. *German Literature from 1832 to the turn of the Century*—Important literary figures and movements with particular attention to the drama and Novelle. *Cr* 3.

MR. MILES

Graduate Courses (Gr)

‡207. *Middle High German*—*Cr* 3.

†208. *Medieval German Literature*—*Cr* 3.

290. *Seminar in Literary Genres*—*Cr* 3.

291. 292. *Individual Authors*—*Cr* 3.

297. 298. *Projects in German*—*Cr Ar.*

399. *Graduate Thesis*—*Cr Ar.*

GREEK (Gk)

1-2. *Elementary Greek*—Fundamentals of the Greek language. In the second semester, selections from Euripides' *Alcestis*. For students who have had little or no preparation in Greek. *Cr* 4.

MR. TATEM

3/4. *Intermediate Greek*—In the first semester, Plato's *Apology*, Euripides' *Alcestis*, and Sophocles' *Oedipus Rex*. In the second semester, selected books from Homer's *Iliad*. (Next offered in 1973-74.) *Cr* 3.

MR. TATUM

‡ Offered 1973-74

† Offered 1974-75

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ITALIAN (It)

‡1-2. *Elementary Italian*—Development of listening comprehension, speaking, reading, and writing skills. Laboratory-oral practice (1 hr. credit) is optional. For students who have had no Italian or less than two years of high school Italian. Cr 3. (or 4.) MR. NEWTON

†3/4. *Intermediate Italian*—For students who have completed Italian 1-2 or two or three years of high school Italian. (Laboratory practice.) Review of grammatical structures. Cr 3. (or 4.) MR. NEWTON

†It. 15. *Italian Diction*—The pronunciation of Italian, with some attention to the rudiments of structure of the language. Designed primarily for singers but may also be elected by others. No prerequisite. Cr 1. MR. NEWTON

LATIN (Lt)

1-2. *Elementary Latin*—Fundamentals of the Latin language. Cr 3.

MR. TATEM

3/4. *Intermediate Latin*—Selected readings from masters of Latin prose and poetry. For students who have had Latin 1-2 or at least two years of high school Latin. Cr 3.

MR. TATEM

9. 10. *Readings in Latin Literature*—Selections from Ovid's poetry. Emphasis on literary values. Second semester, selections from Martial's epigrams and Tacitus Agricola. Cr 3.

MR. TATUM

†47. 48. *Latin Prose Composition and Stylistics*—Review of grammar and syntax, with particular attention to Cicero and Tacitus. The writing of prose, especially in the style of Cicero. This course, which is required for majors, should be taken in the junior year or earlier, if possible. Offered in 1974-75. Cr 3.

MR. TATEM

In Latin (Lt)

151. *Roman Comedy: Plautus and Terence*—One play of each dramatist will be read. The source of Roman comedy, its literary features, and influence upon later literature. Given every three years; offered in 1975-76. Cr 3.

MR. TATEM

152. *Roman Philosophical Thought*—Selections from Lucretius, *De Rerum Natura*, and Cicero's philosophical essays. The three major philosophical schools: Academic, Stoic, Epicurean, and their influence on Roman thought. Given every three years; offered in 1975-76. Cr 3.

MR. TATEM

153. *Poetry of the Republic and Early Empire*—The lyric poetry of Catullus. The *Odes* of Horace. The origin and development of satire, with selections from the satires of Horace and Juvenal. Given every three years; offered in 1974-75. Cr 3.

MR. TATEM

154. *Prose of the Republic of Early Empire*—Selections from Cicero's letters, Pliny's letters, and Tacitus' *Annals*. Given every three years; offered in 1974-75. Cr 3.

MR. TATEM

‡ Offered 1973-74

† Offered 1974-75

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181. *Virgil: The Eclogues, Georgics, Aeneid*—The poet's background achievement, and influence upon later literature. Given every three years; offered in 1973-74. *Cr* 3. MR. TATEM

182. *Survey of Latin Literature*—A rapid survey of the Archaic Age to Medieval Latin. Lectures, discussions, reports, and assigned readings. Given every three years; next offered in 1973-74. *Cr* 3. MR. TATEM

197. 198. *Projects in Latin*—Individual work on a project of the student's selection. Prerequisite: consent of the department head. *Cr* Ar (maximum: 3 hrs.). MR. TATEM

RUSSIAN (Ru)

1-2. *Elementary Russian*—For students who have had no previous study of Russian or less than two years in high school. (Audio practice in the laboratory, which carries one extra hour of credit, is highly recommended.) *Cr* 3. (or 4.)

MR. PYLES

1V/2V. *Elementary Russian-(Audiovisual)*—For students who have had no previous study of Russian, or less than two years in high school. Emphasis is upon achieving skills in the spoken language. *Cr* 4. MR. PYLES

3/4. *Intermediate Russian*—For students who have completed Ru 2 or the equivalent in high school as determined by a placement test. (Audio practice in the laboratory, which carries one extra hour of credit, is highly recommended.) *Cr* 3. (or 4) MR. PYLES

7/8. *Practical Russian*—Systematic training in correct pronunciation, intonation and usage, and in vocabulary building, with written and oral practice. Prerequisite: Ru 4 (or the equivalent) and permission of the instructor. This course is conducted entirely in Russian. *Cr* 3. MR. PYLES

109. 110. *Introduction to Russian Literature*—Important works of Russian literature from the Middle Ages to the present. Prerequisite: Ru 4 or the equivalent. This course satisfies the humanities requirement. Not offered in 1973-74. *Cr* 3. MR. PYLES

SPANISH (Sp)

1-2. *Elementary Spanish*—For students with no previous study of Spanish or less than two years in high school. (Audio practice in the laboratory, which carries one extra hour of credit, is highly recommended.) *Cr* 3. (or 4.) STAFF

1V-2V. *Elementary Spanish-(Audiovisual)*—For students with no previous study of Spanish or less than two years in high school. Emphasis on achieving skills in the spoken language. *Cr* 4. STAFF

1A-2A. *Elementary Spanish (Double Course)*—For students with no previous study of Spanish or less than two years in high school. A full year's work will be covered in one semester. *Cr* 6. STAFF

3/4. *Intermediate Spanish*—For students who have completed Sp 2 or the equivalent in high school as determined by a placement test. Two approaches are available: audio-lingual and emphasis on reading. (Audio-practice in the lab, which carries one extra hour of credit, is highly recommended.) *Cr* 3. (or 4) STAFF

3V-4V. *Intermediate Spanish-(Audiovisual)*—For students who have completed Sp 2 (Audiovisual) or who have achieved a better than average facility in

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speaking in two or three years of Spanish in high school. Although facility in reading will be an important objective, emphasis will be upon the achievement of a high degree of proficiency in the spoken language. *Cr* 4. STAFF

3A-4A. Intermediate Spanish (Double Course)—For students who have completed Sp 2 or Sp 1A-2A or the equivalent in high school as determined by a placement test. A full year's work will be covered in one semester. *Cr* 6. STAFF

7. 8. Practical Spanish—Systematic vocabulary building toward proficiency through written and oral practice with some attention to problems of writing style. Spanish 7.8 aims particularly to improve the student's command of writing, as Sp 9.10 concentrates on speaking, and Sp 11.12 on reading. Prerequisite: Sp 4 or the equivalent. *Cr* 3. STAFF

9. 10. Oral Spanish—A systematic attempt to increase active vocabulary and fluency in spoken Spanish. Techniques used may include dialogues, skits, speeches, and discussions. Prerequisite: Sp 4 or the equivalent. *Cr* 3. STAFF

11. 12. Readings in Spanish Literature—For students who wish further practice in reading before beginning literature courses in the 100 series. Discussion and analysis in Spanish. Prerequisite: Sp 4 or the equivalent. *Cr* 3. STAFF

16. Spanish Play Production—Participation in the acting and production of plays in Spanish. Course may be repeated for credit another year with permission of the instructor. *Cr* 3. MR. LOPEZ-MUÑOZ

†**109. 110. Introduction to Spanish Literature**—A survey of the important periods and trends in Spanish literature, with readings of representative works. Prerequisite: Sp 4 or the equivalent. *Cr* 3. MR. GALBIS

†**140. Latin-American Masterpieces**—A selection of key essays, poems, short stories, and novels from the colonial period to the 20th century. *Cr* 3. MS. LUSZCZYNSKI

‡**151. Spanish Literature of the Twentieth Century**—The Generation of 1898; the poetic generation of 1927; the pre-Civil War novel, drama and thought. *Cr* 3. MR. GALBIS

‡**152. Contemporary Novel**—"Tremendismo," "novela social," and latest experiments. The new poetry. *Cr* 3. MR. GALBIS

†**153. 154. Modern Latin-American Novel**—From the late 19th century to World War II. Spring semester: the contemporary period, with attention to the literary renaissance throughout Latin America. *Cr* 3. MR. GROSS

†**167. Advanced Spanish Grammar, Composition, and Stylistics**—Designed to provide an adequate foundation in Spanish grammar, syntax, and composition for prospective teachers. Also applied stylistics for those with certain proficiency of expression interested in creative writing. *Cr* 3. MR. GALBIS

†**177. Spanish Literature of the 19th Century**—The Romantic Movement: between tradition and revolt. The novel from "costumbrismo" to "realismo." Spanish naturalism: a compromise. *Cr* 3. MR. LOPEZ-MUÑOZ

‡**180. Cervantes**—A careful reading of the Spanish masterpiece, *Don Quijote*, with class discussions and lectures in its historical background and continuing influence. Students will report on *Don Quijote* and other major works. *Cr* 3. MR. GROSS

‡ Offered 1973-74

† Offered 1974-75

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‡181. *Golden Age Dramatists*—Representative works by Lope de Vega, Calderon de la Barca, Tirso de Molina and others will be read and discussed. Cr 3.

MR. NEWTON

Graduate Courses (Sp)

‡207. *Old Spanish*—Cr 3.

†208. *Spanish Literature of the Middle Ages*—Cr 3.

290. *Seminar in Literary Topics*—Cr 3.

291. 292. *Individual Authors*—Cr 3.

297. 298. *Projects in Spanish*—Cr Ar.

Additional Summer Session Courses

Fr 97. *Overseas Study in French Language, Literature and Civilization, at the University of Pau in France*—Cr 6.

STAFF

Fr 197. *Graduate Level Overseas Study in French Language, Literature and Civilization*—(Centre de Hautes Etudes Françaises at the University of Pau, France.) Cr 6.

STAFF

Gm 97. *Overseas Study in German Language, Literature and Civilization at the University of Graz in Austria*—Cr 6.

STAFF

GEOLOGICAL SCIENCES

PROFESSORS BORNS, (CHAIRMAN), OSBERG; ASSOCIATE PROFESSORS DENTON, GREEN, HALL, HOLLIN, NORTON, SCHNITKER; ASSISTANT PROFESSORS CHERNOSKY, FINK; FACULTY ASSOCIATE STUCKENRATH

The geological sciences are concerned with the physical and chemical characteristics of minerals and rocks, with their occurrence, arrangement, and surface expression, and with the history of the earth and its organic inhabitants. The curriculum provides for a basic understanding of the geological sciences and is sufficiently flexible to allow students with interests in geochemistry, geophysics, paleontology, and oceanography to pursue additional courses in appropriate ancillary sciences.

A geology major is prepared to enter directly into industry or survey work, or to enter graduate school in geology. In addition, if Zo 4, Ch 151/152, and Ch 161/162 are taken the requirements for medical or dental schools are met.

The requirements for the major include: Gy 1/2 of Gy 6/2; Gy 111; Gy 112; Gy 114; Gy 115; Gy 116; Gy 155; Gy 156; Ch 13/14; Ms 12; Ms 19; and Ps 1a/2a.

An approved summer field course is recommended between the junior and senior years. This course may be counted toward the major requirements.

The specimen curriculum is somewhat flexible and may be altered for individuals with previous geological training. Special interdisciplinary programs may be arranged after consultation with the departmental undergraduate advisor.

† Offered 1974-75

‡ Offered 1973-74

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GEOLOGY SPECIMEN CURRICULUM

Sophomore Year

		Hours			Hours		
Gy	111	Mineralogy	4	Gy	112	Intro. to Petrology	4
Ms	12	Analytical Geometry		Gy	114	Invertebrate Paleontology	3
		and Calculus	4			Fine and Communicative	
		Fine and Communicative				Arts	3
		Arts	3			Elective	3
		Elective	3			Elective	3
		Elective	2				
			<hr/>				<hr/>
			16				16

Junior Year

			Hours				Hours
Gy	115	Principles of Stratigraphy	3	Gy	116	Intro. to Structural Geology	4
Ps	1a	General Physics	4	Ps	2a	General Physics	4
		Elective	3			Elective	3
		Elective	3			Elective	3
			<hr/>				<hr/>
			13				14

Senior Year

Hours				Hours			
Gy	155	Optical Mineralogy	4	Gy	158	Petrography	3
Ms	19	Principles of Statis-				Social Science	3
		tical Inference	3			Elective	3
		Social Science	3			Elective	3
		Elective	3			Elective	3
		Elective	3				
			16				15

GEOLOGY (Gy)

1/2. Aspects of the Natural Environment—Fall semester: A study of earth materials and processes including the structure of matter, formation of igneous rocks, radioactive age-dating, chemical and mechanical destruction of rocks, formation of sedimentary rocks, evolution of mountain belts, and formation of metamorphic rocks. Laboratory work includes a consideration of earth materials in preparation for two compulsory one-day weekend field trips. *Lec 3, Rec, Lab and field trips, Cr 4.*

Spring semester: An examination of the structure and composition of the interior of the earth, mountain building processes; the origin and use of paleomagnetic data in the continental drift question; the origin and evolution of the atmosphere, the hydrosphere, and life; mechanisms and patterns of biological evolution. A survey of man's place in and utilization of his environment. Laboratory work includes preparation for two compulsory field trips in May. Prerequisite: Gy 1. *Lec 3, Rec, Lab and field trip. Cr 4.*

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6. Geology for Engineers—A study of geology as related to civil engineering practice. *Rec 2, Lab 3, Cr 3.*

21. 22. Geologic Problems—The study of and report upon some original investigation. Time to be arranged. Prerequisite: consent of instructor. *Cr 1 or 2.* May be taken more than once.

Courses Primarily for Undergraduate Students but Open to Graduate Students

111. Mineralogy—Introduction to crystallography and the crystal chemistry of minerals. Identification of the common minerals by their physical properties and x-ray powder analysis. Prerequisites: Ch 13/14 (may be taken concurrently). *Rec 3, Lab 4, Cr 4.*

112. Introduction to Petrology—Introduction to modes of occurrence, textures, and classification of rocks. Simple chemical concepts of rock systems. Prerequisite: Gy 1/2, Gy 111. *Rec 2, Lab 3, Cr 4.*

114. Invertebrate Paleontology—Description and classification of the important phyla of fossil invertebrates and a survey of their use in biostratigraphic, evolutionary, paleoecologic, and other studies. One or more day or weekend field trips. Prerequisite: Gy 2. *Rec 2, Lab 4, Cr 3.*

115. Principles of Stratigraphy—Basic concepts and techniques of stratigraphy and sedimentation. Several day and weekend field trips. Prerequisite: Gy 112. *Rec 2, Lab 4, Cr 3.*

116. Introduction to Structural Geology—Principles of structural geology, with emphasis on the integration of field observations and theory. Three weekend field trips. Prerequisites: Gy 115, Ps 1/2. *Lec 2, Lab 3, Cr 4.*

140. Seminar in Quaternary Studies—A multidisciplinary seminar concerned with selected areas of study, physical, biological and anthropological, related to the Quaternary Period. Subject areas will vary each semester; may be taken more than once for credit. (Same as Ay, S, Zo 140). Prerequisite: consent of instructor. *Rec 2, Cr 2.*

155. Optical Mineralogy—Elementary theory of the polarizing microscope and the optical properties of crystalline substances. Use of the polarizing microscope in the determination of non-opaque minerals. Prerequisite: Gy 111, Ps 1/2. *Lec 2, Lab 6, Cr 4.*

158. Petrography—Application of elementary optical theory in the determination of non-opaque minerals in thin section. Theory and use of the universal stage and point counter. Textures and mineral relationships in igneous, metamorphic, and sedimentary rocks. Prerequisite: Gy 112, 115, Ms 19. *Lec 1, Lab 4, Cr 3.*

Courses Primarily for Graduate Students but Open to Undergraduate Students

212. X-ray Analysis in Mineralogy—*Lec 3, Lab 3, Cr 4.*

221. Low Temperature-Pressure Geochemistry—*Lec 3, Cr 3.*

241. Glacial Geology—*Lec 2, Lab 2, Cr 3.*

242. Quaternary Environments and Climatic Change—*Lec 2, Lab 2, Cr 3.*

244. Glaciology—*Lec 2, Lab 2, Cr 3.*

245. Late Quaternary Paleoecology—*Lec 2, Lab and Rec 5, Cr 4.*

257. Genesis of Ore Deposits—*Lec 3, Lab 3, Cr 4.*

258. Ore Deposits Exploration—*Lec 3, Cr 3.* (Offered fall 1972)

260. Marine Geology—*Lec 3, Cr 3.* (same as Oc 260)

264. Structure and Tectonics of the Seafloor—*Lec 3, Cr 3.* (same as Oc 264) (offered spring 1973)

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266. Micropaleontology—Lec 3, Lab 2, Cr 4. (same as Oc 266)

IDL 267. Actinopaleontology—Cr 2. (same as Oc 267)

275. Topics in Petrology—Lec 3, Cr 3.

279. Seminar in Petrology—Lec 1, Cr 2.

Courses for Graduate Students Only

301. Directed Study in Geology—Course may be repeated with different subtitles.

399. Graduate Thesis

HISTORY

PROFESSORS ALBION, HAKOLA, JEFFREY (Chairman), A. M. JOHNSON, NOLDE, W. H. PEASE, STEWART, TRAFFORD; ASSOCIATE PROFESSORS BANKS, BAKER, BATTIELE, DOTY, NADELHAFT*, J. H. PEASE, REYNOLDS, SCHRIVER, SMITH; ASSISTANT PROFESSORS BLANKE, CASEY, FRIES, LYNN, MCANDREW, ROBERTSON, SCHONBERGER; GRADUATE ASSISTANTS BARD, CHERNESKI, DAVIES, DESANTO, ELLIOTT, FRIO, HENDERSON, HESS, HUNT, LITOFF, LOGAN, ORR, POTTER, YERXA, CRAIG, LAMBERT

The history major must complete Hy 3.4, Hy 5.6, and at least 24 hours of advanced history courses approved by his advisor.

So that the major will receive an adequate background in related disciplines, he must also take a minimum of 12 hours work in two of the following areas: (1) Political Science; (2) Economics; (3) Sociology, Psychology, or Anthropology; (4) Philosophy; (5) English, Foreign Literature, or Classics; (6) Art or Music. Introductory courses in these fields will count toward the satisfaction of the 12-hour minimum requirements.

Superior majors are strongly advised to take in addition at least one 200-level history course in each semester in their senior year. Other majors may be admitted to these 200-level courses by special permission.

The department offers the M.A. degree in history, with specialities in most areas of history. The Ph.D. degree is offered in United States history, Canadian-American Studies; and in the history of Great Britain and the Commonwealth. Within these fields, special emphasis may be placed on military and maritime history. Further details may be found in the Graduate School Bulletin.

HISTORY (Hy)

1. 2. Classical and Medieval Civilization—The social and cultural development of the ancient Greeks and Romans is treated in the first semester. The second semester deals with the social and cultural development of Western Europe in the Middle Ages. Particular attention is given to the great achievements in literature, philosophy, religion, and art. This course satisfies the humanities requirement of the Colleges of Arts and Sciences. Cr 3. MR. ROBERTSON

* On leave of absence, spring semester, 1974

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3. 4. *United States History*—The historical experience of the American people through the major ideas and forces that have shaped the Republic. The first semester covers the exploration of America through post-Civil War Reconstruction; the second deals with the urban-industrial age, liberal political reform, and American world leadership. *Cr 3.* STAFF

5. 6. *History of European Civilization*—Europe and its civilization from its medieval background to the present. The emphasis is upon those political, economic, social, and intellectual developments which help to explain our present-day civilization. *Cr 3.* MR. TRAFFORD, Chairman

7. 8. *Asian Civilization*—A study of the origins and evolution of Asian societies from prehistoric times to the present. Special emphasis on China, Japan, India, and Southeast Asia. First semester: the cultural, philosophical, and political foundations of Asian societies to the 17th century. Second semester: Asia's encounters with the Western world and the most significant changes in Asia in the 19th and 20th centuries. *Cr 3.* MR. CASEY

10. *History of Maine*—A survey of Maine's social, economic, and political life, from primitive times to the present. After a brief study of Indian life preceding white settlement, the periods of colonial, provincial, and state history are covered. *Cr 3.* MR. SCHRIVER

100. *The Cosmos in History*—The interrelationships between man and his environment—the ordered world and universe—as revealed in the cosmological syntheses of prehistory, the Hellenic era, Christianity, the Age of Reason, the global village, and the Space Age. Continuing themes are man's use and misuse of nature; the role of mythology and religion in understanding Creation; the emergence of reason and science to explain the cosmos; and the forces of unity throughout mankind's existence—communication, architecture, art, and survival. Prerequisite: no freshmen. *Cr 3.* MR. REYNOLDS

101. 102. *Ancient History*—The political, social, and economic history of the civilizations of the ancient Mediterranean world. Egypt, the Near East, and Greece will be studied in the first semester; Rome will be covered in the second semester. *Cr 3.* MR. ROBERTSON

103. 104. *The Middle Ages*—Europe from late antiquity through the Renaissance. Special emphasis will be placed on the Carolingian Empire, the origin, development and structure of feudalism, the medieval church and state, medieval theology and philosophy, and the coming of the Renaissance. Prerequisite: Hy 5 or permission. *Cr 3.* MR. ROBERTSON

107. *The Renaissance and Reformation*—The political, social, economic and cultural achievements of Europe in the period 1300-1650. The Protestant revolt, the Catholic reform, and the wars of religion will be evaluated. Prerequisite: Hy 5.6 or permission. *Cr 3.* MR. BATTICK

108. *Europe in the 17th Century*—The major political and intellectual developments of the period will be emphasized. The special histories of each European state will be subordinated to the general problems of state-building, the growth of capitalism and political absolutism, and the diplomacy and wars of Europe as a whole. Prerequisite: Hy 5.6 or permission. *Cr 3.* MR. BATTICK

109. *Europe in the 18th Century*—The history of Europe from 1715 through the Congress of Vienna. Emphasis on the Enlightenment, the Enlightened Despots and the origins of the French Revolution. The impact and spread of French

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revolutionary thought throughout Europe, and the influence of the personality and military campaigns of Napoleon. Prerequisite: Hy 5.6 or permission. *Cr* 3.

MR. LYNN

110. *Europe in the 19th Century*—The history of Europe from 1815 through the Franco-Prussian war. Liberalism and nationalism, reaction and revolution, socialism and imperialism. The impact of the unification of Germany and Italy on the politics and diplomacy of Europe. Prerequisite: Hy 5.6 or permission. *Cr* 3.

MR. LYNN

111. *The Foundations of Contemporary Europe*—The emergence in Europe (1870-1919) of such basic contemporary institutions as mass democracy, modern political parties and social classes, 20th Century cultural tenets, and modern business organization and protest movements under the impact of the Second Industrial Revolution, the new imperialism, the anti-positivist revolt, total war, and the Russian Revolution. Prerequisite: Hy 5.6 or permission. *Cr* 3.

MR. DOTY

112. *Europe in the Contemporary World*—Europe and her peoples since 1919, challenged by fascism, communism, economic crises, the loss of empire, intellectual uncertainty, world war, and Cold War division into East and West, together with post-1945 attempts to regain a position of world influence through economic and political integration, modernization, and renewed cultural vitality. Prerequisite: Hy 5.6 or permission. *Cr* 3.

MR. BLANKE

113. *Expansion of Europe*—A study of the origins course and effect of the overseas expansion of Europe from 1450 to the end of the 18th century. Topics include: the motives for exploration and colonization, the foundations of colonial empires, the economic and political ramifications of colonial expansion within and among the European states, and the impact of expansion upon non-European peoples. Lectures, readings, class discussions and reports, research papers. Prerequisite: Hy 5.6 *Cr* 3.

MR. BATTICK

119. 120. *History of Science*—Development of the physical and biological sciences from pre-Greek civilization to the 20th century. Transmission of scientific thought from one civilization to another, and to the reciprocal relations between scientific thought and intellectual and social culture. Not open to freshmen. *Cr* 3.

MR. FRIES

121. *Early Modern France*—The political social and intellectual history of France from 1500-1815. Emphasis on the France of Francis I, the religious wars, the rise of bureaucratic absolutism, the ages of Louis XIV and Louis XV, the conquest and loss of Canada, the development of classicism, rationalism, and the enlightenment in France, the era of the French Revolution and Napoleon. Prerequisite: Hy 5.6 or permission. *Cr* 3.

MR. LYNN

122. *Modern France*—French history since Napoleon. Emphasis on the internal political and social challenges from the left and right in the failure of three monarchies and three republics, the rise and decline of the French empire, economic growth and lag, Gaullism and the Fifth Republic, and French cultural leadership from Romanticism to Existentialism. Prerequisite: Hy 6 or permission. *Cr* 3.

MR. DOTY

123. 124. *History of Russia*—Russian history from the earliest times to the present. The first semester of the course will treat the political, social, economic and intellectual development of Tsarist Russia to the end of the Crimean War. Late 19th century Russia, the decay of the Tsardom, the Bolshevik Revolution, and the subsequent internal development and expansion of the Soviet Union will oc-

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cupy the attention of the second semester. Prerequisite: Hy 5.6 or permission. *Cr* 3. To alternate with Hy 125.126. MR. BLANKE

125. 126. *History of Modern Germany*—The decline of the Holy Roman Empire, the rise of Prussia, the Napoleonic impact, and the period to 1848 will be covered in the first semester; the second semester will deal with the unification of Germany, the Weimar and National Socialist periods, and the Federal Republic. Stress will be placed upon political, social, economic and intellectual developments. Prerequisite: Hy 6 or permission. *Cr* 3. MR. BLANKE

127. *European Intellectual History*—The interaction of ideas with society and politics in succeeding historical periods since the 17th century. Emphasis on the changing views toward man, society, science, literature, the arts, religion, and government. *Cr* 3. STAFF

130. *Industry and European Society*—How European plain people and businessmen began an industrial revolution in the 18th century and continued it to the present. How entrepreneurial capitalism was changed by the corporation, trust, and conglomerate. How changing industrialization modified people's lives, their perception of work and property, living standards, moral and religious values, family life and leisure, the status of women and children, violence, law and order, and protest movements of reaction, reform, and revolution. *Cr* 3. MR. DOTY

133. 134. *European Diplomatic History*—A survey of the diplomatic history of modern Europe, emphasizing the foreign policies of the major European powers and the changing concepts of international relations. The relationship of nationalism and military strength to foreign policy formulation will be stressed. Prerequisite: Hy 6 or instructor's permission. *Cr* 3.

135. 136. *History of China*—The fall semester will be concerned with the history and culture of the Chinese people from earliest times to the 19th century. The spring semester will treat the Western penetration of China, the coming of the missionaries and the gunboats, the impact of Western ideas, and the resulting nationalist and revolutionary movements. Prerequisite: Hy 7.8 or six hours of history, or permission. *Cr* 3. MR. CASEY

137. *History of Modern Japan*—The history of Japan during the past century with major focus on the Western penetration, the influence of Western ideas on traditional Japanese culture, the emergence of the modern Japanese industrial state, and the rise and defeat of the Japanese empire. Prerequisite: Hy 7.8 or six hours of history, or permission. *Cr* 3. MR. CASEY

138. *Problems of Southeast Asia*—An analysis of European imperialist rivalries in the area together with a consideration of the special problems of the new nations recently emerged from colonialism. The background of the French and the American presence in Vietnam will also be treated. Prerequisite: Hy 7.8 or six hours of history, or permission. *Cr* 3. MR. CASEY

139. 140. *History of South Asia*—A survey history of the Indian sub-continent since 1500 with emphasis on the rise of the Mughal dynasty, Anglo-French rivalries in India and the expansion of British influence. The second semester will treat the period of Crown Rule, the emergence of Indian nationalism, the role of Gandhi, and the problems of Muslim separatism. Prerequisite: Hy 7.8 or six hours of history, or permission. *Cr* 3. MR. CASEY

147. 148. *Hispanic America*—The Spanish and Portuguese colonial empires in America from their establishment to their achievement of independence in the early 19th century. The second semester will mainly concern the national period

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of Hispanic America and an analysis of the contemporary problems and tensions of the area. Prerequisite: No freshmen. *Cr* 3. MR. JEFFREY

149. *Argentina, Brazil, and Chile*—A history of the major countries of South America from their independence in 1823 to the present with primary emphasis on their social structures, political developments, and international relations. Prerequisite: Hy 148 or permission. *Cr* 3. MR. JEFFREY

150. *Mexico*—A history of Mexico from early times to the present. Emphasis on the social and political structure of Mexico, the Mexican wars of independence, and the revolutionary movements of the 20th century. Prerequisite: Hy 148 or permission. *Cr* 3. MR. JEFFREY

152. *Problems of Latin America*—An analysis and evaluation of contemporary Latin American problems. The internal tensions and international relations of the several countries will be considered, together with the rise, spread and development of Castroism in the area. Prerequisite: six hours of history or permission. *Cr* 3. MR. JEFFREY

155. 156. *History of England*—A general survey of the political, social, economic and constitutional aspects of English history. Special attention will center on trial by jury, the evolution of Parliament, the Protestant revolt, the commercial and industrial revolutions, and the growth of political and economic democracy. Prerequisite: Hy 5.6 or six hours of history. *Cr* 3.

MR. BAKER, MR. TRAFFORD

159. 160. *History of Canada*—Canada's history from the earliest settlements in New France to the present. Emphasis will center on the evolution of Canada within the British Empire-Commonwealth, relations with the United States, and on the background of contemporary constitutional, economic and cultural problems. Prerequisite: Hy 3.4 or Hy 5.6, or sophomore standing, or permission. *Cr* 3.

MISS STEWART, MR. MCANDREW

161. *American Colonial History to 1740*—English colonial policy and the founding of the British colonies in America. The political, social and economic development of the American colonies in the 17th and early 18th centuries will be considered, as will the remote causes of the American Revolution. Prerequisite: Hy 3 or permission. *Cr* 3.

MR. NADELHAFT

162. *Revolution and Confederation, 1740-1789*—A study of the origins of the American Revolution. The Revolutionary War will be evaluated with special attention to the attendant internal social and political revolution. Emphasis will also be given the problems of the Confederation period, the diplomacy of the new nation, and the background and events of the Constitutional Convention. Prerequisite: Hy 3 or permission. *Cr* 3.

MR. NADELHAFT

163. 164. *American Ideas*—A study of the major ideas that have emerged from and helped to shape the American experience. Consideration given both to selected formal systems of ideas such as Transcendentalism and Pragmatism and to selected popular or informal responses to major forces in American history such as Manifest Destiny, Utopianism, and Reform Thought. Stress on the interrelationship between ideas and action, conceptualizations and structures. Prerequisite: Hy 3.4 or equivalent, or permission of instructor. *Cr* 3.

MR. PEASE

165. *Hamilton and Jefferson, 1789-1824*—An analysis of the social and economic problems of the new nation with special attention to the Hamilton-Jefferson intellectual dichotomy, the foreign policy and constitutional development of the infant United States, and the emergence of political parties. The initial

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territorial and commercial expansion of the nation will also be considered. Prerequisite: Hy 3 or permission. MR. PEASE

166. *The Age of Jackson, 1824-1850*—A consideration of American political, cultural, social and economic development in the first half of the 19th century. Specific topics will include the controversies surrounding Jacksonian Democracy, the Bank of the United States, internal improvements, the tariff, Manifest Destiny, and the sectional-slavery issue. Prerequisite: Hy 3 or permission. Cr 3.

MR. PEASE

167. *Civil War and Reconstruction, 1850-1877*—The period of national disruption and reunification with emphasis on the collapse and reconstruction of America's political, constitutional and social fabric, the acceleration of economic change, the emergence of the new industrialism, and the development of the new sectionalism. Prerequisite: Hy 4 or permission. Cr 3. MS. PEASE

168. *The Gilded Age and Progressive Era, 1877-1914*—The industrialization and transformation of the United States from a predominantly rural to a predominantly urban society. Emphasis will be given such topics as population movements, business and financial enterprise, labor organizations, religious and reform protests, imperialism, racism, populism, progressivism, and intellectual and social change. Prerequisite: Hy 4 or permission. Cr 3. MS. PEASE

169. *Early 20th Century America, 1914-1938*—The Wilson era of reform and intervention in World War I, the return to isolation, the age of business in prosperity and depression, and the New Deal period of Franklin D. Roosevelt. Also stressed will be the changes in American politics, economics, organized labor, the judiciary, and the arts. Prerequisite: Hy or permission. Cr 3.

MR. SMITH, MR. SCHONBERGER

170. *America Since 1938*—The rise of contemporary American society will be examined through the coming of World War II, the Cold War and the nuclear age, the emergence of the affluent society and the concurrent civil rights and student movements. Special attention will be paid the problems of increased federal centralization, the reform governments of the 1960's, the appearance of the military-industrial-aerospace complex, and resulting social reactions. Prerequisite: Hy 4 or permission.

MR. SMITH, MR. SCHONBERGER

171. 172. *Economic History of the United States*—A survey of American economic history with special attention to such areas as early patterns of trade and commerce, the American industrial revolution, the expansion of the railroads and other common carriers, the growth of heavy industry, changing concepts of business enterprise, the centralization of finance capital, and the adjustment of the United States to the world market. Prerequisite: Hy 3.4 or permission. Cr 3.

MR. HAKOLA, MR. JOHNSON

173. 174. *American Diplomatic History*—American diplomatic history from the revolution to the present, with emphasis on the formation and application of America's major foreign policies. To alternate with Hy 273.274. Prerequisite: Hy 3.4 or permission. Cr 3.

MR. SCHONBERGER

175. *The Negro in American History*—The contribution of the Negro in the making of American history. The development of the slave trade, slavery as a system and its abolition, the decline of the rural South, and the growth of the urban ghettos will be discussed. Such special topics as the contributions of black people to the cultural life of the nation will also be treated. Prerequisite: Hy 3.4 Cr 3.

MS. PEASE

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IDL 176 (Hy 176, Pl 167) *Religion in America*—An examination of the major American ecclesiastical and theological developments from the 17th century to the modern era. Special attention is given to such formative movements as Puritanism, Revivalism, the Social Gospel and Neo-Orthodoxy as well as to their significant exponents. Prerequisite: junior standing or permission of instructor. *Cr* 3.

MS. PEASE

177. *History of the Treatment of the American Environment*—A study of the attitudes, policies, and behavior of Americans and their government toward the land and the natural resources. Special attention will be given to major land and resources issues and the rise of conservation movements. Prerequisite: Hy 3.4 or 2 one semester courses of natural science or permission. Spring semester. *Cr* 3.

MR. SCHRIVER

178. *Race, Sex, and Ethnic Groups in America*—Topical studies in the experience of racial and ethnic groups and of women in the United States. Attention given to the special problems and situations they encountered, the places they occupied, the roles they played, and to their response and protests. Major emphasis on the 19th and 20th centuries. Readings, class reports, research papers, and lectures. Prerequisite: history majors and others by permission. *Cr* 3.

MS. PEASE

180. *Naval History*—The influence of sea power on history with major emphasis on the Anglo-American naval tradition since 1950. Naval strategy, tactics, operations and administration will be evaluated during the period of naval growth (1775-1900) and the subsequent era of the battleship and the fast carrier attack force. Anglo-American naval operations in World War I, World War II, Korea and Vietnam will be specially considered. Prerequisite: Hy 3.4 or permission. *Cr* 3.

MR. REYNOLDS

181. *History of the West*—An analysis of the Westward movement in the United States, with emphasis on the trans-Mississippi West. Study will include evolution of agricultural ranching and mining techniques, transportation developments, the formation and migration of capital on the several frontiers, frontier life and culture, and the influence of the western movement on American history. Lectures, readings, class reports and research papers. Prerequisite: Hy 3.4 or permission. *Cr* 3.

MR. HAKOLA

183. *Maritime History*—Ships and trade from colonial days to the present. Emphasis will be placed on famous ships and shipbuilders, the evolution of ships from sail and wood to steam and sail, the effect of the Civil War and two world wars on the American merchant marine, and the relationship between the United States Navy and the merchant service. Prerequisite: Hy 3.4 or permission. *Cr* 3.

MR. FRIES

191. 192. *War*—The nature and history of armed force from ancient Egypt to the present, with emphasis on the philosophy of war, the strategic dimensions of both total and limited war, and the interrelationships of politics, economics, technology and human attitudes with war. The first semester ends at 1865. Prerequisite: sophomore standing. *Cr* 3.

MR. REYNOLDS

199. *Contemporary Problems in History*—An analysis in depth of a selected controversial and contemporary historical problem. The topic to be studied and the method of approaching it will be chosen jointly by interested students and the staff. Prerequisite: permission. *Cr* 3.

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217. *Early Modern England*—A consideration and analysis of selected problems, ideas, and institutions of the Tudor-Stuart period of British history. Topics of study will be drawn from such general areas as the growth of parliamentary power, political theory, colonial policy, maritime and naval developments, social and economic changes, and foreign affairs. Lectures, readings, class reports, and research papers. Prerequisite: graduate students; senior history majors and others by permission. *Cr 3.*

MR. BATTICK

219. *Modern England*—An evaluation of selected problems in English history since 1815. Among the areas to be treated are the gradual democratization of the British government, the continuing industrial revolution, and the impact of two world wars on English social, cultural and political life. Lectures, readings, class reports, research papers. Prerequisite: graduate students; senior history majors and others by permission. *Cr 3.*

MR. BAKER

220. *The British Empire and Commonwealth Since 1815*—Studies in selected problems of British imperial expansion. Areas of investigation will include changing theories of imperial administration, the transplantation of British institutions and culture to the empire, and the conversion of the empire to the Commonwealth. Lectures, readings, class reports, and research papers. Prerequisite: graduate students; senior history majors and others by permission. *Cr 3.*

MISS STEWART, MR. MCANDREW

221. *Canadian External Relations*—Selected topics in Canadian foreign policy emphasizing relations with the United States. Canada's developing interrelations with other nations, including those of the Commonwealth, will also be studied. Lectures, readings, class reports, and research papers. Prerequisite: Hy 159.160 or permission. *Cr 3.*

MR. MCANDREW

223. 224. *Reading Seminar in Modern European History*—Reading and discussion of important recent books and articles in modern European history. Emphasis on those publications and historical problems which have applicability to the teaching of European and world history on the secondary school and college levels and on preparation for graduate study in European history. First semester deals with the 18th and 19th centuries; second semester with the 20th century. Prerequisite: senior history majors and graduate students. *Cr 3.*

STAFF

History 237: Political Science 237. The Evolution and Development of Canadian Government and Politics—An examination of the theoretical structure and the historical development of government and politics in Canada. Prerequisite: Pol. Sci. 135, or History 160, or by permission. *Cr 3.*

MR. MCANDREW AND MR. HORAN

240. *Readings in Seminar in Modern Asian History*—A research-oriented study of the major themes of Asian history in the 19th and 20th centuries. Topics to include the impact of Western colonialism, the rise of nationalism, and the emergence of contemporary leadership in East, Southeast, and South Asia. Prerequisite: graduate students; senior history majors and others by permission. *Cr 3.*

MR. CASEY

251. *Latin America and the United States*—Studies in United States participation and intervention in Latin American affairs from the early 19th century to the Bay of Pigs. Special attention will focus on the development of the Monroe Doctrine, the evolution of the Good Neighbor policy, and the American response

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to the contemporary Latin American revolutionary movements. Lectures, readings, class reports, and research papers. Prerequisite: graduate students; senior history majors and others by permission. *Cr* 3. MR. JEFFREY

260. *Agricultural History of the United States*—An analysis of rural life in America. Selected studies in agricultural techniques, inventions, capitalization, and the rise of agriculture as a business will be undertaken. The relationship of government and agriculture will also be treated. Lectures, readings, class reports, and research papers. Prerequisite: graduate students; senior history majors and others by permission. *Cr* 3. MR. SMITH

261. *Urban History of the United States*—An evaluation of special topics in the rise of the city in America and the development of urban patterns of life. Attention will focus on such subjects as the population shift to the cities, the development of slums and ghettos, the growth of municipal institutions and services, and the relationship of government with city dwellers. Lectures, readings, class reports, and research papers. Prerequisite: graduate students; senior history majors and others by permission. *Cr* 3. MR. SMITH

270. *Government-Business Relations in American History*—Case studies in such problems as the adoption of a central banking system, federal regulation of railroads, antitrust policy, and the federal government as entrepreneur and as manager of the economy with particular emphasis on the Progressive Era and the New Deal. Lectures, readings, class reports, and research papers. Prerequisite: graduate students; senior history majors and others by permission. *Cr* 3.

MR. JOHNSON

273. 274. *American Diplomatic History*—Studies in special aspects of American foreign policy since 1775. Emphasis will center on America's road to war and peace, the problems of maritime neutral rights, territorial and commercial expansion, and the role of the military and naval power in foreign policy formulation and execution. Lectures, readings, class reports, and research papers. Prerequisite: graduate students; senior history majors and others by permission. *Cr* 3.

MR. SCHONBERGER

276. *Social and Intellectual History of the United States*—A consideration and evaluation of some of the major ideas in American intellectual and cultural history, including such topics as transcendentalism, pragmatism, mission, progress, and revolution. Particular analysis will be given to the interrelationships between ideas and their social environment. Readings, lectures, reports, research papers. Prerequisite: permission of instructor. *Cr* 3. MR. PEASE

285. *New England History*—Studies in the region as a distinct and unique section of the country. Particular attention will be paid to such transitional movements as the decline and shift in agriculture, lumbering and fishing, the growth of industries, population movement, and the impact of those changes on the political social and economic structure of the region. Lectures, readings, class reports, and research papers. Prerequisite: graduate students; senior history majors and others by permission. *Cr* 3. MR. SCHRIVER

299. *Special Topics in History*—A flexible course designed to explore and analyze new trends in research and interpretation in history. Prerequisite: graduate students; senior history majors and others by permission. *Cr* 3. STAFF

[300-level courses are listed in the Graduate School Bulletin]

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HONORS PROGRAM (Hr)

PROFESSORS THOMSON (Secretary), BOST, CAZDEN, COUPE, JOHN HAKOLA, HAMILTON, HARTGEN, HOLMES, MACCOBY, MAJOR, MILES, NORTHAM, TREDWELL; ASSOCIATE PROFESSORS J. ACHESON, J. CLARK, NORTON, SCHRIVER, SCONTRAS, TATEM; ASSISTANT PROFESSORS J. KULBERG, LEMELIN, MACDONALD, MRS. HAKOLA

Freshmen of marked academic ability enrolled in all colleges are invited to apply to the secretary for admission to the sequence of honors courses described below. The work of the freshman and sophomore years, under the direction of staff drawn from all colleges of the University, provides the stimulus and the guidance which should enable a superior student to begin building for himself a perspective view of the liberal arts and sciences and to lay a foundation for the more specialized work which is to come. The Honors Program reaches its climax in a thesis which is written during the senior year and treats some limited problem falling in the student's major field. In exceptional cases, students may be admitted at any stage of the Honors Program up to the opening of the junior year. Of the courses listed below, Hr 41, 45, 47, and 48, are taken in common with students from other colleges within the University.

41. *Distinguished Freshman Seminar*—Students are selected by the Honors Committee. Discussions and demonstrations displaying the range and nature of the Liberal Arts and Sciences. *Cr* 3. MR. HOLMES

45. *Honors Colloquium*—Readings and discussion on the basic concepts of Western civilization. Normally taken in the freshman year. *Cr* 3. MRS. HAKOLA

46. *Honors Summer Readings: Basic*—Optional for those who have taken course 45. An individually arranged program of readings is independently pursued in the summer. *Cr* 1.

47. 48. *Honors Group Tutorial*—Oral and written reports under tutorial direction, upon a planned sequence of books representative of the various fields of liberal education. *Cr* 3. MR. THOMSON, Chairman

49. *Honors Summer Readings: Intermediate*—Guided summer readings and reports, individually adapted to the student's program. Primarily for students who have had only one semester from Hr 47. 48. *Cr* 1. MRS. HAKOLA

50. *Honors Seminar*—Discussion groups in such fields as the arts, philosophy and history of science, aspects of the study of society. Content varies from year to year. Normally taken in the junior year. *Cr* 3.

51. 52. *Honors: Specialized Studies*—A tutorially conducted study of the student's major field, issuing in the choice of an approved thesis topic. *Cr* 3.

53. 54. *Honors Thesis*—The planning and completion of an honors thesis or research projects. *Cr* 3.

INTERNATIONAL AFFAIRS (Ia)

A major in international affairs may be followed in economics, foreign languages, or political science.

During the first two years the student in international affairs should fulfill the basic requirements of the College of Arts and Sciences. Either among such requirements or in addition to them he should take Ec 10, Pol 1, and courses in a modern foreign language. He should also consult the department adviser in international affairs about other courses that it is advisable to take during the first two years. To enter the junior year of the program a student must have a minimum point average of 2.0 or permission from the Committee on International Affairs.

The essential program requirements are:

International Affairs in Economics

- (1) Courses required for a major in economics, including Ec 138 Economic Development and Ec 139 International Trade and Commercial Policy (see page 100).
- (2) Pol 173 International Relations, Pol 174 U. S. Foreign Policy, Pol 187 International Law, and Pol 188 International Organization.
- (3) Two years of advanced modern foreign language courses.

International Affairs in Foreign Languages

- (1) Courses required for a major in foreign languages (see pages 109-111).
- (2) Pol 173 International Relations, Pol 174 U. S. Foreign Policy, Pol 187 International Law, and Pol 188 International Organization.
- (3) Ec 138 Economic Development and Ec 139 International Trade and Commercial Policy.

International Affairs in Political Science

- (1) Courses required for a major in political science, including Pol 173 International Relations, Pol 174 U. S. Foreign Policy, Pol 187 International Law, and Pol 188 International Organization (see page 169).
- (2) Ec 138 Economic Development and Ec 139 International Trade and Commercial Policy.
- (3) Two years of advanced modern foreign language courses.

Detailed programs covering the last two years of study in each discipline may be secured from the Committee on International Affairs, 33 North Stevens, University of Maine, Orono. Maine 04473.

JOURNALISM (Jr)

PROFESSOR HAMILTON; ASSOCIATE PROFESSOR MILLER (Chairman); ASSITANT PROFESSOR GUESMAN; FACULTY ASSOCIATES EVERETT, KRALL, LORING, MORISON, PLATT, WALAS

The Journalism Department provides a sound foundation for the student intending to make a career in journalism and for the University student seeking a broader understanding of the field.

The undergraduate program leads to a bachelor of arts degree in journalism. The department endeavors to make its courses available to other than journalism students.

Broad scholarship is emphasized in the Journalism Department because the successful journalist must be competent to deal with news in virtually every form of human endeavor. Besides journalism courses, study in as many as possible of the disciplines in liberal arts is urged.

College of Arts and Sciences students declare a major at the end of the sophomore year. Freshmen and sophomores considering a major in journalism are urged to request a Journalism Department adviser in order to develop an interdisciplinary program of study that will be useful in their major field.

Laboratory facilities include editorial and business offices for three student publications (a weekly newspaper, a magazine and a yearbook), daily Associated Press wire service, two photography darkrooms, a newspaper production area. A daily television news broadcast aired on the state's public broadcasting network is used as a laboratory for students studying broadcast news. A radio station, a journalism library, audio-visual equipment, graphic arts and other aids to the journalist are available.

BASIC JOURNALISM REQUIREMENTS

In addition to the basic College of Arts and Sciences requirements, journalism majors are required to complete the following journalism courses

<i>Jr 22. Survey of Mass Communications</i>	3
<i>Jr 31. Functional Writing</i>	3
<i>Jr 32. Reporting and Newswriting</i>	3
<i>Jr 75. Law of Publications</i>	3
<i>Jr 82. News Editing</i>	3
<i>Jr 93. Problems in Journalism</i>	3
<i>Jr 95.96. Journalism Laboratories</i>	6
	<hr/>
	24

Prospective journalism majors are expected to be able to type. All journalism course papers must be typewritten.

Students in the College of Life Sciences and Agriculture are also offered an option in journalism, see page 312.

Journalism students wishing to pursue a career in radio and television will want to choose among courses in broadcasting and film offered by the Speech Department, see page 189.

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The major student will either round out his program according to one of the following options, or he may build his own option in such fields as social welfare, science, and business, or others, in consultation with and approval by the Journalism Department faculty.

Public Affairs Option—For the student preparing for news work involving government and society in the United States. Required courses: Pol 1, American Government; Pol 158, Public Opinion; Ec 10, Principles of Economics. Other recommended courses: Pol 3, State Government; Pol 159, Problems of American Government; Ec 21, Current Economic Problems; Ec 137, Comparative Economic Systems; Hy 3. 4, United States History.

Foreign Affairs Option—The student must complete work in at least one language (French, German, Russian or Spanish) up to at least the 7/8 course level. In addition, he should select 18 hours in other courses appropriate for a background in international affairs. Some recommended courses: Ec 137, Comparative Economic Systems; Ec 139, International Trade and Commercial Policy; Hy 173, 174, American Diplomatic History; Jr 42, Foreign Press; Pol 173, 174, International Relations; Pol 187, International Law. Other courses should be chosen after adviser consultation and approval.

Art, Literature and Humanities Option—For the student interested in this broader background as preparation for a writing or broadcasting career. Students must elect 18 hours from courses in art, folklore, music, theater, English and American literature and comparative literature. With the help of his adviser, the student may also select from a few other appropriate course areas.

Courses in Journalism (Jr)

22. Survey of Mass Communications—A beginner's course in the structure and operation of modern news media and the social and political implications of their activities. Open to all freshmen and sophomores. Cr 3. STAFF

25. History of American Journalism—A review of the newspaper's role in American history, the development of modern mass communications. Cr 3. STAFF

31. Functional Writing—A basic course in newswriting and reporting; intensive practice in developing newswriting techniques, accuracy, style, judgment and responsibility. Prerequisite: Not open to freshmen. Cr 3. STAFF

32. Reporting and Newswriting—Further development of news gathering and reporting techniques, with emphasis given to in-depth, investigation reporting. Prerequisite: Jr 31. Cr 3. STAFF

42. The Foreign Press—Survey of the world press; its role in political, economic and cultural development. Cr 3. Not offered every year. MR. MILLER

51. Publications Management—This lab course explores the advertising, circulation and editorial problems in publishing today. Prerequisite: Jr 56 or permission of instructor. Cr 3. MR. GUESMAN

56. Introduction to Advertising—Social and economic roles of advertising. Rate structures, agency practices, effective use of media. Advertising laws analyzed and discussed from the media point of view. Prerequisite: Ec 10. Cr 3. MR. GUESMAN

61. Introduction to Photojournalism—For students desiring an understanding of photography as an effective medium of communications. Classroom

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and darkroom instruction. Basic principles of processing, composition, and the uses of photography in various media. (Not offered every year.) *Cr* 3.

75. *Law of Publications*—A study of the legal systems affecting the publishing and broadcasting worlds. Topics include libel, privacy, contempt, copyright, obscenity, censorship, prejudicial pre-trial publicity, and others as they develop within the society. *Cr* 3. MR. HAMILTON

82. *News Editing*—A lab course, centered on operation of the modern news desk, aimed at developing editorial judgment and skills in preparing news for publication and broadcast. Prerequisite: Jr 32. *Cr* 3. MR. MILLER

91. *Staff Training*—On-the-job training arranged by the student under the direction of a local editor. Prerequisite: permission only. *Cr* 3.

93. *Problems in Journalism*—A seminar for seniors with different topics each semester as new situations in the field develop. Frequent guests will act as discussion leaders. Prerequisite: Jr 82. *Cr* 3. MR. HAMILTON

95. 96. *Journalism Laboratories*—Designed to give students a variety of practical experience in publishing and/or broadcasting news and public affairs. Students may elect one or two of several sections in newspaper publishing (the student newspaper), broadcasting news (as a television news broadcast), or in other sections working with other publications (see time schedule). Prerequisite: Jr 82 or permission. *Cr* 3. STAFF

MATHEMATICS AND ASTRONOMY

PROFESSORS MAIRHUBER (Chairman), EVES, WOOTTON, CUNNINGHAM, NORTHAM, POGORZELSKI; ASSOCIATE PROFESSORS HAMM, TOOLE, HARPER, DODGE, HANNULA, MURPHY, LANGFORD, GEIGER, HOOPER, DUBE, SOULE, PURI, BALAKRISHNAN, BYTHER, FARLOW, FEICHTINGER, FERGUSON, HAGGARD, LOCKE; ASSISTANT PROFESSORS PERRY, STEARNS, MORSE, FUENTES, BRESINSKY, WOHLGEMUTH, CHEN, SOBEL, BEARD, GUPTA; GRADUATE ASSISTANTS MR. ACCOMANDO, MR. GILBERT, MISS HERTZBERG, MISS HUTCHINS, MRS. KURLANSKI, MISS MONTGOMERY, MISS BYRNE, MR. CASSILY, MISS DAWSON, MR. HENDERSON, MRS. HORNER, MR. MOURADIAN, MR. MYERS, MR. RYAN, MR. STOCKFORD

The courses Ms 6, Ms 14, and Ms 26 have sufficient overlap that credit should not be given for more than one of these. The same is true for the pair Ms 15 and Ms 19, and also for the three courses Ms 81, Ms 181, and General Engineering 7.

Students who plan to major in mathematics will normally complete the following courses in their freshman and sophomore years: Ms 26, 27, 28, 161, and 162.

To satisfy departmental requirements, a student must complete at least 39 hours of mathematics, including Ms 26, 27, 28, 125, 161, 162, and 163, as least one of the Ms 59, 131, 155, and 187, and at least one of Ms 145, 147, 165, and 175. Courses numbered below 20 cannot be counted as part of the 39 hours. It is possible to obtain advanced placement, or to be excused from elementary courses by passing proficiency examinations for the department.

Mathematics majors must fulfill the laboratory science requirements outside the Mathematics Department.

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The student's program of elective courses for the junior and senior years will depend upon his vocational plans. In selecting upper courses, the mathematics major will be assisted by a Mathematics Department member assigned by the department as his adviser. The score of required courses demanded of all mathematics majors has been selected as being necessary for work in any branch of mathematics.

The general requirements for the master of arts are given in the Graduate School Catalog. Candidates for this degree in mathematics are expected to have substantial undergraduate training in this subject.

The course numbering scheme uses the tens digit of the course number to designate the area of the course according to the following table.

1-19	100-119	200-219	General Service, Education
20-29	120-129	220-229	Analysis
30-39	130-139	230-239	Statistics
40-49	140-149	240-249	Logic Foundations, History
50-59	150-159	250-259	Applied Mathematics
60-69	160-169	260-269	Algebra
70-79	170-179	270-279	Geometry and Topology
80-89	180-189	280-289	Computer Science

Old course numbers are indicated within parentheses.

ASTRONOMY (As)

9. Introduction to Astronomy—An elementary course which does not require an extensive mathematical or scientific background. A simple mathematical explanation, using high school mathematics, is frequently used to make a point clear. Not given every semester. *Cr* 3.

14. Navigation—Piloting, dead reckoning and celestial navigation. Prerequisite: trigonometry. Not given every year. *Cr* 3.

15/16. General Astronomy—A more complete treatment of the subject than is possible in As 9. Prerequisite: one year of college mathematics. *Cr* 3.

50/60. Advanced Astronomy—Spherical, trigonometry; determination of latitude and longitude on land and at sea; interplanetary space navigation. Celestial mechanics, artificial satellites. interplanetary flight, the restricted three-body problem, the tidal force, binary star solution. Prerequisite: Ms 27 or permission. *Cr* 3.

MATHEMATICS (Ms)

GENERAL SERVICE EDUCATION

Undergraduate Courses

4. Algebra and Trigonometry—The trigonometric functions, their properties and applications. Basic topics in algebra for further work in mathematics. Prerequisite: two units high school algebra, one unit high school geometry. *Rec* 5, *Cr* 4.

5/6. Elements of College Mathematics—Ms 5: a modern viewpoint of several topics, including mathematical logic, set theory, number theory, probability,

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abstract algebra and number systems. The content may vary with the instructor. Ms 6: an introduction to different and integral calculus. Prerequisite: two units high school algebra, one unit high school geometry. Students may not take both Ms 6 and Ms 26 for credit. *Lec 3, Rec 2, Cr 4.*

7/8. *The Structure of Arithmetic*—A development of the real number system beginning with the sub-system of natural numbers and generalizing through the systems of integers, rational numbers, and real numbers. Properties of numbers, relations, and operations. Details of numeration systems. Primarily for the elementary school teacher. *Cr 3.*

(NOTE: Ms 7/8, Ms 9, Ms 10 may not be taken for credit by A & S students.)

9. *Informal Geometry*—Sets, points, lines, planes, and other configurations of one, two, and three dimensional geometry. Congruences, measurement, and constructions. Primarily for the elementary school teacher. Prerequisite: consent of the instructor or teaching experience in an elementary or junior high school. *Cr 3.*

10. *Basic Algebra*—An introductory treatment of mathematical operations on set symbols including procedures for solving simple equations and inequalities. Primarily for the elementary school teacher. Prerequisite: consent of the instructor or teaching experience in an elementary or junior high school. *Cr 3.*

13/14. *Mathematics for the Social Sciences*—An introduction to elementary mathematical analysis and the calculus, with applications to business and economics. Mathematical models, elementary functions, systems of equations and inequalities, linear programming, matrix algebra, topics from the calculus. Prerequisite: 3 years H.S. Math. *Cr 3.*

15/16. *Introduction to Statistical Analysis*—An introduction to the statistical aspect of experimental design, analysis of data, decision making, with special application to economic and business problems; emphasis on concepts and an understanding of the rational underlying statistical procedures. Prerequisite: Ms 13/14 or consent of instructor. *Cr 3.*

19. *Principles of Statistical Inference*—An introductory course including such topics as distributions, sampling variability, estimation, hypothesis testing and regression. *Cr 3.*

105. (149) *Mathematics for Teachers*—A modern approach to selected topics in mathematics with a critical examination of certain fundamental processes. Prerequisite: Ms 28. *Cr 3.*

Graduate Course (Ms)

200. *Seminar in Mathematics Education*—*Cr 3.*

ANALYSIS

Undergraduate Courses

26. (12) *Analytic Geometry and Calculus*—Equations and graphs, differentiation and integration of simple functions, applications. Prerequisite: the equivalent of Ms 4. *Cr 4.*

27. *Analytic Geometry and Calculus*—Differentiation and integration of algebraic, trigonometric, logarithmic and exponential functions; applications, infinite series. Prerequisite: Ms 26 or consent of the department. *Cr 4.*

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28. *Analytic Geometry and Calculus*—Geometry of three dimensions, infinite series, partial derivatives; multiple integrals; applications. Prerequisite: Ms 27. Cr 4.

125/126. (173/174.) *Advanced Calculus*—Functions of real variables, limits, infinite series, partial differentiation, and other topics. Prerequisite Ms 161. Cr 3.

Graduate Courses

223/224. (283/284) *Functions of a Real Variable*—Cr 3.

227/228. (279/280) *Functions of a Complex Variable*—Cr 3.

STATISTICS

Undergraduate Courses (See also 15/16 and 19)

131. (130) *Mathematical Statistics I*—Probability and principles of inference. Particular emphasis is given to the normal distribution and related sampling distributions. Prerequisite: Ms 28. Cr 3.

133. *Probability*—A brief review of the elements of probability followed by material on random walks, Markov chains, and more general stochastic processes. Prerequisite: Ms 3 or permission. Cr 3.

136. (166) *Introduction to Sampling Methods*—Basic sampling schemes: simple random, stratified, cluster, and multi-stage. Biases and errors. Ratio and regression estimation. Prerequisite: Ms 131. Not given every year. Rec 2, Lab 2, Cr 3.

137. (167) *Statistical Methods in Research*—An introduction to Analysis of Variance and Regression Analysis using a unifying approach to theory, and applications and illustrations from many fields. Prerequisite: Ms 19 or Ms 131 or permission. Rec 2, Lab 2, Cr 3.

138. (168) *Design of Experiments*—Continuation of Ms 167, with consideration of non-orthogonal designs in Analysis of Variance, and an introduction to other experimental design techniques which are widely applicable. Prerequisite: Ms 137. Rec 2, Lab 2. Cr 3.

Graduate Courses

231/232. *Mathematical Statistics I and II*—Cr 3.

LOGIC—FOUNDATIONS—HISTORY

Undergraduate Courses

41. *Introduction to Mathematical Logic and the Nature of Proof*—An introductory course designed specifically to view logic and the nature of mathematics, proof with concepts and symbolism as used throughout modern mathematical background. Prerequisite: Ms 27 or Ms 122. Cr 2.

141. (185) *Mathematical Logic*—Sentential calculi, deduction theorem and post completeness theorem. Prerequisite: One year college mathematics. Cr 3.

145. (161) *History of Mathematics* — The development of elementary mathematics from ancient to modern times. Prerequisite: Ms 27. Cr 3.

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147/148 (197/198) Foundations of Mathematics—Fundamental concepts and methods of mathematics; viewpoints on the foundation of mathematics. Not given every year. Prerequisite: Ms 28 or permission. *Cr* 3.

APPLIED MATHEMATICS

Undergraduate Courses

59. (29) Differential Equations—An introduction to ordinary differential equations; applications. Prerequisite: Ms 28. *Cr* 4.

151. Introduction to Vector Analysis and Matrices—The algebra and calculus of vectors. Matrices and systems of linear equations, eigenvalues and eigenvectors, bilinear and other forms. Prerequisite: Ms 28. *Cr* 3.

152. Introduction to Complex Variables—Analytic functions, integration, series, and mappings. Applications. Prerequisite: Ms 28. *Cr* 3.

153/154. Partial Differential Equations—An introduction to the general properties of partial differential equations followed by solutions of specific equations. The techniques include eigenfunction expansions, operational methods, and Green's functions. Prerequisite: Ms 59. *Cr* 3.

155. (103) Linear Programming I—Formulation of the general linear programming problem, homogeneous and non-homogeneous linear equalities, the simplex method for non-degenerate cases, simplex computational procedure and check concluding slack, surplus and artificial variables, revised simplex procedures, degeneracy and cycling. Prerequisite: Ms 162, or permission. Recommended: Ms 180 (187). *Cr* 3.

156. (104) Linear Programming II—Duality theory, primal-dual algorithm, transportation and transshipment problems, network flows, game theory, optimal strategies, operations research, decision theory, machine assignment, optimal product mix, refinery applications, linear programming and the firm, economic theory applications, closed and dynamic Leontief models. Prerequisite: Ms 155. *Cr* 3.

157. (193) Non-Linear Programming I—Introduction to non-linear programming problems, mathematical background review of pertinent linear algebra, convex set theory, linear programming techniques, classical optimization techniques, properties of convex functions, approximation methods for solution of problems involving separable functions, stochastic programming, Kuhn-Tucker theory, and quadratic programming. Prerequisite: Ms 28 and Ms 155. Recommended: Ms 156, Ms 162, Ms 181, Ms 187, and permission. *Cr* 3.

158. (194) Non-Linear Programming II—Integer linear programming including sequencing problems, project planning, manpower scheduling, and capital budgeting: gradient methods, Arrow-Hurwicz gradient method for concave programming, dynamic programming including manpower loading and inventory problems, dynamic formulation of transportation problems, equipment replacement problems, combined production scheduling and inventory control problems, Markov processes, optimal pure strategies, and recent developments. Prerequisites: Ms 157 *Cr* 3.

Graduate Courses

255/256. Theory of Ordinary Differential Equations—*Cr* 3.

COLLEGE OF ARTS AND SCIENCES

ALGEBRA

Undergraduate Courses

161. (122) *The Structure of the Real Number System*—Development of the arithmetic and order properties of the integers, rationals, and real numbers. Division algorithm, well-ordering, mathematical induction, fundamental theorem of arithmetic, sequences and series, and consequences of the completeness property of the real numbers. Prerequisite: Ms 27. Cr 3.

162. (124) *Linear Algebra*—An introduction to the theory of vector spaces and linear transformations. Prerequisite: Ms 28. Cr 4.

163/164 (171/172) *Introduction to Abstract Algebra*—Abstract algebraic structures including groups, rings, ideals, integral domains and fields. Prerequisite: Ms 161 and Ms 162. Cr 3.

165. *Theory of Numbers*—Elementary properties of the integers. Prerequisite: Ms 161 or Ms 7/8. Cr 3.

166. (123) *Theory of Equations*—Techniques for finding and approximating roots of polynomial equations, synthetic division, factorization of polynomials, solution of linear systems of equations, elementary theory of finite fields. Prerequisite: Ms 161. Cr 3.

Graduate Course

263/264. (271/272) *Abstract Algebra*—Cr 3.

GEOMETRY AND TOPOLOGY

Undergraduate Courses

171/172. 191/192 *Differential Geometry*—Applications of calculus to the study of space curves and surfaces. Not given every year. Prerequisite: Ms 28. Cr 3.

174. (164) *Projective Geometry*—Discussion of incidence axioms duality, perspectivities and projectivities, Desargues' Theorem, Pappus' Theorem, Fundamental Theorem, coordination, finite geometries. Prerequisite: Ms 162. Cr 3.

175/176. *Higher Geometry*—Constructions. Properties of E., Ceva's and Menelaus' theorems with applications—Desargues', Pappus' and Pascal's theorems. Isometrics. Ms 176 is essentially a continuation of Ms 175 with emphasis on coordinate systems. An axiomatic approach to one of the geometries. Algebraic models for Geometry. Klein's Erlanger program. Classical construction problems. Prerequisite: Ms 28 or permission. Cr 3.

Graduate Courses

277/278. *Topology*—Cr 3.

COMPUTER SCIENCE

Undergraduate Courses

81. (69) *Computer Programming*—Concentrates on programming logic and techniques using a higher level language (usually FORTRAN). Introductory hardware concepts are covered throughout the course as needed. This is a service

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course in computer programming. Students are assigned programs from various areas of application and these programs are run on the University's computer. *Cr* 3.

181. (169) *Introduction to Computer Science*—Programming logic and techniques. Concentrates on the IBM Fortran language. Student programs will be run on the University's IBM 360 computer. *Cr* 3.

186. (190) *Programming Language*—Formal description of programming languages including specification of syntax and semantics. Discussion of infix, prefix, and postfix notation along with translation and execution of arithmetic statements. Other topics include branching, grouping of statements, data structures, storage allocation, subroutines, list and string processing, execution time representation, and relation of language design on efficiency. Prerequisite: Ms 181 or equivalent. *Cr* 3.

187. *Numerical Analysis*—Computational methods for electronic computers with exercises on the IBM 360 for interpolation, simultaneous linear algebraic equations, non-linear and polynomial equations, numerical integration, and ordinary and partial differential equations. Prerequisite: Ms 28 and Ms 181. *Cr* 3.

188. *Graph Theory*—A general survey of a number of topics in graph theory. Topics to be included: Eulerian and Hamiltonian lines, factors, colourings of graphs, embedding of graphs in surfaces, room squares and various decomposition problems. Prerequisite: Ms 28. *Cr* 3.

189. *Structure of Computers and Assembly Language*—Introduction to with exercises on the IBM 360 for interpolation, simultaneous linear algebraic and execution, addressing techniques. Input-output processes, and interrupt handling. Programming aspects include assembler program segmentation and linkage. The IBM 360 and BAL will be used to illustrate the various topics. Prerequisite: Ms 181 or equivalent. *Cr* 3.

SELECTED TOPICS IN MATHEMATICS; THESIS

Undergraduate Courses

0: The tens digit specifies the area in which the course is given. e.g. Ms 60—Topics in algebra.

—0 (96) *Topics in Mathematics*—Topics in mathematics not regularly covered in other courses. Content is not fixed, but can be varied to suit current needs. The course may, with permission of the department, be taken more than once. Prerequisite: consent of the department. *Cr* 1 to 3.

1-0: the tens digit specifies the area in which the course is given. 120—Analysis, 130—Statistics, etc.

1-0 (196) *Selected Topics in Mathematics*—Advanced topics in mathematics not regularly covered in other courses. The content is not fixed but can be varied to suit current needs. The course may, with permission of the department, be taken more than once. Prerequisite: permission. *Cr* 2 or 3.

Graduate Courses

2-0: The tens digit specifies the area in which the course is given.

2-0 (296) *Advanced Topics in Mathematics*—*Cr* 2 or 3.

399. *Graduate Thesis*—*Cr* Ar.

COLLEGE OF ARTS AND SCIENCES

MODERN SOCIETY (My)

ASSOCIATE PROFESSOR SCONTRAS (Chairman); ASSISTANT
PROFESSOR MACDONALD

Modern Society (My 1-2) is an introductory course in social science designed to acquaint the student with some of the pivotal ideas in sociology, social psychology, economics and political science, and the contribution of such ideas to the understanding of human behavior. Lectures and discussion.

Informal meetings are held to discuss course-related materials and ideas that students may wish to explore beyond the limits of regular classroom lectures and discussions. Participation in such meetings is voluntary.

Modern Society is recommended to any student who has not had a minimum of two years of social science at the college level. Three credits.

MUSIC (Mc)

PROFESSORS GODWIN (CHAIRMAN), CAZDEN; ASSOCIATE PROFESSORS COLLINS*, FOLEY, JACOBS, NESBIT; ASSISTANT PROFESSORS HALLMAN, MAGNUSON, OSTROW; INSTRUCTORS CALDWELL, HALL, MRS. COLLINS*, MRS. GARWOOD, MRS. MUMMÉ, MR. ROSS, MR. STRATTON.

The curricula of the Department of Music lead to baccalaureate degrees as follows:

1. *Bachelor of Arts Degree* with a major in music

This program is designed for the study of music within a strong liberal arts curriculum. It offers a broad coverage of the field of music with emphasis upon the study of the history and theory of music. It furnishes an appropriate background for prospective candidates for advanced degrees who are preparing for such careers as musicologists, composers, and music librarians. It does not qualify the graduate for certification as a public school music teacher. Candidates for the degree are expected to attain a level of performing ability equivalent to that required at the completion of the sophomore year in the Bachelor of Music program. A senior project is required in lieu of a recital.

Total number of required semester hours in music: 48

Music Theory	20
Music History and Literature	10
Performance Emphasis (7 Semesters)	7
Senior Project	1
Music Organization	4
Music Electives (theory or history)	6
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	48

* Leave of Absence 1973-74

2. Bachelor of Science in Music Education

This is a four-year professional degree for students in the College of Education who intend to make music a career either as a public school teacher or supervisor of music. Majors in music education will register in the College of Education and follow the curriculum outlined there. The specific requirements for the degree may be obtained from the Department of Music. The degree provides for many professional opportunities and serves also as preparation for graduate study in music education. Upon satisfactory completion of the music education course of study the student is certified to teach both elementary and secondary music. A half-hour recital is required in the junior or senior year. Total number of required semester hours in music: 68

Music Theory	22
Music History and Literature	10
Major performance area	12
Music Organization	7
Instrumental concentration	
or	
Vocal/Keyboard concentration	17
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	68

3. Bachelor of Music

This degree is designed to assist the gifted music student to prepare for a career in music performance. It serves also as preparation for graduate study in music and teaching at the college level. Emphasis is placed on performance, music theory, music history, and studies in the liberal arts. The degree is granted in the following applied music areas: Strings, Woodwinds, Brass, Piano, Voice, and Pipe Organ. Graduation requirements include appropriate proficiency in playing or singing, excellent memory and substantial repertoire, and musicianship of a high order.

A half-hour recital is required in the junior year, and a full recital in the senior year.

Total number of required semester hours in music. 84

Music Theory	28
Music History and Literature	16
Performance Major	16
Performance Minor	4
Music Organization	8
Conducting, Literature	6
Elective in Music	6
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	84

A proficiency examination in piano must be passed by all degree students in music. See the music adviser for details.

All entering students are required to take a placement examination in piano.

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Applied Music Fees

1. For the Music Major:

No fees will be charged for *required* private instruction.

2. For the non-music major and for instruction *not* required of music majors: A fee of \$45 per semester will be charged for one ½-hour lesson per week; a fee of \$90 per semester will be charged for one 1-hour lesson per week. Private instruction for the non-music major and instruction not required for the music major is contingent upon the availability of time of the instructor. Arrangements for such instruction must be made through the office of the Music Department.

Practice facilities are provided in the music building. The University provides, so far as possible, practice opportunities for students who desire to take applied music for credit.

After being accepted by a teacher, the student should report immediately to the music office for a fee statement. The lesson fee must be paid to the Business Office before lessons can begin.

Courses in Music Performance

The Department of Music provides private instruction in various instruments and voice. The student should enroll under one of the following numbers

	Performance Minor B.A. (Major in music) candidates, all others	Performance Major B. Mus., B.S. in Mus. Educ. candidates
*First level	Mc 1-2 Cr 1	Mc 10-20 Cr 2
Second level	Mc 3-4 Cr 1	Mc 30-40 Cr 2
Third level	Mc 5-6 Cr 1	Mc 50-60 Cr 2
Fourth level	Mc 7-8 Cr 1	Mc 70-80 Cr 2

- The level is roughly the equivalent of the year, but the student who does not meet the requirements for the level at the end of each year as determined by the jury examination will continue on the previous level until the requirements are met. Students will be reviewed at the end of their sophomore year by a jury composed of the faculty of the Department of Music to determine whether they should be advanced to upper level standing in applied music.

Instruction is provided in the following areas. When enrolling, add the appropriate division noted below after the course number to indicate the instrument or voice.

Example: Mc 10—1 (voice)

Voice, 1	Viola, 5	Oboe, 9	Trumpet, 13
Piano, 2	Cello, 6	Clarinet, 10	Baritone Horn, 14
Organ, 3	Bass, 7	Bassoon, 11	Trombone, 15
Violin, 4	Flute, 8	French Horn, 12	Tuba, 16
			Percussion, 17
			Saxophone, 18

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Candidates for B. Mus., B.S. in Mus. Ed. enroll for two hours credit for the major instrument or voice, one hour for the second instrument or voice. B.A. (major in music) candidates, *all other students* enroll for one hour credit.

Courses in applied music and music performance may be repeated for credit.

Each student taking instruction in an applied area must take an examination before a jury of the faculty of music at the end of each semester. Attendance at the Tuesday afternoon student recital is required. Prerequisite: qualifying test; see the Chairman of the Department of Music.

Mc 98. Senior Project—A research paper, original composition, or by special permission, a lecture-recital presented in lieu of a recital. Required of all music majors in the Bachelor of Arts degree program. Accomplished under the guidance of an assigned faculty member during the senior year. *Cr 1.*

Musical Organizations and Ensembles (Mc 0)

1. 2. University Singers—Rehearsal and performance of choral concert repertoire. Membership through audition requires sight reading ability. Extended concert tours. Four hours of rehearsal a week. Attendance at all rehearsals and public performances required. May be repeated for credit. *Lab 4, Cr 1.*

3. 4. Oratorio Society—Rehearsal and performance of major choral works. Membership through audition. Attendance at all rehearsals and public performances required. May be repeated for credit. *Lab 2, Cr 1.*

5. 6. Varsity Women's Glee Club—Rehearsal and performance of choral music written expressly for this performing medium. Membership through audition. Attendance at all rehearsals and public performances required. A limited touring organization. May be repeated for credit. *Lab 2, Cr 1.*

7. 8. Varsity Men's Glee Club—Rehearsal and performance of choral music written expressly for this performing medium. Membership through audition. Attendance at all rehearsals and public performances required. A limited touring organization. May be repeated for credit. *Lab 2, Cr 1.*

9. 10. University Chorus—Rehearsal and performance of choral music appropriate for choral singers with limited background and training. No audition required. Open to all students. Attendance at all rehearsals and public performances required. May be repeated for credit. *Lab 3, Cr 1.*

11. Band—During football season the band functions as a marching unit; the remainder of the semester is spent in the rehearsal and performance of concert band repertoire. Membership through audition. Attendance at all rehearsals and public performances required. May be repeated for credit. (Fall semester only.) *Lab 4, Cr 1.*

12. Concert Band—Rehearsal and performance of standard band repertoire. Membership through audition, or previous participation in Marching Band. Attendance at all rehearsals and public performances required. Extended concert tours. May be repeated for credit. (Spring semester only.) *Lab 4, Cr 1.*

13. Varsity Band—Organized each fall following football season from members of the University Band who are not selected for the Concert Band. *Lab 2, Cr 1.*

21. 22. University Orchestra—Rehearsal and performance of standard orchestral repertoire. Membership through audition. Attendance at all rehearsals and public performances required. May be repeated for credit. *Lab 4, Cr 1.*

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31. Chamber Singers—The study and performance of chamber music for the voice. May be repeated for credit. *Lab 2, Cr 1.*

32. Opera Workshop—Rehearsal and performance of standard opera repertory. Acceptance by audition. May be repeated for credit. *Lab 3, Cr 1.*

41. Brass Ensemble—The study and performance of chamber music for brass instruments. May be repeated for credit. *Lab 2, Cr 1.*

42. Trombone Ensemble—The study and performance of music for trombones. May be repeated for credit. *Lab 2, Cr 1.*

43. 20th Century Music Ensemble—Rehearsal and performance of 20th century instrumental music with emphasis on improvisation. May be repeated for credit. Prerequisite: permission of instructor. *Cr 1.*

45. 46. Woodwind Ensemble—The study and performance of chamber music for woodwind instruments. May be repeated for credit. *Lab 2, Cr 1.*

49. 50. String Ensemble—The study and performance of chamber music for string instruments. May be repeated for credit. *Lab 2, Cr 1.*

Courses in Music Education (Mc E)

1. Music Methods for the Elementary Teacher—A functional course covering the methods, content, and materials of the elementary music program. *Cr 3.*

3. Music in General Education—Methods, materials, organization and administration of the music curriculum in the public schools. Prerequisite: MC T 14 A and MC L 22. *Cr 3.*

5-6. Music for the Elementary Classroom Teacher—Basic musicianship and approaches to the musical training of the elementary school child. Emphasis is placed upon the achievement and utilization of elemental performance skills in the areas of singing, rhythmic movement, aural, analysis, composition, improvisation and instrumental techniques. *Lec 1, Lab 2, Cr 2.*

21. Teaching of General Music—Organization and teaching of general music classes in the junior high school. Prerequisite: MC E 3, or equivalent. *Cr 3.*

Courses in Performance Techniques (Mc P)

1. 2. Voice Class—The systematic development of the principles of good singing through class method approach. Prerequisite: MC T 1 or equivalent. *Lab 2, Cr 1.*

5/6. Piano Class—Designed to give a basic command of the keyboard. Recommended especially for students preparing to take the proficiency examination in secondary piano. May be taken as an introduction to piano performance for the beginning student. Prerequisite: MC T 1 or equivalent. *Lab 2, Cr 1.*

9/10. String Class—Basic skills pertaining to each of the four string instruments. First semester, study of all instruments; second semester, concentrated work on one instrument. Prerequisite: MC T 1 or equivalent. First semester: *Lab 4, Cr 2.* Second semester: *Lab 2, Cr 1.*

13. Woodwind Class—Basic skills pertaining to the woodwind instruments. Prerequisite: MC T 1, or equivalent. *Lab 4, Cr 2.*

17. Brass Class—Basic skills pertaining to the brass instruments. Prerequisite: MC T 1, or equivalent. *Lab 4, Cr 2.*

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21. Percussion Class—Basic skills pertaining to the percussion instruments. Prerequisite: MC T 1, or equivalent. *Lab 2, Cr 1.*

40. Basic Conducting—Conducting techniques; emphasis on practical application to vocal and instrumental groups. *Cr 2.*

41. Choral Conducting and Literature—Basic choral conducting, and study of problems in the organization and training of choral groups. Prerequisite: MC H 2. *Lec 2, Lab 3, Cr 3.*

45. Instrumental Conducting and Literature—Basic instrumental conducting, and study of problems in the organization and training of bands and orchestras. Prerequisite: MC H 2. *Lec 2, Lab 3, Cr 3.*

51. 52. Accompanying—Fulfilled through accompanying students in lessons and recital or as accompanist for major performing organization. *Lab 2, Cr 1.*

101/102. Performance Studies—Applied study in piano, voice, organ, stringed instruments, and orchestral instruments at the advanced level. Intensive study of performance techniques and concentration on repertoire and preparation of material which shall be of such advancement technically and interpretatively as to compare favorably with a professional recital program. May be repeated for credit. Prerequisite: Mc 8 or equivalent. *Cr 2.*

105/106. Keyboard Musicianship—A comprehensive application of the study of harmony to the keyboard, directed towards the development of sight-reading and accompanying skills, keyboard score-reading, transposition, harmonization at sight, improvisation and the realization of figured bass or other chording schemes. Prerequisite: Mc T 14, Mc P 6 or equivalent level, including completion of Piano Proficiency requirements. *Cr 2.*

111/112. Advanced Chamber Music—The study and performance of the standard ensemble literature for string instruments, wind instruments, and piano. *Cr 2.*

Courses in Music History (McH)

1/2. History of Western Music—The history of music from antiquity to the present day with a technical study of the significant musical trends. Prerequisite: For the major, MC L 22, or sophomore standing. For the general student, permission of the instructor. *Cr 3.*

117. Music of the Baroque Period—A study of music in the 17th and first half of the 18th centuries; from Monteverdi and Schütz to Bach and Handel. Prerequisite: MC H 2, or permission of the instructor. *Cr 3.*

119. Music of the Classical Period—The changing style in form and content as evolved by Haydn, Mozart and Beethoven viewed against the background of social and political conditions of the time. Prerequisite: MC H 2, or permission of the instructor. *Cr 3.*

121. Music of the Romantic Period—Study of musical expression during the 19th century with emphasis on the intellectual foundations of the romantic movement. Study and detailed analysis of representative works from Beethoven through Debussy. Prerequisite: MC H 2, or permission of instructor. *Cr 3.*

123. Music of the Twentieth Century—Trends in contemporary music and their relationship to the cultural and political life of our time. Prerequisite: MC H 2, or permission of the instructor. *Cr 3.*

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Courses in Music Literature (Mc L)

1/2. *Understanding Music*—First semester: a study of the nature of music, and the basic elements necessary for intelligent listening exemplified in representative works of the great composers. Second semester: a survey of music literature emphasizing a broad acquaintance with the basic repertory, stylistic and aesthetic criteria and a critical and analytic approach to listening. For the general student. *Cr 3.*

3. *Vocal Literature*—A survey through discussion and performance of vocal literature from the 18th century to the present day to include classic Italian songs, German Lieder, French art songs, and contemporary American and British songs. *Cr 1.*

5. *Woodwind Literature*—A survey through discussion and performance of woodwind literature to familiarize the student with the standard repertory. *Cr 1.*

7. *Brass Literature*—A survey through discussion and performance of brass literature to familiarize the student with the standard repertory. *Cr 1.*

9. *String Literature*—A survey through discussion and performance of string literature to familiarize the student with the standard repertory to include that composed for string quartet. *Cr 1.*

11. *Piano Literature*—A survey through performance and discussion of standard literature for piano. *Cr 1.*

13. *Organ Literature*—A survey through discussion and performance of standard literature for organ. *Cr 1.*

21/22. *Survey of Music Literature*—A comparative study of styles, characteristics, forms, and performing mediums of music from the Renaissance to the present. Primarily for music majors. *Cr 2.*

Courses in Music Theory (Mc T)

1. *Fundamentals of Music*—An elemental study of the dimensions and basic characteristics of musical sounds, with primary emphasis upon the development of skills and concepts through creating, performing and analyzation. For the general student. *Cr 3.*

11A/12A. *Elementary Harmony*—Four-part harmony in diatonic relationships. To be taken concurrently with MC T 11B/12B. Primarily for music majors. *Cr 3.*

11B/12B. *Elementary Sight Singing and Ear Training*—Sight singing, ear training, dictation, and keyboard work. To be taken concurrently with MC T 11A/12A. *Lab 2, Cr 1.*

13A/14A. *Advanced Harmony* — A continuation of MC T 11A/12A. Function and use of the seventh, ninth, eleventh and thirteenth chords, chromatic harmony, and advanced modulation. To be taken concurrently with MC T 13B/14B. Prerequisite: MC T 12A. *Cr 3.*

13B/14B. *Advanced Sight Singing and Ear Training*—A continuation of MC T 11B/12B. To be taken concurrently with MC T 13A/14A. *Lab 2, Cr 1.*

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21. Modal Counterpoint—Contrapuntal techniques as practiced by composers of the 16th and 17th centuries. Written exercises and analysis. Prerequisite: MC T 12A, or permission of instructor. *Cr 2.*

22. Tonal Counterpoint—Contrapuntal techniques as practiced by composers of the 18th and 19th centuries. Written exercises and analysis. Prerequisite: MC T 12A. *Cr 2.*

55/56. Canon and Fugue—Analysis of masterpieces in forms, with particular concentration on the canons and fugues of Bach. Composition projects in these polyphonic types. Prerequisite: MC T 14B, and MC T 22, or its equivalent. *Cr 2.*

99. Music Theory Review—Review of basic traditional harmonic practice, construction and recognition of cadences, musical progressions, triads and seventh chords, modulation and "altered chords" such as Neopolitan Sixth and the augmented sixths. Prerequisite: MC T 14A or equivalent, or consent of instructor. Not offered for graduate credit. *Cr 3.*

115/116. Form and Analysis—Harmonic and structural analysis of musical forms from the smallest to the largest. Prerequisite: MC T 12A or the equivalent. *Cr 2.*

151. Instrumentation and Arranging—Study of the ranges, tonal possibilities, technical limitations, and transpositions of all orchestral and band instruments; scoring of short pieces for band, orchestra and ensembles. Prerequisite: MC T 12A. *Cr 2.*

161. Composition I (Small Forms)—Creative writing in the smaller forms including harmonic textures and use of contrapuntal devices. Prerequisite: a working knowledge of harmony and counterpoint and permission of the instructor. May be repeated for credit. *Cr 2.*

163. Composition II (Large Forms)—Continuation of MC T 161. Creative writing for voice and instruments in the large forms. Prerequisite: MC T 161. May be repeated for credit. *Cr 2.*

Graduate Courses (Mc)

230/231. Advanced Choral Conducting and Literature—*Cr 3.*

240. Wind Literature and Conducting—*Cr 3.*

250. Master Course in Conducting—*Cr 3.*

290. Psychology of Music—*Cr 3.*

300. Introduction to Graduate Study in Music—*Cr 3.*

310. Vocal Performance—*Cr 2.*

311. Keyboard Performance—*Cr 2.*

312. String Instrument Performance—*Cr 2.*

313. Wind Instrument and Percussion Performance—*Cr 2.*

398. Special Studies in Music—*Cr 3.*

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SCHOOL OF NURSING

ASSOCIATE PROFESSOR EELLS (Dean), PROFESSOR MACLEAN; ASSOCIATE PROFESSORS COTTON, FISH, IVANISIN (Assistant Dean), JENSEN, MADDOX, ROSCOE, TRYON; ASSISTANT PROFESSORS DUBOWICK, HAAS, LINEHAN, MALMUDE, STONE, TALBOT, TUKEY; INSTRUCTORS BELLONE, MARSHALL, PAIGE, SHAPIRO, TATRO; INSTRUCTOR ROST, Director, Bureau of Continuing Education for Nursing.

The School of Nursing of the University of Maine Portland-Gorham offers a program of four years which leads to the degree of bachelor of science with a major in nursing. One-hundred and twenty hours are required for graduation. The first two years in the program consisting largely of general education are available on the Orono, the Portland and the Presque Isle campuses. Early application is advisable. The junior and senior years, consisting of the clinical nursing courses, are available only on the Portland campus. Advanced placement credit for some of the general education courses may be obtained through subject examinations offered through CLEP. The School of Nursing also offers credit by examination in certain nursing courses of for advanced placement. For more details, interested students should contact Department Chairmen for specific courses.

The program is accredited by the National League for Nursing, and approved by the Maine Board of Nursing. Graduates are eligible to take the State Board examination for licensure as registered nurses.

In addition to the usual fees and expenses, nursing students must purchase uniforms (approximately \$75) during the sophomore year. They must also provide themselves with a car for one semester during the senior year for use in the course in Community Health Nursing.

Objectives of the Program

In order to prepare the student for nursing in today's world and for the ability to cope with nursing of the future, the program at the University of Maine School of Nursing is designed to prepare a nurse who can 1) make relevant, effective responses to the needs of people in providing direct care; 2) demonstrate an ability to work effectively to coordinate care in various settings; 3) identify her role as a professional nurse in the community.

Philosophy

The faculty believes that nursing is an art and developing science which began with the simple acts of caring and curing. Nursing begins with the initial response of recognizing the biological, social psychological needs of the patient, makes a priority assessment of such needs and utilizes feasible modes of nursing intervention. It is this set of sensitive and crucial responses that comprises excellence in nursing care.

The faculty further believes that adequate professional nursing preparation occurs within the climate of higher education. The practice of nursing stems from a theoretical base that concerns man in his biological, social and cultural environment, and the utilization of this knowledge in nursing science.

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The Program

Areas				Credits	
Art, Communications, Music				6	6
Humanities				6	6
Nursing	Nsg	01	Role of the Nurse	3	3
Natural Sciences	Bc	7	Fundamentals of Chemistry	4	
	Bc	8	Elem. Physiological Chemistry	4	
	Fn	152	Human Nutrition	3	
	Mb	21A	Elem. Microbiology Lab	1	
	Mb	127	General Microbiology	3	
	Zo	3	Animal Biology	4	
	Zo	10	Anatomy & Physiology	5	24
			Two Courses	2	2
Physical Education					
Social Sciences	Py	1	General Psychology	3	
	Py		Elective	3	
	Sy	3	Intro. to Sociology	3	
			Elective—Ay PoL I, Sy	3	12
Free Electives				10	10
					63

The junior and senior years include:

Nsg	301/302	Medical-Surgical Nursing	14
Nsg	303/304	Nursing of Mother and Child	14
Nsg	400	Community Health	3
Nsg	401	Community Health Nursing	6
Nsg	402	Psychiatric Nursing	6
Nsg	403	Advanced Medical Surgical Nursing	12
Nsg	404	Nursing Seminar	2
			57

Course Descriptions

Nu 1. The Role of the Nurse—A survey of the current and expanding roles of the nurse. *Cr 3.* EELLS, MACLEAN

Nsg 301/302. Medical Surgical Nursing (undergraduate only)—The nursing care of adults with health problems, present or potential, arising from aging or a pathophysiological condition. The nursing process of assessment, planning, intervention and evaluation is utilized. Learning experiences in the classroom and clinical laboratory are closely correlated with Nsg 303/304 for integration of nursing concepts basic to both areas of clinical practice. *Cr 7, 7.* TALBOT AND STAFF

Nsg 303/304. Nursing of Mother and Child (undergraduate only)—A family centered approach to nursing needs of parents and children in community care agencies. Learning experience in classroom and clinical laboratory will be closely correlated with Nsg 301/302 for integration of nursing concepts basic to both areas of clinical practice. *Cr 7, 7.* LINEHAN AND STAFF

Nsg 400. Community Health (undergraduate only)—Concepts and principles basic to the development and maintenance of community health. Includes theories of ecology, biostatistics, epidemiology and the organization and delivery of health services to the community. *Cr 3.* ROSCOE AND STAFF

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Nsg 401. Community Health Nursing (undergraduate only)—Concepts and selected field experiences essential to the understanding of the role of the nurse in the community. Prerequisite: Nsg 301/302 and Nsg 303/304. Cr 6.

ROSCOE AND STAFF

Nsg 402. Psychiatric Nursing (undergraduate only)—Guided experience in the application of psychodynamic concepts to the nursing care of selected patients. Prerequisite: Nsg 301/302 and Nsg 303/304. Cr 6.

COTTON AND STAFF

Nsg 403. Advanced Medical-Surgical Nursing (undergraduate only) — Designed to increase the student's competency in providing complex nursing and to assist her in applying administrative concepts in a leadership role. Prerequisite: Nsg 301/302 and Nsg 303/304. Cr 12.

STONE AND STAFF

Nsg 404. Seminar in Nursing (undergraduate only)—Current problems of the profession. Prerequisite: Nsg 301/302 and 303/304. Cr 2.

IVANISIN

Nsg 295. Independent Study in Nursing

Nsg 395. Independent Study in Nursing

Nsg 495. Independent Study in Nursing

Individual study in an area of nursing—Permission of the instructor. Cr 2-3.

STAFF

The Bureau of Continuation Education for Nursing

The overall objective of the Bureau is to provide educational programs for nurse practitioners in Maine that are designed to (1) stimulate and create an interest in extending their basic education, (2) update their knowledge within specialized areas of nursing care, (3) enhance the leadership capability of nurses, (4) promote better health care to consumers by enhancing the knowledge and skills of the nurse practitioner, and (5) create an awareness of the total system of health-care delivery and how their special nursing knowledge and skills can serve imaginatively the health-care delivery system.

The planning and implementation of such programs are based upon identified and projected needs of the learner and society and are conducted in concert with related health agencies and key advisory people in the State of Maine.

As part of the School of Nursing the Bureau of Continuing Education for Nursing offers counseling and program guidance to persons interested in pursuing part-time study prior to matriculation into the School of Nursing.

Program information and student guidance are available through the Bureau Director, Mary Ann Rost, at 59 Exeter Street, Portland campus.

PHYSICS (Ps)

PROFESSORS HOOPER (Chairman), CAMP, CARR, KRUEGER; ASSOCIATE PROFESSORS BROWNSTEIN, CLARK, CSAVINSZKY, HARMON, MORROW, TARR; ASSISTANT PROFESSORS CLARK, CARNIGLIA, HESS, ROONEY, SMITH, VIETTI; INSTRUCTOR LITTLEFIELD

The department offers major work leading to the degree of bachelor of arts in physics in the College of Arts and Sciences, and also major work leading to the degree of bachelor of science in engineering physics in the College of Technology.

The following courses should be taken by all candidates for the B.A. degree: Ps 1/2 (or 1a/2a), 17, 18, 36, 153, 155, 172, 176, along with Ms 26, 27/28, 59.

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A minimum of 35 credit hours in physics is required although in special cases a course in another department may be substituted for a physics course. In addition, Ch 13/14 and further courses in mathematics are recommended. Any program of study must be approved by the department.

Prospective physics majors should take Ms 26 and Ms 27 and, if possible, Ps 1/2 (or Ps 1a/2a) in the freshman year. If not prepared for Ms 26, a student should elect Ms 4 and, if taking physics concurrently, should take Ps 1a/2a.

The following courses of the more descriptive variety are open to all students and have no prerequisite: Ps 3, 9, 10, 31.

1/2. General Physics—The fundamentals of mechanics, matter, sound, heat, electricity, magnetism, light, and modern physics. The course meets the needs of engineering and science students. Calculus will be used. *Lec* with *Dem* 2. *Rec* 1, *Lab* 3, *Cr* 4. MR. BROWNSTEIN AND STAFF

1a/2a. General Physics—The fundamentals of mechanics, sound, heat, electricity, magnetism, light, and modern physics. Similar to Ps 1/2 but with less emphasis on computations and more emphasis on discussion and graphical methods. Calculus is not used. *Meets the needs of pre dental and premedical students.* *Lec* with *Dem* 2, *Rec* 1, *Lab* 2, *Cr* 4. MR. HESS AND STAFF

3. Descriptive Physics—For the non-science student. A treatment in non-mathematical language of the more important topics in physics. Designed to develop an appreciation for the concepts, vocabulary, and methods of the science. *Lec* with *Dem* 3, *Cr* 3. MR. MORROW

6. Essentials of Physics—A one-semester general physics course designed primarily for students from the College of Life Sciences and Agriculture. A condensation of Ps 1/2 accompanied by a careful selection of the topics treated. *Lec* with *Dem* 3, *Lab* with discussion 4. *Cr* 5. MR. CARR AND STAFF

9. Climatology—An introduction to general climatology, treating the elements and controls of climate, climate classification, and various relationships between climate and other natural phenomena and human activities. No prerequisite. *Rec* 3, *Cr* 3. MR. VIETTI

10. Meteorology—The earth's atmosphere, composition, and movements. Atmospheric conditions accompanying changes in weather, and weather predictions. Air-mass analysis. The course may be followed by Course 161. *Rec* 3, *Cr* 3. MR. VIETTI

17. 18. Intermediate Physics—A more rigorous treatment, with the calculus of general physics to supplement. Courses 1/2 or 1a/2a, either of which is a prerequisite, to complete suitable preparation for advanced courses in the department. *Lec* 2, *Comp* 2, *Cr* 3. MR. KRUEGER

19. 20. Sophomore Laboratory-Physics — Normally taken concurrently with Ps 17. 18, but may be taken separately by permission. Students enrolled in Ps 36 may take Ps 19, and students enrolled in Ps 172 may take Ps 20. *Lab* 2, *Cr* 1. MR. KRUEGER

31. Photography—Fundamental theories and techniques. For the scientist and the amateur. Characteristics and use of various types of cameras, lenses, exposure and exposure meters, emulsions, filters, artificial lighting and copying by contact and projection printing, dark-room practice. *Rec* 2, *Lab* 2, *Cr* 3. MR. CARNIGLIA

36. Introductory Modern Physics—Selected topics in molecular, atomic, electronic, and nuclear physics, intended to meet the needs of the present-day engi-

neering student. College physics, calculus, and some chemistry are prerequisite. *Lec 2, Rec 1, Cr 3.*

153. Electrical Measurements—A third-year laboratory course covering theories and practices in the measurement of electrical and magnetic quantities. *Lab 4, Cr 2.*

155. Electricity and Magnetism—An advanced treatment of the fundamental aspects of electrostatics, magnetism, electromagnetic phenomena, direct and alternating currents. Prerequisite: Ps 18 or permission. *Rec 3, Cr 3.* MR. CAMP

161. Advanced Meteorology—A more theoretical treatment than Course 10, combined with which the meteorology requirement for government service is satisfied. Not given every year. *Rec 3, Cr 3.* MR. VIETTI

162. Heat and Thermodynamics—The laws of thermodynamics. Thermodynamic description of the properties of matter. *Rec 3, Cr 3.* MR. CAMP

163. Statistical and Thermal Physics—Emphasizes the principles and methods of statistical mechanics as a foundation for classical thermodynamics. Elementary statistical mechanics applied to systems of current interest. Quantum statistics and non-equilibrium theory considered as time permits. Prerequisite: Ps 17, 18, 36. Not given every year. *Rec 3, Cr 3.* MR. HARMON

166. Physical Electronics—Electronic ballistics, electronic emission, high-vacuum, solid state, and gaseous electronics. Not given every year. *Rec 3, Cr 3.*

169. Atomic Physics—Atomic and molecular physics. Includes atomic structure, X-rays, quantum concepts and spectroscopy. Prerequisite: Ps 36 or permission. *Rec 3, Cr 3.*

170. Nuclear Physics — Basic concepts, radioactivity, nuclear reactions, alpha-beta and gamma-decay. A more specialized course than Ps 169. *Rec 2, Cr 3, if taken with laboratory or Cr 2 if taken without laboratory.* MR. HESS

172. Optics—An introductory study of geometric and physical optics. *Rec 3, Cr 3.* MR. CARNIGLIA

174. Physical Optics—A senior level or first year graduate course covering diffraction, polarized light, interferometry and laser theory. Prerequisites: Ps 172 and Ps 155. *Lec 2, Lab 3, Cr 3.* MR. CARNIGLIA

176. Physical Measurements—A third-year laboratory course in which experiments are selected from various branches of physics. *Lab 4, Cr 2.* MR. TARR

181. 182. Advanced Laboratory Physics—Selected projects for senior students. Opportunity is given to develop original ideas and to design and construct novel apparatus. Departmental approval required. *Lab 6, Cr 3.* STAFF

186. Introduction to Quantum Mechanics—Concepts of quantum theory. The Schrodinger equation and its solution for simple physical systems. Perturbation theory. Prerequisite: Ps 169, and the differential equations. *Rec 2, Cr 2.*

191. 192. Mathematical Physics—An advanced theoretical course which deals with the mathematical aspects of physics. Mathematics is treated as a tool in the analysis of physical problems. Analytical mechanics is emphasized the first semester; topics are selected from the whole field of physics in the second semester. *Rec 3, Cr 3.*

193. Topics in Physics—A course primarily for undergraduates dealing with selected topics in areas not already covered by regular course offerings in the department. Given on demand. *Cr Ar.* STAFF

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196. *Physics of Materials*—Relates the commonly observed macroscopic properties of materials to the microscopic process from which they result. Electrical, magnetic, optical, and mechanical properties will be discussed. Prerequisite: Ps 36, Ps 155 and Ms 29. *Rec 3, Cr 3.* MR. SMITH
- 198a/198b. *Physics Seminar*—Oral and written reports on approved topics. Primarily for seniors. 198a No credit, 198b *Cr 1.* MR. SMITH
199. *Problems in Physics*—A thesis project primarily for undergraduates and ordinarily of an experimental nature. *Cr Ar (1-3).* STAFF

Graduate Courses

201. *Mechanics*—*Rec 3, Cr 3.* MR. TARR
205. *Modern Physics*—*Rec 3, Cr 3.* MR. CARR
210. 211. *Graduate Laboratory*— MR. CLARK
212. *Electrodynamics I*—*Rec 3, Cr 3.* MR. KRUEGER
218. 219. *Methods of Theoretical Physics*—*Rec 3, Cr 3.*
220. *Quantum Mechanics I*—*Rec 3, Cr 3.* MR. BROWNSTEIN
230. *Statistical Mechanics*—*Rec 3, Cr 3.* MR. HARMON
234. *X-Rays*—*Rec 3, Cr 3.*
291. *Special Topics in Theoretical or Experimental Physics*—*Cr Ar.* STAFF
300. *Graduate Seminar*—*Cr Ar.*
307. *Nuclear Physics*—*Rec 3, Cr 3.* MR. HESS
309. *Physics or Elementary Particles*—*Rec 3, Cr 3.* MR. MORROW
313. *Electrodynamics II*—*Rec 3, Cr 3.*
315. *Spectroscopy at Microwave and Radio Frequencies*—*Rec 3, Cr 3.*
321. *Quantum Mechanics II* MR. BROWNSTEIN
- 324/325. *Solid State Physics I*—*Rec 3, Cr 3.* MR. CLARK
- 324/325. *Solid State Physics II*—*Rec 3, Cr 3.* MR. CLARK
328. *Plasma Physics*—*Rec 3, Cr 3.* MR. HARMON
399. *Graduate Thesis*—*Cr Ar.* GRADUATE STAFF

GRADUATE WORK IN PHYSICS

The degrees of master of science and doctor of philosophy are offered in physics. See section on Graduate Study for detailed requirements. Also consult the Graduate School Catalog.

SPECIMEN CURRICULUM IN PHYSICS¹

FALL SEMESTER

SPRING SEMESTER

Freshman Year

Hours				Hours			
Ps	1,	or 1a General Physics	4	Ps	2,	or 2a General Physics	4
Ms	26	Anal. Geometry and Calculus	4	Ms	27	Anal. Geometry and Calculus	4
		Electives ²	6			Electives ²	6
Pe	1	Physical Education	0	Pe	2	Physical Education	0
14				14			

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Sophomore Year

Hours				Hours			
Ps	17	Intermediate Physics	3	Ps	18	Intermediate Physics	3
Ps	19	Soph. Laboratory Physics	1	Ps	20	Soph. Laboratory Physics	1
Ps	36	Introd. Mod. Physics	3	Ps	172	Optics	3
Ms	28	Calculus	4	Ms	59	Differential Equations	4
Ge	7	Computer Programming	2			Electives2	6
		Electives2	3				
<hr/>				<hr/>			
16				17			

Junior Year

Hours				Hours			
Ch	13	Chemical Principles	4	Ch	14	Chemical Principles	4
Ps	135	Electrical Measurements	3	Ps	169	Atomic Physics	3
Ps	135	Electricity and Magnetism	2	Ps	176	Physical Measurements	2
Ms	153	Part. Diff. Equations	3	Ms	154	Part. Diff. Equations	3
		Electives2	3			Electives2	3
<hr/>				<hr/>			
15				15			

Senior Year

Hours		Hours	
Physics Elective	3	Physics Elective	3
Electives2	12	Electives2	12
<hr/>		<hr/>	
15		15	

1. This curriculum is intended to be suggestive of a typical program. Modifications are possible.
2. Included among the elective courses are those needed to satisfy the basic requirements of the College of Arts and Sciences (except the mathematics-natural science group).

PHILOSOPHY (PI)

PROFESSORS HJELM, SKORPEN, TREDWELL, WHITE (Chairman); ASSISTANT PROFESSOR WEBER; INSTRUCTOR CRAIG; LECTURER DR. WEISZ

Philosophy is rigorous reflection on human nature, culture, and the world. It is analytic in clarifying the concepts and methods particular to the humanities and to the sciences. It is synthetic in interpreting the descriptive and evaluative findings of all branches of human inquiry, including its own.

The Humanities Requirement

The Arts and Sciences humanities requirement may be met by taking any six hours except PI 131. PI 1, The Ideal of 'Humanities' from Mythical Image to Modern Philosophy and PI 2, Philosophy and Modern Life, are reserved for freshmen and sophomores.

Other philosophy courses open without prerequisite are PI 3, Methods of Reasoning; PI 4, Problems of Philosophy; PI 60, Introduction to Religious Studies; PI 101, History of Greek and Roman Philosophy; PI 111, Ethics; PI 103, History of Modern Philosophy; PI 123, Recent Philosophical Concepts of the Individual and the State; PI 131, Logic I, (this course does not meet the humanities requirement); PI 161, Introduction to Biblical Thought; PI 162, Religions of the East; PI 163,

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Judaism and Islam; Pl 164, Western Religion and Philosophy from the 1st to the 16th Century; and Pl 167, Religion in America. Any of these courses excepting Pl 131 may serve as an introduction to philosophy and as the first step in meeting the humanities requirement. Other courses in the department carry prerequisites—usually, satisfactory completion of one 100-level philosophy course. See individual course listings in this catalog or in the University time schedule for details.

The Philosophy Major

Philosophy majors complete a minimum of 27 hours in philosophy.

Elementary Courses

1. *The Ideal of 'Humanitas' from Mythical Image to Modern Philosophy*—A one semester course explaining some major crises and stages in Western philosophy and interpreting several stages in the development of images and ideas of human nature. Special attention to the interplay between human thought and human behavior and to man's relation to culture and physical environment. Among typical thinkers considered: a spokesman for mythic thought, (e.g. Homer) Plato as representative of Hellenic philosophy, Kant as representative of the Enlightenment. Limited to freshmen and sophomores. *Cr 3.* MR. SKORPEN

2. *Philosophy and Modern Life*—Thoughtful contemporary works such as Castaneda's *Separate Reality*, Bach's *Johnathan Livingston Seagull*, and B. F. Skinner's *Beyond Freedom and Dignity* comment on issues which have concerned philosophers for centuries. Contemporary statements and traditional philosophic texts on problems of existence, knowledge, and conduct. *Cr 3.*

MR. TREDWELL, MR. WEBER

3. *Methods of Reasoning*—A study of principles used to distinguish correct from incorrect reasoning. Topics include: the nature of thought, the uses of language, recognition of arguments, informal fallacies, purposes and types of definition, deduction and induction. Emphasis on understanding and mastering (through practice) some fundamental techniques for testing the soundness of many different kinds of reasoning—including the student's own. *Cr 3.* MR. WHITE

4. *Problems of Philosophy*—A comprehensive survey of the major problems with which philosophy deals, including theories of knowledge, ethical value, and the nature of society, art, and religion. Emphasis on conflicts that result from divergent attempts to deal with these problems. *Cr 3.* MR. WHITE

60. *Introduction to Religious Studies*—An examination of religion as an expression of human culture, both past and present. Institutional and non-institutional manifestations of religion as conveyed through myth and symbol, religious experience, struggle for societal change, mysticism, and various quests for the articulation of human values. In dealing with the multi-dimensional nature of religion, inquiry by various disciplines will be considered, e.g. psychology, sociology, history, philosophy, and theology. *Cr 3.* MR. HJELM, MR. CRAIG

History of Philosophy

101. *History of Greek and Roman Philosophy*—Hellenic philosophy with emphasis on Plato and Aristotle, and including socratic philosophy, Stoicism, Epicureanism, and Neo-Platonism. *Cr 3.* MR. WEBER

103. *History of Modern Philosophy*—An interpretation of modern philosophy beginning with Bacon and Descartes at the start of the 17th century, devel-

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oping through rationalism and empiricism during the 18th, and culminating in the systems of Kant and Hegel early in the 19th. *Cr* 3. MR. TREDWELL

104. Recent Philosophy—Philosophy since World War I. Topics include: logical empiricism and the growth of analytic philosophy; pragmatism; phenomenology and the ontology of Heidegger; the linguistic turn in philosophy; the contemporary critique of empiricism. Prerequisite: *Pl* 103. *Cr* 3. MR. TREDWELL

107. American Philosophy—A brief examination of colonial and early 19th century American contributions to the development of present-day philosophy. Particular emphasis given to the philosophical views of Royce, Pierce, James, Dewey and Santayana. Prerequisite: one course in philosophy. (Not offered in 1973-74). *Cr* 3. MR. WHITE

121. Existentialism—The perennial philosophical questions of human identity, individual purpose, and existential courage. Concepts of despair, alienation, tragic heroism, bad faith, and authenticity, are explored in the writings of such philosophers as Kierkegaard, Nietzsche, Camus, Sartre, Heidegger, and Jaspers. Prerequisite: any 3-hour philosophy course. *Cr* 3. MR. WEBER

128. Philosophical Classics—An intensive study of the works of a major philosopher or school. This course is conducted in seminar format. May be repeated for credit when different philosophers or problems are studied. (Not offered in 1973-74). *Cr* 3. MR. WEBER

Value Theory

111. Ethics—Readings and discussions of works by Mill, Kant, Kierkegaard, Nietzsche, Dewey, and some other systematic moral philosopher. In each case, the nature of the system, its *summum bonum* and defense, will be examined, criticized, and tested for its applicability to personal and public predicaments. *Cr* 3. MR. SKORPEN

113. Aesthetics—Analysis of aesthetic experience and value. Various interpretations, classical and contemporary, of the nature of beauty, feeling, and the arts are studied. Prerequisite: one course in philosophy or permission of instructor. (Not offered in 1973-74). *Cr* 3. MR. WHITE

Logic and Formal Studies

131. Logic I—An introductory course in modern symbolic logic. Techniques of deductive inference, including decision procedures and axiomatization, are studied in developing the propositional and predicative logics. Some attention given to metalogic and the philosophy of logic. *Cr* 3. MR. TREDWELL

132. Logic II—Advanced topics in symbolic logic. Prerequisite: *Pl* 131 or permission of instructor. (Not offered 1973-74). MR. TREDWELL

Philosophy of Science

141. Philosophy of Natural Science—A critical examination of the conceptual and experimental procedures scientists employ in formulating and evaluating their theories. Readings from scientists' writings and from contemporary philosophers of science. *Cr* 3. MR. TREDWELL

142. Philosophy of Behavioral Science—Consideration of the philosophical and scientific applications of concepts such as ego, self, person, community, and interpersonal transaction. Readings from both philosophy and the behavioral sciences. Seminar. Prerequisite: permission of instructor. *Cr* 3. MR. SKORPEN

Topics in Philosophy

50. *Philosophy of Language*—The diversity of usage and meaning in ordinary language. Topics include: a description of a variety of philosophical accounts of the nature of language, the relation between meaning and the use of language, and a consideration of the dimensions of meaning expressible through language. Prerequisite: Pl 3 or junior, senior standing. *Cr 3.* MR. WHITE

123. *Recent Philosophical Concepts of the Individual and the State*—An inquiry into the tension between individual and collective existence centering around such questions as: Does personality find its highest expression in unanimity and solidarity or in isolation and solitude? How should we conceive responsibility to others? And how are 'freedom' and 'responsibility' related? Contemporary expression of these questions in the debate between Existentialists and Marxists. Readings include Teilhard de Chardin, Karl Jaspers, Ortega y Gasset, Jean-Paul Sartre, Karl Marx, and Nikos Kazantzakis. *Cr 3.* MR. WEBER

153. *Philosophy of History*—A critical examination of the problems of historical knowledge, and of major speculative contributions to the interpretation of history. Readings include Hegel, Marx, Spengler, and Toynbee. Prerequisite: one course in philosophy or permission of instructor. (Not offered 1973-74). *Cr 3.*

154. *Epistemology*—Concentrating on the theory of knowledge since Kant, this course examines such topics as: the sense-data theory of the origin of knowledge; the relation of language to theories; the methods by which claims to know are supported or dismissed. Prerequisite: one course in philosophy or permission of instructor. *Cr 3.* MR. WHITE

155. *Metaphysics*—A study of traditional and contemporary views on the nature of reality. Historical treatment of representative metaphysicians of the past forms the basis for an examination of the categories and tenets of present-day metaphysics. Prerequisite: one course in philosophy or permission of instructor. *Cr 3.* MR. WEBER

156. *Philosophy of Religion*—A philosophical study of religion, with emphasis on such topics as revelation and reason, religious language and the divine existence as they have been dealt with in classical and contemporary thought. Prerequisite: one course in philosophy or permission of instructor. *Cr 3.* MR. HJELM

159. *Topics in Philosophy*—Individual and small group study of problems or systems of philosophical concern. Course conducted in seminar style and, relying on careful use of major philosophical resources, attempts fresh exploration of fundamental topics. May be repeated for credit when different philosophers or problems are studied. Not offered first semester. Second semester: to be announced. *Cr 3.* MR. SKORPEN

199. *Readings in Philosophy*—Individual study of a selected topic, agreed upon by the student and the instructor. This offering is designed to address advanced issues not covered in normal offerings. Prerequisite: 9 hours and permission of department and instructor.

SPECIALIZATION IN RELIGIOUS STUDIES

The program of specialization in religious studies is designed to provide students with the intellectual tools and scholarly background required for a critical understanding of the forms and traditions of religion that have appeared in human culture.

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PI 60, Introduction to Religious Studies, is the recommended introductory course for this field.

Participants in this program of specialization within the Department of Philosophy are required to meet the following requirements:

Courses in the Field of Religious Studies: 21 credits are required for specialization and must include PI 161 (Introduction to Biblical Thought), PI 164 (Western Religion and Philosophy from the 1st to the 16th Century), PI 166 (Contemporary Religious Thought), and one semester of PI 169 (Topics in Religion). The remaining 6 credits may be chosen from the following: PI 156 (Philosophy of Religion), PI 162 (Religions of the East), PI 167 (Religions in America), PI 168 (Religion and Society), Sy 182 (Sociology of Religion).

Supporting courses in the Field of Religious Studies: 9 credits in courses relevant to the particular interest of the student in religious studies must be selected under the direction of the chairman of the Department of Philosophy.

Religious Thought

161. Introduction to Biblical Thought—The historical, literary and theological development of the Biblical tradition from the time of the Hebraic origins to the emergence and expansion of the Christian community. *Cr 3.* MR. HJELM

162. Religions of the East—The origins, literature, belief and practices of the major religious traditions of India, China, and Japan. Special attention to the Buddhist tradition. *Cr 3.* MR. CRAIG

163. Judaism and Islam—Analysis of post-Biblical Judaism in its cultic and theological forms up to the modern developments. The course also surveys the origins and growth of Islam from the 7th century to the present time. Prerequisite: PI 161. (Not offered 1973-74). *Cr 3.*

164. Western Religion and Philosophy from 1st to the 16th Century—The interaction of Greek philosophy and the Christian, Jewish and Islamic traditions. Emphasis on the primary sources of these traditions. *Cr C.* MR. HJELM

166. Contemporary Religious Thought—Analysis of the formative thinkers and movements in religious thought from World War I to the present. Emphasis on the work of such men as Buber, Barth, Tillich and Bonhoeffer. Such current developments as Black Theology, Jewish Theology in the light of Auschwitz, Women's Liberation and Theology of Hope. Prerequisite: one course in Religious Thought, *Cr 3.* MR. CRAIG

167. Religion in America—Major American ecclesiastical and theological developments from the 17th century to the modern era. Special attention to such formative movements as Puritanism, Revivalism, the Social Gospel, Neo-Orthodoxy, and their significant exponents. Prerequisite: junior or senior standing or permission of instructor. *Cr 3.* MR. CRAIG

168. Religion and Society—The relation of religion to utopian visions. Communitarianism, past and present. Communitarian movements will be considered, e.g. Shakers, Oneida, *Bruderhof*, and *Kibbutz*. Particular attention to contemporary quests for communes. Prerequisite: one course in Religious Thought or permission of instructor. *Cr 3.* MR. CRAIG

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169. Topics in Religion—Individual and small-group study of problems and issues in religious thought. Conducted in seminar style, this course undertakes detailed examination of topics of present interest to students of religion. Since its content varies from term to term, Pl 169 may be repeated for credit. Prerequisite: permission of instructor. Fall semester: Marx and Marxism. Spring semester: Traditions of the Reformation. *Cr 3.* MR. CRAIG, MR. HJELM

POLITICAL SCIENCE (Pol)

PROFESSORS MAWHINNEY (Chairman), COLLINS, SCHOENBERGER, THOMSON; ASSOCIATE PROFESSORS CLARK, HAYES, HORAN, PALMER, SHIN; ASSISTANT PROFESSORS CAYER, HELMKE, HENDERSON, REID, TAYLOR, WENDZEL; MR. MARSTERS, MRS. GODWIN, MR. WRIGHT; MR. ALLEN, MR. BRZOZY, MISS HAMALUK, MR. JACOBS

Students may major in the following fields: (1) political science, (2) international affairs, or (3) public management.

Specific requirements for majors:

1. Political Science: a minimum of 33 hours of work in the department including Pol. 1: at least six hours within three of the following six sub-areas, with at least one sub-area selected within (a) and one sub-area within (b):

(a) United States Government

(1) United States National Institutions

Pol 55; 144; 156; 158; 159; 183/184; 179;* 249
*283.284; *295

(2) Public Administration

Pol 134; 151; 152; 153; 154; *200; *201; *212; *217

(3) State and Local Government

Pol 3; 7.8; 133; 134; 160; 195; *200; *201

(b) Foreign Governments and Theory

(1) Comparative Governments

Pol 131; 135; 136; 165; 167; 168; *217;
*231; *237

(2) International Studies

Pol 21.22; 173.174; 177; 187; 188; 194; 196; 199; *273;
*287; Geo 123/124

(3) Political Theory

Pol 10; 12; 182; 189.190; 191; 192; 194; 199; *289; *294

*Graduate courses at the 200-level may be advised for a few senior students.

In addition, a student is required to select one of the following alternatives:
(a) Related Areas—General: 12 hours total from at least three related social science fields as follows: anthropology, economics, United States *or* European history, philosophy, psychology, sociology; or (b) Related Areas—Specific: the introductory course plus at least 12 hours in any one of the following fields: anthropology, economics, history, philosophy, psychology, or sociology.

2. International Affairs: see page 135.

3. Public Management: a minimum of 33 credit hours, in addition to pre-requisites, as described below.

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The program requires a student to serve a summer internship between his junior and senior years. Since the number of internships in this field is limited, the Departmental Public Management Committee will establish a list of recommended candidates. These candidates will then be placed in the positions available.

*Graduate courses at the 200-level may be advised for a few senior students.

Prerequisites (for admission to the program)

1. *Pol 1 American Government*
2. *Pol 3 State Government*
3. *Ec 10 Principles of Economics*

Of the 33 credit hour minimum described below, at least 18 credit hours should be in Political Science

A. Skills Component (6 hours)

1. *Eh 17 Advanced Professional Exposition or
Sh 45 Discussion and Inquiry or
Sh 57 Business and Professional Speaking*
2. *Ba 9 Principles of Accounting I or
Ms 19 Principles of Statistical Inference or
Ms 81 Computer Programming*

B. Substantive Core (15 hours)

1. *Pol 151 Public Administration*
2. *Pol 153 Administration of Public Personnel*
3. *Pol 154 Public Budgeting and Financial Administration or
Ec 172 State and Local Government Finance or
Ec 144 Urban Economics*
4. *Pol 133 The American City or
Sy 126 Sociology of Urban Life*
5. *Pol 134 Municipal Administration or
Pol 160 Problems of State Government*

C. Practical Component (6 hours)

1. *Pol 195 Internship*
2. *Pol 198 Practicum in Municipal Government*

D. Electives (6 hours)

1. *Are 136 Governmental Policies Affecting Rural America*
2. *At 19 Modern Architecture and Design*
3. *Ba 10 Principles of Accounting II*
4. *Ce 5 Surveying*
5. *Ce 28 Highway Engineering Fundamentals*
6. *Ce 30 Transportation Engineering*
7. *Ce 31 Introduction to Sanitary Engineering*
8. *Ce 175 Contemporary Environmental Pollution*
9. *Jr 22 Survey of Mass Communications*
10. *Pol 7/8 Maine Government*
11. *Pol 152 Administrative Law*
12. **Pol 200 City and Regional Planning*
13. **Pol 201 State Administration*
14. *Sy 24 Sociology of Rural Life*
15. *Sw 150/151 Social Welfare*

* Graduate courses at the 200-level may be advised for a few senior students.

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The department offers two graduate programs, leading to the M.A. degree in Political Science and the Master of Public Administration degree. Students desiring to concentrate in international affairs may do so within the M.A. in political science.

Bureau of Public Administration

Created within the Department of Political Science by the 102nd Maine Legislature, the Bureau of Public Administration is engaged in governmental research and publication and in programs of career development over the state. Political science students are encouraged to use its collections of governmental materials at 162 College Avenue.

Courses in Geography (Geo)

(Not offered in 1973-74)

1. Physical Geography—Basic knowledge of the world's physical environments, organized under five topics: maps, weather and climate, landforms, soils, and vegetation. Prerequisite: sophomore standing. *Cr 3.*

2. World Regional Geography—A study of world regions and their human occupants. Special attention will be given to those regions which are the focus of world attention. Prerequisite: sophomore standing. *Cr 3.*

26. Economic Geography—The geographical aspects of world resources, production, and trade. Prerequisite: sophomore standing. *Cr 3.*

101. Historical Geography of North America—The growth of the American economy studied in its spatial aspect as reflected by urban and rural settlement patterns. Particular attention given to three historical "cross-sections": 1760, 1860, and 1910. Prerequisite: junior standing. *Cr 3.*

102. Urban Geography—Techniques of regional geographic analysis as applicable to urban study. Emphasis on spatial patterns which transports facilities and associated with commercial, residential, and governmental land uses assume in the American city. Prerequisite: junior standing. *Cr 3.*

123/124. Political Geography—The geographic and demographic factors that condition national and international politics. Emphasis will be placed on the relationships of major nations to their areas and to the world, on examination of their strategic necessities, and on historical reviews of their resultant foreign policies. *Cr 3.*

MR. SCHOENBERGER

150. The Geography of Canada—The analysis of the physical and human elements and their part in producing the distributional patterns of present day Canada. Regional case studies focusing on current problems and future potentialities. *Cr 3.*

Courses in Political Science (Pol)

1. American Government—An introductory study of the major principles, structures, processes and policies of United States government. The course emphasizes such topics as the Constitution and its development, civil liberties, federalism, the role of political parties and interest groups, and the nature of the presidency, the bureaucracy, the Congress and the national courts. *Cr 3.*

MR. HORAN, Chairman

3. State Government—State constitutions, structure and functions of state government, relations with federal, state and local governments. Freshmen and sophomores only. *Cr 3.*

MR. PALMER

COLLEGE OF ARTS AND SCIENCES

7. 8. Maine Government—Practical operations and current problems of state and local government in Maine. One lecture each week by an official, followed by a discussion period. Open to all students. *Cr 1.*

MR. PALMER AND GUEST LECTURERS

7a. 8a. Maine Government—Designed for prospective teachers and others who wish more material on Maine government than is given in Pol 7.8. No person may receive credit for both Pol 7 and 7a or both Pol 8 and 8a. *Cr 2.*

10. An Introduction to Politics—A study of the scientific development of political science; of such key concepts as power, influence and authority; and of the relationship of politics to such contemporary problems as racism, poverty, threats to the environment, and international conflict. Freshmen and sophomores only. *Cr 3.*

MR. HELMKE

12. Introduction to Political Ideas—An introduction to concepts and issues found in political discourse. Attention given to contemporary political ideologies, such as Communism, Fascism, and Democracy. *Cr 3.*

MR. REID

21. 22. Current World Problems—The first semester is a study of contemporary international politics, focusing on the factors which condition the choice of foreign policies by the United States and the Soviet Union, and reviews, from the point of view of each, their respective policies from World War II until the present. The second semester is a study of the contemporary international political problems of the United Kingdom, France, Germany, the Middle East, China and Japan. *Cr 3.*

MR. SCHOENBERGER

55. Congressional Internship—A first-hand study of the national legislative process and the function of the legislator. The student will be assigned to the staff of a Congressman or Senator in Washington, D.C., from about February 1 to the end of June. Readings and reports are required in addition to the staff work. Open to juniors and seniors on a competitive basis. Rules announced publicly each fall semester. *Cr 6.*

MR. PALMER

131. Introduction to Comparative Politics—A systematic study of the nature, dimensions, and issues in the discipline of comparative politics. The course will emphasize relevant theories and approaches, basic conceptual tools, analytical skills, spatial and chronological surveys of various political systems, and the processes of political development. Prerequisite: Six hours of Political Science.

MR. HENDERSON

133. The American City—The process of government in urban America, including concepts of local self-government, forms and procedures in urban governing, and developments in intergovernmental relations and metropolitan areas. Prerequisite: Pol 1. *Cr 3.*

MR. TAYLOR

134. Municipal Administration—The management, financial control and administration of modern American cities; emphasis on personnel and finance administration, the city plan, and line functions: public safety, transportation, health and welfare, housing. Prerequisite: Pol 133. *Cr 3.*

MR. TAYLOR

135. Democratic Governments of Europe—The political traditions, parties, governmental structures, and special political problems of Great Britain, France and West Germany. Prerequisite: Pol 1. Juniors and seniors only. *Cr 3.*

MR. HORAN

136. Communist Governments—Marxism-Leninism and the contemporary Communist party, state, economy and society of the Soviet Union. Survey of the satellites. Prerequisite: Pol 1. Juniors and seniors only. *Cr 3*

MR. HORAN

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144. Public Relations—Principles of public relations and a study of their application through cases and problems. National, international, community and educational public relations with press, consumers, taxpayers, and other groups. *Cr 2.*

151. Public Administration—The dynamics of governmental administration including administrative principles, decision-making, communication, leadership organizational models and technical, political and personal factors of administration. Prerequisite: Pol 1. *Cr 3.* MR. CAYER

152. Administrative Law—Primarily case studies of the legal adjustment of administrative authority and individual liberty, including: judicial control over administration, personal liability of officers, scope and limits of administrative powers and the due process measurement of administrative procedure. Prerequisite: Pol 151. *Cr 3.* MR. CAYER

153. Administration of Public Personnel—An analysis of the various functions of public personnel administration, including organization and management and the handling of personnel problems relating to public employees at all levels of government. Prerequisite: Pol 151. *Cr 3.* MR. CAYER

154. Public Budgeting and Financial Administration—An analysis of the budgeting process including political aspects. The budget is considered as an instrument of fiscal policy; budget preparation and classification are discussed with special emphasis given to program and performance budgeting. Prerequisite: Pol 151. Juniors and seniors only. *Cr 3.* MR. TAYLOR

156. Political Parties—Development and present organization and operation of the American party system. Nature and function of major and minor parties, sectionalism, nominating systems, presidential and congressional elections, the electorate, financial groups. Prerequisite: junior standing and Pol 1. *Cr 3.* MR. HAYES

158. Public Opinion—The role of public opinion in American democracy; definition and measurement; sociological and psychological influences; mass media; linkage to government. Prerequisite: junior standing and Pol 1. *Cr 3.* MR. HAYES

159. Problems of American Government—An examination of basic problems of American national government. Case studies in such areas as federalism, the nature of the presidency, congressional organization, civil rights and liberties, the role of the judiciary, and foreign affairs. Prerequisite: Pol 1. Juniors and seniors only. *Cr 3.* MR. CAYER

160. Problems of State Government—An examination of basic problems of American state government. Case studies in such areas as the role of the state in the federal system, the office of the governor, lawmaking, administrative organization, the nature of judiciary, and the future of state government. Prerequisite: sophomore standing and Pol 1. *Cr 3.* MR. PALMER

165. Governments of South Asia—The governments and politics of selected countries of South and Southeast Asia. Emphasis on common problems of emergent nations of the area. Prerequisite: six hours of Political Science. *Cr 3.* MR. HENDERSON

166. Governments of East Asia—A study of the contemporary political systems of China and Japan. Prerequisite: six hours of Political Science. *Cr 3.* MR. HENDERSON

COLLEGE OF ARTS AND SCIENCES

167. *Emerging Africa*—The transition of Ghana, the Congo and other selected areas from colonial to independent states. Attention to political and economic organization and the native culture's impact on government. Prerequisite: six hours of Political Science. MR. HENDERSON

168. *Government in Latin America*—Concentration of "political styles," the contemporary struggle between tradition and revolution, political elites, economic and political problems. Selected case studies, not necessarily the same each year. Prerequisite: six hours of Political Science. Cr 3. MR. HENDERSON

173. *International Relations*—An analysis of the international system of states; the impact of nationalism; the restraints imposed on the unilateral actions of governments; and the possibility of peace resulting from war, disarmament, functionalism, and diplomacy. Prerequisite: junior standing and six hours of History or Political Science. Cr 3. MR. SCHOENBERGER, MR. WENDZEL

174. *United States Foreign Policy*—The formulation and implementation of United States foreign policy. The course analyzes such topics as: the conceptual framework for foreign policy study, the structures and processes of policymaking, factors shaping foreign policy, foreign policy in operation, specific foreign policy problems, and alternative foreign policy strategies. Prerequisites: junior standing and six hours of Political Science or History. Cr 3. MR. SCHOENBERGER, MR. WENDZEL

177. *Politics of the Middle East*—The politics of the Middle East from World War I to the present. Special attention to problems of Palestine and the creation of Israel, the interplay between the politics of the Great Powers and Middle East conflicts, and problems of nationalism, modernization, and revolution. Prerequisite: junior standing or permission. Cr 3. MR. WENDZEL

182. *Introduction to Law*—The focus of the course is on the nature and functions of law in the modern world; on law as part of the study of society. Not a technical course in law. Prerequisite: junior or senior standing. Cr 3. MR. THOMSON

183/184. *Constitutional Law*—The political, social and economic development of the Constitution through Supreme Court decisions. Court procedures. First semester: decision on the nature of the federal system and commerce, taxation and war powers. Second semester: decisions in civil liberties; Bill of Rights and Fourteenth Amendment. Prerequisite: junior standing and Pol 1. Cr 3. MR. MAWHINNEY

187. *International Law*—Introduction to the law that governs relations among states; includes the territory and jurisdiction of states, the law of treaties, recognition of states and governments, the law of the sea, and the law of war. Prerequisite: junior standing and six hours of History or Political Science. Cr 3. MR. COLLINS

188. *International Organization*—The nature, historical development, and basic principles of international organization. The structure, operations, and peacekeeping activities of the United Nations are emphasized. Prerequisite: junior standing or permission of instructor. Cr 3. MR. COLLINS

189. 190. *Political and Social Thought*—A survey of political theories from ancient Greece to the French Revolution. The basic approach is historical, and seeks to relate theories of politics to the environments in which they developed. Prerequisite: junior standing. Cr 3. MR. REID, MR. THOMSON

191. *American Political Ideas*—The development of political ideas in America from 1620 to the present. Prerequisite: junior standing. Cr 3.

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192. *Modern Political and Social Thought*—From the French Revolution to the present. Liberalism, utilitarianism, socialism, fascism, communism. Prerequisite: junior standing. *Cr* 3. MR. THOMSON

194. *Asian Political Ideas*—The traditional pattern of Asian thought on man, society and politics: Chinese, Indian (Hindu), Muslim. Seminar style, one two-hour meeting per week. Prerequisite: junior standing. *Cr* 3.

195. *Municipal or State Internship*—Professional experience in either a local government unit or a department or agency of state government. Open to selected students. Reports and readings required. State government option available under the Maine State Government Internship Program enacted by the 103rd Legislature; Municipal Government option required for the B.A. or M.A. degree in Public Management. *Cr* 3 or 6 hrs. Students may not receive more than 6 credit hours for internships within the department. MR. TAYLOR, MR. PALMER

196. *International Affairs Internship*—Study during the summer in a government agency, an international organization, or a business with overseas operations. Readings, reports, and on-the-job training required. Open to junior or senior International Affairs majors. *Cr* 3. MR. SCHOENBERGER

197. *Scope of Political Science*—The scope and nature of the study of politics: power and society; basic descriptive political theory and the role of political institutions. Prerequisite: Open to senior Political Science majors or with permission. *Cr* 3. MR. THOMSON

198. *Practicum in Municipal Government*—Lectures presented by visiting municipal, regional, state and federal officials on a series of topics and problems which will face the public administrator in his position; supplemented by the instructor and reading assignments. Required of Public Management majors. Prerequisite: Public Management senior or permission of instructor. *Cr* 3. MR. TAYLOR

199. *Theory and Methodology of International Relations*—An analysis of traditional and current theories of international politics and the application of such theories to specific situations. Particular emphasis will be given to such approaches as systems analysis, game theory, decision-making, simulation, and the development of theoretical models. Prerequisite: Pol 173 or permission. *Cr* 3. MR. SCHOENBERGER

Graduate Courses

200. *City and Regional Planning*—*Cr* 3.

201. *State Administration*—*Cr* 3.

205. *Political Man and His Milieu*—*Cr* 3.

206. *State Politics in the United States*—*Cr* 3.

207. *Local and Regional Government and Politics*—*Cr* 3.

212. *Electronic Data Processing in Public Administration*—*Cr* 3.

217. *Comparative Administrative Systems*—*Cr* 3.

231. *Topics in Comparative Politics*—*Cr* 3.

237. *The Evolution and Development of Canadian Government and Politics*—*Cr* 3. (IDL 237 or Hy 237)

249. *Seminar in American Politics*—*Cr* 3.

273. *Problems in International Politics*—*Cr* 3.

283. 284. *American Constitutional Development*—*Cr* 3.

287. *Problems in International Law*—*Cr* 3.

289. *Topics in the History of Political Philosophy*—*Cr* 3.

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- 294. *Topics in Political Theory*—Cr 3.
- 295. *Methods of Political Science*—Cr 3.
- 297. 298. *Seminar*—Cr 3.
- 302. *Topics in Public Administration*—Cr Ar.
- 303. *Topics in International Relations*—Cr Ar.
- 310. *Administrative Theory*—Cr 3.
- 311. *Program Analysis and Evaluation*—Cr 3.
- 320. *Urban Regional Government*—Cr 3.
- 325. *Planning and Organization for Economic and Social Development*—Cr 3.
- 327. *Intergovernmental Relations*—Cr 3.
- 331. *Seminar in Comparative Politics*—Cr 3.
- 333. *Community Political Power Structures*—Cr 3.
- 350. *Independent Readings*—Cr Ar.
- 397. *Method Seminar in Public Administration*—Cr 3.
- 398. *Project Seminar in Public Administration*—Cr 3.
- 399. *Graduate Thesis*—Cr Ar.

PSYCHOLOGY (Py)

PROFESSORS ANTONITIS, HAMMER, KAPLAN, NICHOLS, PLISKOFF (Chairman), SAPER, WADE; ASSOCIATE PROFESSORS ABELSON, FREY, GOLD, G. KULBERG, MAGARO, MARTINDALE, RYCKMAN, STONE, STUBBS, VITRO; ASSISTANT PROFESSORS BUTLER, CHERULNIK, COWAN, FARTHING, GERSHMAN, HESS, J. KULBERG; LECTURERS GRANT, SANDERS

The instruction offered by the Department of Psychology is designed to acquaint the student with psychology as a biological science and as a social science. The department provides the student with training in psychological theory and methodology as well as in the applications of psychology.

The minimum requirement for a major in the department is 27 hours, which must include Py 1, Py 45, Py 141, and Py 171/172. Additional courses to complete the major requirement will be chosen in conjunction with a departmental adviser, who may recommend additional courses outside the department.

Py 1—General Psychology, is a prerequisite for all advanced courses in the department.

1. General Psychology—A survey of psychology as the science of behavior. Lecture discussions of basic psychological processes including conditioning, perception, motivation and emotion, higher mental processes, individual differences and personality and additional selected topics. To provide depth to the student's experience, participation in research to a maximum of two hours is expected. Cr 3.

STAFF

5. Applied Psychology for Nurses—An introductory course for three-year nurses. Not acceptable for credit towards the B.S. degree in the School of Nursing, University of Maine. Cr 2.

STAFF

Unless stated otherwise, Py 1 or the equivalent is prerequisite for the following advanced courses.

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20.21. Child Study Laboratory—Observation and study of a group of pre-school children. Individual projects, supplemented by reading and class discussions. Opportunity to assist in guiding the children's activities. *Rec 2, Lab 3, Cr 3.*

MRS. GERSHMAN, MRS. GORHAM

45. Principles of Psychological Research—Techniques of psychological research. Applications of general methodology and specific techniques to major problem areas in behavioral research. Prerequisite: Py 141. *Cr 3.*

MR. CHERULNIK, MISS COWAN, MR. GOLD, MRS. KULBERG

74. Seminar in Issues in Contemporary Psychology—A review of some of the current theoretical issues and research findings in the general areas of psychology. Seniors only. *Cr 3.*

MR. MAGARO

90. Problems in Psychology—Opportunity to carry out a particular research problem under supervision. Students *must* file a special form for this course during the first week of the semester; the form may be obtained in the Department office. Py 45 and Per. *Cr Ar.*

STAFF

103. Applications of Behavior Principles—Methods employed in the experimental analysis of behavior; principles of respondent (classical) and operant (instrumental) conditioning; applications of principles to the understanding and control of behavior in everyday life situations. *Cr 3.*

MR. ANTONITIS

111. Business and Industrial Psychology—Applications of psychological principles, facts, and research methods to problems of trait and proficiency measurement, selection, efficiency, training, accidents, motivation, and adjustment in business and industry. *Cr 3.*

MR. WADE

117. Educational Psychology—The underlying psychological principles useful to the educator: understanding individual differences in development, personality; intelligence; principles of effective learning; interpretation of standardized tests. *Cr 3.*

MRS. KULBERG

123. Psychology of Childhood—A systematic study of the child's behavior and psychological development. Emphasis upon principles underlying development, methods of child study, and practical implications. *Cr 3.*

MISS COWAN, MR. NICHOLS

124. Psychology of Adolescence—Adolescent development in the physical, intellectual, emotional, and social spheres. Adolescent personality and problems of adjustment in relation to the family, the school and the community, and the world of work. Delinquency and abnormality in adolescents. *Cr 3.*

MR. BUTLER

126. Psychology of the Retarded Child—Description and analysis of various types and levels of retardation and study of causative factors. Consideration of psychological principles and techniques applicable to the identification, care, and training of retarded children. Prerequisite: Py 123. *Cr 3.*

MR. NICHOLS

127. Psychology of the Superior Child—Identification, development, and behavioral characteristics of superior children. Discussion of social and psychological problems associated with the superior child. Prerequisite: Py 123. *Cr 3.*
(Not offered 1973-74)

128. Psychology of the Exceptional Child—A consideration of the development and behavior of the exceptional child. Special emphasis on the practical problems related to the management of children with intellectual, emotional, orthopedic, sensory, and academic handicaps. Prerequisite: Py 123. *Cr 3.*

MR. NICHOLS

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130. Social Psychology—An introduction to the study of social behavior from a psychological perspective. Representative topics include culture and personality, attitude formation and change, conformity, leadership and prejudice. *Cr 3.*

MR. CHERULNIK, MR. STONE, MR. GOLD, MR. RYCKMAN

131. Social Psychology and Problems in Contemporary Society—An application of social psychological principles to major problems confronting contemporary American society. Problems under consideration may include institutional racism, international conflict, poverty and overpopulation. *Cr 3.* (Not offered 1973-74).

132. Mental Hygiene—A consideration of the fundamental factors in human adjustment with emphasis upon the prevention of inadequate adjustments and upon the process by which maladjusted individuals may be restored to normal living. Family and educational situations will be emphasized. *Cr 3.* MR. HAMMER

133. Abnormal Psychology—The origin, development, and manifestations of the psychoneuroses and major psychoses with a view to a better understanding of deviant behavior in our society. Emphasis of the biological, social, and psychological determinants of deviant behavior. *Cr 3.*

MR. MAGARO, MRS. HESS, MR. MARTINDALE

135. Cognition—An introduction to the psychological study of thinking, attention, and language. Representative topics include fantasy, altered states of consciousness, psycholinguistics, and creativity. *Cr 3.* MR. MARTINDALE

138. Theories of Personality—A survey of the chief contemporary approaches to the study of personality. Critical issues in personality. Consideration of assessment techniques and research methods. *Cr 3.* MR. RYCKMAN

141. Statistics in Psychology I—A survey of techniques used to obtain, display, analyze, and interpret data in psychology. *Cr 3.*

MR. ABELSON, MR. FREY

142. Statistics in Psychology II—A survey of techniques used to obtain display, analyze, and interpret data in psychology. Prerequisite: Py 141 and Py 45.

MR. ABELSON

147. 148. Experimental Psychology—First semester: Techniques and objective approach to the study of human perception, learning, psychophysics, etc. Training in writing psychological research reports. Second semester: Basic principles in programming and use of operant conditioning procedures with animal subjects. Planning and conducting an original investigation by the student. *Rec 2, Lab 4, Cr 4.* Prerequisite: Py 141. (Not offered 1973-74)

151. Psychology of Motivation—A survey of theory, research methodology and experimentally obtained facts related to the activation and direction of behavior. (Not offered 1973-74) *Cr 3.*

154. Learning and Motivation—An examination of fundamental principles of classical conditioning and operant conditioning, including interrelations between learning and motivation. Research data will be discussed in relation to various theories of learning. Laboratory work will emphasize demonstrations of fundamental learning phenomena in animal subjects. Prerequisite: Py 45. *Lec 3, Lab 2, Cr 4.* MR. FARTHING

155. Human Learning—Basic principles that underlie the discovery, fixation and retention of new modes of human behavior. Primary emphasis on verbal learning, retention, transfer of learning, and concept formation. Prerequisite: Py 45. *Lec 3, Lab 3, Cr 4.* MR. WADE

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157. *Learning in the Classroom*—An examination of the basic phenomena and principles involved in understanding and managing the learning process in the classroom from subprimary through the college level. Prerequisite: Py 117 or equivalent. *Cr* 3. MR. NICHOLS

160. *Psychology of Political Behavior*—Application of social-psychological principles to the study of political behavior. Topics will include: political socialization, motivation for participation, political attitudes, and personality factors related to political roles. Prerequisite: Py 130 or permission. *Cr* 3. MR. STONE

161. *Sensation and Perception*—A systematic examination of selected sensory and perceptual processes. Emphasis on the experimental method, research findings and theoretical interpretations. Prerequisite: Py 45. *Lec* 3, *Lab* 2, *Cr* 4. MR. STUBBS

165. *Physiological Psychology*—Physiological bases of behavior with emphasis upon the development and function of the nervous system and the sense organs; the relation between psychological processes and physiological activity. Prerequisite: a basic course in Zoology, Py 45. *Cr* 3 MR. ABELSON

167. *Animal Behavior*—An examination of several topics in comparative animal psychology, including learning, motivation, sensory processes, behavioral genetics, innate behavior, social behavior, and the development of behavior. Various methods of investigating and classifying animal behavior are critically evaluated. Prerequisite: Py 1 and Zo 3 or consent of instructor. *Cr* 3. MR. FARTHING

171/172. *History and Systems of Psychology*—First semester covers the history of psychology from prehistoric times to 19th century thought which led to modern psychology. Second semester covers the systems of psychology from Wundt to modern times. Course open to upper juniors and seniors only and is required of all majors in psychology. *Cr* 2 each semester. MR. PLISKOFF

Graduate Courses

222. *Advanced Child Psychology*—*Cr* 3. MISS COWAN

224. *Experimental Child Psychology*—*Cr* 4. (Not offered 1973-74)

234. *Advanced Psychopathology*—*Cr* 3. MR. KULBERG

238. *Research in Personality*—*Cr* 3. MR. RYCKMAN

242. *Psychological Methodology*—*Cr* 3. MR. WADE

243. *Correlation Techniques*—*Cr* 3. MR. GOLD

244. *Psychological Test Theory*—*Cr* 3. MR. GOLD

245. *Nonparametric Techniques in Psychology*—*Cr* 3. (Not offered 1973-1974)

247. *Introduction to Factor Analysis*—*Cr* 3. (Not offered 1973-74)

251. *Advanced Physiological Psychology*—*Cr* 4. (Not offered 1973-74)

256. *Theories of Learning*—*Cr* 3. (Not offered 1973-74)

257. *Controversial Issues in Learning*—*Cr* 3. (Not offered 1973-74)

258. *Hullian and Neo-Hullian Theories of Learning*—*Cr* 3. (Not offered 1973-74)

259. *Advanced Experimental Analysis of Behavior and Its Application*—*Cr* 3. (Not offered 1973-74)

261. *Advanced Social Psychology*—*Cr* 3. (Not offered 1973-74)

263. *Group Processes*—*Cr* 3. MR. CHERULNIK

265. *Attitudes and Opinions*—*Cr* 3. (Not offered 1973-74)

267. *Psychology of Literature*—*Cr* 3. MR. MARTINDALE

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303. *Ethics and Professional Problems*—Cr 1. MR. GRANT
311. *Scientific Inquiry in Psychology*—Cr 3. (Not offered 1973-74)
312. *Advanced Experimental Psychology*—Cr 3. (Not offered 1973-74)
315. *Advanced Experimental Design*—Cr 3. (Not offered 1973-74)
317. *Experimental Social Psychology*—Cr 3. (Not offered 1973-74)
321. *Individual Psychological Testing*—Cr 4. MR. VITRO
325. *Basic Methods in Assessment*—Cr 3. MRS. KULBERG
326. *Advanced Clinical Assessment*—Cr 3. (Not offered 1973-74)
327. *Clinical Interviewing*—Cr 3. (Not offered 1973-74)
328. *Consultation*—Cr 3. (Not offered 1973-74)
330. *Practicum (activity)* —Cr Ar.
341. *Personality*—Cr 3. MR. RYCKMAN
342. *Theories of Psychopathology*—Cr 3. MR. MARTINDALE
343. *Seminar in Clinical Psychology*—Cr 3. MR. KULBERG
344. *Research in Clinical Psychology-Schizophrenic*—Cr 3. MR. MAGARO
347. *Seminar in School Psychology*—Cr 3. (Not offered 1973-74)
351. *Child Psychopathology*—Cr 3. (Not offered 1973-74)
355. *Seminar in Psychotherapy*—Cr 3.
357. *Case Studies in Psychotherapy*—Cr 3. MR. HAMMER
358. *Seminar in Behavior Therapy*—Cr 3. (Not offered 1973-74)
361. *Seminar in History and Systems of Psychology*—Cr 3. (Not offered 1973-74)
362. *Seminar in Physiological Psychology*—Cr 3. (Not offered 1973-74)
363. *Seminar in Learning*—Cr 3. (Not offered 1973-74)
364. *Seminar in Motivation*—Cr 3. MR. PLISKOFF
365. *Seminar in Perception*—Cr 3. (Not offered 1973-74)
366. *Seminar in Social Psychology*—Cr 3. MR. CHERULNIK
371. *Topics in Child Psychology*—Cr 3. (Not offered 1973-74)
372. *Topics in Comparative Animal Behavior*—Cr 3. MR. FARTHING
373. *Topics in Physiological Psychology*—Cr 3. MR. ABELSON
374. *Topics in Learning*—Cr 3. (Not offered 1973-74)
375. *Topics in Sensation and Perception*—Cr 3. (Not offered 1973-74)
376. *Topics in Quantitative Methods in Psychology*—Cr 3. (Not offered 1973-74)
377. *Topics in Clinical Psychology*—Cr 3.
390. *Directed Research: (area)*—Cr not to exceed 6. STAFF
392. *Directed Reading: (area)*—Cr not to exceed 6. STAFF
399. *Graduate Thesis*—Cr Ar.

UNIVERSITY OF MAINE

INSTITUTE FOR QUATERNARY STUDIES

PROFESSOR HAROLD W. BORNS, JR. (Director)—Quaternary and Glacial Geology;
ASSOCIATE PROFESSOR RONALD B. DAVIS—Paleoecology-Limnology; ASSOCIATE
PROFESSOR GEORGE H. DENTON—Quaternary and Glacial Geology;
ASSOCIATE PROFESSOR JOHN T. HOLLIN—Glaciology and Quaternary
Geology; ASSOCIATE PROFESSOR DAVID SANGER—Archaeology;
FACULTY ASSOCIATE ROBERT STUCKENRATH—
Radiocarbon Dating

The Quaternary Period, the most recent in earth history, witnessed numerous climatic fluctuations, glaciations, sea-level changes, and shifts in distributions of organisms. These changes shaped our contemporary environments and strongly influenced the evolution of man. A knowledge of Quaternary events facilitates understanding of current environmental changes and may enable anticipation of future changes. Maine was particularly affected by Quaternary events, because its landscape was shaped largely by glaciation and its biota was influenced strongly by climatic change.

Quaternary studies are often interdisciplinary and thus require cooperation among several academic departments. To facilitate such cooperation an Institute for Quaternary Studies, dedicated to teaching and research, has been established at the University of Maine at Orono. The Institute is staffed by members of the Departments of Anthropology, Botany and Plant Pathology, and Geological Sciences. The Institute is not a formal academic department. Rather, it serves to organize and promote interdepartmental teaching and research related to Quaternary studies.

Academically, the main purpose of the Institute at present is to coordinate a unified course structure which includes archaeology, Quaternary paleoecology and palynology, Quaternary geology, glaciology, pedogenesis and interdisciplinary seminars on subjects of broad interest.

Research interests of staff members focus on historically oriented problems of the Quaternary. These research interests overlap and complement each other to a degree which insures cooperation and encourages interdisciplinary approaches and joint research projects. Graduate students may pursue interdisciplinary thesis projects and may be supervised jointly by several staff members. Although much Institute research is conducted in New England and adjacent Canada, projects are also current in Alaska, Yukon Territory, Lapland, northwestern Europe, and Antarctica.

QUATERNARY SETTING OF MAINE

Ice sheets covered Maine repeatedly during the Quaternary. Drift deposited by the last ice sheet, which withdrew from Maine 12,000 to 14,000 years ago, is particularly well preserved. The coastal region displays widespread marine sediments, extensive systems of large stratified moraines, small washboard moraines, and raised deltas and strandlines. Eskers, ice-disintegration deposits composed of till, fluted till sheets, ice-contact stratified drift, outwash, and periglacial features characterize the inland landscape. In addition, the Longfellow Mountains in northwestern Maine contain numerous cirques and other features of glacial erosion. A

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well-dated framework of Quaternary events in Maine provides a base for detailed studies of glacial and periglacial deposits, glacial and postglacial events, and sea-level changes.

Maine's numerous lakes and bogs afford widespread opportunities for research in Quaternary paleoecology. Fossils in lake sediments record ecologic changes since the last glaciation. The earliest terrestrial vegetation included a high proportion of tundra plants. As the climate became warmer, the vegetation was characterized first by closed forests of spruce and pine and later by more southern trees such as hickory. Climatic cooling during the most recent 3000 years has offered competitive advantage to northern forms. Present-day isolated populations of *Rhododendron maximum* and the marine sponge, *Microciona prolifera*, probably are vestiges of the earlier warm period, whereas arctic species on high mountains and along the coast probably have survived in special environments in Maine since late-glacial time.

Prehistoric remains in Maine are largely unstudied and research opportunities in archaeology span all periods in a variety of ecological systems. The earliest cultural record consists of scattered surface finds of Paleo-Indian fluted points which probably date to at least 10,500 years ago. The lengthy Archaic stage is best known from cemeteries of the Laurentian Tradition which are located both in coastal and interior environments. Late Archaic remains are common along the coast and apparently represent the beginning of an intensive maritime exploitation pattern which was dependent largely on shellfish. Current research involves excavation and analysis of habitation sites in order to define the range of settlement and subsistence patterns. In several research projects Quaternary specialists are cooperating to provide environmental data pertinent to the prehistory of Maine.

GRADUATE AND UNDERGRADUATE PROGRAMS

It is anticipated that Master of Science in Quaternary Studies will be available in the academic years of 1973-74.

However, the Institute currently does not offer degree programs and incoming graduate and undergraduate students must enroll in a cooperating academic department. The Institute then encourages the student to pursue an interdisciplinary course program in Quaternary studies tailored to his or her needs. The Department of Botany and Plant Pathology offers an M.S. program. A program leading to a Ph.D. in Plant Science is a cooperative offering of the Departments of Botany and Plant Pathology, Entomology, Microbiology, and Plant and Soil Sciences. The Department of Geological Science offers an M.S. program. Courses in Quaternary studies are listed below. Research for interdisciplinary graduate dissertations may be carried out under the supervision of several staff members.

The course structure designed by the Institute offers undergraduate students a unique opportunity to obtain a strong interdisciplinary base from which to pursue graduate work in fields related to Quaternary studies. Interested and qualified upper-class undergraduate students may enroll in most of the courses listed below and thus must accumulate a minor concentration of Quaternary courses.

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Courses in Quaternary Studies

Seminar in Quaternary Studies
Glacial Geology
Quaternary Environments and Climatic Change
Glaciology
Directed Study in Quaternary Geology
Lake Ecology and Productivity
Quaternary Paleoecology and Pollen Analysis
Introduction to Archaeology
Old World Prehistory
North American Prehistory
Field Research in Archaeology
Radiocarbon Dating

FINANCIAL ASSISTANCE AND ADMISSION

Application forms and information on graduate fellowships and traineeships may be obtained from:

Dean Franklin P. Eggert
Office of the Graduate School
University of Maine at Orono
Orono, Maine 04473

Information on graduate teaching and research assistantships and further information about graduate and undergraduate programs in Quaternary studies may be obtained from:

Dr. Harold W. Borns, Jr.
Department of Geological Sciences
University of Maine at Orono
Orono, Maine 04473

Undergraduate application forms for admission to the University of Maine at Orono may be obtained from:

Mr. James A. Harmon
Director of Admissions
Alumni Hall
University of Maine
Orono, Maine 04473

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SOCIOLOGY (Sy)

ASSOCIATE PROFESSOR GUPTILL (Chairman); PROFESSOR MACCOBY; ASSOCIATE PROFESSOR FENN; ASSISTANT PROFESSORS COHN, GALLAGHER, KARUSH, MARKIDES*, MARKS, WATKINS, ZICKLIN

The Department of Sociology offers courses designed to further the student's perception and understanding of society through the study of major social institutions, social structures, social processes, and social behaviors. The department also offers a set of elective courses in social welfare as an option for students interested in that field.

Students who wish to explore the requirements for graduate study, or professional careers in sociology, or in social welfare, should consult with the departmental secretary who will direct them to an appropriate adviser.

Requirements for Majors

The student who majors in the department must complete satisfactorily a minimum of 36 hours of departmental course work, of which at least 9 hours must be in *electives* bearing numbered designations of 140 or higher. (Required courses do not apply to this 9 hour minimum, nor do courses listed as Sy 197, 198, unless otherwise specified in the catalog.)

The following courses are required of all departmental majors:

- Sy 3. Introduction to Sociology
- Ms 19. Principles of Statistical Inference or departmental statistics course when given
- Sy 110. Social Organization
- Sy 160. Sociological Theory
- Sy 190. Logic of Sociological Inquiry
- Sy 191. Practicum in Sociological Research
- Eh 7. Advanced Composition—Expository Writing
(The department will waive the requirement in Eh 7 for the student who demonstrates satisfactory achievement in expository writing. Credit for this course does not apply towards the 36-hour minimum in sociology. For further information, see the departmental secretary by March 1 of the academic year in which you propose to declare as a departmental major.)

Departmental majors in the social welfare option are required additionally to complete the following courses which also satisfy for them the requirement for a minimum of 9 hours of electives in departmental courses numbered 140 or higher.

- Sw 150/151. Social Welfare
- Sw 152/153. Social Work as a Profession
- Sw 154 or Sw 155. Field Experience in Social Work

The department encourages all prospective majors in the department to complete 9 hours of sociology in their freshman and sophomore years (including in particular Sy 3 and Sy 110), as well as Eh 7.

* On leave 1973-74.

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Prerequisites for Courses

- A. The two courses listed below are introductory courses in sociology. They have no prerequisites.

Sy 3/4. Introduction to Sociology
IDL 24 (ARE, Sy). Sociology of Rural Life

- B. The following courses are designed as extended introductions to the discipline for students with a limited preparation in sociology. *Sy 3 is a prerequisite for each of them, or permission of the instructor. They are not open to freshmen.*

Sy 110. Social Organization
Sy 113. Deviant Behavior
Sy 115. Sociology of Youth
Sy 116. Sociology of Aging
Sy 118. Sociology of the Family
Sy 126. Sociology of Urban Life
Sy 127. Self and Society
Sy 135. Human Ecology
Sy 138. Race and Culture Conflict
Sy 139. Sociology of Medicine
Sw 150/151. Social Welfare

- C. The following courses are intended for students who have had a broader preparation in sociology. Each requires *at least 9 hours of sociology or permission of the instructor*. Those marked with an asterisk (*) have further prerequisites which are indicated in their descriptions in the sequential listing of courses.

Sy 142. Population and Society
*Sy 147. Social Stratification
*Sy 160. Sociological Theory
Sy 163. The Sociology of Knowledge
Sy 165. Social Change
Sy 169. Collective Behavior and Social Movements
Sy 170. Small Group Analysis
Sy 172/173. Political Sociology
Sy 175. 176. The Sociology of the Economy
Sy 182. Sociology of Religion
Sy 190. Logic of Sociological Inquiry
*Sy 191/192. Practicum in Sociological Research

- D. The following courses have special prerequisites and/or stipulations. For further details, see their descriptions in the sequential listing of courses.

Sy 197. 198. Departmental Projects
Sw 152/153. Social Work as a Profession
Sw 154. 155. Field Experience in Social Work
IDL 124 (ARE, Sy) Contemporary Rural Problems
IDL 129 (ARE, Sy) The Individual and the Community

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Sociology (Sy)

3/4. Introduction to Sociology—The fundamental concepts, principles, and methods of sociology; analyzes the influence of social and cultural factors upon human behavior; evaluates effect of group processes, social classes, stratification, and basic institutions on contemporary society. First semester (Sy 3) concentrates on concepts and principles; second semester (Sy 4) on application of these concepts to various social problem areas. *Cr 3.* STAFF

IDL 24 (ARE, Sy). Sociology of Rural Life—Significance of rural society in American culture. The impact of forces of change, including population movement. The significance of changes in the social systems of communities, family, religion, education, and stratification. *Cr 3.* MR. PLOCH

110. Social Organization—An analysis of the nature of social order within society. Prerequisite: Sy 3 or permission of instructor; not open to freshmen. *Cr 3.*

MR. COHN

113. Deviant Behavior—A study of behavior defined by society as deviant. The processes by which an act or actor becomes defined as deviant and the nature of occupying a deviant role. The "techniques" of deviance and the acquisition of a deviant self concept. Prerequisite: Sy 3 or permission of instructor; not open to freshmen. *Cr 3.*

MR. GALLAGHER

115. Sociology of Youth—Attention is given to the social behavior of adolescents, the development of adolescent culture and the involvement of adolescents in the various social systems and the class structure of society. Prerequisite: Sy 3 or permission of instructor; not open to freshmen. *Cr 3.* MR. ZICKLIN

116. Sociology of Aging—Analysis of the demographic and sociocultural factors in aging, the aging individual as a person, older people as groups and aggregates within the culture and structure of a changing society, the manner in which society attempts to meet the needs of aging people, and the aged. Prerequisite: Sy 3 or permission of instructor; not open to freshmen. *Cr 3.* MR. GUPTILL

118. Sociology of the Family—A sociological approach to the study of the family, including the structure of social relationships, the modern American family as a social institution, the cultural background of the family, and the impact of social change. Prerequisite: Sy 3 or permission of instructor; not open to freshmen. *Cr 3.*

MR. MARKS, MR. ZICKLIN

IDL 124. (ARE, Sy). Contemporary Rural Problems—A problem-oriented, class participation course focusing on the trends taking place in contemporary rural society. Includes rural population displacement and mobility, poverty, industrialization; consequent changes in occupational composition, and related changes. Prerequisite: IDL 24 or equivalent. *Cr 3.* MR. WATKINS

126. Sociology of Urban Life—A descriptive and analytical approach to the study of city life. Emphasis on environment, social organization, the ecological processes, population, areas, housing, and maladjustments. Prerequisite: Sy 3 or permission of instructor; not open to freshmen. *Cr 3.* MR. KARUSH, MR. FENN

127. Self and Society—The behavior and symbolic processes of individuals who occupy positions in social structures, organizations and groups. The behavior of individuals as it is controlled, influenced, or limited by the social environment. The manner in which the behavior of individuals reacts upon, shapes, and alters social structures and enters into the functioning of groups. Prerequisite: Sy 3 or permission of instructor; not open to freshmen. *Cr 3.* MR. ZICKLIN

IDL 129. (ARE, Sy). *The Individual and the Community*—Analysis of the functioning and structure of the community. Emphasis on ways in which individuals and groups are affected by community dynamics. Community project. Prerequisite: IDL 24 or Sy 126 or permission. *Cr* 3. MR. PLOCH

135. *Human Ecology*—Spatial distribution of human beings and related activities and social processes. Prerequisite: Sy 3 or permission of instructor; not open to freshmen. *Cr* 3. MR. KARUSH

138. *Race and Culture Conflict*—Analysis of factors involved in group conflict, with emphasis on conflict between minority groups in contemporary societies. Prerequisite: Sy 3 or permission of instructor; not open to freshmen. *Cr* 3. MR. GUPTILL

139. *Sociology of Medicine*—Attention is given to the relationship between sociocultural factors and the occurrence of disease and the social systems which are developed in the treatment and prevention thereof. Prerequisite: Sy 3 or permission of instructor; not open to freshmen. *Cr* 3. MR. GUPTILL

142. *Population and Society*—The sociological analysis of population processes and their effects on society. Includes fertility, migration, mortality; population, resources and technology; population, social change and economic development; family planning and population policy. Prerequisite: 9 hours of sociology or permission of instructor. *Cr* 3. MR. KARUSH

147. *Social Stratification*—Systematic analysis of social differentiation and evaluation. Theories of, and research in, the structure and function of class, caste, and ethnic stratification. Descriptive materials will be drawn from studies of American and other societies. Prerequisite: 9 hours of sociology, including Sy 110, or permission of instructor. *Cr* 3. MR. COHN

160. *Sociological Theory*—A critical examination of the sociological theories of Marx, Max Weber, Durkheim, and contemporary theorists such as Parsons and Robert Merton. Study of developments in sociological theory as related to methodology, social issues, and current trends in contemporary sociology. Prerequisite: 9 hours of sociology, including Sy 110, or permission of instructor. *Cr* 3. MR. MARKS, MR. GALLAGHER

163. *The Sociology of Knowledge*—An examination of the relationship between knowledge and social interaction. The general characteristics of knowledge as a social phenomenon are explored. The problem of knowledge as being both influenced by and an influence upon the social structure will provide the focus of the course. Prerequisite: 9 hours of sociology or permission of instructor. *Cr* 3. MR. GALLAGHER

165. *Social Change*—Review and analysis of major principles and theories in social change and their relevance in understanding contemporary social processes in developed as well as developing societies. Prerequisite: 9 hours of sociology or permission of instructor. *Cr* 3. STAFF

169. *Collective Behavior and Social Movements*—Behavior of groups such as mobs, crowds, and riots which involve little cultural direction. Relatively unstructured mass behavior and broad society-wide movements are analyzed. Prerequisite: 9 hours of sociology or permission of instructor. *Cr* 3. STAFF

170. *Small Group Analysis*—Communication and interaction patterns within small groups are identified and analyzed. Course involves participation in and observation of such interaction. Prerequisite: 9 hours of sociology or permission of instructor. *Cr* 3. MR. GALLAGHER

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172/173. Political Sociology—An examination of the societal framework of political order. In the first semester, the focus is on social conditions which support different patterns in political culture and political activity. In the second semester, the focus is on social conditions which support different political structures and different patterns of political authority. Prerequisite: 9 hours of sociology or permission of instructor. Cr 3. MR. MACCOBY

175. 176. The Sociology of the Economy—The relationship, within industrialized societies, between economic behavior and structures and the structure of the total society. The course will first consider general social and cultural factors influencing areas of basic economic interest, and will then consider the influence of the economy upon other areas of the society. Prerequisite: 9 hours of sociology or permission of instructor. Cr 3. MR. COHN

182. Sociology of Religion—An objective study of religion as a social institution. Attention given to the social correlates of religion and the functions of religions in society. Prerequisite: 9 hours of sociology or permission of instructor. Cr 3. MR. FENN

190. Logic of Sociological Inquiry—The concern here is with the logical and conceptual supports of sociological research. The focus is on application to problem formulation and design in sociological research. Prerequisite: 9 hours of sociology or permission of instructor. Cr 3. MR. MACCOBY

191/192. Practicum in Sociological Research—Techniques of data collection, including observation, participation, interviewing, questionnaires, and tests. The process and logic of data analysis. Field work to include conducting and analyzing a sociological study. Prerequisite: 12 hours of sociology, including Ms 19, Sy 190, senior level, or permission of instructor. Cr 3. MR. GUPTILL, MR. KARUSH

197. 198. Departmental Projects—Prerequisites will vary with the particular project. Cr 2 or 3. STAFF

Graduate Courses (Sy)

210. Seminar in Survey Methods—Cr 3.

211. Seminar in Advanced Data Analysis and Interpretation—Cr 3.

212. Seminar in Field Research Methods—Cr 3.

220. Seminar in Micro-Sociological Theory—Cr 3.

221. Seminar in Macro-Sociological Theory—Cr 3.

290. Research Frontiers in Sociology—Cr 1.

297. Directed Research—Cr Ar.

298. Directed Readings—Cr Ar.

391. Thesis Seminar—Cr 1.

399. Graduate Thesis—Cr 6.

Social Work (Sw)

150/151. Social Welfare—Study of social welfare as a social institution. An examination of social welfare programs, their philosophy and methods, within a social and cultural context. Prerequisite: Sy 3. Not open to freshmen. Cr 3.

MRS. WATKINS

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152/153. *Social Work as a Profession*—Study of the ideology and methods of the social work profession. An examination of the role of the social worker in modern society, and the relationship of social work to other helping professions: psychology, psychiatry, medicine, and the ministry. Prerequisite: Sw 150/151, or permission of instructor. *Cr 3.* MRS. WATKINS

154. 155. *Field Experience in Social Work*—Field observation and experience in community agencies to enable students to apply social science and social welfare knowledge and to test their motivation and capacity for the field of social work. Prerequisite: senior social welfare majors only. *Cr 4.* MRS. WATKINS

SPECIAL PROGRAMS

INTERDISCIPLINARY STUDIES IN THE HUMANITIES AND FINE ARTS

The college provides an opportunity for interdisciplinary studies in various periods of civilization with offerings in the Departments of Art, English, Foreign Languages and Classics, History, Music, Philosophy, and Speech.

For interdisciplinary majors several conditions and requirements prevail: (1) a program is designed with a concentration of work in one department as well as related work in the participating departments; (2) the student is advised and his program is administered by the department in which his studies are concentrated; (3) the student must take a minimum of 24 hours of work in the department of his concentration and a minimum of 24 hours of related work in several of the participating departments; and (4) students will be known as Interdisciplinary majors in an area of concentration and coded accordingly: e.g., At-Is for Art, Eh-Is for English, etc. The program provides for broad areas of specialization, for example: Greek and Roman Studies, The Middle Ages, The Renaissance and Reformation, Neoclassicism and the Enlightenment, European Romanticism, the Later Nineteenth Century, and the Twentieth Century.

Information may be obtained from the participating departments. See statements of the participating departments elsewhere in this catalog.

PROJECTS-IN-LEARNING

Projects-in-Learning consists of several component programs which are experimental in nature, and designed to offer to qualified students an opportunity to explore in depth subjects not normally dealt with in the curriculum.

One program, Independent Study, (I.S. 100) is available to students with an accumulative point average of 2.5 or better and second semester freshman standing or above. Independent study projects are arranged between instructor and student. An instructor helps the student shape a project and is available for guidance at all times; however, emphasis is on the word *independent* and the student is encouraged to work on his own. Independent study projects can be used to satisfy requirements with the prior approval of the department head.

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The second component is the Special Seminar (S.S.) Program. Each semester seminars dealing with topics not covered in depth in regular courses are offered to students who have an accumulative point average of 2.0 or better and have second semester freshman standing or above. Emphasis is placed on topics of concern to interested students and faculty and range from those dealing with contemporary social problems to those designed to explore the unusual and provocative. Examples of seminars recently offered are: "The Brain and the Computer" and "Contemporary Poetry." Special seminars carry degree credit but do not satisfy any university, college or departmental requirements.

A third component to Projects-in-Learning is Freshman Seminar (F.S.A. 99), a non-credit experimental course set up by a faculty adviser for the following purposes: (a) to bring freshmen and faculty into closer association at the very beginning of the student's university career in a small class situation, (b) to provide students in their freshman year with a better opportunity for intelligent decisions in determining their role in higher education, (c) to familiarize them with the many options available to them in making academic decisions, (d) to familiarize freshmen with the basic workings of a university through some of the literature in the area of higher education. There are no eligibility requirements for the student other than first semester freshman standing in the College of Arts and Sciences.

The Projects-in-Learning Program is directed by a supervisory committee which must approve all projects work. Students, faculty and administrators are encouraged to formulate and submit imaginative proposals to the committee which consists of four faculty members and four students.

Eligible students may take the freshman seminar and up to four "projects" in their last three and one half years but no more than one each semester. *All projects work is graded Pass or Fail.*

Information regarding this program may be obtained from the academic adviser and from the Dean's Office, 100 Stevens Hall.

THE BACHELOR OF ARTS IN SPECIAL STUDIES

A limited number of students in the College of Arts and Sciences are permitted to construct for themselves special "majors" other than those presently existing.

Such students might: (1) be from such groups as the Onward Program; (2) have special backgrounds such as the military, business, the ministry, etc.; (3) be especially gifted in such things as mathematics, computer science, physics, or languages, political experience, law, etc., and for whom the traditional major might unduly restrict their unusual and unique abilities.

The program is centered in the Office of the Dean of the College, and is administered by a Special Studies Committee appointed by the dean.

The program is limited to approximately 50 students, who will declare a BASS major at the usual time in their sophomore year; all college generalization requirements must be met; 120 hours will be required for graduation, 72 of which must be elected outside of any one department; the College 2.0 accumulative average will apply to this program as well as other existing rules (such as those pertaining to the five-course limit per semester except for Dean's List students; the pass-fail regulations; and the rules concerning the Projects-in-Learning program).

Students in this program must have been in the program for his last 28 hours, and at least 60 hours must be taken in courses numbered 100 or better.

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SPEECH (Sh)

PROFESSORS GARDNER (Chairman), BOST, COLBATH, DOPHEIDE; ASSOCIATE PROFESSORS CYRUS, GILLESPIE, PETTIT, SCHER; ASSISTANT PROFESSORS W. BURNS, DOUGLASS, HARTMAN, RICE, VAN RHEENEN, N. WILKINSON; INSTRUCTORS MR. F. BURNS, MR. LUMSDEN, MRS. MOWER, MRS. PICKERING; PART-TIME INSTRUCTOR MRS. D. WILKINSON; FACULTY ASSOCIATE OLSEN; GRADUATE ASSISTANTS MR. BOURGOIN, MR. CRISCUOLO, MR. HAHN, MRS. KELLER, MR. MARSHALL, MISS RINFRET, MISS WOMELDORF

The major studies may lead to either a B.A. degree in speech or a B.A. degree in theatre. In addition, the major in speech permits the student, by meeting special requirements, to concentrate in one of the following areas: broadcasting; oral communication (general speech, rhetoric and public address, and speech education); or speech pathology and audiology. Specific requirements for each are available at the departmental office, including suggestions for preferred courses in meeting college requirements.

All majors in the department are required to complete six hours in one or more of the areas of the department, outside of the particular area of concentration or major.

All majors are expected to take advantage of the laboratory opportunities offered by the department through University Forensics, the Maine Masque Theatre, WMEB-FM and WMEB-TV, and the Speech and Hearing Center.

The department cooperates in the program of Interdisciplinary Studies in Fine Arts and Humanities at the undergraduate level and in the program in Comparative Literature at the graduate level. Further information may be obtained in 315 or 225 Stevens Hall.

The department offers programs leading to the master of arts degree. Further details may be found in the Graduate School Catalog.

Courses in Oral Communication (Sh)

The University forensic program offers practical experience in debate, discussion, oratory, extemporaneous speaking, and oral interpretation through competition with other colleges and universities. All undergraduate students in the University may participate in the program.

2. *Fundamentals of Interpersonal Communication*—A study of the basic elements of interpersonal communication, with special emphasis on developing knowledge and skills applicable to face-to-face interactions between individuals and in small groups. *Cr 3.* MR. VAN RHEENEN, Chairman

3. *Fundamentals of Public Speaking*—Study of the nature and problems of public speech communication, with practical experience in representative speaking experiences. *Cr 3.* MR. W. BURNS, Chairman

6. *Fundamentals of Interpretation*—An introduction to the art of interpretation in order to stimulate an understanding and responsiveness to literature and to develop the ability to convey to others, through oral reading, an appreciation of that literature. *Cr 3.* (formerly Sh 41) MRS. RICE, Chairman

9. *Parliamentary Procedure*—The principles and methods by which groups organize themselves and transact business with efficiency and fairness. *Cr 1.* MR. GARDNER

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45. Discussion and Inquiry—An introduction to the principles of the decision-making process involved in the area of discussion and group inquiry as a means of solving problems. Practical application of these principles through classroom experiences. Prerequisite: Sh 2 or equivalent. Cr 3. (formerly Sh 5)

MRS. HARTMAN, Chairman

47. Debate and Advocacy—An introduction to the principles of the decision-making process involved in the area of debate and advocacy, with emphasis on the use of reason in controversy. Practical application of these principles through classroom experience. Prerequisite: Sh 3, or equivalent. Cr 3. (formerly Sh 7)

MR. DOUGLASS, Chairman

51. 52. Debate Laboratory—Practical application of the principles and procedures of debate through the University of Maine Forensic Program. Prerequisite: Sh 47 or permission. Lab 2, Cr 1.

MRS. HARTMAN

53. Contemporary American Speakers—Consideration of the public address of 20th century America. An examination of representative speakers of all races and classes, the issues about which they are talking, and the rhetorical manner in which they attempt to deal with the problems of contemporary society. Prerequisite: Sh 3 or permission. Cr 3.

MR. W. BURNS

56. Advanced Oral Interpretation—Consideration of the particular problems involved in the oral reading of the following: (1) prose, (2) poetry, and (3) drama. (Formerly Sh 192) Prerequisite: Sh 6 or permission. Cr 3.

MRS. RICE

57. Business and Professional Speaking—Advanced study and practice in specialized audience analysis, strategies and tactics, conference procedures, interviewing techniques, and delivery of scientific and professional presentations. Prerequisite: Sh 2 or 3 or permission. Cr 3.

MR. W. BURNS

101. Persuasive Speaking—Study of the principles involved in influencing an audience, with emphasis on the means by which speakers try to influence the attitudes, beliefs, values, and actions of others. Experience in creating and evaluating persuasive messages and campaigns. Prerequisite: Sh 2 or 3 or permission. Cr 3

MR. DOUGLASS

103. Speech Analysis and Criticism—A study of the basic theories of rhetoric as they relate to the problems and issues involved in the critical analysis of human communication. Prerequisite: Sh 2 or 3 or 6 or permission. Cr 3.

MR. DOUGLASS

109. Theories of Speech Communication—The historical development of empirical and behavioral theories concerning intrapersonal, interpersonal, and public communication. Prerequisite: Sh 2 or 3 or permission. Cr 3.

MR. VAN RHEENEN

190. Ensemble Interpretation—A study of the theories and styles of oral presentation of literature, with application of the basic principles to the problems of group interpretation of literature. Emphasis on methods, materials, and actual group reading. Prerequisite: Sh 6 and permission. Cr 3.

MRS. RICE

197. Teaching of Speech Communication—Curricular and co-curricular programs in the secondary school. Problems, methods, and materials related to the high school course or courses in speech and to the directing of the forensic program in debate and individual events. Prerequisite: 12 hours of departmental courses. Cr 3.

MRS. HARTMAN

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Courses in Theatre (Sh)

The Maine Masque Theatre presents four major productions each year, in addition to other laboratory or studio programs, and serves as a practical training ground in theatre. All students in the University are eligible to read for plays to be produced and may participate in the other areas of the theatre.

11. *Introduction to Theatre*—A study of the nature of the theatre medium, its basic elements and techniques. Emphasis on the principles that underlie theatre practice and the process by which plays are translated into theatrical expression. For the general student as well as prospective theatre majors. *Cr 3.*

MR. COLBATH, Chairman

12. 13. *Masterpieces of World Drama*—The study of world drama, both Eastern and Western, as literature and as theatre. Stress will be placed on dramatic form and content, and on the uniqueness of the drama to reflect the philosophical, social, and political environment. *Fall semester*: Greek drama through the Renaissance. *Spring semester*: Restoration through 19th Century, and Asian drama. For the general student, as well as prospective theatre majors. *Cr 3.*

MR. WILKINSON

14. 15. *Stagecraft*—An introduction to technical production in the areas of scene design, lighting, costumes, properties, and makeup. Projects and laboratory work associated with theatre productions will be required. *Fall semester*: scene design and lighting; *Spring semester*: costumes, properties, and makeup. Sh 11 recommended. *Lec 2, Lab 2, Cr 3.*

MR. CYRUS

16. *Play Production*—An introduction to the responsibilities of the director and to the basic principles of stage directing, including choosing and analyzing plays, scheduling rehearsals, blocking action, and determining stage business. Back-stage work on major and laboratory theatre production is recommended. *Lec 2, Lab 2, Cr 3.*

STAFF

17. *Fundamentals of Acting*—The basic skills of acting, including the actor's internal preparation for playing a role and the developing of his external techniques for projecting the role to his audience. *Lec 2, Lab 2, Cr 3.*

MR. BOST, MR. COLBATH

68. *Theatre Practicum*—Supervised experience in Maine Masque Theatre productions in such areas as: acting, stage managing, publicity, scenery, lighting, and costume. Prerequisite: six hours of theatre courses and permission of Director of Maine Masque Theatre. May be repeated for a maximum of three hours. *Cr 1.*

STAFF

161. 162. *Theatre History*—A study of the development of the drama, physical theatre, and modes of production. *Fall semester*: Greek theatre through the Renaissance. *Spring semester*: Restoration to the present day. Limited to juniors and seniors. *Cr 3.*

MR. BOST, MR. WILKINSON

163. *Scene Designing*—Principles, methods, and materials used in scene designing. Laboratory projects in preparing the complete design for a particular production, including drawings and plans. Prerequisite: Sh 14. *Cr 3.*

MR. CYRUS

164. *Stage Lighting*—Principles, methods, and materials used in stage lighting, including their artistic and technical applications. Projects will include problems in lighting particular productions. Prerequisite Sh 14. *Cr 3.*

MR. CYRUS

165. *Stage Costuming*—An introduction to aspects of stage costuming including history, aesthetic principles, and practical application to actual productions. Prerequisite: Sh 15. (Not offered every year.) *Cr 3.*

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166. Stage Directing—The translation of all aspects of the theatre production into an artistic unity. Emphasis on theatre aesthetics. Practice in the directing of short plays, with particular attention to the director's work with the actor. Prerequisite: Sh 16. Limited to juniors and seniors. *Lec 2, Lab 2, Cr 3.*

MR. COLBATH

167. Advanced Acting—Development of the individual actor's versatility, with emphasis on the actor's exploration of himself as an instrument. Practice in broadening basic acting skills, role interpretation, and characterization. Limited to juniors and seniors. Prerequisite: Sh 17. *Lec 2, Lab 2, Cr 3.* MR. WILKINSON

Courses in Broadcasting and Film (Sh)

Radio Station WMEB-FM provides practical experience in broadcasting. All students have the opportunity to work for staff positions and program assignments. Certain opportunities are available on University television station WMEB-TV.

21. Introduction to Broadcasting and Film—Survey of the nature of the mass communications media of radio, television, and film in America, developmental history, social and economic influence, philosophy, and systems of content and dissemination. *Cr 3.*

MR. SCHER, Chairman

22. Basic Audio Techniques—The role of sound in radio, television, and film. Basic considerations of equipment, audio patterns, and voice requirements. Emphasis on the role of the announcer and narrator. *Lec 1, Lab 4, Cr 3.*

MR. LUMSDEN

23. Radio Laboratory—Practicum in the functions of radio programming and production. Students will be assigned specific responsibilities in the operation of WMEB-FM. Prerequisite: three hours of broadcasting courses and permission. May be repeated for a maximum of three hours. *Cr 1.*

24. History of Film—Historical development of the film as art and institution. Survey of major innovations in form and content significant film makers and film trends in representative countries. *Cr 3.*

MR. SCHER

124. The American Film and Society—Consideration of the American motion picture as social, cultural and artistic phenomena in American life. Viewing of selected feature films. Prerequisite: Sh 24 or permission. *Cr 3.* MR. SCHER

170. Broadcasting and Government—A study of the relationship between station operation and governmental policy or regulation. Special emphasis on the licensee's public service responsibilities as established by legislative and judicial precedents. Prerequisite: Sh 21 or permission. *Cr 3.*

MR. LUMSDEN

MR. SCHER

171. Writing for Broadcasting—An analysis of the problems in writing for radio and television. The preparation of different forms of continuity copy and the creation of various types of programs. Prerequisite: Sh 21 or permission. *Cr 3.*

MR. SCHER

172. Advanced Audio Techniques—Production of audio patterns for the mass media. Emphasis on the art of the radio production and the television or film soundtrack as an aesthetically composite whole. Prerequisite: Sh 22 or permission. *Cr 3.*

MR. LUMSDEN

173. Basic Television Production—An introduction to the theory and processes of television production. Emphasis on the use of television equipment, its potentials and limitations. Prerequisite: Limited to juniors and seniors or by permission. *Lec 2, Lab 2, Cr 3.*

MR. LUMSDEN

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174. *Advanced Television Production*—An analysis of the problems involved in the creation, production, and direction of the television program. Emphasis on the total production as an aesthetic whole. Prerequisite: Sh 173. *Lec 1, Lab 4, Cr 3.* MR. LUMSDEN

175. *Techniques of Film Production*—A study of basic equipment and techniques used in the production of different types of films. Emphasis on 16mm equipment currently used in commercial and non-commercial broadcast stations. Students will utilize this equipment in the planning, shooting, and editing of short films such as documentaries and special features. Student lab fee to cover costs of film and processing. Limited to juniors and seniors and permission. *Cr 3.*

176. *Broadcast Programming and Criticism*—An investigation of programming practices, strategies and conventions, considered in terms of broadcast history, economics and socio-cultural factors. Readings in American broadcast criticism, together with critical analysis of contemporary program trends in television and radio. Prerequisite: Sh 21 or permission. *Cr 3.* MR. SCHER

177. *Using Television in the Classroom*—The values and potentials of utilizing television in education, with particular emphasis on current use of the media in elementary and secondary schools, colleges and universities, and adult education. *This is not a course in producing the instructional program.* Limited to juniors and seniors. (Not offered every year). *Cr 3.*

178. *Television Laboratory*—Students will serve as crew members at a television studio. Crew functions will include camera operation, technical direction, announcing, and various other production duties. Prerequisite: Sh 173 and permission. *Cr 3.* STAFF

Courses in Speech Pathology and Audiology (Sh)

The Speech and Hearing Center is available for both diagnosis and therapy for all who can benefit from its services. It also provides training opportunities for those who are preparing to become speech therapists.

32. *Phonetics*—A study of the formation, auditory recognition, and phonetic (IPA) transcription of the sounds of the English language, with an examination of the interrelationship of such sounds in connected speech. *Cr 3.* MR. GILLESPIE

35. *Directed Speech Improvement*—A study of the voice and articulation needs of students who have demonstrated an ineffective use of certain vocal factors and the establishing of programs of self improvement for each student admitted to the course. May be repeated. *Cr 1.* MR. GILLESPIE

180. *Language and Speech Development*—An examination of the psychological and sociological foundations of language development and the sequential aspects of speech development. The interrelationships of the natural and behavioral sciences in understanding the speech and language processes. Limited to juniors and seniors or by permission. *Cr 3.* MR. GILLESPIE

181. *Introduction to Speech Pathology*—A survey of the major disorders of speech with attention to their recognition and the principles of their treatment. *Recommended for all teachers.* Limited to juniors and seniors or by permission. *Cr 3.* STAFF

182. *Fundamentals of Speech Pathology*—Study of the diagnosis and treatment of speech disorders presented by school age children. Emphasis on the interpersonal therapeutic experience and basic clinical procedures followed by

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the speech and hearing clinician. *Not recommended for classroom teachers.* Prerequisite: Sh 181. Limited to junior and senior majors. *Lec 2, Lab 2, Cr 3.*

MR. DOPHEIDE

183. *Anatomy and Physiology of the Speech Mechanism*—Study of the structures, the muscular system, and the nervous system underlying breathing, phonation, articulation, and language. While emphasis is placed on normal neurophysiological function, attention is directed to organic pathologies affecting speech and language. Limited to juniors and seniors. *Cr 3.*

MR. DOPHEIDE

184. *Basic Research in Speech and Hearing Science*—An introduction to research findings on the importance of acoustical, physiological, and perceptual factors in speech production and reception. Methodology and instrumentation employed in such research are surveyed. Limited to juniors and seniors. *Cr 3.*

MR. PETTIT

185. 186. *Clinical Practicum I*—Supervised experience with selected clients in the University of Maine Speech and Hearing Center. Three hours weekly participation, plus weekly conference. Prerequisite: Sh 182 and permission of the Director of the Center. *Cr 1.*

STAFF

187. *Organic Speech Disorders*—A study of the diagnosis and treatment of speech disorders of organic origin: Cleft palate, cerebral palsy, aphasia, and dysarthrias. *Not recommended for classroom teachers.* Prerequisite: Sh 181. *Cr 3.*

MR. PETTIT

188. *Hearing Impairment*—An introduction to normal auditory function as a basis for understanding disorders of hearing. A survey of procedures for hearing assessment and rehabilitation methods used with the hearing-impaired person. Limited to juniors and seniors or permission. *Cr 3.*

MR. F. BURNS

189. *Introduction to Audiology*—The field and profession of audiology. A study of the methods of hearing assessment, including their administration and interpretation. Audiometric identification of hearing loss and rehabilitation of the hearing-impaired person. Prerequisite: Sh 188. *Cr 3.*

MR. F. BURNS

General Course (Sh)

195. 196. *Problems in Speech*—For the advanced student desiring to study a particular problem under the guidance of a member of the staff. Prerequisite: permission of the department chairman. *Cr 1-3.*

STAFF

Graduate Courses (Sh)

202. *20th Century Public Address*—*Cr 3.*

204. *Persuasion*—*Cr 3.*

206. *Survey of Rhetorical Theory*—*Cr 3.*

208. *Communication Theory*—*Cr 3.*

255. *History of American Public Address*—*Cr 3.*

260. *Production of Pre-Modern Drama*—*Cr 3.*

261. *Production of Modern Drama*—*Cr 3.*

263. *American Theatre*—*Cr 3.*

264. *Asian Theatre*—*Cr 3.*

265. *Dramatic Theory*—*Cr 3.*

267. *Drama Colloquium*—*Cr 3.*

272. *Comparative Systems of Broadcasting and Film*—*Cr 3.*

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- 281. *Articulation Disorders*—Cr 3.
- 282. *Voice Disorders*—Cr 3.
- 283. *Stuttering*—Cr 3.
- 286. *Current Issues in Clinical Practice*—Cr 3.
- 288. *Aural Rehabilitation*—Cr 3.
- 301. *Seminar in Research Methods*—Cr 3.
- 302. *Teaching Speech in College*—Cr 1.
- 369. *Theatre Laboratory*—Cr 3.
- 385. *Diagnostic Procedures in Speech Pathology*—Cr 3.
- 386. *Clinical Practicum II*—Cr 1-2.
- 390. 391. *Directed Research*—Cr 1-3.
- 399. *Graduate Thesis*—Cr Ar.

ZOOLOGY (Zo)

PROFESSORS SPEICHER, ALLEN, BARDENT[†], DEAN, PRATT, MUN, C. MAJOR, J. COOK, VALLEAU, ROBERTS; ASSOCIATE PROFESSORS HATCH, SASS, DEARBORN*, HAYNES (Chairman), DEWITT, J. MCCLEAVE, VADAS; ASSISTANT PROFESSORS MCALICE, GREGORY, HIDU, SINNOCK, SUMMERS, LYNCH; LECTURERS PORTER, RODERICK, WADSWORTH, RIDGWAY, KANDUTSCH, STEVENS, FELL, BAILEY, CHERRY, POTTS, RUSSELL, BERNSTEIN, DAHL, WILSON; TEACHING ASSOCIATE BLAKE; PART-TIME INSTRUCTORS WEATHERBEE, M. MAJOR, B. COOK, B. MCCLEAVE; GRADUATE ASSISTANTS KAISER, EAKIN, JOHNSON, WILLARD, DUNNING, ZIMMERMAN, JONES, BERNSTEIN, STARR, HYLANDER, TRIAL

The Department of Zoology offers a varied program for the study of animal biology. This may include almost all aspects of animal life, such as anatomy, physiology, embryology, heredity, and ecology. Thus, a curriculum can be tailored to meet the needs of the individual student. To this end each major student is assigned a senior faculty member as his academic adviser, and close faculty-student relationship is emphasized.

Upon graduation, a zoology major may enter various areas of education, industry and research. Zoology graduates hold positions as varied as museum curator, teacher (elementary to college level), hospital administrator, marine biologist, ranger-naturalist, medical and biological illustrator, medical researcher, and science writer.

A zoology major may prepare also for graduate study in the various areas of biology (see Graduate Catalog) and for professional training in medical and dental schools, medical technology, optometry, and in other health sciences.

The Zoology Department offers work leading to the degrees of bachelor of arts in zoology, master of science in zoology and doctor of philosophy. It also administers the program leading to the degree of bachelor of arts in medical

[†] On leave of absence Fall Semester 1973-74

* On leave of absence Spring Semester 1974

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technology. A curriculum leading to the degree of bachelor of arts in biology is also available. Those who are interested should consult with the department chairman.

The department maintains a cooperative graduate program with The Jackson Laboratory, Bar Harbor, Maine, for the study of mammalian genetics. It is a cooperating member of The Ira C. Darling Center, Walpole, Maine, a branch of the University which provides facilities for marine-oriented studies. The Maine Cooperative Fishery Unit provides opportunity for training and research in fishery science. It is operated by the University under a cooperative agreement with the U. S. Fish and Wildlife Service, the Bureau of Sport Fisheries and Wildlife, and the Maine Department of Inland Fisheries and Game. The Fishery Unit staff are members of the Zoology Department.

Facilities

The Zoology Department is housed in Murray Hall, a modern structure of approximately 60,000 square feet of floor space, which provides well-equipped teaching and research laboratories. Special facilities include RCA EMU-3G and Philips 201 electron microscopes, a GE 250 KVP X-ray machine, a central micro-technique facility and an aquatic laboratory which supplies special well water to aquaria. Darkrooms for photography and autoradiography, and cold rooms are provided in Murray Hall. Air-conditioned animal quarters for breeding colonies are maintained by a full-time attendant. The Zoological Collections of various animal groups are of sufficient importance to be described elsewhere, on page 28.

Preparation for the Zoology Major

In addition to the general requirements of the college, the department requires the following courses for the B.A. degree in zoology:

Zo 3/4, Animal Biology, or Bt 1, General Botany, and Zo 4

Ch 13/14, Chemical Principles

Ch 151/152, 161/162, Organic Chemistry (with lab), or Bc 21, Organic

Chemistry and Bc 122, Biochemistry

Ms 26, Analytic Geometry and Calculus

Ps 1a/2a, General Physics

Requirements for the Zoology Major

Twenty-two hours of advanced work in zoology are required of all departmental majors. It is strongly recommended that at least one course be selected from each of the following categories while fulfilling the required 2 hours.

*Group I. Zo 133, Comparative Anatomy
Zo 136, Developmental Biology
Zo 153, Invertebrate Zoology*

Group II. Zo 162, Principles of Genetics

Group III. Zo 177, Animal Physiology

Group IV. Zo 156, Animal Ecology

Zo 168, Limnology

IDL 170. Introduction to Oceanography

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Requirements for the Biology Major (B.A.)

In addition to the general requirements of the college, the department requires the following courses for the B.A. degree in Biology:

Zo 3/4 Animal Biology, or Bt 1 General Botany and Zo 4

Bt 2 The Plant Kingdom

Ch 13/14 Chemical Principles

Ch 151/152, 161/162 Organic Chemistry (with lab), or

Bc 21 Organic Chemistry and Bc 122 Biochemistry

Ms 26 Analytical Geometry and Calculus

Ps 1a/2a General Physics

***Mb 127 General Microbiology and Mb 128 General Microbiology
Laboratory***

***En 26 Introductory Entomology and En 26L Introductory Entomology
Laboratory***

Eighteen hours of advanced course work are required. It is highly recommended that at least one course be elected from each of the following categories while fulfilling the required 18 hours:

Group I.	<i>Bt</i>	<i>135</i>	<i>Plant Anatomy</i>
	<i>En</i>	<i>251</i>	<i>Morphology of Insects</i>
	<i>Zo</i>	<i>133</i>	<i>Comparative Anatomy</i>
	<i>Zo</i>	<i>136</i>	<i>Developmental Biology</i>
	<i>Zo</i>	<i>151</i>	<i>Histology</i>
Group II.	<i>Bt</i>	<i>153</i>	<i>Plant Physiology</i>
	<i>Mb</i>	<i>153</i>	<i>Bacterial Physiology</i>
	<i>Zo</i>	<i>177</i>	<i>Animal Physiology</i>
Group III.	<i>Zo</i>	<i>162</i>	<i>Principles of Genetics</i>
Group IV.	<i>Bt</i>	<i>130</i>	<i>Plant Ecology</i>
	<i>Fy</i>	<i>19</i>	<i>Ecology</i>
	<i>Zo</i>	<i>156</i>	<i>Animal Ecology</i>
Group V.	<i>Bt</i>	<i>164</i>	<i>Taxonomy of Vascular Plants</i>
	<i>En</i>	<i>140</i>	<i>Insect Biology and Taxonomy</i>
	<i>Mb</i>	<i>136</i>	<i>Determinative Bacteriology</i>
	<i>Zo</i>	<i>131</i>	<i>Vertebrate Biology</i>
	<i>Zo</i>	<i>153</i>	<i>Invertebrate Zoology</i>

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SPECIMEN CURRICULUM FOR ZOOLOGY MAJORS (AND FOR PREMEDICAL/PREDENTAL STUDENTS MAJORING IN ZOOLOGY*)

Freshman Year

FALL SEMESTER				SPRING SEMESTER			
Hours				Hours			
Eh	1	Freshman Composition or Eh 9, Modern Literature	3	Ms	26	Anal. Geometry & Calculus	4
Ms	4	Algebra & Trigonometry	3	Pe	1	Physical Education	1
Pe	1	Physical Education	1	Zo	4	Animal Biology	4
Zo	3	Animal Biology	4			Modern Foreign Lang.	3
		Modern Foreign Lang.	3			Social Science	3
		Social Science	3				
<hr/>				<hr/>			
17				15			

Sophomore Year

Ch	13	Chemical Principles	4	Ch	14	Chemical Principles	4
Zo	133	Comparative Anatomy	4	Zo	136	Developmental Biology	4
		or				Fine Arts	3
Zo	153	Invertebrate Zoology	4			Elective	3
		Fine Arts	3				
		Elective	4				
<hr/>				<hr/>			
15				14			

Junior Year

Ch	151	Organic Chemistry	3	Ch	152	Organic Chemistry	3
Ch	161	Organic Chemistry Lab	2	Ch	162	Organic Chemistry Lab	2
Ps	1a	General Physics	4	Ps	2a	General Physics	4
Zo	177	Animal Physiology	4	Zo	162	Prin. of Genetics	3
		Elective	3			Elective	3
<hr/>				<hr/>			
16				15			

Senior Year

Zo	156	Animal Ecology	4	Zo	168	Limnology	4
		Humanities	3			or	
		Electives	8	IDL	170	Intro. to Oceanography	3
						Humanities	3
						Electives	8
<hr/>				<hr/>			
15				15			

* See page 86 for premedical programs.

SPECIMEN CURRICULUM FOR MEDICAL TECHNOLOGY

Freshman Year

FALL SEMESTER				SPRING SEMESTER			
Hours				Hours			
†Ch	13	Chemical Principles	4	†Ch	14	Chemical Principles	4
†Ms	4	Algebra and Trigonometry	4	Pe	2	Physical Education	1
Pe	1	Physical Education	1	†Ps	3	Descriptive Physics	3
†Zo	3	Animal Biology	4	†Zo	4	Animal Biology	4
		Foreign Language	3			Foreign Language	3
<hr/>				<hr/>			
16				15			

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Sophomore Year					
†Ch 140	Quantitative Analysis	4	†Mb 152	Pathogenic Bacteriology	
†Mb 127	General Microbiology	5		and Serology	4
	Fine & Comm. Arts	3		Fine & Comm. Arts	3
	Social Science	3	†Zo 158	Animal Parasitology	4
		—		Social Science	3
		15		Elective	3
					—
					17

Junior Year							
†Bc	21	Organic Chemistry	4	†Bc	122	Biochemistry	4
		Humanities	3			Humanities	3
Zo	151	Histology	4	Zo	152	Animal Microtechnique	2
		Elective	6			Elective	6
			<hr/>				<hr/>
			17				15

*Senior Year

Twelve months in either the Eastern Maine Medical Center, Bangor, Maine; the Central Maine General Hospital, Lewiston, Maine; or the Maine Medical Center, Portland, Maine.

	Weeks	No. of credits
†Microbiology (Bacteriology, Parasitology, Mycology)	12	7
†Clinical Biochemistry	13	8
†Clinical Microscopy (urine, feces, spinal fluid)	4	3
†Blood Bank Procedures	6	4
†Serology	4	3
Total	51	32

• Students desiring to spend their senior year at the University of Maine may do so by electing the proper advanced courses along with a departmental major other than medical technology. Such students are candidates for the bachelor's degree in the major fields of their choice. They are eligible for the certificate of M.T. only upon completion of a fifth year of training, this to be obtained at a hospital laboratory.

† These courses, or their equivalents, are required for the major in medical technology.

Courses in Zoology (Zo)

3/4. *Animal Biology*—A basic two-semester course. The first semester deals with principles of life, including properties of cells, heredity, ecology, and evolution. The second semester is an introduction to vertebrate structure and function, with emphasis placed on basic physiological principles. Zo 3 is not to follow Bt 1. *Lec 2, Lab 4, Cr 4.* MR. HAYNES, MR. LYNCH

8. *Anatomy and Physiology*—The general principles of animal life, with emphasis on the structure and functions of the human body. Prerequisite: Zo 3 or chemistry. Students who have had Zo 3/4 should take Zo 133 rather than Zo 8. *Lec 2, Rec 1, Lab 2, Cr 4.* MR. SASS

10. *Anatomy and Physiology*—Similar to Zo 8, with additional time for laboratory. For students in the School of Nursing. Prerequisite: Zo 3. *Lec 3, Lab 4, Cr 5.* MR. SASS

100. Drug Use and Abuse—An introduction to drugs of importance in contemporary society with emphasis on those of biological, medical, and social importance, survey of principles of administration, dose response curves, physiological and pharmacological actions, and toxicity. Prerequisite: Zo 3/4 or Bt 1, and Zo 4. *Lec 2, Cr 2.* MR. MAJOR

131. Vertebrate Biology—An introduction to the classes of vertebrates; their characteristics, evolution, physiology, and ecology. Prerequisite: Zo 3/4 or Bt 1/Zo 4. (Not recommended for students who have taken Zo 139, 160, or 232.) *Lec 3, Cr 3.* MR. MCCLEAVE

131L. Vertebrate Biology Laboratory—Emphasis is on taxonomy of regional fauna. Prerequisite: Zo 131 concurrently. *Lab 2, Cr 1.* MR. MCCLEAVE

133. Comparative Anatomy—The structure, origin, and history of the vertebrate organ-systems. Prerequisite: Zo 3/4, Bt 1-Zo 4, or permission of instructor. *Lec 2, Lab 4, Cr 4.* MR. SUMMERS

134. Biological Ultrastructure—A study of the ultrastructure of the cells of multicellular organisms, protozoa, bacteria and viruses. Prerequisite: Zo 151 and Biochemistry. *Lec 3, Cr 3.* MR. HAYNES

136. Developmental Biology—The transformation of the fertilized egg into a new adult individual: the concepts of growth and development of organisms. Prerequisite: Zo 3/4 or Bt 1-Zo 4. *Lec 2, Lab 4, Cr 4.* MR. MUN

137. Comparative Embryology—A comprehensive approach to the early embryological phases of selected invertebrate and vertebrate forms, with emphasis on living development and embryological techniques. Prerequisite: two years of zoology. *Lec 2, Lab 4, Cr 4.* (Not offered in 1973-74) MR. HAYNES

139. Mammalogy—The characteristics of mammals, their life histories and economic importance. Lectures supplemented by laboratory study of skins and mounted specimens. Prerequisite: Zo 3/4 or Zo 3-Bt 2. *Lec 2, Lab 3, Cr 3.* MR. BARDEN

IDL 140. (GY, ay, bt, s, zo) Seminar in Quaternary Studies—A multidisciplinary seminar that is concerned with selected areas of study—physical, biological and anthropological—related to the Quaternary Period. The subject areas of the seminar will vary each semester and it can be taken more than once for credit. Prerequisite: consent of instructor. *Lec 2, Cr 2.* STAFF

151. Histology—Microscopic anatomy of animal tissues. Prerequisite: Zo 3/4 or Bt 1-Zo 4. *Lec 2, Lab 4, Cr 4.* MR. ROBERTS

152. Animal Microtechnique—Histological and histochemical techniques for the preparation of animal tissues and cells for microscopic study. Medical technology majors; others with permission of the instructor. Prerequisite: Zo 3/4 or Bt 1-Zo 4. *Lec 1, Lab 4, Cr 3.* MR. SUMMERS

153. Invertebrate Zoology—The morphology, physiology, life histories, phylogenetic relationship, and economic importance of invertebrates exclusive of insects. (Lab, 153L, optional.) Prerequisite: Zo 3/4 or Bt 1-Zo 4. *Lec 2, Lab 4, Cr 2 or 4.* MR. DEARBORN

156. Animal Ecology—The interrelationships between animals and their physical and biotic environment. Topics include essentials of existence, ecosystem concepts, energy relationships, populations, communities, distribution, adaptations and applications. This course and Bt 130 and Fy 19 all cover basic ecological principles but with different emphases. It is recommended that only one of these

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courses be taken for credit. Prerequisite: Zo 3/4 or Bt 1-Zo 4. Several required field trips. *Lec 2, Lab 4, Cr 4.* MR. LYNCH

158. Animal Parasitology—The life histories, economic importance, methods of control, host necropsy and the preparation of parasites. (Lab, 158L, optional.) Prerequisite: Zo 3/4 or Bt 1-Zo 4. *Lec 2, Lab 4, Cr 2 or 4.* MR. ALLEN

160. Ornithology—The characteristics of birds, their life histories and economic importance. Lectures, laboratory study of skins and mounted specimens, and field identifications. Prerequisite: Zo 3/4 or Zo 3-Bt 2. *Lec 2, Lab 4, Cr 4.* MR. BARDEN

161. Human Genetics—The principles of genetics, with emphasis on the human. Not to follow Zo 162. Prerequisite: Zo 3 and junior standing. *Lec 3, Cr 3.* MR. SPEICHER

162. Principles of Genetics—The nature of hereditary factors and the mechanisms by which they are transmitted and expressed. Prerequisite: Zo 3 and junior standing. *Lec 3, Cr 3.* MR. SPEICHER

164. Genetics Laboratory—Practical experience in the rearing of some genetically important laboratory species, and analysis of the resulting data. Prerequisite: Zo 162 or concurrently. *Lab 4, Cr 2.* MR. SPEICHER

165. Evolution—The origin and development of evolutionary theory and the mechanisms which bring about the genetic differentiation of groups of organisms. Prerequisite: Zo 3. *Lec 3, Cr 3.* MR. SINNOCK

168. Limnology—The ecology of inland waters, with primary emphasis on the physical, chemical and biological factors controlling productivity. Prerequisite: Zo 3/4 or Zo 3-Bt 2; Ch 13/14. *Lec 3, Cr 2.* MR. HATCH

168L. Limnology Laboratory—Laboratory and field exercises in parameter measurement and faunistic survey in the aquatic environment. Saturday field trip. Prerequisite: Zo 168 or concurrent, Zo 153, En 26 or permission. *Lab 4, Cr 2.* MR. HATCH

IDL 170. (OC. zo) Introduction to Oceanography—Basic concepts in physical, geological, chemical, and biological oceanography. Prerequisite: one year each of mathematics, physics, chemistry, and biology, or permission of instructor. *Lec 3, Cr 3.* Seniors and graduates. STAFF

171. Fishery Biology—Introduction to theory and practice of contemporary fishery biology emphasizing ecology, life history, fish population sampling and manipulation, human factors and multiple use concepts. Prerequisites: Zo 131, Zo 156 or Fy 19. Recommended: Fy 4 or Ms 19 and Zo 168. *Lec 3, Cr 3.* MR. GREGORY

171L. Fishery Biology Laboratory—Field and laboratory exercises providing experience with techniques commonly employed in fishery biology. Data interpretation and report preparation. Two Saturday field trips. Prerequisite: Zo 171 or concurrently. *Lab 2, Cr 1.* MR. GREGORY

177. Animal Physiology—Physiological processes in vertebrates with emphasis on the integration of organ systems. Prerequisites: Zo 3/4 or Bt 1-Zo 4; one year of chemistry. *Lec 2, Lab 4, Cr 4.* MR. MAJOR, MR. VALLEAU

178. General Physiology—The vital phenomena common to all organisms. The effects of pressure and temperature in biological systems. Membrane structure is treated in detail. Prerequisite: Zo 3/4 or Bt 1-Zo 4; Organic Chemistry and year of physics. *Lec 2, Cr 2.* MR. COOK

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178L. General Physiology Laboratory—An optional general methods laboratory: colorimetry, Warburg manometry, flame photometry, introduction to radioisotopes. *Lab 4, Cr 2.* MR. COOK

187. 188. Problems in Zoology—Open to juniors and seniors who have special interest and qualifications in some branch of zoology. Admission by permission of the head of the department. *Cr Ar.* STAFF

GRADUATE STUDY IN ZOOLOGY

The department offers work leading to the degrees of master of science and doctor of philosophy, the general requirements for which are listed under Graduate Study.

A reading knowledge of French or German, preferably the latter, is a requirement for the advanced degree. In the major field, all courses numbered 200 or over are given primarily for graduate credit. All courses numbered 100 to 199 may be taken for graduate credit, with the prior approval of the student's advisory committee. Students may be required to take, without graduate credit, certain undergraduate courses which they lack.

Specific fields of interest for thesis subjects include cytology, ecology, experimental embryology, fishery biology, general physiology, genetics, and invertebrate zoology.

Graduate Courses in Zoology

IDL 201. (OC, 30) Biological Oceanography—The study of marine organisms and their interrelationships with the chemical, geological and physical aspects of their environment. Prerequisite: permission of instructor. *Lec 3, Cr 3.*

MR. DEWITT

IDL 208. (OC, 30) Anatomy and Classification of Fishes—An introduction to the classification of fishes, including fossil forms, and a discussion of those aspects of fish anatomy of most value in systematics. Summers only, at the Darling Center. Prerequisite: Zo 133 and/or 136, or permission of instructor. *Lec & Lab, Cr 5.*

MR. DEWITT

IDL 211. (OC, 30) Larval Biology of Marine Invertebrates—Life-histories of free-living marine invertebrates, excluding protozoans, with emphasis on development, behavior, and ecology of larval forms. Laboratory studies stress methods of procuring, handling, and culturing larvae for descriptive or experimental purposes. Numerous field trips required. Summers only, at The Darling Center. Prerequisite: Zo 153 or equivalent. *Lec 2, Lab 6, Cr 5.*

MR. MAZURKIEWICZ

†212. Polar Ecology—The interrelationships between organisms and their physical and biotic environment in high latitudes. Marine ecosystems will be emphasized. Prerequisite: Zo 153 and Zo 156, or equivalent, or permission of instructor. *Lec 3, Cr 3.*

MR. DEARBORN

‡214. Animal Distribution—A study of the distribution and dispersal of animals with a consideration of the ecological, historical and evolutionary factors involved. Prerequisite: Zo 156 or equivalent. *Lec 3, Cr 3.*

MR. BARDEN

† Offered in 1974-75

‡ Offered in 1973-74

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232. Ichthyology—The characteristics, functional anatomy, behavior and ecology of fishes. Lectures, laboratory study, and field trips. Prerequisite: permission of instructor. *Lec 2, Lab 4, Cr 4.* MR. MCCLEAVE

‡**250. Genetics of Populations**—An introduction to the study of the genetic structure of populations and the factors which affect the genetic composition of populations. Prerequisites: Zo 162 and Ms 26. *Lec 3, Lab 2, Cr 4.* MR. SINNOCK

270. Advanced Topics in Aquatic Biology—In-depth study of various aspects of freshwater or marine biology. Students select topic, prepare critical papers and organize discussion. May be repeated for credit. Prerequisite: permission of instructor. *Cr 2.* MR. GREGORY

273. Fisheries Science—Field and laboratory exercises in the application of scientific techniques to the study of fish populations. Population estimation, growth rate determinations, fish production and propagation in the freshwater and marine environments. Prerequisites: Ms 19 or Fy 4 and Zo 171; Zo 168 or 170 recommended; or permission of instructor. *Lec 1, Lab 3, Cr 2.*

MR. HATCH, MR. GREGORY

279. Experimental Endocrinology—A comprehensive survey of the vertebrate endocrine glands and their functional relationships. The experimental and comparative approach is emphasized. Prerequisite: Zo 177, and Organic Chemistry. *Lec 2, Lab 4, Cr 4.* MR. VALLEAU

280. Cell Mechanisms—A physico-chemical analysis of cell metabolism. Emphasis on mechanisms controlling growth and division. Prerequisite: Organic Chemistry or Biochemistry. *Lec 3, Lab 4, Cr 4.* MR. COOK

‡**292. Functional Anatomy of Marine Invertebrates**—Detailed studies of the functional anatomy of selected groups of marine invertebrates. Adaptations to specific environments and feeding biology will be emphasized. Laboratory work will deal primarily with live material. Prerequisite: Zo 153 or equivalent. *Lec 1, Lab 4, Cr 3.* (Not offered in 1973-74) MR. DEARBORN

337. Experimental Embryology—*Lec 2, Lab 4, Cr 4.* MR. MUN

IDL 340. (BT, en fy, zo) Seminar in Ecology—*Lec 1, Cr 1.* STAFF

‡**352. Cytology and Cytogenetics**—*Lec 2, Lab 4, Cr 4.* MR. SPEICHER

354. Advanced Genetics—*Lec 3, Cr 3.* MR. ROBERTS

‡**357. Population Dynamics**—*Lec 2, Cr 2.* MR. HATCH

362. Estuarine Ecology—*Lec 2, Lab 4, Cr 4.* STAFF

380. Comparative Physiology—*Lec 2, Lab 4, Cr 4.* MR. MAJOR

381. Experimental Physiology—*Lec 2, Lab 2, Cr 3.* MR. MAJOR

‡**384. Advanced Cell Physiology**—*Lec 2, Cr 2.* MR. COOK

385. Comparative Endocrinology—*Lec 3, Cr 3.* MR. VALLEAU

391. 392. Problems in Zoology—*Cr Ar.* STAFF

393. 394. Problems in Biological Oceanography—*Cr Ar.* STAFF

399. Graduate Thesis—*Cr Ar.* STAFF

‡ Offered in 1973-74





COLLEGE OF BUSINESS ADMINISTRATION

W. STANLEY DEVINO, DEAN



College of Business Administration

The College of Business Administration offers a four-year program in the major area of business administration. Upon successful completion of the prescribed curriculum the student is awarded the bachelor of science degree.

The college also provides a graduate program leading to the degree of master of business administration. The graduate offerings of the College of Business Administration are described in the Graduate School Catalog.

UNDERGRADUATE PROGRAMS

The primary objective of the undergraduate program in business administration is to develop the student's abilities to assume the responsibilities of business management. The program is aimed at providing the broad training necessary for successful business management in a rapidly changing economy. No attempt is made to provide detailed specialized training in particular business tasks. The program aims, rather, at developing skills and attitudes of mind that will enable the student to cope successfully with the changing problems of business management in the years ahead. Implementation of this program takes place in three general phases: First, the student acquires broad training in the liberal arts and sciences for the necessary foundation upon which his future education will build. Second, the student pursues a program of study designed to provide him with an understanding of the major functional areas common to most business operations and with a knowledge of certain fields which are particularly relevant to the study of business management. This is referred to as the "core" program and includes basic courses in accounting, economics, finance, the legal environment of business, marketing, and general management. Third, the student undertakes to acquire a deeper knowledge of the major field which he has selected. This is done largely during the senior year and is accomplished by taking 18 credit hours of work beyond the introductory course in the chosen field. The four major fields of concentration in which advanced work may be done are accounting, finance, marketing, and management.

COLLEGE OF BUSINESS ADMINISTRATION

GENERAL INFORMATION

Admission—Students are usually admitted to the College of Business Administration as first-year students in the University. The specific requirements for admission are given on page 46 of this catalog. All deficiencies in entrance requirements must be removed before registering for the sophomore year. Students who transfer from other colleges with advanced standing must satisfy all basic entrance requirements within one year.

Transfer Credit—No transfer credit is granted for courses completed at another accredited institution in which grades below C have been received. Responsibility for evaluating course work for which transfer credit is requested rests with the Director of Admissions and the Dean of the College.

Students in other colleges of the University of Maine who wish to transfer to the College of Business Administration must present an academic record which meets at least the minimum standards of quality established by the University. Also, they are required to complete at least one full year of academic work as students in the College of Business Administration.

Graduation Requirements—Completion of the required work of the College of Business Administration leads to the degree of bachelor of science. All students are required to complete 120 degree hours, exclusive of credit for basic military training.

In addition, each student must accumulate a total of "grade points" equal to 1.8 times the number of credit hours in which he receives grades. This grade point average is computed by multiplying each credit hour of the grade by a factor in the following manner A hours by 4, B hours by 3, C hours by 2, D hours by 1, and E hours by 0.

All course work taken in Business (Ba) and Economics (Ec) must be completed with a 2.0 (C) average for a student to be eligible for a degree.

The required course work for the B.S. in Business Administration is given below

1. B.S. IN BUSINESS ADMINISTRATION PROGRAM

A. General Foundation Subjects—54 credits

1. *Humanities and Fine Arts* (21 credits)

Eh 1—College Composition

Eh 17—Advanced Professional Writing

Sh 3—Fundamentals of Public Speaking

At least three of the remaining 12 credit hours must have an Eh designation. The remainder may be selected in such fields as: art, the classics, English composition, foreign languages, journalism, literature, music, philosophy, speech, and theatre.

2. *Behavioral and Social Science* (21 credits)

Ec 10—Principles of Economics

Py 1—General Psychology

At least three of the remaining 15 credit hours must have an Ec designation. The remaining credits may be taken in such fields as: anthropology, economics, history, modern society, political science, psychology, and sociology.

UNIVERSITY OF MAINE

3. *Mathematics and Computer Science* (12 credits)

Ms 13/14—Mathematics for the Social Sciences*

Ms 15—Statistics for the Social Sciences**

Ms 81—Computer Programming

* Ms 12 and Ms 27 may be substituted for Ms 13/14.

** Ms 130 may be substituted for Ms 15.

B. *Core Requirements in Business*—24 credits

Ba 9—Principles of Accounting I

Ba 10—Principles of Accounting II

Ba 23—Elements of Industrial Management

Ba 63—Marketing

Ba 130—The Legal Environment of Business

Ba 151—Business Finance

Ba 159—Business Management and Policy (Seniors Only)

Ba or Ec course

C. *Major Field*—18 credits

The major field to be composed of 18 credit hours to be required by each functional area subject to approval of the faculty. All courses must carry a Ba or Ec designation.

1. *Accounting* (18 credits):

Required Ba 41—Intermediate Accounting

Ba 143—Advanced Accounting I

Ba 145—Cost Accounting I

Ba 148—Auditing

and two of the following:

Ba 144—Advanced Accounting II

Ba 146—Cost Accounting II

Ba 185—Accounting Control Systems

2. *Finance* (18 credits):

Required: Ba 41—Intermediate Accounting

Ba 150—Financial Institutions

Ba 156—Investment Strategy

Ba 158—Corporate Treasury Dynamics

and two of the following:

Ba 145—Cost Accounting I

Ba 146—Cost Accounting II

Ec 171—Public Finance and Fiscal Policy

Ec 172—State and Local Government Finance

Ec 173—Economic Analysis

Ec 175—Industrial Organization

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3. Management (18 credits):

Required: Ba 161—Personnel Management
Ba 164—Dynamics of Organization and Behavior
Ba 168—Seminar in Contemporary Management Problems

and *three** of the following:

Ba 125—Business Logistics
Ba 160—Production and Operation Management
Ba 162—Industrial Relations
Ba 199—International Management
Ec 133—Labor Economics
Ec 139—International Trade and Commercial Policy
Ec 173—Economic Analysis

* at least *one* of the three must have a Ba designation.

4. Marketing (18 credits):

Required: Ba 125—Business Logistics
Ba 165—Advertising
Ba 167—Sales Management
Ba 170—Managerial Marketing

and *two* of the following:

Ba 90—Problems of Small Business
Ba 150—Financial Institutions
Ba 161—Personnel Management
Ba 164—Dynamics of Organization and Behavior
Ba 168—Seminar in Contemporary Management Problems
Ba 169—Marketing Research

D. Free Electives—24 credits

THE FRESHMAN YEAR

Students admitted to a program in the College of Business Administration should pursue the following program during the freshman year:

FALL SEMESTER				SPRING SEMESTER			
			Hours				Hours
Ec	10	Principles of Economics	3	Ec		Economics elective	3
Eh	1	College Composition	3	Ms	14	Math for Social Sciences	3
Ms	13	Math for Social Sciences	3	Sh	3	Fundamentals of Public Speaking	3
		Social Sciences elective	3			English elective	3
		Humanities elective	3			Social Science elective	3
Pe	1	Physical Education	1	Pe	2	Physical Education (Optional)	1
			16				16

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COURSES OF INSTRUCTION

PROFESSORS ALPANDER, DEVINO, FORSGREN, JENSEN, MURPHY; ASSOCIATE PROFESSORS BARTLETT, GOODMAN, MCCLURE*, UYAR; ASSISTANT PROFESSORS BURNHAM, HOUSE, KAKALIK, TURKEY, WEBSTER, ZIEGENBEIN, ZINGALE; LECTURER BOYCE; INSTRUCTORS KOBRITZ, LAWRENCE; GRADUATE ASSISTANTS BAXTER, DESCHAIINE, GREBENSTEIN, GUTMANN, HAMMOND, SMITH, SPARKS, and TSEGAYE

Courses numbered 1 to 99 are undergraduate courses. They are open to graduate students but credit earned in these courses may not be used to satisfy advanced degree requirements. Courses numbered 100 to 199 are upperclass undergraduate courses which may be used by the graduate student's advisory committee. Courses numbered 200 to 299 are graduate courses which may be elected by undergraduate honor students, or those undergraduates whose advancement in the field will permit their taking a graduate level course among graduate students without disadvantage to themselves. Courses numbered 300 to 399 are graduate level courses which may be taken only by students admitted to the Graduate School.

Courses in Business Administration (Ba)

9. Principles of Accounting I—An introductory course in accounting with emphasis on the basic accounting cycles, management use of accounting data, construction and analysis of financial statements, asset valuation, and elementary cost analysis. *Cr 3.*

10. Principles of Accounting II—Books of original entry, analysis of assets and liabilities, negotiable instruments, and an introduction to partnership and corporate accounting. Prerequisite: Ba 9. *Cr 3.* STAFF

23. Elements of Industrial Management—A comprehensive survey of all phases of the management of industrial and business enterprises. The influence of industrial relations is interspersed with the treatment of management's technical problems. Prerequisite: Ec 10. *Cr 3.* MR. UYAR

41. Intermediate Accounting—Principles regarding the valuation and recording of working capital items and noncurrent items; capital stock and surplus; statement analysis. Prerequisite: Ba 9, 10. *Cr 3.* MR. BOYCE

63. Marketing—Problems of distribution for representative industrial and consumer goods, including merchandising policies, selection of distribution channels, price policies, and advertising and sales promotion methods. Prerequisite: Ba 9, Ec 10. *Cr 3.* MR. KAKALIK

76. Federal Tax Reporting—Federal tax laws as they affect individuals, partnerships, corporations, and estates. An opportunity is given the student to become familiar with tax forms. Prerequisite: Ba 9, 10. *Cr 3.* MR. LAWRENCE

****90. Problems of Small Business**—A consideration of those aspects of management that are uniquely important to small firms, in the interest of developing an understanding of the economic and social environment in which the small concern functions. Course will afford the student practice in decision-making on the same types of problems that small businessmen face. Directed toward stu-

* On leave 1973-74.

** Not offered 1973-74.

COLLEGE OF BUSINESS ADMINISTRATION

dents who wish to explore opportunities for operating their own small businesses, and to those who expect to have small businesses as customers or suppliers. Problems relevant to small business operations in Maine will be stressed. Prerequisite: Ba 9.

STAFF

125. Business Logistics—An introduction to the elements of the logistical system includes consideration of transportation modes, plant and warehouse location, inventory size determination, etc. Cases and problems are utilized to sharpen analytical techniques. Final attention turns to the total cost approach to logistical system analysis and decision-making. Prerequisite: Ba 23, 63. Cr 3. MR. KAKALIK

130. The Legal Environment of Business—An examination of fundamental legal concepts and their application to the business community. Among the topics discussed are the evolution of law and its underlying conceptual framework from which legal rules and principles of business develop. Selected legal cases will be critically analyzed and discussed. (Juniors and seniors only) Cr 3.

MR. KOBKITZ

143. Advanced Accounting I—Principles, theory, and procedures of parent and subsidiary accounting. A comprehensive study of consolidated statements, affiliation structures, and consolidations and mergers. Also includes home office and branch accounting. Prerequisite: Ba 41. Cr 3.

MR. MCCLURE

144. Advanced Accounting II—The application of accounting principles to accounting problems arising in connection with: partnerships, joint ventures, insurance, consignments, installment sales, statement of affairs, receiverships, estates and trusts, statement of realization and liquidation, foreign exchange, and governmental and institutional accounting. Prerequisite: Ba 41. Cr 3.

MR. MCCLURE

145. Cost Accounting I—The principles and methods of job order costs, including inventory control and pricing, labor and analysis and allocation of factory overhead. Principles and practices of process cost accounting. Prerequisite: Ba 9, 10. Cr 3.

MRS. GOODMAN

146. Cost Accounting II—A comprehensive study of joint and by-product costs, estimated and standard costs, distribution and differential costs. Budgeting. Analysis of cost structure and management use of standards. Prerequisite: Ba 145. Cr 3.

MRS. GOODMAN

147. Business Data Processing—The purpose of this course is to introduce the student to applications of the computer to business decision-making. Fundamentals of computer programming are discussed and then are applied to financing, inventory, simulation, and other types of systems models in business. Prerequisite: Ms 15, 81. Cr 3.

MR. JENSEN

148. Auditing—The systematic verification of financial statements including a study of the responsibilities, liabilities and ethics of the independent public accountant. Prerequisite: Ba 9, 10, 41. Cr 3.

MR. LAWRENCE

150. Financial Institutions—A survey of the operations and economic roles of financial institutions: commercial banks, investment houses, and investment markets; savings and insurance institutions; and governmental agencies. An institutional introduction to the fields of private and public finance. Prerequisite: Ec 10, or permission. Cr 3.

MR. MURRAY

151. Business Finance—This course deals with the promotion, organization, and financing of the single proprietorship, partnership, and corporation. It

•• Not offered 1973-74

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also utilizes advanced cases and problems related to the above topics. Prerequisite: Ec 10, Ba 9. *Cr* 3. MR. WEBSTER

156. *Investment Strategy*—Emphasis is on analysis and selection of stocks and bonds as part of the investor's approach to financial security. The relationships between the securities markets, the total money market and the general economy are examined. Prerequisite: Ba 151. *Cr* 3. MR. WEBSTER

158. *Corporate Treasury Dynamics*—The counterflows of cash between the corporate unit and the money market due to seasonal, cyclical, and secular demands are first analyzed. Numerous approaches to debt limit determination are then presented. The student finally turns to the total problem of making optimal financing decisions in specific corporate and bank management settings. Prerequisite: Ba 151. *Cr* 3. MR. ZIEGENBEIN

159. *Business Management and Policy*—Administrative practice at the higher levels of business management through case analysis and discussion. The course attempts to coordinate the background of business majors in the formulation and administration of sound business policy. Seniors only. *Cr* 3. MR. BURNHAM

160. *Production and Operations Management*—The place of production planning and control in an industrial organization and its relation to the actual production procedure. Analysis of the problems in design, marketing, forecasting, capacity evaluation and quality control which are interwoven with those of production and inventory management. Prerequisite: Ba 23. *Cr* 3. MR. UYAR

161. *Personal Management and Industrial Relations*—The personnel management systems of private and public organizations are surveyed from the interdisciplinary perspective of modern industrial relations. The use of an integrated behavioral, quantitative and systems approach permits an applied synthesis of the social sciences which analyze the employment relationship. Among the aggregate manpower management systems considered are: manpower planning and forecasting; labor marketing; selection and placement; training and development; compensation; leadership; and, labor-management. Designed for students interested in personnel management and industrial relations in business, educational, engineering, food service, government, health service, and social welfare organizations. Prerequisites: Permission or the equivalent of Ec 10, Ms 15, and Py 1. *Cr* 3.

MR. ZINGALE

162. *Labor-Management Relations*—The labor-management systems of the private and public sectors are surveyed from the interdisciplinary perspective of modern industrial relations by analyzing three aspects. The nature and characteristics of labor-management relations are considered from such perspectives as the structural, historical, international, legal, psychological, and economic. Contract administration process and such issues as wages, economic supplements, institutional rights, and administrative rules. These two aspects are applied in a simulated collective bargaining exercise. Designed for students interested in labor-management relations in business, educational, engineering, food service, government, health service, and social welfare organizations. Prerequisites: Permission or the equivalent of Ba 161. *Cr* 3.

MR. ZINGALE

164. *Dynamics of Organization and Behavior*—An analysis of business organization and the problems of administrators in an interpersonal setting. Primary emphasis is on the findings of behavioral sciences which are particularly relevant to the management of economic enterprises. Also an examination of interdisciplinary approaches to human relations and adjustment problems in modern organiza-

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tions. Motivation, leadership, and organization theory as related to work and productivity, and associated topics are also covered. Prerequisite: Ba 23. Cr 3.

MR. FORSGREN

•• 165. *Advertising*—The place of advertising in the marketing program. Business cases are analyzed to determine those situations in which advertising may be profitably employed to stimulate primary and selective demand for industrial and consumer goods and services. Prerequisite: Ba 63. Cr 3.

MR. BARTLETT

167. *Sales Management*—An analysis of the problems facing marketing management in formulating sales policy and in managing the sales organization. Prerequisite: Ba 63. Cr 3.

MR. BARTLETT

168. *Seminar in Contemporary Management Problems*—Seminar in developments in the behavioral and management sciences, the development of management thought, and critical issues in organizational theory, with special reference to industrial application. In addition, students will conduct library research, or field work of considerable depth, in select managerial topics. Prerequisite: Ba 164, and permission. Cr 3.

MR. ALPANDER

169. *Marketing Research*—A consideration of marketing research as a tool in solving problems of production and distribution. Emphasis is upon problem formulation, exploratory research, research design, basic observational and sampling requirements, data analysis, interpretation, and sampling. Prerequisite Ba 63 and Ms 15. Cr 15.

MR. HOUSE

170. *Managerial Marketing*—A managerial approach emphasizing the integration of marketing, as an organic activity, with other activities of the business firm. Study is directed toward recognition and appreciation of the problems encountered by top marketing executives in modern business, with a consideration of the policies and procedures that may be followed in their solution. By case analysis and consideration of current marketing literature, students are provided opportunities for development of abilities in solving marketing management problems. Prerequisite: Ba 63.

MR. HOUSE

•• 185. *Accounting Control Systems*—An upper level management accounting course emphasizing accounting as a system for information and control. Particular emphasis on the organizational and behavioral implications of accounting. Prerequisites: Ba 23 and 145. Cr 3.

MR. TURNEY

199. *International Management*—Management problems of organizations whose interests extend across international boundaries. The significance of cultural traditions and social structures for the conduct of business enterprise. International similarities and difference in managerial functions, structure, and processes will be analyzed. Problems of the formation of international operations, cultural issues confronting the local manager, organizational problems of multinational corporations, and problems of control and communications will be covered. Prerequisite: Ba 23 or permission (Not open to freshmen and sophomores). Cr 3.

MR. ALPANDER

301. *Quantitative Analysis for Business Decisions*—Cr 3.

MR. JENSEN

302. *Behavioral Analysis for Administrative Decisions*—Cr 3.

MR. ALPANDER

303. *Managerial Economics*—Cr 3.

MR. MURPHY

320. *Managerial Accounting*—Cr 3.

MR. MCCLURE

321. *Accounting for Planning and Control*—Cr 3.

MR. TURNEY

•• Not offered 1973-74

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330. <i>Financial Management—Cr 3.</i>	MR. ZIEGENBEIN
331. <i>Investment Management—Cr 3.</i>	MR. WEBSTER
332. <i>Management of Financial Institutions—Cr 3.</i>	MR. MURPHY
340. <i>Production Management—Cr 3.</i>	MR. UYAR
341. <i>Operations Research—Cr 3.</i>	MR. JENSEN
345. <i>Industrial Relations and Personnel Management—Cr 3.</i>	MR. ZINGALE
346. <i>Collective Bargaining—Cr 3.</i>	MR. DEVINO
347. <i>Organizational Behavior in Business—Cr 3.</i>	MR. FORSGREN
350. <i>Marketing Management—Cr 3.</i>	MR. HOUSE
351. <i>Market Research and Analysis—Cr 3.</i>	MR. KAKALIK
352. <i>Business Logistics—Cr 3.</i>	MR. HOUSE
397. <i>Management Policy—Cr 3.</i>	MR. BURNHAM







COLLEGE OF EDUCATION

JAMES J. MURO, ACTING DEAN



College of Education

The College of Education offers four-year programs designed to prepare elementary, junior and senior high school teachers and teachers of physical education, health, recreation, music and art. Within the four-year undergraduate program a student may start his preparation for such positions as a specialist in reading, guidance counselor, principal, supervisor, and school administrator. These programs are usually completed during a period of graduate study.

The College of Education also provides instruction, on a service basis, in the professional subjects essential to the preparation for teaching, to undergraduate students from other divisions of the University, and also for students registered with the Faculty of Graduate Study.

GENERAL INFORMATION

The College of Education concerns itself only with those students who are planning for a career in the field of education. All of its undergraduate programs are designed so that each student will include a substantial amount of college work in general education, a concentration of academic work closely related to the area of special teaching interest, and basic professional work in education and psychology. No undergraduate student in the College of Education will be recommended for a degree until he has fulfilled these requirements.

ADMISSION

Students ordinarily are admitted to the College of Education as first-year students in the four-year program. The specific admission requirements are given on page 47 of this catalog. A student admitted with advanced standing must satisfy all basic entrance requirements during his first year in the College of Education.

Bangor Theological Seminary—Regularly enrolled students in the College of Education may register for courses at the Bangor Theological Seminary, not to exceed six credit hours per semester, without payment of additional fees. The College of Education extends a like privilege to students regularly enrolled at the Bangor Theological Seminary. Such registrations must have the approval of the deans of both institutions and the instructors involved. Credit for courses so taken will be where he is enrolled.

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While enrolled at the Bangor Theological Seminary, a student may, with the approval of his dean and the admissions office of the University, also register as a special student in the College of Education on the established fee basis for such courses. Work so taken, if it does not substitute for or duplicate courses taken in the seminary program, may be counted as advanced standing credit toward the degree in the event a student later registers for a degree program at the University.

DESCRIPTION OF THE FOUR-YEAR PROGRAM

The booklet, "Four-Year Programs in the College of Education," describing in detail the special requirements in general education, the courses needed for the development of various teaching fields, and the required work in professional education, has been prepared for students who desire to enter education.

A copy of this booklet may be obtained by writing to the Director of Admissions or the Dean of the College of Education.

ADMISSION WITH ADVANCED STANDING

Students from other institutions who have already completed a portion of college work, or who desire to change their professional plans and enter education, are invited to apply for admission by transfer. Each case will be considered on its own merits. When such students are accepted, they will be given advanced standing in the College of Education for work already completed which meets the established standards of quality and the specific course requirements of the program to which they are seeking admission.

Summer Session and Continuing Education Students—Students whose only work in the College of Education has been or will be in the Summer Session or Continuing Education Division program are strongly urged to apply for admission to the University exactly as they would if they expected to apply for resident work during the regular school year. This recommendation applies both to students who expect to work for a degree in the various colleges of the University and also those who have not yet fully decided on the matter.

Among the advantages of being admitted to the University are immediate assignment of a major adviser to counsel on registration, requirements, etc.; and eligibility for guidance and counseling service. Students who expect their work to be in the Summer Session should apply before their first registration; students whose first work is to be by continuing education class should apply during their first course.

Application for admission should be made directly to the Director of Admissions, University of Maine. (See sections immediately above.)

GRADUATION REQUIREMENTS

The completion of the required work of the College of Education leads to the degree of bachelor of science in education (B.S. in Ed.)

A minimum of 120 degree hours of required college work, exclusive of credit for basic military training (if elected), is required for graduation. In addition, each student must accumulate a total number of "grade points" equal to twice the number of hours in which he receives grades. Grade points are computed by

UNIVERSITY OF MAINE

multiplying each hour of the letter grade by the factor as follows: A by 4, B by 3, C by 2, and D by 1.

Included in the 120 semester hours required for graduation for those who follow the *elementary teacher* program are a minimum of 47 degree hours in general education, 30 degree hours of courses in professional subjects, 5 hours of course work offered by affiliated departments, and 24 hours in an academic field of concentration. Special work in appropriate fields (such as art, music and health and physical education) also is required.

All courses taken in the student's academic teaching field and in his professional work must be completed with a 2.0 (C) average to be eligible for a degree. In addition, a student must likewise acquire a 2.0 (C) average in all work taken before the degree may be awarded.

Those who follow the *secondary teacher* program are required to complete a minimum of 38 degree hours in general education, 18 degree hours in professional education, and 51 to 62 degree hours in the field of concentration (depending upon field of concentration), plus electives.

Students who expect to qualify to teach in a *specialized field*, such as physical education program will be required to complete a 30-hour academic teaching areas as their field of concentration. In addition, students who follow the physical education program will be required to complete a 30-hour academic teaching major. Those who follow the music or art education program are required to complete no less than a 24-hour academic specialization.

Students who follow the *elementary teacher* program are required to complete a 24-hour academic specialization in addition to other specialized subjects such as music and art. Details will be found in the folder outlining the complete program, which may be obtained by writing to the Dean of the College of Education.

General Education Subjects Required—Information concerning the specific courses required in general education is available from the Office of the Dean. The subjects are:

- English
- Speech
- Social Studies
- Science and Mathematics
- Psychology
- Fine Arts and Humanities

In addition to their regular subjects, teachers generally participate in the direction of student activities such as music, debating, dramatics clubs, and games. Each student in the College of Education should develop some proficiency in at least one of these fields.

Professional Subjects Required—The professional subjects required for a degree from the College of Education also meet the current state requirements for a teaching certificate. Students who desire to qualify for general teaching in the junior and senior high school only are required to complete 18 credit hours in professional education in addition to courses in general psychology. Students who desire to qualify for general teaching in the elementary school are required to complete 30 credit hours in professional education, certain course work offered by affiliated departments and general psychology.

COLLEGE OF EDUCATION

The required professional subjects are designed to acquaint the student with the general aims of education and the techniques and principles of teaching. These courses are arranged so that they culminate in the course Observation and Supervised Student Teaching.

RESIDENCE REQUIREMENTS

A minimum of 30 semester hours of credit must be earned as a student in the College of Education to qualify a candidate for a degree. This requirement may be met by one academic year of residence or by attending Summer Sessions; however, regularly enrolled students in the University who wish to transfer to the college may be expected to complete two full years, or the equivalent, to meet degree requirements. For students enrolled in Continuing Education Division and Summer Session courses, the 30 hours of residence credit may be obtained over an extended period of time and need not be continuous. Work taken in the C.E.D. is considered resident credit for undergraduate students in the College of Education. Off-campus students, before enrolling for a course, should ascertain from the Dean of the College of Education the amount of such work that is allowed toward fulfilling the requirements for the degree.

Exceptions to these rules will not be permitted except by a vote of the faculty.

EDUCATION COURSES IN THE SUMMER SESSION AND IN THE CONTINUING EDUCATION PROGRAM

Numerous education courses are offered during the Summer Session and by class extension through the Continuing Education Division. Detailed information regarding the Summer Session may be obtained by communicating with the director, Edward Hackett, Merrill Hall, Orono, Maine 04473. Information concerning extension programs in the C.E.D. program may likewise be obtained by writing Mr. Edward Hackett, Associate Director C.E.D., University of Maine, Orono, Maine 04473.

INSTRUCTIONAL SYSTEMS CENTER

The Instructional Systems Center offers two kinds of instructional services: research and development and instructional support. These services are provided to the faculty and staff of the Orono and Bangor campuses.

The research and development team consists of two instructional technologists, an instructional systems analyst and a media designer. Their skills in learning theory, teaching processes, methodology media design and instructional technology are at the disposal of faculty for curriculum design, large group instructional techniques, individualized instruction and modular sequences of instruction. The team uses systems analysis and instructional technology applications to solve instructional problems and produce innovative learning sequences.

The instructional support services: instructional television, instructional graphics, audiovisual (equipment) service and the Film Rental Library are utilized by the research and development team, but also offer their services to the university community at large. These services originally were part of the former Audio-visual Center.

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Instructional television service is in two areas. A studio for production of half-inch videotape segments is located in 11 Shibles Hall. The studio has a multi-camera and multi-microphone input. It allows for the addition of music to the sound track and a variety of special effects on the tape. It is best used for more professional videotaping than can be accomplished with the half-inch equipment. In addition to the studio, single camera, half-inch videotape units are available for faculty use. When possible, an operator will be available with these units.

Instructional graphics service offers art and photographic service for instructional purposes. Slides, overhead transparencies, mounting, laminating and preparatory art are among the kinds of services available. Limited cinematography service also is available. A self-help laboratory is maintained so that faculty, staff and students may create their own overhead transparencies, slides, laminations, etc.

Audiovisual (equipment) service offers 16mm projectors, slide and film-strip projectors, two formats of audiotape recorders and some specialized instructional hardware for faculty use. A high speed audiotape duplication service is also available. Maintenance of all audiovisual hardware is also done here.

The Film Rental Library has a collection of approximately 4,000 films. Central administration supports the faculty use of these films so that there is no charge to faculty. The rental of films from outside sources is an additional service. Suggested acquisition of films by request of faculty is encouraged. Catalogs of all major film productions and rental companies are available.

THE HONORS PROGRAM

With the cooperation of the other divisions, the College of Education participates in the University Honors Program. Twice during their freshman year, students of high academic standing and exceptional promise are considered for enrollment in honors courses. Students who do not enter the program during the spring semester of their freshman year may, if qualified, be selected to begin honors study the following fall. Although as a rule students are invited to become candidates for the program by a selection committee, a student himself may initiate his candidacy by requesting a written endorsement from his academic adviser addressed to the committee. Information about this program may be obtained from Prof. George T. Davis, 132 Education Building.

A more detailed statement of the University Honors Program begins on page 134 of this catalog. Honors (Hr) courses are as follows:

41. Distinguished Freshman Seminar—Limited to Distinguished Maine Students and to a limited number of other students, by invitation. Discussions and demonstrations displaying the range and nature and the Liberal Arts and Sciences. *Cr 3.*

MR. SIMPSON, Chairman

45. Honors Colloquium—Readings and discussions on the basic concepts of Western civilization. *Cr 3.*

47. 48. Honors Group Tutorial—Oral and written reports under tutorial direction, upon a planned sequence of books representative of the various fields of liberal education. Hr 47.48 fulfills the sophomore humanities requirement for those students interested in the Honors Program. *Cr 3.* MR. THOMSON, Chairman

51. 52. Honors: Specialized Studies—A tutorially conducted survey of the student's major field, issuing in the choice of an approved thesis topic. *Cr 3.*

53. 54. Honors Thesis—The planning and completion of an honors thesis of research project. *Cr 3.*

TEACHER EDUCATION PROGRAM

Teacher education is a function and responsibility of the entire University. A universitywide Advisory Council on Education oversees the admission of students to the Teacher Education Program. Regardless of a student's college or department affiliation, the student must enroll as a teacher candidate if he desires to receive the University's approval for certification as a public school teacher. Application forms may be obtained at the Information Desk in Shibles Hall. The Advisory Council screens applications submitted usually at the end of the sophomore year.

Students admitted to the University Teacher Education Program who make satisfactory records in student teaching, and who meet the graduation requirements of their college, will be recommended by the University for the provisional teaching certificate.

CERTIFICATES FOR TEACHERS

It should be clearly understood that the State Department of Education has sole authority to issue certificates for teaching. The office of the Dean of the College of Education, however, is in a position to advise prospective teachers concerning certificates.

To provide for the many types of school positions, the State Department issues several types of certificates. However, upon successful completion of his program, the undergraduate student in the College of Education will generally be eligible for the provisional teaching certificates at either the elementary or secondary school level, whichever is applicable. The graduation requirements of the College of Education are established so that all students graduated from the college will meet or exceed the requirements for the provisional certificate.

In addition to furnishing courses for its own students, the College of Education acts as a service agency to provide professional training for students from other teaching units of the University who wish to qualify for a teaching certificate. Such students are enrolled in the same classes with students from the College of Education.

Pattern A

For students in colleges *other than the College of Education preparing for a secondary certificate* (1) a minimum of 30 semester credit hours in a subject field (which may include three hours of special methods) together with (2) a minimum of 18 semester credit hours in a second subject field is required unless pattern B is followed.

Pattern B

A minimum of 50 semester credit hours including three hours of special methods within the area of specialization (i.e., social studies, English, science and mathematics, the sciences).

Requirements for certificates in the areas of physical education, music education, and art education differ from the above. Information may be obtained at the office of the College of Education.

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Acceptable 30-Hour Majors

Acceptable 30-hour majors are: English, French, Russian, speech, German, economics, Latin, Spanish, geology, history, mathematics, chemistry, geography, physics, political science, biology, government, earth science, and sociology.

The following majors are acceptable if approved by the college: health, physical education, home economics, agriculture, industrial arts, commercial, art, and music.

Acceptable 18-hour minors, in addition to those listed above, are: psychology, classic studies, science, and social studies.

PLACEMENT FOR TEACHERS

The University of Maine Placement Bureau includes among its services assistance to prospective teachers in finding teaching positions and in facilitating promotion of teachers in service. Information regarding this service may be obtained from the University of Maine Placement Bureau, East Annex, University of Maine, Orono, Maine 04473.

COURSES OF INSTRUCTION

PROFESSORS CAUGHRAN, G. DAVIS, MURO (ASSOCIATE DEAN), LINDLOF, PRESCOTT, ROBERTS, SANFORD, SEZAK, SUPPLE; ASSOCIATE PROFESSORS BISHOP, BUTZOW, CHIAPPONE, COBB, W. DAVIS, DRUMMOND, GRAY, JOHNSON, LOWELL, J. MILLER, MYERS, NICHOLS (ASSOCIATE DEAN), RYAN, VITRO, VROOMAN, WORK; ASSISTANT PROFESSORS BRIGHTMAN, CHILD DEVELOPMENT AND EDUCATION, DUPLISEA, FITZGERALD, HART, JUDD, MCCARTHY, OLIVER, CHILD DEVELOPMENT AND EDUCATION, PECHINSKI, YVON; INSTRUCTORS MCCOURT, SALESI; LECTURERS COATES (ADMINISTRATIVE OFFICER), FERLAND, GODOMSKY (ASSISTANT PROFESSOR, U OF M, FARMINGTON), COOPERATING STAFF MEMBERS PROFESSORS O'NEILL, WOOTTON, ASSISTANT PROFESSORS BROWN, FOLSOM, LUCY, NESBIT, SKAGGS, WHITMAN

Courses numbered 1 to 99 are undergraduate courses. They are open to graduate students but credit earned in these courses may not be used to satisfy advanced degree requirements. Courses numbered 100 to 199 are upperclass graduate courses which may be used for graduate degree credit by graduate students if given prior approval by the graduate student's advisory committee. Courses numbered 200 to 299 are graduate courses which may be elected by undergraduate honor students, or those undergraduates whose advancement in the field will permit their taking a graduate level course among graduate students without disadvantage to themselves. Courses numbered 300 to 399 are graduate level courses which may be taken only by students admitted to the Graduate School.

The following courses may be offered during the regular academic year, through the Continuing Education Division, or the Summer Session.

COLLEGE OF EDUCATION

Appraisal—Pupil Adjustment and Personnel practices (Ed A)

150. Guidance and the Teacher—Role of the classroom teacher in studying individual pupils and utilizing accumulative records; resources available to the teachers for help in studying individual pupils; teacher's function in homeroom activities. For either elementary or secondary school classroom teachers. This course is particularly designed for the certified classroom teacher. *Cr 3.*

MR. SANFORD, MR. MURO, MR. JOHNSON

Basic Professional Courses (Ed B)

2. The American School—Examines the nature, role, purposes, and curriculum of elementary and secondary schools with special attention to the place and function of the teacher within this social institution. This is one of the courses prerequisite to student teaching in all regular undergraduate programs. *Cr 3.*

STAFF

3. Growth-Learning Process—The pupil and his learning processes, including learning theories, pupil growth patterns, and selected techniques for the study of pupil development. This is one of the courses prerequisite to student teaching in all regular undergraduate programs. Not open to freshmen or sophomores. *Cr 3.*

STAFF

4. The Teaching Process—The procedures of instructional planning, including such items as improved use of small groups, classroom space, and appropriate teaching materials; measurements, evaluation, and reporting of pupil learning. This is one of the courses prerequisite to student teaching in all regular undergraduate programs. Not open to freshmen or sophomores. *Cr 3.*

STAFF

Curriculum and Instructional Materials (Ed C)

117. Children's Literature—An overview of literature written for children between the ages of four and twelve. Emphasis will be placed on developing means of evaluating various types of books and selecting of individual children. Prerequisite: Ed M 13 and junior standing. (May be taken concurrently with Ed M 13) *Cr 3.*

MISS SALESI

120. Principles of Team Teaching—The theory and practice of instructional teams. Emphasis on cooperative planning, pupil groupings, and curriculum innovations. Prerequisite: Ed B 2, Ed B 3, Ed B 4 or their equivalents. *Cr 3.*

MR. NICHOLS

132. Student Activities in Secondary Schools—The place, organization and direction of student activities in the modern secondary school. Prerequisite: Ed B 2, Ed B 3, Ed B 4 or their equivalents. *Cr 3.*

MR. MYERS

133. Instructional Media—Basic course in the improvement of learning and teaching through the effective use of instructional media and related materials. Learning principles in relation to visual communication media; nature and applications of media and instructional materials; evaluation and selection of media and instructional materials. *Cr 3.*

STAFF

134. Teacher-Made Instructional Material—Planning and producing inexpensive instructional materials for both elementary and secondary school subjects; involving either photographic or graphic media. *Cr 3.*

INSTRUCTIONAL SYSTEMS STAFF

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140. *Studies in the Physical Sciences I*—An interdisciplinary study of the physical sciences intended to build science attitudes and knowledge of physical science at both pre-service and in-service stages for elementary and junior high school teachers. The course is laboratory-centered and includes investigations in such areas as light, structure of crystals, liquids and gases, motion and forces, and energy. *Cr 3.* MR. BUTZOW

141. *Studies in the Physical Sciences II*—The course is laboratory-centered and includes investigations in such areas as bonding in crystals, electric charges, atomic models, ions, molecules, non-ionic substances. Prerequisite: Ed C 140 and permission of instructor. *Cr 3.* MR. BUTZOW

142. *Studies in the Earth Sciences (Elementary)*—A science content course for elementary school teachers. Course work will involve a series of elementary laboratory and field studies in astronomy and the earth sciences of geology, meteorology and soils. Topics selected will be those that can be explored through direct observation and study. Discussions, films and library assignments will be scheduled to supplement the work in laboratory and field. *Cr 3.* MR. G. DAVIS

143. *Field Course in the Earth Sciences (Secondary)*—The studies included in this course are intended for elementary and secondary school teachers who need some introductory information in the earth sciences of geology, meteorology and soils. Where possible, the studies will be undertaken in a natural setting using equipment and materials appropriate to the learning tasks. Lectures, films and library assignments will be scheduled to supplement the field work. *Cr 3.* MR. G. DAVIS

144. *Basic Field Ecology*—This course is designed for secondary school science teachers with a broad background in the natural sciences and for qualified elementary school teachers who desire studies beyond those ordinarily included in introductory natural history courses. The course involves accumulating, interpreting and applying data acquired primarily from the natural environment. The unique facilities offered at the Bryant Pond Campus and surrounding areas make possible biotic studies ranging from the lower inland elevations to subalpine environments. This program is intended to serve the needs of teachers conducting studies in the Green Version of BSCS biology. *Cr 3.* MR. G. DAVIS

146. *Natural Science Education—Coastal—(Elementary)*—Primarily for elementary school teachers. Field studies of plants, animals, rocks, minerals, stars and weather, with special attention to marine life of the Maine coast. Areas to be studied are selected with the needs of the elementary school teacher in mind. Lectures and library work will supplement the field studies; offered only in Summer Session, at Goose Cove, Maine. *Cr 3.*

147. *Natural Science Education—Coastal—(Secondary)*—Primarily for secondary school teachers. See general description under Ed C 146. *Cr 3.*

148. *Natural Science Education—Inland—(Elementary)*—Lectures, library work and field studies in the natural history of inland Maine, with special attention to the Bryant Pond area. Such areas as general ecology, geology, weather and climate will be studied. Opportunity will be given to study various types of habitats found in Maine. This course is directed to the needs of the elementary school teacher. Given only in Summer Session at the Freeman-Waterhouse Campus, Bryant Pond, Maine. *Cr 3.*

149. *Natural Science Education—Inland—(Secondary)*—Primarily for general science and biology teachers in the secondary school. See general description under Ed C. *Cr 3.*

COLLEGE OF EDUCATION

History and Philosophy (Ed H)

2. History of Education—A study of educational thought in its historical bearings with particular emphasis on current modes of thought relative to the values, objectives, purposes, and outcomes of American education. *Cr 3.*

MR. DUPLISEA

History and Philosophy (Ed H)

100. Trends in Adult Education—Need for and purpose of adult education programs. Consideration of learning, program development, organization, and administration of programs. Emphasis on adult education through the public schools, Cooperative Extension Service, and community agencies. *Cr 3.*

130. Trends in Education—Discussion of issues in American education as they relate to current and emerging practices in organization curriculum and teaching in the schools. *Cr 3.*

MR. GRAY

151. Education for Intercultural Understanding—Forces of international, racial and religious conflict in contemporary community life; ways in which schools teach understanding of an adjustment to such cultural conflicts. *Cr 3.*

MR. EMERICK

School Leadership (Ed L)

151. Organization and Administration of Adult Education—The organization, financing, staffing, promotion, and evaluation of programs of adult education. Teaching resources and the role of the adult education administrator are given major emphasis. Prerequisite: senior standing or permission of instructor. *Cr 3.*

Methods (Ed M)

13. Teaching of Reading in the Elementary School—General background for teaching reading in the elementary school; reading readiness, comprehension, word analysis skills, directed reading lessons, recreational reading and evaluation. An introductory course. Prerequisite: Py 1; open to juniors and seniors. *Cr 3.*

MR. LOWELL, STAFF

18. Teaching Language Arts in the Elementary School—Current methods and materials in teaching handwriting, spelling, oral and written composition; analysis and correction of basic difficulties. Prerequisite: Py 1; open to juniors and seniors. *Cr 3.*

MR. CAUGHRAN, MR. ROBERTS, STAFF

114. Teaching Arithmetic in the Elementary School—The arithmetic curriculum in the elementary school; methods and the techniques in teaching arithmetic; the arithmetic readiness program; instructional and evaluation material. An introductory course. Prerequisite Py 1, Ms 7. *Cr 3.*

MR. YVON

115. Teaching Social Studies in the Elementary School—Methods and materials for social studies in the elementary school; ways of relating the work of the social studies class to the understanding of practical problems of the community. Prerequisite: Py 1, and sophomore standing. *Cr 3.*

MR. SUPPLE

116. Teaching Science in the Elementary School—Materials, methods, devices, and activities appropriate to the program of science in the elementary school. Prerequisite: Py 1, junior or senior standing. *Cr 3.*

MR. G. DAVIS, MR. BUTZOW

UNIVERSITY OF MAINE

120. *Teaching Geography in the Elementary School*—Materials, methods, devices, activities, and appropriate background information to the program of teaching geography in the school. Prerequisite: Py 1. *Cr* 3. MR. SUPPLE

130. *Education of the Trainable*—The contents of this course are family, social, and educational implications of the trainable mentally retarded child with emphasis being placed on the latter. Teaching methodology appropriate to the needs of the trainable child, as well as curriculum, goals, etc., are also included. Prerequisite: Ed B 2, Ed B 3, Ed B 4, or their equivalents. *Cr* 3.

MR. CHIAPPONE, MR. W. DAVIS, MR. MCCARTHY

140. *Teaching Reading in the Secondary School*—An exploratory course for the high school teacher who wishes to develop competence in teaching reading within his academic field. Topics studied include: the nature of the reading process, rationales for continuing reading instruction in the junior and senior high school, teaching reading and study skills, improving rates of reading, organization of reading instruction, and evaluation of reading. *Cr* 3. MR. ROBERTS

141. *Teaching Social Studies in the Secondary School*—Current practices in teaching social studies; selection and use of instructional materials; modern trends in curriculum construction for social studies in the secondary school. Prerequisite: Py 1, junior or senior standing. *Cr* 3. MR. MILLER

142. *Teaching Science in the Secondary School*—Methods and materials in teaching of science; development of the science curriculum, and equipment, supplies, and supplementary materials for science teaching in the secondary schools. Prerequisite: Py 1, junior or senior standing. *Cr* 3.

MR. G. DAVIS, MR. BUTZOW

143. *Teaching Geography in the Secondary School*—Materials, methods, devices, activities, and appropriate background information to the program of teaching geology in the school. Prerequisite: Py 1. *Cr* 3. MR. SUPPLE

150. *Newer Practices in Reading*—Objectives, materials, and procedures for the improvement of the teaching of reading; methods and materials used in evaluating the reading program; comparison of current practices in reading instruction. Prerequisite: Ed M 13 or Ed M 140, or their equivalents. *Cr* 3.

MR. CAUGHRAN, MR. ROBERTS, MR. LOWELL

165. *Methods of Teaching the Superior Child*—Methods, materials and techniques for teaching the gifted child. Prerequisite: Ed B 2, B 3, B 4 or their equivalents. *Cr* 3.

170. *Methods of Teaching the Retarded Child*—Methods, materials, and techniques in teaching retarded children at the special class level. *Cr* 3.

MR. CHIAPPONE, MR. W. DAVIS, MR. MCCARTHY

172. *Education of the Exceptional Child*—The characteristics identifications, educational provisions, adjustment, and guidance of exceptional students. Prerequisite: Ed B 2, Ed B 3, Ed B 4, or their equivalents. *Cr* 3.

MR. CHIAPPONE, MR. W. DAVIS, MR. MCCARTHY

180. *Teaching in Adult Education*—This is a course in methods for teaching adults and makes a critical examination of major problems in teaching and learning in adult education. Emphasis is given to factors which affect learning ability, achievement, motivation to learn through the adult life cycle. Prerequisite: senior standing, graduate standing, or permission of the instructor. *Cr* 3.

OBSERVATION AND STUDENT TEACHING

The University's arrangement for Observation and Student Teaching is generally made a year in advance and based upon the need of students. The demand for this course has increased to the point where it has become necessary to make application (not to be confused with *registration*) with the Director of Student Teaching, Room 121, Shibles Hall. This *application* must be approved well in advance of actual registration for the course.

190. Full-Day Student Teaching (Elementary)—A full-day, off-campus internship program in a selected school for one half of the semester; a full day, on-campus program of college courses is provided for the other half of the semester. Special conferences and group discussions as required. Prerequisite: Ed B 2, Ed B 3, Ed B 4 or their equivalents, methods course, and senior standing.

MR. NICHOLS AND STAFF

191 Full-Day Student Teaching (Secondary)—A full-day, off-campus internship program in a selected school for one half of the semester; a full-day, on-campus program of college courses is provided for the other half of the semester. Special conferences and group discussions as required. Prerequisites: Ed B 2, Ed B 3, Ed B 4, or their equivalents, methods course, and senior standing. Cr 6.

MR. NICHOLS AND STAFF

192. Half-Day Student Teaching (Elementary)—A half-day program of observation and student teaching in a selected school in the University area. The same four consecutive periods must be free daily in order to schedule this course. Special conferences and group discussions as required. Prerequisite: Ed B 2, Ed B 3, Ed B 4, or their equivalents, methods course, and senior standing. Cr 6.

MR. NICHOLS AND STAFF

193. Half-Day Student Teaching (Secondary)—A half-day program of observation and student teaching in a selected school in the University area. The same four consecutive periods must be free daily in order to schedule this course. Special conferences and group discussions as required. Prerequisites: Ed B 2, Ed B 3, Ed B 4, or equivalents, methods course, and senior standing. Cr 6.

MR. NICHOLS AND STAFF

194. Student Teaching K-12 (Music or Art Education)—A program of observation and student teaching in selected elementary and secondary schools. Special conferences and group discussions as required. Prerequisites Ed B 2, Ed B 3, Ed B 4, or their equivalents, methods course, and senior standing. Cr 6.

MISS BROWN, MR. NESBIT

General (Ed X)

51. Basic Driver Education—A short basic, intensive course in driver education for teachers has been arranged in cooperation with the American Automobile Association. This training is designed specifically to aid high schools in establishing plans for a course in driver education, not for the purpose of teaching an individual how to drive. Cr 3.

52. Driver and Traffic Safety Education—An intensive course in driver and traffic safety education for teachers who have completed the basic course in driver education, Ed X 51, and have had a minimum of one year's teaching experience in this area of education. Deals with problems experienced by teachers in teaching driver education and highway safety. Prerequisite: Ed X 51. Cr 3.

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53. Driver Education Simulation—This course is devised to provide driver education teachers with the necessary knowledge and skills to effectually utilize driver education simulation as part of the total driver education program. *Cr 3.*

110. Workshop for Cooperative School Personnel (Activity)—A workshop concerning the nature and scope of the activities of the supervisor, resource teacher, team leader, critic teacher, aids with other school personnel. Attention will be given to the literature, research, practices and materials relating to effective utilization of cooperating school personnel as indicated. *Cr 3.*

MR. NICHOLS, MR. GRAY

162. Workshop in Elementary Education (Activity)—A workshop designed to increase the competence of the elementary school teacher, supervisor, curriculum director, administrator, and other school personnel related to the school program. Attention will be given to the literature, research and materials concerned with a special aspect of elementary education. *Cr 3-6.* STAFF

163. Workshop in Conservation Education — Most of this elementary school teacher workshop program relates to the mineral, soil, water, forest, fish, wildlife, and recreational resources of Maine. Field studies are emphasized. *Cr 3.*

172. Workshop in Secondary Education (Activity)—A workshop designed to increase the competence of the director, administrator, and other school personnel related to the school program. Attention will be given to the literature, research and materials concerned with a special aspect of secondary education. *Cr 3-6.* STAFF

173. Workshop in Conservation Education—Same as course 163 except for secondary teachers. *Cr 3.*

181. Educational Travel (Area)—A summer session study tour designed to provide an insight in the social, economic, historical, and geographic aspects of the locale visited with special consideration to those areas which have made major contributions to our cultural heritage. Tours currently conducted to Europe, United States, Maritime Provinces and Quebec. *Cr 3-6.*

198. Problems in Education—Individual work on a problem of the student's own selection. Primarily for majors in education. *Cr Ar.* STAFF

DIVISION OF MUSIC EDUCATION

The College of Education offers a program in music education for students who intend to make music a career either as a teacher, and/or a supervisor of music. Majors in these programs will register in the College of Education. Upon satisfactory completion of the course of study, the student will graduate with the bachelor of science in education degree and will be certified to teach music in the public schools. Students who are interested in this program should obtain a special folder from the College of Education concerning this program.

DIVISION OF ART EDUCATION

A four-year program in art education is offered by the College of Education for students who intend to teach art or to become supervisors of art in the public or private schools. Majors in art education register in the College of Education and follow a curriculum outlined by the Department of Art in conjunction with the College of Education. Specific requirements for the degree may be obtained

from the Department of Art, Carnegie Hall. Upon satisfactory completion of this course of study, the student is certified to teach on both elementary and secondary levels.

DIVISION OF HEALTH, PHYSICAL EDUCATION AND RECREATION

The professional curriculum in physical education is designed to prepare qualified students to teach health and physical education, to coach athletic teams and to direct recreational programs. It provides for a major in health, physical education and recreation and a second major in an academic teaching area. A bachelor of science degree in education is awarded graduates of this program.

Definite evidence of intellectual capacity, positive qualities of character and personality, good health, and competent proficiency in motor skills are the factors determining admission. Applicants who lack any of these qualities, which are considered essential for professional success in health, physical education, and recreation will be advised to enter some other field of study. Applicants are urged to present at least one unit in a laboratory science.

COURSES OF INSTRUCTION (HPER)

ROBERT A. COBB, Acting Coordinator; Cooperating Personnel From Department of Education and Athletics: PROFESSORS WESTERMAN, WOODBURY; ASSOCIATE PROFESSORS BROWN, BUTTERFIELD, STYRNA, WALKUP; ASSISTANT PROFESSORS ABBOTT, AMES, ANDERSON, CARVILLE, JORDAN, PHILBRICK; INSTRUCTORS BALLINGER, CHAPPELLE, DEVARNEY, FOLGER, HARRIMAN, MALOON, MILLIGAN, STOYELL, SWITZER; LECTURERS MERRILL AND WILSON

(M-men students only; W-women students only)

9m. Team Sports Skills—To develop skills, techniques, and understandings for competency in basketball and football. *Cr* 1. STAFF

10m. Sports Skills—To develop skills, techniques, and understanding for competency in baseball and track. *Cr* 1. STAFF

10w. Sports Skills—To develop skills, techniques, and understandings for competency in volleyball, golf, and tennis. *Cr* 1. STAFF

11m. Team Sports Skills—To develop skills, techniques, and understandings for competency in soccer and wrestling. *Cr* 1. STAFF

11w. Team Sports Skills—To develop skills, techniques, and understandings for competency in soccer, speedball, hockey, and basketball. *Cr* 1. STAFF

12m. Individual and Dual Sports—To develop skills, techniques, and understandings for competency in golf, archery, badminton, fencing, handball, squash, and tennis. *Cr* 1. STAFF

12w. Individual and Dual Sports—To develop skills, techniques, and understandings for competency in skiing, swimming, track-field, and archery. *Cr* 1.

13m. Physical Conditioning Programs—To develop skills, techniques, and understandings for competency in conditioning and training for fitness for all age groups. *Cr* 1.

MR. PECHINSKI

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13w. Sports Skills—To develop skills, techniques and understanding for competency in badminton, fencing, softball, and lacrosse. *Cr 1.* STAFF

14. Rhythmic Activities—To develop skills, techniques, and understandings for competency in rhythms, folk dance, and square dance. *Cr 1.*

15m. Gymnastics—To develop skills, techniques, and understandings for competency in tumbling, apparatus, and free exercise. *Cr 1.* MR. STOYELL

15w. Gymnastics—To develop skills, techniques, and understandings for competency in conditioning exercises, tumbling, apparatus, and free exercise. *Cr 1.* STAFF

17. Swimming Skills—To teach and/or improve the skills of swimming, springboard diving, water polo and related aquatic programs. *Cr 1.*

MR. SWITZER AND STAFF

16w. Techniques in Modern Dance—To develop skills, techniques, and understandings for competency in modern dance. *Cr 3.*

50. Camp Leadership—Designed for the training of camp counselors, with emphasis on participation in the varied activities of camping. In addition to the regular two hours per week in the classroom, field trips will be arranged. *Cr 2.*

MR. AMES

56. Physical Education in the Elementary School—Designed to give organizational procedures for curriculum construction, contributions of current research, and selection of content for the elementary school program. Activity participation in the specific areas of dance, gymnastics, sports and games, and aquatics. *Cr 2.* MISS HAAS

61m. Methods, Organizing and Administering the Physical Education Program—Includes study of the development and implementation of administrative policies, budgeting, personnel, purchasing and evaluation of staff and programs. Administrative details associated with the athletic program are also discussed. *Cr 2.*

MR. CARVILLE

61w. Methods Analysis of Movement Skills—Emphasis on recognition, understanding, and application of variables which help to contribute toward a skilled performance at all levels. *Cr 2.*

62m. Methods of Teaching Physical Education Activities—Includes study of the essentials of effective lesson planning and evaluation. Emphasizes the presentation of individual and dual activities which have lifetime, carryover value. *Cr 2.* MR. WOODBURY

62w. Methods, Curriculum Structure and Conduct—The basis for organizing, structuring, and conducting a total physical education program. *Cr 2.*

63m. Methods of Coaching and Teaching Track and Basketball—Practical instruction in track and basketball for men preparing to enter the teaching and coaching profession. *Rec 2, Cr 2.* MR. CHAPPELLE, MR. STYRNA

63w. Methods in Modern Dance—An intensive study of modern dance, with special emphasis on teaching techniques, theory and principles of composition. Prerequisite: Pe 14w. *Rec 3, Cr 2.* MISS CASSIDY

64m. Methods of Coaching and Teaching Baseball and Football—Practical instruction in baseball and football for men preparing to enter the teaching and coaching profession. *Rec 2, Cr 2.* MR. BUTTERFIELD, MR. ABBOTT

65m. Methods of Coaching and Teaching Soccer and Wrestling—Practical instruction in soccer and wrestling for men preparing to enter the teaching and coaching profession. *Rec 2, Cr 2.* MR. MACKINNON, MR. STOYELL

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66m. *Methods of Coaching and Teaching Swimming and Diving*—Stroke analysis, training and conditioning for competitive swimming, springboard diving, basic synchronized swimming and pool management. Cr 2.

MR. SWITZER AND STAFF

69. *Foundation of Recreation*—Fundamental concepts, principles, and practices in the field of recreation, with emphasis on historical and philosophical backgrounds. Cr 2.

MISS BROWN

73. *Athletic Training*—Prevention and care of injuries in recreation and athletic activities; the use of proper personal and field equipment support methods, conditioning exercises, the medical examination, and therapeutic aids. Cr 3.

MR. JORDAN

78. *Health Education*—Stress is placed on elements of services, facilities, and instruction at elementary and secondary school levels as they influence habits of positive health. Cr 2.

MR. PECHINSKI

145. *Community Centers and Playgrounds*—Covers various aspects of organization, administration, management, facilities, equipment, and activities of building-centered programs and community playgrounds. Cr 3.

MISS BROWN

148. *Field Experience*—Supervised experience in conducting recreation programs in camp, community, social agency or institution situations. Enrollment by permission. Cr 3-6.

MISS BROWN

155. *Philosophy and Organization of Physical Education for Elementary Schools*—Examines the philosophical bases for physical education programs at the elementary school level. Contrasting emphases in the curriculum are studied as well as the implications found in perceptual-motor development research. Cr 3.

MR. COBB

165. *Leadership Organization in the Intra-Extramural Programs*—Principles and philosophy, administration, organization, and supervision of intra-extramural activities in the physical education program in elementary, junior, and senior high schools. Cr 3.

MR. AMES

168. *Protective Practices and Safety in Physical Education and Athletics*—Designed to acquaint teachers and athletic coaches with modern principles and practices in prevention, treatment, rehabilitation, and safety in physical education and athletics. Cr 3.

MR. JORDAN

171. *History and Philosophy of Physical Education*—Designed to develop an appreciation of the place and function of physical education during the course of civilization and to assist in the formation of a constructive approach to present day problems in this area. Cr 2.

MR. COBB

172. *Tests and Measurements in Physical Education*—Techniques and devices for the evaluation of physical education programs. Includes the selection and administration of traditional physical performance tests, the construction of teacher-made tests specific to instructional programs in physical education and the knowledge and understandings basic to interpretations of tests scores. Cr 3.

MISS WALKUP

176. *Kinesiology*—Introduction to the analysis of movement patterns based on precepts necessary for the application of basic mechanics and kinesiological principles to the teaching of motor skills. Cr 3.

MR. PECHINSKI

180. *Health, Physical Education, and Recreation Programs in the Elementary School*—Study of skills, progressions in rhythms, sports, and gymnastics. Health programs including curriculum planning, and methods of presentation.

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Organization and administration of elementary school recreation programs. For elementary classroom teachers. *Cr 3.*

183. *Planning the Health Education Curriculum*—Designed to assist the student in more thoroughly understanding health education in relation to the total school curriculum. Concepts of curriculum development, national considerations, and current research related to curriculum construction are examined and evaluated. *Cr 3.* MR. COBB

184. *Practicum in Physical Education*—Leadership experiences under staff supervision in the service program. Limited opportunities also exist in local public schools. Consult either Dr. Walkup, Mr. Woodbury or Dr. Cobb before registering. *Cr 1-3.* STAFF

185. *Recreation Leadership*—Skills and practical experiences essential to the development and organization of an effective recreation program. *Cr 3.* MISS BROWN

198. *Problems in Health and/or Physical Education and Recreation*—Individual work on a problem in the area of health, physical education or recreation. *Cr 1-3.* Consult Dr. Cobb before registering.

GRADUATE COURSES

Appraisal—Pupil Adjustment and Personnel Practices (Ed A)

220. *Test Construction*—*Cr 2.*

221. *Evaluation of Instruction*—*Cr 3.*

251. *Introduction to School Guidance Services*—*Cr 3.*

252. *Guidance in Groups*—*Cr 3.*

253. *Guidance in the Elementary School*—*Cr 3.*

254. *Introduction to Counseling the Young Child*—*Cr 3.*

255. *Introduction to Counseling*—*Cr 3.*

261. *Student Personnel Services in Higher Education*—*Cr 3.*

290. *Nature and Needs of the Retarded*—*Cr 3.*

320. *Educational Measurement*—*Cr 3.*

321. *Statistical Methods in Education*—*Cr 3.*

322. *Organization and Administration of School Testing Programs*—*Cr 3.*

351. *Vocational Development Theory*—*Cr 3.*

352. *Group Procedures in Counseling*—*Cr 3.*

353. *Occupational and Educational Information*—*Cr 3.*

354. *Organization and Administration of School Guidance Services*—*Cr 3.*

355. *Advanced Counseling*—*Cr 3.*

Curriculum and Instructional Materials (Ed C)

210. *Planning the Curriculum for the Retarded Child*—*Cr 3.*

211. *Planning the Elementary School Curriculum*—*Cr 3.*

221. *Planning the Secondary School Curriculum*—*Cr 3.*

224. *Planning the Junior High School Curriculum*—*Cr 3.*

233. *The Dynamics of the Curriculum*—*Cr 3.*

236. *Campus, Culture and Student Activities in Higher Education*—*Cr 3.*

237. *New Media in Education*—*Cr 3.*

312. *Principles of Curriculum Construction (Elementary)*—*Cr 3.*

322. *Principles of Curriculum Construction (Secondary)*—*Cr 3.*

Seminars, Research and the Thesis (Ed G)

- 300. *Seminar: Education in the United States—Cr 3.*
- 301. *Seminar in Reading—Cr 3.*
- 302. *Seminar in Arithmetic—Cr 3.*
- 303. *Seminar in Social Studies (Elementary)—Cr 3.*
- 304. *Seminar in Science (Elementary)—Cr 3.*
- 305. *Seminar: Special Education (Exceptional Children)—Cr 3.*
- 306. *Seminar in Higher Education in the U. S.—Cr 3.*
- 307. *Seminar in Language Arts—Cr 3.*
- 308. *Seminar in Student Personnel Problems—Cr 3.*
- 309. *Seminar in College Teaching—Cr 3.*
- 315. *Seminar in Methods of Teaching—Cr 3.*
- 316. *Seminar in Audio-Visual Aids—Cr 3.*
- 321. *Seminar in Social Studies (Secondary)—Cr 3.*
- 322. *Seminar in Science (Secondary)—Cr 3.*
- 331. *Seminar in Elementary School Curriculum—Cr 3.*
- 332. *Seminar in Secondary School Curriculum—Cr 3.*
- 341. *Seminar in Supervision—Cr 3.*
- 342. *Seminar in School Administration—Cr 3.*
- 343. *Seminar—The Superintendent—Cr 3.*
- 351. *Seminar in Measurement and Evaluation—Cr 3.*
- 361. *Seminar in Guidance—Cr 3.*
- 362. *Advanced Seminar in Counseling, Guidance, and Student Personnel Administration—Cr 3.*
- 373. *Seminar in Business Education (Administration and Supervision)—Cr 3.*
- 375. *Advanced Seminar in Science Education—Cr 3.*
- 376. *Advanced Seminar in Social Studies Education—Cr 3.*
- 391. *Graduate Apprenticeship—Cr 2-6.*
- 393. *Educational Internship—Cr 3.*
- 395. *Educational Research—Cr 3.*
- 396. *Doctoral Seminar in Education—No credit.*
- 397. *Advanced Educational Research I—Cr 6.*
- 398. *Advanced Educational Research II—Cr 2-6.*
- 399. *Graduate Thesis—Cr 6.*

History and Philosophy (Ed H)

- 261. *Comparative Education—Cr 3.*
- 265. *History of Higher Education in the United States—Cr 3.*
- 362. *Philosophy of Education—Cr 3.*

School Leadership (Ed L)

- 210. *School Administration and Supervision—Cr 3.*
- 211. *Educational Supervision—Cr 3.*
- 220. *Coordinating Service in Special Education—Cr 3.*
- 230. *Public Relations—Cr 3.*
- 231. *School Law —Cr 3.*
- 251. *Theories of Administration—Cr 3.*

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- 311. *The Elementary School Principalship*—Cr 3.
- 321. *The Secondary School Principalship*—Cr 3.
- 330. *School Finance and Business Management*—Cr 3.
- 340. *Housing the School Program*—Cr 3.
- 350. *School Personnel Management*—Cr 3.
- 352. *The Governance of Education*—Cr 3.
- 360. *Educational Surveys of the School System*—Cr 3.

Methods (Ed M)

- 200. *Field Observation (Activity)*—Cr 1-3.
- 215. *Newer Practices in Social Studies in the Elementary School*—Cr 3.
- 216. *Advanced Studies in Science Education (Elementary)*—Cr 3.
- 230. *Advanced Study in Language Arts*—Cr 3.
- 232. *Methods of Teaching the Emotionally Disturbed*—Cr 3.
- 241. *Newer Practices in Social Studies in the Secondary School*—Cr 3.
- 242. *Advanced Studies in Science Education (Secondary)*—Cr 3.
- 251. *Newer Practices in Arithmetic*—Cr 3.
- 253. *Remedial Reading*—Cr 3.
- 269. *Clinical Practices in Reading*—Cr 6.
- 271. *Observation and Practice in Special Class Education*—Cr 3.
- 273. *Problems in Teaching the Slow-Learning Child*—Cr 3.
- 280. *Educational Institute (Activity)*—Cr 3-6.
- 301. *Diagnosis in Reading*—Cr 3.
- 310. *Learning Disability and the Handicapped*—Cr 3.
- 311. *Learning Disability—Educational Methods*—Cr 3.
- 320. *Theories of Teaching*—Cr 3.
- 357. *Educational Practicum (Activity)*—Cr 3.

Vocational (Ed V)

- 271. *Improvement of Instruction in the Vocational Business Subjects*—Cr 3.
- 272. *Improvement of Instruction in the Non-vocational Business Subjects*—Cr 3.
- 275. *Business Education Curriculum*—Cr 3.

General (Ed X)

- 200. *The Computer in Education*—Cr 3.
- 286. *Workshop in Special Education (Activity)*—Cr 3-6.
- 398. *Individual Study in Education (Field of Specialization)*—Cr 3-6.

Physical Education (Pe)

- 270. *Interpretation of Health, Physical Education, and Recreation*—Cr 3.
- 272. *Planning the Physical Education Curriculum*—Cr 3.
- 273. *Seminar in Motor Learning*—Cr 3.
- 275. *Current Studies in Health, Physical Education, and Recreation*—Cr 3.

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276. *Physiology of Activity—Cr 3.*

277. *Organisation and Administration of Health, Physical Education and Recreation—Cr 3.*

280. *Mechanical Analysis of Human Movement—Cr 3.*

282. *Physical Education for the Exceptional—Cr 3.*

284. *Evaluation Procedures in Health, Physical Education, and Recreation—Cr 3.*

310. *Seminar in Health, Physical Education, and Recreation—Cr 3.*

COURSES TO BE OFFERED PERIODICALLY

(All courses are 3 credit hours except as noted by figure in parentheses following course title.)

Curriculum Instructional Materials (Ed C)

113. *Principles of Curriculum Construction (Conservation) for Elementary School Teachers.*

123. *Principles of Curriculum Construction (Conservation) for Secondary School Teachers.*

Seminars, Research and the Thesis (Ed G)

365. *Seminar in Self-Actualization.*

Methods (Ed M)

273. *Problems in Teaching the Slow-Learning Child.*

Physical Education (Pe)

140. *Outdoor Education and Recreation Education.*

274. *Organisation and Administration of Recreation Programs.*

279. *Current Studies in the Administration of Athletics.*

281. *Recreation in the American Community.*

283. *Administration of Elementary and Secondary School Health Program.*



COLLEGE OF LIFE SCIENCES AND AGRICULTURE

FREDERICK E. HUTCHINSON, DEAN



College of Life Sciences and Agriculture

The College of Life Sciences and Agriculture has contributed richly to the well-being of people in this state and the nation. Graduates around the world carry on the struggle against food and fiber problems, help cope with environmental problems, and seek ways of using, conserving, and restoring our national resources.

Towards these ends the college offers a continuum of education with programs of study leading to associate, bachelor's, master's, and doctoral degrees. While considerable variation exists in program requirements, all have as common objectives: proficiency in a professional subject-matter field and a broad, liberal education for effective citizenship. This gives the student a fundamental education in the biological, physical, and social sciences as well as courses in the arts and humanities. The central focus is to provide professional education in several different areas leading to attractive career opportunities with private firms and public and private agencies.

The college is composed of two schools: Forest Resources and Human Development and two divisions: Division of Agricultural Science includes the Departments of Agricultural and Resource Economics, Agricultural Engineering, Animal and Veterinary Science, Food Science and Plant and Soil Sciences; Division of Life Sciences includes the Departments of Biochemistry, Botany and Plant Pathology, Entomology, and Microbiology. In addition to instruction, each unit carries on research and public service functions. All programs of study fall under one or more of these administrative units. In all programs of study, the college has developed a highly student-oriented counseling system. Each student is assigned a faculty adviser who assists in program planning and career development. In the student-counselor relationship the capabilities, aspirations, and goals of the student are paramount throughout his academic career. Students may select a major or professional area of specialization upon entering college or they do so at the end of the freshman or sophomore year.

COLLEGE OF LIFE SCIENCES AND AGRICULTURE

DEGREES AND SPECIALIZATIONS

LIFE SCIENCES DIVISION*

Biological Sciences

1. Biology
2. Biochemistry
3. Botany and Plant Pathology
4. Entomology
5. Microbiology

Forest Resources

6. Forestry
7. Wildlife Management
8. Forest Engineering (Joint with Agricultural Engineering)

Human Development

9. Human Development, with degrees in:
 - Food and Nutrition
 - Child Development Education
 - Home Economics Education
 - General Home EconomicsWith specialization in, Social Service
10. Health and Family Life Education

Natural Resource Management

11. Natural Resource Management, with options in:
 - Conservation Technology
 - Forest Resources
 - Resource Economics
 - Soil and Water Conservation

AGRICULTURAL SCIENCE DIVISION*

12. Agricultural Engineering
13. Agricultural Mechanization
14. Forest Engineering (Joint with Forest Resources)
15. Agricultural and Resource Economics, with options in: Agricultural Business Management and Marketing; Sociology of Rural Life and International Affairs
16. Animal and Veterinary Science Options in: Animal Science, Animal Agribusiness, and Science Teaching.
17. Plant and Soil Science

In addition, special pre-professional programs in Agricultural Education, Dairy Manufacture, and Food Processing are offered as a part of the New England Board of Higher Education plan for regional cooperation. This agreement permits students to complete two-year preparatory programs at the University of Maine at Orono, and to transfer to other specified New England universities for the final two years of professional training. A Pre-Veterinary curriculum is provided for those who wish to qualify for entrance into a regular college of veterinary medicine.

* Minor areas of emphasis in baccalaureate degree programs: Agricultural Education, Biology Education, Food Science, International Agricultural Development, and Journalism. (see page 109). Preparation may be gained for admission to dental and medical schools, and for graduate study in marine biology.

UNIVERSITY OF MAINE

TECHNICAL DIVISION

The college has two-year technical programs that lead to an associate of science degree. The programs are:

- 1. Animal Technology
- 2. Animal Medical Technology
- 3. Forest Management
- 4. Food Service Management
- 5. Merchandising
- 6. Plant and Soil Technology (Landscape and Nursery Management)
- 7. Resource and Business Management, with specialization in
 - Agricultural Business Management
 - Food Industry Management
 - Resource Management

ADMISSION REQUIREMENTS

Bachelor of science degree students must submit to the Director of Admissions with the application, scores on the College Entrance Examination Board, Scholastic Aptitude Test (S.A.T.) and the scores on three C.E.E.B. Achievement Tests.

High school course requirements for admission to various professional areas of study are:

- A. Animal and Veterinary Sciences, Plant and Soil Sciences, Agricultural and Resource Economics, Agricultural Engineering, Agricultural Mechanization, Biological Sciences, Forest Engineering, Forestry and Wildlife and Natural Resource Management:

English	4 units
Algebra	2 units
Plane Geometry	1 unit
Trigonometry	½ unit (Agricultural and Forest Engineering only)
Science	2 units (Chemistry or Physics required)
History or Social Science	1 unit
Electives	5½ to 6 units
<hr/>	
Total	16 units

- B. School of Human Development:

English	4 units
Mathematics	2 units (at least 1 of algebra)
Science	1 unit (Chemistry recommended)
History or Social Science	1 unit
Electives	8 units
<hr/>	
Total	16 units

- C. Two-Year Associate of Science degree students must have graduated from high school, must complete the C.E.E.B Scholastic Aptitude Tests, and possess a strong desire for a specific technical program. Two units of

COLLEGE OF LIFE SCIENCES AND AGRICULTURE

mathematics, one of which must be algebra, are required, except for the Forest Management Technician program that requires two units of High School Algebra and one unit of geometry.

Students who contemplate continuation in a regular four-year baccalaureate degree curriculum must first complete the two-year associate degree program at a grade average of 2.50 or higher, and must satisfy entrance requirements to the desired baccalaureate degree program.

GRADUATION REQUIREMENTS

Bachelor of Science Degree Candidates

Completion of course work required in the various programs of the College of Life Sciences and Agriculture leads to a degree of bachelor of science. All students are required to complete a minimum of 120 degree hours, exclusive of credit for basic military training. Exceptions are the School of Forest Resources that requires 132 credit hours plus 6 credit hours of summer camp and a one-hour spring trip in the Forestry and Wildlife programs, and Agricultural Engineering that requires a 130 credit hours.

In addition, each student must accumulate a minimum grade point average of 2.0 (effective with class entering fall 1971) and receive a passing grade in all required courses in the program of study.

General subject matter requirements of all degree candidates are:

Communications

		Credit Hours
Writing course*	3	
Speaking course**	3	6
Humanities and Social Science		15
Physical Education		
(1 semester required, second semester optional)		1
	Total	<hr/> 22***

*Students selected for Freshman Honors are excused; students may receive degree credit through Advanced Placement or CLEP (College Level Examination Program). All others will ordinarily take Eh 1, College Composition, with possible substitution of Eh 7, Advanced Composition, Eh 17, Advanced Professional Exposition, or Jr 31, Functional Writing.

**Students will ordinarily take Sh 3, Fundamentals of Public Speaking. Possible substitutes, with permission of Chairman, Department of Speech, are: Sh 45, Discussion of Inquiry, Sh 47, Debate and Advocacy, or Sh 6, Fundamentals of Interpretation.

***Military Science degree credit is allowed after the first four Basic Military Courses (Mt 1, 2, 3, and 4).

Associate of Science Degree Candidates

For the degree of associate of science, students must complete satisfactorily a prescribed technical curriculum with a minimum of 64 credit hours earned at an accumulative grade point average of at least 2.0 (effective with class entering fall of 1971).

Physical Education requirement for men and women in two- and four-year undergraduate programs is one semester for one hour of degree credit with a pass/fail grade; a second semester for one hour of degree credit is optional. Exemptions from the above are granted for:

One number is used for a course which is given both fall and spring.

Courses offered in 1973-74 and alternate years are indicated by the sign (†) placed before the number of the course; courses offered in 1974-75 and alternate years are indicated by the sign (†) placed before the number of the course.

- Ms 4 and 26 may be substituted, or Ms 5 and 6.

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Agricultural Engineering

FALL SEMESTER				SPRING SEMESTER			
		Subject	Credit Hours			Subject	Credit Hours
LSA	1	University Life	0	Ch	14	Chemistry Principles	4
Ch	13	Chemistry Principles	4	Eh	1	College Composition	3
Ge	1	Introduction to Engrg. Design	2	Ge	2	Introduction to Enrg. Design	2
Ge	5	Engineering Orientation	0	Ge	6	Engineering Orientation	0
Ma	26	Anal. Geom. and Calculus	4	Ma	27	Anal. Geom. and Calculus	4
Pe	1	Physical Education	1	Ps	2	General Physics	4
Ps	1	General Physics	4				
			15				17

Agricultural Mechanization

FALL SEMESTER				SPRING SEMESTER			
		Subject	Credit Hours			Subject	Credit Hours
LSA	1	University Life	0	Bi	1	Plant Biology	4
Ec	10	Prin. of Economics	3	Ge	2	Introduction to Engineering	
Ge	1	Introduction to Engineering				Design	2
		Design	2	Ps	2a	General Physics	4
Eh	1	College Composition	3			Electives	5
Ma	4	Algebra and Trigonometry	4				
Ps	1a	General Physics	4				
Pe	1	Physical Education	1				
			17				15

Animal and Veterinary Sciences

FALL SEMESTER				SPRING SEMESTER			
		Subject	Credit Hours			Subject	Credit Hours
AnV	45	Animal Sciences	3	Eh	1	College Composition	3
	9				10		
Ch	11 or			Ch	12 or		
	13	General Chemistry	4		14	General Chemistry	4
LSA	1	University Life	0	Zo	4	Animal Biology	4
Ma	4 or					Elective (AnV or Ma	
	26	Mathematics	4			recommended)	4
Pe	1	Physical Education	1				
Zo	3	Animal Biology	4				
			16				15

Plant and Soil Sciences

FALL SEMESTER				SPRING SEMESTER			
		Subject	Credit Hours			Subject	Credit Hours
LSA	1	University Life	0	Ch 10, 12,		Chemistry	4
Ch	9, 11			or	14	Soils	4
	or	Chemistry	4	S	2	Electives	7
Eh	1	College Composition	3				
Ma	4*	Algebra and Trigonometry	4				
Pe	1	Physical Education	1				
Bi	1	Plant Biology	4				
			16				15

* Ma 5 and 6, or Ma 26 may be substituted

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Biological Sciences

(Microbiology-Biochemistry-Biology-Botany-Entomology)

FALL SEMESTER				SPRING SEMESTER			
		Subject	Credit Hours			Subject	Credit Hours
LSA	1	University Life	0	Ch 10, 12,			
Ch 9, 11				or	14	Chemistry	4
or	13	Chemistry	4	Ms	26	Anal. Geom. and Cal.	4
Eh	1	College Composition*	3	Bt	2	Plant Biology	}
Ms	4	Algebra and Trigonometry* ..	4	Zo	4	or	
Pe	1	Physical Education	1			Animal Biology	
Bt	1	Plant Biology	}			Elective	3
		or					
Zo	3	Animal Biology					
			16				15

*If qualified, may take next higher level course

Forestry and Wildlife

FALL SEMESTER				SPRING SEMESTER			
		Subject	Credit Hours			Subject	Credit Hours
Ch 9, 11,				Ch 10, 12,			
or	13	Chemistry	4	or	14	Chemistry	4
Ge	11	Basic Graphics & Cartography	2	Ge	12	Forestry Drawing	2
Fy	1	Intro. to Forest Resources ..	2	Fy	4	Statistical Inference in Forest Resources	3
Ms	4*	Algebra and Trigonometry ..	4	Eh	1	College Composition	3
Bt	1	Plant Biology	}	Bt	2	Plant Biology	}
		or				or	
Zo	3	Animal Biology		Zo	4	Animal Biology	
Pe	1	Physical Education	1				16
			17				

* Ms 26 may be substituted

Natural Resource Management

FALL SEMESTER				SPRING SEMESTER			
		Subject	Credit Hours			Subject	Credit Hours
LSA	1	University Life	0	Ch 10, 12,			
Ch 9, 11				or	14	Chemistry	4
or	13	Chemistry	4	Ms	26	Anal. Geom. & Calculus	4
Eh	1	College Composition	3			Biology Elective	4
Ms	4	Algebra & Trigonometry	4			Elective	3
Bt	1	Plant Biology	}				
		or					
Zo	3	Animal Biology					
Pe	1	Physical Education	1				15
			16				

COLLEGE OF LIFE SCIENCES AND AGRICULTURE

Life Sciences Division

BIOCHEMISTRY

PROFESSORS RADKE, DEHAAS; ASSOCIATE PROFESSOR LERNER; ASSISTANT PROFESSORS BLAKE, JOHNSON; LECTURERS CHASE, CHEN, CUPRAK, O'CALLAGHAN, SENSENIG

Biochemistry deals with the study of (1) the nature of the chemical constituents of living matter and of chemical substances produced by living things, (2) the functions and transformations of these chemical entities in biological systems, and (3) the chemical and energetic changes associated with these transformations in the course of activity of living matter. The ultimate goal of biochemistry is to describe the phenomena that distinguish the "living" from the "non-living" in the language of chemistry and physics.

The biochemist does research and development in pharmaceutical houses, medical schools and research centers on all aspects of human health. He studies all phases of foods and nutrition, including such areas as composition, utilization, preservation, additives, and contaminants.

There are many opportunities for the B.S. biochemist, and many more for those who continue for graduate degrees. The prescribed program in this catalog is a good preparation for both stopping points. A foreign language, or even two, is recommended for those definitely planning graduate study.

Courses of study can be developed to fulfill admission requirements for medical and dental schools. At least 120 degree hours at an accumulative grade-point average of 2.00 are required for graduation.

Curriculum Leading to a Bachelor of Science Degree in Biochemistry

Freshman Year. See Page 244.

Curriculum for Biochemistry Majors

Required Courses		Credit Hours	Minimum Degree Hours Required
A. BIOCHEMISTRY			21
Bc 159	Physical Biochemistry	4	
Bc 161, 162	Advanced Biochemistry	7	
Bc 164	Biochemical Lab Methods	4	
Bc 191, 192	Biochemical Research	6	
B. OTHER BIOLOGICAL AND PHYSICAL SCIENCES			39
Zo 3, 4	Animal Biology	8	
Mb 127, 128	General Microbiology	5	
Ch 3, 14	Chemistry	4	
Ch 140	Quant. Analysis	4	
Ch 151, 152	Organic Chemistry, Lec.	6	
Ch 161, 162	Organic Chemistry, Lab.	4	
Ps 1, 2	General Physics	8	
C. MATHEMATICS			12
Ms 4	Algebra and Trigonometry	4	
Ms 26	Anal. Geom. and Calculus	4	
Ms 27	Anal. Geom. and Calculus	4	

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D. COMMUNICATIONS		8
Writing	3	
Speaking	3	
Bc 171, 172	Seminar	2
E. HUMANITIES AND SOCIAL SCIENCES		15
F. FRESHMAN ORIENTATION		0
G. PHYSICAL EDUCATION		1
H. ELECTIVES		24
Minimum Degree Hours for Graduation		120

Courses in Biochemistry (Bc)

7. Fundamentals of Chemistry—A review of the essential material from Inorganic Chemistry followed by a study of the types and reactions of organic compounds. Prerequisite: one year of high school chemistry. *Rec 3, Lab 2, Cr 4.*

MR. LERNER

8. Elementary Physiological Chemistry—Carbohydrates, lipids, proteins, digestion, enzymes, metabolism, vitamins, hormones, blood and urine. Prerequisite: Bc 7 or the equivalent. *Rec 3, Lab 2, Cr 4.*

MR. LERNER

21. Organic Chemistry—Hydrocarbons, alcohol, acids, ketones, aldehydes, esters, amines, and amides. Prerequisite: Ch 11 and 12. *Rec 3, Lab 2, Cr 4.*

MR. RADKE

122. Biochemistry—H-ion concentration; the properties, digestion, metabolism, and excretion of carbohydrates, fats and proteins; enzymes, vitamins, hormones. Prerequisite: Bc 1. *Rec 3, Lab 2, Cr 4.*

MR. RADKE

159. Physical Biochemistry—A study of the fundamental laws, theories, and concepts of physical chemistry as they apply to biochemical problems. Prerequisite: Ch 140 and 152, Ps 2 or equivalent, Ms 12 or equivalent. *Rec 3, Lab 3, Cr 4.*

MR. DEHAAS

161. Advanced Biochemistry—Water, carbohydrates, lipids, proteins, nucleic acids, vitamins, hormones, enzymes, coenzymes, metabolism, enzyme kinetics, bioenergetics and other topics. Prerequisite: Ch 152. *Rec 4, Lab 3, Cr 5.*

STAFF

162. Advanced Biochemistry II—Advanced metabolism, enzyme kinetics, nucleic acid metabolism, porphyrins, energy relationships and current topics. Prerequisite: Bc 161. *Rec 2, Cr 2.*

STAFF

164. Biochemical Laboratory Methods—Chromatography, electrophoresis, enzymes, natural products, and other procedures employed in biological research. Prerequisite: Bc 161 or instructor's permission. *Lab 8, Cr 4.*

MR. JOHNSON

171. 172. Seminar—Preparation and presentation of papers dealing with current research in the field of biochemistry. *Cr 1.*

STAFF

191. 192. Biochemical Research—Problems in biological or agricultural chemistry. A comprehensive report is required. Seniors and graduate students only. *Cr Ar.*

STAFF

‡220. Carbohydrates and Lipids—The chemistry and metabolism of carbohydrates and lipids as they characterize different biological forms. Prerequisite: Bc 162 or permission. *Rec 3, Cr 3.*

MR. DEHAAS, MR. LERNER

†225. Proteins and Enzymes—A comprehensive study of the structure and properties of proteins with special emphasis on their catalytic activity. Prerequisite: Bc 162 or permission. *Rec 3, Cr 3.*

MR. RADKE

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†230. *Vitamins and Hormones*—The chemistry and biological activity of the regulators of living systems. Prerequisite: Bc 162 or permission. *Rec* 3, *Cr* 3.

MR. DEHAAS

234. *Plant Biochemistry*—The biochemistry of photosynthesis, respiration and other metabolic processes in plants including growth regulators and essential elements. Prerequisite: Bc 162 or permission. *Rec* 3, *Cr* 3.

‡242. *Biochemical Mechanisms*—Specific biochemical reaction mechanisms will be discussed in terms of the mechanistic principles of organic and inorganic chemistry. Prerequisite: Bc 159 or equivalent and Bc 161 or equivalent or permission.

MR. LERNER

399. *Graduate Thesis*—*Cr Ar.*

MR. DEHAAS, MR. JOHNSON, MR. LERNER, MR. RADKE

BIOLOGY

PROFESSOR DIMOND (COORDINATOR)

The Biology curriculum is designed to permit a student to gain a broad background in all of the biological sciences. He will at the same time receive basic training in chemistry, physics and mathematics. In addition, the unusual extent of elective opportunities in the curriculum permits students to exercise considerable freedom in choosing courses. This enables students to transfer later into any of the basic or applied fields in the life sciences.

Students preparing to teach high school biology, for careers in medicine, marine biology, ecology and environmental sciences, food science, journalism, and as naturalists with various public and private agencies will find this program appropriate. The curriculum is equally suitable for students wishing the broad basic training required in preparation for more specialized work in graduate study leading to careers in college teaching, and research at the university level, in government, or in biology based industries.

In addition to the basic program outlined below, specialized options are available in (1) Teaching High School Biology, (2) Pre-Marine Biology, (3) Food Science (See page 313), (4) Pre-Medicine, and (5) Journalism. Students can consult their advisers about the particular requirements of these options. Students interested in ecology should follow the basic Biology curriculum and elect additional ecology and supportive courses, e.g., geology and soils, where possible.

The curriculum in Biology is an interdepartmental offering administered by a committee representing students and faculty in the Departments of Biochemistry, Botany, Entomology, Microbiology and Zoology.

Curriculum Leading to the B.S. Degree in Biology

Freshman Year. See Page 244.

A. BIOLOGICAL AND PHYSICAL SCIENCES

		Credit Hours	Minimum Hours	Degree Required
1. Required				48
Ch 9-10 or 11-12 or 13-14	Chemistry	8		
•Ms 4, 26	Mathematics	8		
Ps 1a-2a	Physics	8		

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Bt 1 or Zo 3	Biology	4	
Bt 2	Plant Kingdom	4	
Zo 4	Animal Biology	4	
En 26	Entomology	4	
Mb 127	Microbiology	3	
Mb 128	Microbiology Lab.	2	
Zo 162	Genetics	3	
2. Group Electives			22-26
Bc 21, 122	Organic and Biochemistry 8		
• or	or		
Ch 151-152	Organic Chemistry Lec. }		
Ch 161-162	Organic Chemistry Lab. }	(10)	
Mb 136, Bt 158, 169, 163, 164, 174	Taxonomy	4(3)	
En 140, 153, Zo 131, 139, 153			
158, 160			
Bt 153, 154, Mb 153	Physiology	4	
Zo 177, 178			
AnV 135, Bt 135, 150	Anatomy	4	
En 251, Zo 133, 136, 151, 152			
Bt 130, En 143,	Ecology	4(3)	
Fy 19, Zo 156			
B. COMMUNICATIONS			6
1. Written			
Eh 1, 7, Jr. 31		3	
2. Oral			
Sh 3, 6, 45, 47		3	
C. HUMANITIES AND SOCIAL SCIENCES			15
D. FRESHMAN ORIENTATION			0
E. PHYSICAL EDUCATION (1 SEMESTER)			1
F. FREE ELECTIVES			24-28
Minimum Degree Hours Required for Graduation			120

* Students with adequate background may enter Ms 26 directly, removing the requirement for Ms 4.

Courses in Biology (Bio)

51. Interpretation of Biological Statistics—A beginning course dealing with basic statistics, test, and procedures commonly used in biological research. Much emphasis on presenting research results and on interpreting and evaluating published data. Prerequisite: Ms 4. *Rec 3, Cr 3.* MR. FORSYTHE

60. Interactions Between Man and Environment—The interrelationships between man and the rest of nature, with consideration of human population growth, natural resources, population and degradation of the biosphere. Environmental problems are examined in the light of ecological ideas and principles. No freshmen. *Rec 3, Cr 3.* MR. DAVIS

Graduate Course

213. Biological Literature—*Rec 1, Cr 1.*

MR. DIMOND, MR. STORCH, MR. VADAS

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BOTANY AND PLANT PATHOLOGY

PROFESSOR MCINTYRE (Chairman); PROFESSORS CAMPANA, COOPER, MANZER, McCRUM, RICHARDS; ASSOCIATE PROFESSORS DAVIS, GELINAS, HOMOLA, NEUBAUER, VADAS; ASSISTANT PROFESSOR LABER; FACULTY ASSOCIATES FRANK, SHIGO; EMERITUS PROFESSORS HILBORN AND HYLAND

The Botany curriculum leading to a bachelor of science degree is designed for majors preparing for teaching, research and other careers in botany or related biological sciences. Botany majors successfully completing the undergraduate requirements herein stated will be well qualified to enter graduate programs in botany and other biological disciplines at this and other institutions for advanced study.

Curriculum for Botany Majors

Freshman Year. See Page 244.

Required Courses

		Credit Hours	Minimum Degree Hours Required
A. BOTANY			30
Bt 1	Plant Biology	4	
or Zo 3	Animal Biology		
Bt 2	Plant Kingdom	4	
Bt 130	Ecology	3	
Bt 135	Plant Anatomy	4	
Bt 153, 153a	Plant Physiology	5	
Bt 164	Taxonomy of Vascular Plants	4	
Bt 271/2 72	Botany Seminar	2	
	Electives	4	
B. OTHER BIOLOGICAL SCIENCES			12
Zo 4	Animal Biology	4	
or En 26	General Entomology		
Mb 127, 128	General Microbiology	5	
Zo 162	Principles of Genetics	3	
or Bt 145			
C. PHYSICAL SCIENCES			20
Ch 9-10, 11-12 or 13-14	Chemistry	8	
Ch 151*	Organic Chemistry Lec.	3	
Ch 161*	Organic Chemistry Lab.	2	
or Bc 21	Organic Chemistry	(4)	
Ps 1a, 2a	General Physics	8	
D. MATHEMATICS			4
Ms 26	Analytical Geometry & Calculus	4	
E. COMMUNICATIONS			9
Eh 1	College Composition	3	
Eh 7, 8, 17	Composition	3	
or Jr 31			
Sh 2, 3, or 6	Speech	3	

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F. HUMANITIES AND SOCIAL SCIENCES 15

Recommended: Six hours or more in one of the following foreign languages:
French, German, or Russian, which may meet the humanity requirement.

G. FRESHMAN ORIENTATION 0

H. PHYSICAL EDUCATION (1 semester) 1

I. ELECTIVES 29

Minimum Degree Hours Required for Graduation 120

* Recommended

Courses in Botany (Bt)

1. Plant Biology—An introduction to the structure, function, and reduction of seed plants. Open to students of all colleges. Course same as Bio 1. *Rec 3, Lab 2, Cr 4.* MR. GELINAS

2. The Plant Kingdom—The morphology, reproduction, ecology and phylogenetic significance of the major classes of the plant kingdom. Open to students of all colleges. Prerequisite: Bt 1 or Zo 3. *Rec 3, Lab 2, Cr 4.* MR. RICHARDS

33. Dendrology—Classroom and field work on identification and classification of trees and native shrubs of North America. Prerequisite: Bt 1 or Zo 3. *Lec 2, Rec 1, Lab 2, Cr 4.* MR. RICHARDS

47. 48. Problems in Botany—Open to juniors and seniors who have special interest and qualifications in botany. The approval of the chairman of the department is required. *Cr Ar.* STAFF

130. Plant Ecology—Principles of autecology, synecology, and vegetative analysis. Major emphasis on populations biology and interactions at the population, community, and ecosystem level. Prerequisite: Bt 1 or Zo 3 or permission. *Rec 3, Cr 3.* MR. VADAS

135. Plant Anatomy—The origin, development, and structure of tissue systems of vegetative and reproductive organs of vascular plants. Prerequisite: Bt 1 or Zo 3. *Rec 3, Lab 2, Cr 4.* MR. NEUBAUER

IDL 140. Seminar in Quaternary Studies—Physical, biological and anthropological studies related to the Quaternary Period. Subjects vary each semester. May be taken more than once for credit. Prerequisite: permission. *Cr 2.*

150. Botanical Microtechnique—Methods of killing, embedding, sectioning, and staining plant material. Methods of studying and recording microscopic preparation. Prerequisite: Bt 2 or Zo 4. *Rec 2, Lab 4, Cr 4.* MR. NEUBAUER

153. Plant Physiology—Physiological processes in plants, with emphasis on water relations, mineral nutrition and physiological ecology. Prerequisite: Bt 1 or Zo 3 and one year of chemistry. *Lec 3, Cr 3.* MR. COOPER

153a. Plant Physiology Laboratory—A laboratory study of the physiological function of the higher plants. Prerequisite or corequisite: Bt 153. *Lab 4, Cr 2.* MR. COOPER

154. Intermediate Plant Physiology—Physiological and biochemical aspects of plant metabolism, growth and development. Laboratory methods for physiological studies on intact plants, isolated organelles and enzymes. Prerequisite: Bt 153, Ch 151, 152 or consent of the instructor (Ch 152 may be taken concurrently). *Lec 2, Lab 4, Cr 4.* MR. LABER

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156. Plant Pathology—Principles of plant disease. Open to juniors and seniors. Prerequisite: Bt 1 or Zo 3. *Rec 2, Lab 4, Cr 4.*

MR. CAMPANA, MR. MCINTYRE

156. Plant Pathology (Forestry)—Principles of plant disease. Open to juniors and seniors. Prerequisite: Bt 1 or Zo 3. *Lec 2, Rec 1, Lab 2, Cr 4,*

MR. CAMPANA

†**158. Bryology**—Identification and classification of liverworts and mosses. Prerequisite: Bt 2 or an equivalent with the permission of the instructor. *Lec 1, Rec 1, Lab 2, Cr 3.*

MR. HOMOLA

159. General Mycology—Comparative morphology, classification and identification of fungi plus investigation of unusual hereditary and physiological characteristics. Prerequisite: Bt 1 or Zo 3. *Rec 2, Lab 4, Cr 4.*

MR. HOMOLA

‡**163. Introductory Phycology**—Morphology, identification, and classification of algae with minor emphasis on culturing, sexuality, physiology, and ecology. Prerequisite: Bt 1 or Zo 3 and 2, one year of chemistry or permission. *Lec 2, Rec 1, Lab 2, Cr 4.*

MR. VADAS

164. Taxonomy of Vascular Plants—Identification and classification of flowering plants. Prerequisite: Bt 1 or Zo 3. *Rec 2, Lab 4, Cr 4.*

MR. RICHARDS

165. Field Studies in Ecology—A field trip of one to several weeks duration to an area of ecologic interest; location, dates and cost to be announced in time for registration each year the course is offered. Trips may be scheduled during Christmas, midyear, spring recess, or summer. This is an intensive ecology field course; field and living conditions will often be rigorous and/or primitive. Prerequisite: a course in ecology. Other preparation and /or recommended prerequisites will be announced for each trip. Credit will differ, depending upon trip.

MR. VADAS, MR. DAVIS

‡**174. Aquatic Flowering Plants**—Identification, classification and ecology of marsh and aquatic flowering plants. Prerequisite: Bt 164 or permission of the instructor. *Lec 1, Lab 2, Cr 2.*

MR. RICHARDS

IDL 245. Late Quaternary Paleoecology—Ecology of the recent geologic past; effects of changing environments on distribution, migration, and extinction of marine, inland-aquatic, and terrestrial biota. Historical view of organism interaction, including role of man. Laboratory and field studies emphasize late- and post-glacial changes, and include analyses of the pollen and plankton microfossil content of Maine lake sediments. Prerequisite: permission and a course in ecology and a year of chemistry. *Lec 2, Lab 4, plus at least two all-day field trips. Cr 4.*

MR. DAVIS

‡**250. Plant Nematology**—An intensive survey of nematodes causing plant disease including anatomical, morphological and physiological characteristics, taxonomic status, disease causation and control. Prerequisite: Bt 156 or permission. *Lec 2, Cr 2.*

MR. MCINTYRE

†**256. Advanced Plant Pathology**—Advanced study of plant disease with emphasis on the physiology of parasitism and microbial interaction. Prerequisite: Bt 153 and Bt 156. *Rec 2, Lab 4, Cr 4.*

MR. MCINTYRE, MR. CAMPANA

258. Advanced Plant Physiology—Advanced study of the physiology of plants, including photosynthesis, mineral nutrition, growth regulators, water relations, and respiration. Prerequisite: Bt 152. *Rec 2, Lab 4, Cr 4.*

MR. COOPER

†**260. Comparative Morphology of Vascular Plants**—Basic concepts on the origin and development of vascular plants, their morphology, anatomy, homologies

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and interrelationships. Prerequisite: Bt 135 or equivalent and permission. *Rec 2, Lab 4, Cr 4.* MR. NEUBAUER

‡262. *Plant Geography*—The distribution of plants on the earth with emphasis on the causes of distributional phenomena. Field trips will be arranged. Prerequisite: Bt 154. *Rec 3, Cr 3.* MR. RICHARDS

‡IDL 263. *Marine Benthic Ecology*—An advanced course emphasizing ecological studies on benthic intertidal and subtidal marine organisms. Includes discussions on limiting factors, distributions zonation, biotic interactions, food webs, succession, productivity, energy, community structure and species diversity. Prerequisite: a course in ecology. *Lec 2, Rec 1, Cr 3.* MR. VADAS

†264. *Photosynthesis and Chloroplast Development*—An advanced course concerned with the physiology and biochemistry and photosynthesis. Includes discussion of chloroplast structure and development, chlorophyll synthesis, photolysis of H₂O, electron transport, photophosphorylation, the path of carbon in photosynthesis, photorespiration, and plant productivity. Prerequisite: Bc 122 and Bt 153, or permission of instructor. *Lec 2, Rec 1, Cr 3.* MR. LABER

†265. *Field Studies in Ecology*—A field trip of one to several weeks duration to an area of ecologic interest; location, dates and cost to be announced in time for registration each year the course is offered. Trips may be scheduled during Christmas, midyear, spring recess, or summer. This is an intensive ecology field course; field and living conditions will often be rigorous and/or primitive. Prerequisite: a course in ecology. Other preparation and/or recommended prerequisites will be announced for each individual trip. Credits: will differ, depending on trip. MR. DAVIS

271. 272. *Seminar*—Literature reviews. Techniques procedures and results in botanical research. *Rec 1, Cr 1.* STAFF

‡299. *Lake Ecology and Productivity*—Functional aspects of lake ecosystems, including productivity, trophic dynamics, succession (incl. Paleolimnology) and eutrophication; an advanced course for students already familiar with basic ecologic principles. Prerequisites: a course in ecology (Zo 168 Limnology desirable but not essential); Ch 13/14 or equivalent; or permission of the instructor. *Lec 1, Lab 4, Cr 4.* MR. DAVIS

301. *Research Methods in Plant Science*—Laboratory, greenhouse, and field techniques involved in botanical research. Prerequisite: Bt 153 or Bt 156 and permission of instructor. *Cr Ar.* STAFF

307. 308. *Problems in Botany*—*Cr Ar.* STAFF

IDL 340. *Seminar in Ecology*—An interdisciplinary seminar concerning both the theoretical aspects and application of ecological principles. Prerequisite: permission of instructor. (Same course as En, Fy, Zo 340.) STAFF

399. *Graduate Thesis*—*Cr Ar.* STAFF

Courses Offered in Summer Session and CED Only

110. *The Plant World*—A course in botany designed for teachers instructing at the elementary and secondary school levels. The role of plants in the economy of man; basic study of plants including origin, classification, structure and development, function, modification, environment and distribution. Laboratory work in plant collection, identification and preservation. Techniques in methods of preparation of material for study, exhibits and displays. Additional require-

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ments will be stipulated for graduate credit. (Limited to 24 students) *Lec 3, Cr 3.*

STAFF

115. *Our Common Trees and Shrubs*—A field course designed primarily to familiarize elementary and secondary school teachers with our native woody plants. Emphasis is placed on identification, classification and economic importance. Labeled collections will be made by students and kept as reference material. Additional requirements will be stipulated for graduate credit. (Limited to 24 students) *Cr 3.*

STAFF

120. *Structure of Plants Used by Man*—A course designed to familiarize elementary and secondary school teachers with the structure of our common economic plants. Emphasis will be placed on the specific part of the plant used (i.e., stem, root, leaf, fruit, seed) and the nature of the tissues, cells or cell contents useful to man. Enrollment will be limited to 24. Prerequisite: Bt 1 or the basic general botany course required in any college or university of approved standing. Additional requirements will be stipulated for graduate credit. *Cr 3.*

STAFF

124. *Local Flora*—Identification and classification of the common herbaceous flowering plants and ferns of Maine. Field trips will be taken to collect and study plants in various habitats. Additional requirements will be stipulated for graduate credit. *Cr 3.*

MR. RICHARDS

125. *Non-Vascular Plants of Maine*—Identification and classification of common algae, fungi, lichens and mosses of Maine. Field trips will be taken to collect and study plants in various habitats. Additional requirements will be stipulated for graduate credit. *Cr 3.*

MR. RICHARDS

131. *Plants and Environment*—The dynamic aspects of the environmental relationships of plants. *Cr 3.*

MR. COOPER

149. *Structure and Identification of Wood*—A study in wood structure and the relation of wood anatomy to structural endurance, decay resistance, and utility. Enrollment will be limited to 24. Additional assignments, involving a detailed microscopic study of some phase of wood anatomy, will be required for graduate credit. *Lec 2, Lab 2, Cr 3.*

STAFF

ENTOMOLOGY

PROFESSORS SIMPSON, DIMOND, OLSON; ASSOCIATE PROFESSORS FORSYTHE, D. LEONARD, MCDANIEL, OSGOOD, STORCH; VISITING PROFESSORS BROWER, CHADWICK; FACULTY ASSOCIATES K. E. GIBBS, HOLBROOK; RESEARCH ASSOCIATES KIMBALL, SIMMONS, SOPER

The Entomology curriculum is designed to provide training for various positions in government and industry or to lay a firm basis for further training at the graduate level, leading to teaching or extension positions in colleges or to research positions in experiment stations or in industry.

Students with sufficient background and interest will be encouraged to enter graduate school for further specialization. Such students are encouraged to elect foreign languages as undergraduates.

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The Department of Entomology offers a master of science degree. A doctor of philosophy degree may be taken in the plant science field, through the Department of Zoology or through the School of Forest Resources.

Curriculum Leading to a Bachelor of Science Degree in Entomology

Required Courses		Credit Hours	Minimum Degree Hours Required
A. ENTOMOLOGY			15
En 26	Introductory Entomology	4	
En 140	Elementary Taxonomy of Insects	4	
En 153	Advanced Taxonomy of Insects	4	
En 149	Economic Entomology	3	
B. OTHER BIOLOGICAL SCIENCES			40
Bt 1 or Zo 3	Biology (Plant or Animal)	4	
Bt 2	Plant Kingdom	4	
Bt 164	Taxonomy of Vascular Plants	4	
Mb 127-128	Bacteriology	5	
Bc 21 and 122	Biochemistry	8	
Zo 4	Animal Biology	4	
Zo 153	Invertebrate Zoology	4	
Zo 158	Parasitology	4	
Zo 162	Genetics	3	
C. PHYSICAL SCIENCES			16
Ch 9-10, 11-12 or 13-14	Chemistry	8	
Ps 1a-2a	General Physics	8	
D. MATHEMATICS			8
Ms 4	Algebra and Trigonometry	4	
Ms 26	Analytic Geometry and Calculus	4	
E. COMMUNICATIONS			8
Eh 1, 7, or 17	Composition	3	
Sh 3, 6, 45, or 47	Speech	3	
En 161-162	Seminar	2	
	Elective	2 (3)	
F. HUMANITIES AND SOCIAL SCIENCES			15
A foreign language, French, German or Russian—at least 8 hours of any one— may be used as a humanity. (Recommended)			
G. FRESHMAN ORIENTATION			0
H. PHYSICAL EDUCATION			1
I. ELECTIVES: Suggested Zo 156 Animal Ecology or Bt 130 Plant Ecology Ms 19 Statistics			17
Minimum Degree Hours Required for Graduation			120

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Courses in Entomology (En)

26. *Introductory Entomology*—Fundamental principles of insect life and the relation of insects to plants, animals, and man. En 26L to be taken concurrently. Prerequisite: Bt 1 or Zo 3. *Rec 2, Cr 2.* MR. STORCH

26a. *Introductory Entomology for Foresters*—Principles of insect life with emphasis in lectures on technical aspects of interest to professional foresters. Offered in the spring semester only. En 26L to be taken concurrently. Prerequisite: Bt 1 or Zo 3. *Rec 2, Cr 2.* MR. DIMOND

26L. *Introductory Entomology Laboratory*—A study of structure, physiology, ecology, and systematics. An insect collection is required. Students may wish to start their collections before taking the course. To be taken concurrently with En 26 or with En 26a. *Lab 4, Cr 2.* MR. STORCH AND STAFF

47. 48. *Problems in Entomology*—Open to juniors and seniors in any college who have special interest and qualifications in entomology. The approval of the head of the department is required. *Cr Ar.* STAFF

140. *Insect Biology and Taxonomy*—Introduction to the orders and families of insects: their characteristics, evolution, biology, and systematics. Laboratory emphasis is on identification of lower orders and Coleoptera. Prerequisite: En 26 or 26a. *Rec 2, Lab 4, Cr 4.* MR. OSGOOD

143. *Forest Insect Ecology*—Study of the physical and biotic environmental components which regulate the distribution and abundance of insects. Forest insects are used to illustrate ecological principles. Prerequisite: En 26 or 26a. *Rec 2, Lab 2, Cr 3.* MR. OSGOOD

†149. *Economic Entomology*—Survey of the basic principles involved in applied control of insects other than those found in the forest environment. Emphasis on biological, cultural and chemical control methods and their respective ecological implications. Legislation relating to the use of chemicals for pest control. Prerequisite: permission. *Rec 2, Cr 2.* MR. FORSYTHE

†149L. *Economic Entomology Laboratory*—Detailed study of some pests of a student's choice. Three term papers; one dealing with a particular pest; one with the pests of a particular crop; and one with a specific control measure. To be taken concurrently with En 149. Prerequisite: En 26 or 26a. *Lab 2, Cr 1.* MR. FORSYTHE

†153. *Biology and Taxonomy of Advanced Orders*—Characteristics, biology, and systematics of Lepidoptera, Diptera, and Hymenoptera. Laboratory deals exclusively with the identification of native and exotic specimens within those three orders. Prerequisite: En 26 or 26a. *Rec 2, Lab 4, Cr 4.* MR. OSGOOD

205. 206. *Problems in Entomology*—*Cr Ar.* STAFF

‡211. *Insect Ecology*—The ecological effects of biotic and abiotic factors on insects and on insect population ecology. Outside reading, field trips, and an independent laboratory study are required. Prerequisite: beginning course in ecology, and some background in statistics, physiology, and entomology or permission of instructor. *Rec 3, Lab 2, Cr 4.* MR. LEONARD

†214. *Medical Entomology*—Training in recognition, classification, life cycles, habits and control of insects and near relatives that cause disease or function as vectors of pathogens. Prerequisite: En 26 and Zo 158 or permission of instructor. *Rec 2, Lab 2, Cr 3.* MR. MCDANIEL

‡251. *Morphology of Insects*—External and internal anatomy of insects.

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Laboratory includes gross dissections of internal organs of representative insects.
Prerequisite: En 26. *Rec 2, Lab 4, Cr 4.* MR. STORCH

261. 262. Seminar—Review of entomological literature on assigned topics and its presentation. The subject area of seminar will vary each semester. The course may be taken more than once for credit. *Rec 1, Cr 1.* MR. LEONARD

312. Biological Control of Insects—Reading of significant original contributions. May be repeated with permission by covering different areas, e.g., viruses, fungi, parasites and predators, radiation, sterility, etc. Prerequisite: En 149. *Rec 1, Cr 1.* STAFF

†314. Behavior of Arthropods—Anatomy of the nervous system, especially sensory receptors. Basic patterns of orientation to extrinsic stimuli. Significance of behavioral patterns to the survival of individuals and populations. Prerequisite: permission. *Rec 2, Lab 2, Cr 3.* MR. DIMOND, MR. STORCH

399. Graduate Thesis—*Cr Ar.* STAFF

MICROBIOLOGY

PROFESSORS PRATT, BUCK, WHITEHILL; ASSOCIATE PROFESSORS
BAIN, GERSHMAN; ASSISTANT PROFESSORS DESIERVO,
NICHOLSON; LECTURER WAYMOUTH

The Microbiology curriculum is designed to give students a thorough knowledge of biological principles while providing skills needed to study microorganisms and tissue culture.

Students with interests in microbiology are prepared for wide variety of positions in industry, government, and public health laboratories. With proper selection of electives a student can satisfy requirements to all medical and dental schools.

Students who are well qualified and interested are encouraged to pursue graduate work for further specialization. The Department of Microbiology offers a master of science degree; a doctor of philosophy degree can be earned in a cooperating program.

Requirements for a B.S. degree are satisfactory completion of at least 120 degree hours at an accumulated grade-point average of not less than 2.0 in a course of study that conforms to the following curriculum.

Curriculum for Microbiology Majors

Freshman Year. See Page 244.

Required Courses		Credit Hours	Minimum Degree Hours Required
A. MICROBIOLOGY			23
Mb 127	General Microbiology	3	
Mb 128	General Microbiology	2	
Mb 136	Determinative Bacteriology	4	
Mb 152	Pathogenic Bact. and Serology	4	
Mb 153	Bacterial Physiology	4	
Mb 176	Virology	4	
Mb 178, 188	Seminar	2	

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B. PHYSICAL SCIENCES			20
Ch 13, 14	Chemical Principles	8	
Ch 140	Quantitative Analysis	4	
Ps 1a, 2a	General Physics	8	
C. GENERAL BIOLOGY			8
Bt 1 or Zo 3	Plant or Animal Biology	4	
Zo 4	Animal Biology	4	
D. ORGANIC CHEMISTRY AND BIOCHEMISTRY			12-21
Bc 21	Organic Chemistry	12	4
Bc 122	Biochemistry		4
Bc 164	Biochemistry Lab Methods		4
or			
Ch 151-152	Organic Chemistry Lec	21	6
Ch 161-162	Organic Chemistry Lab		7
Bc 161-162	Advanced Biochemistry		4
Bc 164	Biochemistry Lab Methods		4
(Students should consult major adviser)			
E. MATHEMATICS			8
Ms 4	Algebra and Trigonometry	4	
Ms 26	Anal. Geom. and Calculus		
F. COMMUNICATION			6
Eh 1	College Composition	3	
Sh 3	Fundamentals of Public Speaking	3	
G. HUMANITIES AND SOCIAL SCIENCES			15
H. FRESHMAN ORIENTATION			0
I. PHYSICAL EDUCATION (1 semester)			1
J. FREE ELECTIVES			18-27
Minimum Degree Hours for Graduation			120

Courses in Microbiology (Mb)

21a. Elementary Microbiology Laboratory—A laboratory and demonstration course. Microscopy, cultivation, biochemical, activities and control of microorganisms are considered. Prerequisite or corequisite: Mb 21 or Mb 127. *Cr 1.* STAFF

30. Fundamentals of Public Health—General consideration of the relationship between the health of the individual and environment. Prerequisite: Mb 21 or 127. *Rec 2, Cr 2.* MR. WHITEHILL

122. Microbiology and Man—The basic principles of bacteriology and their application to agriculture, industry, sanitation, public health and disease. Student participation in techniques dealing with laboratory procedures. Summer Session only. *Rec 3, Cr 3.*

127. General Microbiology—A basic biology course dealing with general principles as illustrated by microorganisms, in particular, bacteria and viruses. Includes a consideration of cell structure, cell metabolism, genetics, geochemical activities, and host-parasite relations. *Rec 3, Cr 3.* STAFF

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128. General Microbiology Laboratory—A laboratory study of the properties of bacteria and related microorganisms. Emphasis is on techniques and identification. Suggestion for students majoring in sciences. Prerequisite or corequisite: Mb 127. *Lab 4, Cr 2.* STAFF

136. Determinative Bacteriology—A study of morphological, cultural and physiological characteristics of important bacterial groups with special emphasis placed on isolation and classification of organisms in our environment. Prerequisite: Mb 127, Mb 128. *Rec 2, Lab 4, Cr 4.* MR. BAIN

152. Pathogenic Bacteriology and Serology—The relationships and characteristics of microorganisms that cause disease in man and animals and the response of the latter to the invasion of the parasite. Prerequisite: Mb 127, Mb 128. *Rec 2, Lab 4, Cr 4.* MR. WHITEHILL

153. Bacterial Physiology—A study of the properties and behavior of bacteria with respect to their chemical and physical requirements for life and reproduction. Prerequisite: Mb 127, Bc 122. *Rec 2, Lab 4, Cr 4.* MR. BAIN

176. Virology—An introductory course in the study of viruses, emphasizing their nature, methods of cultivation, mode of transmission, and classification. Prerequisite: Mb 152 or permission of instructor. *Rec 2, Lab 4, Cr 4.* MR. BUCK

187. 188. Seminar—Preparation and presentation of papers dealing with current research and developments in the field of bacteriology. *Cr 1.* STAFF

191. 192. Problems in Microbiology—A laboratory and conference for students desiring to pursue some particular line of investigation. Prerequisite: permission of instructor. *Cr Ar.* STAFF

201. Marine Bacteriology—A study of the properties and distribution of bacteria in the marine environment. Attention given to their role in the cycle of elements in the sea. Population changes in response to environmental changes will be considered. Parallels with aquatic and soil microbiology will be drawn. Prerequisites: General Microbiology and General Chemistry. *Rec 3, Cr 3.* MR. PRATT

231. Microbial Genetics—A study of the genetics of bacteria and viruses dealing with mutation, transformation, transduction, recombination, and gene control mechanisms. Microbial techniques of genetic mapping and fine structure determination will be described. Lecture demonstrations of experimental material are planned. Prerequisite: General Microbiology and Organic Chemistry. *Lec 3, Cr 3.* MR. DESIERVO

275. Tissue Culture Techniques and Mechanisms—A study of tissue culture techniques especially designed to acquaint the student with methods of growing tissue cells from various sources and the practical application. Prerequisite: Mb 128 or Bt 156. *Rec 2, Lab 4, Cr 4.* MR. BUCK

280. Immunology—A study of the immune response with particular emphasis on the structure of antigens and antibodies; the synthesis of antibody molecules; and the nature and significance of antigen-antibody reactions. Prerequisites: General Microbiology and Organic Chemistry. *Rec 3, Cr 3.* MR. NICHOLSON

282. Immunology Laboratory—A laboratory course designed to familiarize the student with diagnostic and experimental techniques for the characterization of antigens, antibodies, and antigen-antibody reactions. Prerequisite: Mb 280 or concurrent registration therein. *Lab 3, Cr 1.* MR. NICHOLSON

399. Graduate Thesis—*Cr Ar.* STAFF

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FOREST ENGINEERING

The Forest Engineering curriculum, a joint administrative responsibility of the Agricultural Engineering Department and the School of Forest Resources, combines study of basic physical sciences, mathematics, engineering and forestry to provide students with the in-depth training necessary in a career emphasizing the design, planning and management of tree harvesting systems, logging equipment and environmental engineering in general.

Forest Engineering is engineering in a natural environment. Forest engineers are involved in reforestation methods, systems for wood production and harvesting, handling and transportation, forest road systems, design of improvised bridges, soil-water control and conservation, and recreational development.

A unique feature of the Forest Engineering curriculum is that it provides the academic background necessary for full association with both professional engineering and forestry societies. Founded upon intensive study in the physical and natural sciences, the professional subject matter contained in the program is directed toward on-campus as well as off-campus study. The realities encountered in the use of mechanized logging equipment in a natural environment are recognized as are the inherent constraints imposed by the interaction of technology, biology and social order.

In addition to basic engineering and forestry courses, four specific areas of forest engineering are dealt with: forest machinery, soil and water control, forest roads and structures, and logging systems planning.

Graduates may find employment as forest engineers with companies producing forest machinery and equipment, with pulp and paper or lumber firms, with federal and state agencies. Positions are open in research and development work, or in direct wood production and processing. Opportunities are nationwide in this new field.

The curriculum requires completion of 139 degree hours (including 6 degree hours in Forestry Summer Camp) at an accumulative grade point average of not less than 2.0.

Forest Engineering Curriculum

		Credit Hours
BASIC SCIENCES AND MATH		48
Ch 13 & 14	Chemical Principles	8
Ps 1 & 2	General Physics	8
Ms 26, 27, 28, 29	Calculus & Diff. Equations	16
Ge 7 (or Ms 69 or Ms 169)	Computer Programming	2
Bt 1	Plant Biology	4
Fy 4 (or Ms 19)	Statistics	3
•Bio-Earth Science Electives		7
ENGINEERING		35
Ge 1 & 2	Intro. to Design	4
Ce 5	Surveying	3
Me 33	Thermodynamics I	3
Me 55	Statics and Strength of Materials	3

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Me 52	Dynamics	3	
Me 59	Fluid Mechanics	3	
AE 20	Principles of Mechanization	3	
AE 55	Materials in Ag. Eng.	3	
AE 165	Soil & Water Engineering	4	
AE 170	Forest Machinery	3	
AE 173	Forest Roads & Structures	3	
		35	
FORESTRY			33
Fy 1	Intro. to Forest Resources (Audit)	0	
Fy 5	Forest Biometry	3	
Fy 6	Forest Photogrammetry	3	
Fy 7	Silvics (Forest Ecology)	4	
Fy 8	Silviculture	3	
Fy 13, 13s	Harvesting of Forest Crops	3	
Fy 41s	Summer Camp	6	
Fy 146	Forest Policy & Administration	3	
Fy 149	Timber Management and Valuation	4	
Fy 171	Production Analysis in Forestry	2	
Fy 172	Planning and Control of Forest Operations	2	
			12
HUMANITIES, SOCIAL SCIENCES, AND COMMUNICATIONS			
	Communications	6	
	Economics	6	
OTHERS			11
Pe 1	Physical Education	1	
	Electives	10	
	TOTAL		139
•Recommended electives include:—			
S3	Forest Soils		
Bt 156	Forest Pathology		
En 26A	Forest Entomology		

NATURAL RESOURCE MANAGEMENT

The curriculum provides a strong interdisciplinary emphasis in the natural and social sciences. These non-professional programs are designed for general training in natural resources management with specialized instruction in various disciplines. These programs provide a broad education and knowledge that will permit better planning and decision making regarding use of land and water resources. A rapidly increasing population and more leisure time has created keen competition by industrial recreational and agricultural interests for available land and water.

— *Conservation Technology*—Principles and technology related to conservation of natural resources.

— *Forest Resource Conservation*—Basic introduction to measurement and use of forest land.

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— **Land Use Planning**—Principles and technology related to making decisions in the use of land and other resources as they affect the economic environmental and ecological development.

— **Resource Economics**—Economic and business aspects of resource recreation development.

— *Soil and Water Conservation*—Soil conservation and hydrology.

NATURAL RESOURCE MANAGEMENT (CORE CURRICULUM)

		Credits
1. Mathematics and Physical Sciences		24
Mathematics	11	
Physics	5	
Chemistry	8	
2. Biological Sciences		15
Biology (Bt 1 or Zo 3)	4	
Ecology	3	
Entomology	4	
Elective	4	
3. Earth Sciences		6
Geology	3	
Soils	3	
4. Humanities and Social Sciences		18
Economics	3	
Literature	3	
Philosophy	3	
Political Science (Pol 1)	3	
Public Administration (Pol 151)	<i>or</i>	
Forest Policy Administration (Fy 146)	3	
Sociology	3	
5. Communications		9
Eh 1 College Composition	3	
Eh 17 Advanced Professional Exposition	3	
Sh 3 Fundamentals of Public Speaking		
6. Physical Education (1 semester)		1
7. Orientation		0
8. Professional Specialization		47
Department or School options		
Minimum degree hours for graduation		120

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Professional Specialization Options

The core curriculum represents the minimum credits that a student takes in the various areas to qualify for the degree. The professional specialization area requirement is met by selecting one of four options which follow

Option in (Conservation Technology)

			Credits
Basic Engineering and Mathematics			20
Ms 19	Principles of Stat. Inference	3	
Ms 27	Analytical Geometry and Calculus	4	
Me 50	Statics	3	
Ce 5	Surveying	3	
Ce 26	Hydraulics	4	
Ce 65	Soil Mechanics	3	
Professional Field			20
S 156	Physical Properties of Soils	3	
AE 164	Instrumentation	3	
AE 165	Soil and Water Engineering	4	
Ce 155	Hydrology	3	
Ce 230	Water Resources Engineering	3	
AE 83, 84	Special Design Topics	4	
Electives			8
Total			48

Option in Forest Resource Conservation (Non-professional)

			Credits
Forest Resources			22
Fy 1	Intro. to Forest Resources	2	
Fy 5	Mensuration	3	
Fy 7	Silvics	4	
Fy 8	Silviculture	3	
Fy 19	Ecology	3	
Fy 53	Forest Recreation Management	2	
Fy 128	Game Management	2	
Fy 157	Forest Watershed Management	3	
Related Sciences			20
Bt 2	Botany (or Zo 4)	4	
Bt 33	Dendrology (or Bt 164)	4	
Ce 5	Surveying	3	
IDL 170	Intro. to Oceanography	3	
ARE 171	Land Resource Economics	3	
Ce 175	Contemp. Environmental Pollution	3	
Electives			6
Total			48

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Option in
Soil and Water Conservation

				Credits
Soil and Water				25
AE	35	Soil Water Control	3	
Ce	175	Contemp. Environmental Pollution	3	
Gy	2	Geology	4	
P	21	Crop Science	3	
P 173. 174		Seminar	2	
S	2	Soil Science	3	
or				
S	3	Forest Soil Science	3	
S	50	Soil & Water Conservation	2	
S	52	Land Use Planning—Soil Aspects	2	
S	152	Soil Classification	3	
Resource Economics				9
ARE	150	Human Factors in Resource Development	3	
ARE	171	Land Resource Economics	3	
Ba	130	Legal Environment of Business	3	
Electives				14
Total				48

Option in
Resource Economics

				Credits
Professional Resource Economics				30
Ba	9	Accounting	3	
Ba	130	Legal Environment of Business	3	
Ec	173	Economic Analysis	3	
ARE	71	Economics of Environmental Quality	3	
ARE	154	Production Economics	3	
ARE	159	Business Management	3	
ARE	165	Marketing	3	
ARE	168	Price Analysis and Forecasting	3	
ARE	171	Land Resource Economics	3	
ARE	272	Resource Use & Economic Growth	3	
Other Social Sciences				6
Ec	153	Money and banking	3	
ARE	150	Human Factors in Resource Development	3	
Electives				12
Total				48

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Option in Land Use Planning				Credits
Professional Specialization				
Plant Soil and Water Sciences				14
Ce	175	Contemporary Environmental Pollution	3	
Fy	48	Natural Resources	2	
Fy	157	Forest-Water Relationships	3	
or				
S	50	Soil & Water Conservation	3	
Geo	1	Physical Geography	3	
or				
Gy	241	Glacial Geology	3	
S	152	Soil Classification	3	
Social Sciences				9
ARE	71	Economics of Environmental Quality	3	
ARE	150	Human Factors in Resource Development	3	
ARE	171	Land Resource Economics	3	
or				
Ec	154	Regional Economics	3	
Planning and Management				15
Fy	53	Recreation Management	2	
Fy	6	Photogrammetry	3	
Ge	11	Basic Graphics and Cartography	2	
S	52	Land Use Planning—Soil Aspects	2	
IDL		Landscape Design	3	
IDL		Land Use Planning	3	
Electives*				10
Total Professional Specialization				48
Minimum Degree Hours for Graduation				120

*Recommended Electives				Credits
AE	35	Soil Water Control	3	
Ba	9	Accounting	3	
Ba	130	Legal Environment of Business	3	
Ba	161	Personnel Management	3	
CSM	90	Real Estate Law (no credit)	0	
Geo	26	Economic Geography	3	
IDL	170	Intro. to Oceanography	3	
Pl	131	Logic I	3	
P	21	Crop Science	3	
P	31	Landscape Materials	3	
S	156	Physical Properties of Soils	3	
Sy	134	Population	3	
ARE	186	Government Policies Affecting Rural America	3	

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RECREATION AND PARKS

(Pending)

The curriculum prepares students for professional careers in the management and administration of recreation and park resources. Specific objectives include the identification and development of abilities that will prepare the student for management and executive positions in the recreational and parks field with specialization in economics, planning, supervision, and administration.

Unprecedented growth of the population, increase in leisure time, concentration of people around urban centers, and the rapid disappearance of open space all create a growing demand for professional recreation personnel to provide opportunities for meaningful leisure experience. Shortages exist for trained recreation workers. Opportunities are expected to increase in the future.

This baccalaureate degree program is offered by the College of Life Sciences and Agriculture. Students will take a basic core of courses in the physical, biological, and social sciences and humanities in addition to professional and technical courses in management and administration of parks and recreation enterprises. Upon completion of requirements students will be awarded a B.S. degree in Recreation & Parks (Management).

Planned, in the near future, is a joint offering in the College of Education that relates to the education aspects of the recreation and parks fields. Students completing requirements would be awarded a B.S. degree in Recreation & Parks (Education).

RECREATION AND PARKS

Core Curriculum

				Credits
Mathematics and Physical Sciences				11
*Ms	4	College Algebra and Trigonometry	4	
Ms		Statistics	3	
Ch		Chemistry	4	
Biological Sciences				15
Bt 1/Zo	3	Plant or Animal Biology	4	
*Bt	164	Taxonomy of Vascular Plants	4	
Zo	4	Animal Biology		
		(Zo 8 for Rec'n Ed. Opt.)	4	
Fy	19	Ecology	3	
Earth Science				7
Gy	1A	Natural Environment	3	
*S	2	Soil Science	4	
Humanities and Social Sciences				12
ARE	71	Economics of Environmental Quality	3	
ARE/SY	24	Sociology of Rural Life		
or				
Sy	3	Introduction to Sociology	3	
Py	1	General Psychology	3	
Pol	1	Introduction to Government	3	

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Communications				6
Eh	1	College Composition	3	
Sh	1	Oral Communication	3	

TOTAL—Core Curriculum				51
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*Not required for those students selecting *Education option*.

The following courses should be substituted:

Eh	6	Introduction to Fiction	3	
or				
Eh	9	Modern Literature		
Eh	7	Adv. Composition—Expository Writ.	3	
Hy 3	Hy 4	United States History	6	
or				
Ay 1	Ay 2	Introduction to Anthropology		

Option in
Management

				Credits
Economics and Business Management				15
Ec	10	Economics	3	
Ba	9	Accounting	3	
ARE	171	Land Economics	3	
Electives				
(See advisor for Recommendations)				6
Related Technical and Professional				27
IDL	161	Park Planning and Design	3	
IDL	162	Recreation and Park Management	3	
Fy	53	Forest Recreation Management	2	
Fy	128	Game Management	2	
Pol	151	Public Administration	3	
P	35	Landscape Design	3	
Electives				
(See advisor for Recommendations)				11
Recreation Leadership				9
Pc	69	Foundation of Recreation	2	
Pc	148	Field Experience	3	
Electives				
(See advisor for Recommendations)				4
Free Electives				18
Total Management Option				59
Minimum Degree Hours for Graduation				120

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School of Forest Resources

DIRECTOR KNIGHT; ASSOCIATE DIRECTOR (WILDLIFE) COULTER; ASSISTANT TO THE
DIRECTOR GIDDINGS; PROFESSORS CORCORAN, COULTER, DIMOND, GRIFFIN,
KNIGHT, MENDALL, SHOTTAER, YOUNG; ASSOCIATE PROFESSORS
GIDDINGS, HALE, KUTSCHA, OWEN, PLUMMER, RANDALL,
SCHEMNITZ, SCHOMAKER, WHITTAKER; ASSISTANT
PROFESSORS ASHLEY, BANASIAK, RICHENS.
ROBBINS, SHULER, ZAGATA;
INSTRUCTOR WILSON

Four undergraduate curricula with nine sequences are offered in the School of Forest Resources. The objectives are: (1) to train students in the theories and techniques for positions in forest land management, forest product harvesting, manufacture and sale, forest engineering, wildlife management and natural resources; (2) to prepare qualifying students for graduate study; (3) to provide a broad education for effective citizenship.

Graduation requirements in the School of Forest Resources are: (1) passing grades in all required courses; (2) successful completion of 132 degree hours plus summer camp (6 hours) and spring trips (1 hour) or alternatives, as required in the curriculum and sequence selected; (3) an accumulative average of not less than 2.0.

FORESTRY AND FOREST PRODUCTS

The sequences for Forestry and Forest Products offer students an opportunity to qualify for a degree in forestry, membership in the Society of American Foresters or other professional societies and for civil service positions in public agencies and for positions with private industry employing professional foresters. Graduates of the school have been employed in about equal numbers by private industry and public agencies. Students with qualifying grades are encouraged to pursue graduate work. All sequences provide an opportunity for a broad education by requiring both cultural and scientific courses supplemented by several hours of electives.

The Dwight B. Demeritt Forest is managed by the School. This tract of 1,750 acres lies within two miles of the campus and is used extensively as a field laboratory and for research. The School assists the Maine Forest Service in the management of Indian Township in eastern Maine. This tract of 17,000 acres is close to the location of Camp Robert I. Ashman where the summer field courses required of forestry are given. A variety of wood-using firms are located near the school and the summer camp area.

Field or work experience is essential to foresters. Students are urged to obtain summer employment in the forest environment if possible.

Two off-campus training periods are required of forestry students. (1) A week's field trip through New England in silviculture or utilization is required of all forestry students at the completion of the junior year. (2) Immediately following the sophomore year, six weeks at camp near Princeton, Maine (Indian Township), is required.

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The program in Wood Science and Technology emphasizes the study of the properties and basic structural components of wood, as well as the conversion and distribution of wood-based products. The off-campus training phase of this program provides for approved employment experience followed by a comprehensive report as a possible alternative to spring trip and summer camp requirements.

WILDLIFE MANAGEMENT

The three sequences in Wildlife Management offer a broad training in the natural sciences. The management sequence is designed to train students for forestland, game habitat management, and, for graduate work. The ecology sequence is designed for students who are most interested in biology and who plan to do graduate work. The general sequence offers an opportunity for students to pursue a variety of objectives in an innovative way. Upon completion of the curriculum requirements the student is granted the degree of bachelor of science in wildlife management.

Off-campus training of six weeks is required after the sophomore year of all students in the wildlife sequences. Field experience is important to wildlife managers and students are urged to obtain summer field employment.

Seniors and graduates are eligible for Civil Service examinations for positions with federal and state agencies that administer natural resources.

The **Maine Cooperative Wildlife Research Unit** provides for a cooperative wildlife program sponsored and financed by the University, the Maine Department of Inland Fisheries and Game, the U. S. Fish and Wildlife Service, and the Wildlife Management Institute. The director of the school is the University representative on the Coordinating Committee. The purpose of the unit is to conduct and promote research, graduate training and public education in the wildlife field.

NATURAL RESOURCES (FOREST RESOURCES CONSERVATION)

This is an interdisciplinary curriculum leading to a B.S. in Natural Resource Management (Forest Resources Conservation), designed to offer a broad training in the various fields of natural resources. Courses in social sciences, humanities, and communications together with resources are required to provide a liberal education and a general natural resource background with the major in forest resources. This program is not designed to meet the requirements for professional standing in forestry or wildlife. See details on page 260.

FOREST ENGINEERING

The bachelor of science degree in Forest Engineering is a program jointly administered by the School of Forest Resources and the Agricultural Engineering Department. It is designed to meet the accreditation requirements of both the engineering and forestry professions. The program offers a unique opportunity to prepare for a diversity of challenging careers that direct engineering principles toward the needs of the forest environment.

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Graduate Study

Students are accepted for graduate work in both forestry and wildlife management. Course requirements are flexible in the School of Forest Resources so that a student may be provided the best education available for his particular objectives, previous training, and thesis interest. Further details are available in the Graduate School catalog and from the School of Forest Resources. Three degrees are offered: the Master of Science in Forestry and in Wildlife Management and the Ph.D. in Forest Resources.

CURRICULA AND AVAILABLE SEQUENCES

Students in Forest Resources have nine sequences from which to choose their program.

Forest Management	Wildlife (General)
Forest Utilization	Wildlife Ecology
Forestry (General)	Wildlife Management
Wood Science and Technology	Natural Resources Management
Forest Engineering	

Freshman Year

The first semester in the School of Forest Resources sequences is a common program for all students (see page 244). The second semester varies in minor details for different sequences. Students are not required to select a specific upperclass specialization until near the end of the second semester.

Basic Core: All students are required to take the following 53 credit hours of core courses:

		Hours Required			Required Hours
Bt	1	Plant Biology (or Zo 3)	4	Sh	3
Zo	4	Animal Biology (or Bt 2)	4		Fund. of Public Speaking
Ch	11 & 12	General Chemistry (or Ch 9, 10 or Ch 13, 14	8	Ps	Physics (Ps 6 minimum)
Bt	33	Dendrology (or Bt 164)	4	Ms	Mathematics (Ms 4 minimum)
Eh	1	College Composition	3	Ge	11 Basic Graphics & Cartography
Ec	10	Principles of Economics	3		His./Gov't. Elective
Eh	17	Advanced Prof. Exposition	3		Lit./Fine Arts Elective
				Pe	1 Physical Education
					53

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Additional Required Courses

Forestry Sequences*			Wildlife Sequences*		
		Credit Hours			Credit Hours
Fy	1	Intro. to Forest Resources .....2	Fy	1	Intro. to Forest Resources .....2
Fy	4	Stat. Inf. in For. Res. ....3	Fy	4	Stat. Inf. in For. Res. ....3
Ce	5	Surveying .....3	Zo	131	Vertebrate Zoology .....4
Fy	5	Forest Biometry .....3	En	26	Entomology .....4
Fy	112	Wood Technology I .....2	Fy	19	Ecology .....3
Fy	7	Silvics (Forest Ecology) .....4	Fy	22	Biol. Charact. of Birds and Mammals .....3
Fy	8	Silviculture .....3	Fy	21s	Wildlife Ecology .....6
Fy	149	Timber Mgt. & Valuation .....4	Zo	153	Invertebrate Zoology .....4
Fy	144	Forest Economics .....3	S	3	Forest Soil Science .....3
Fy	146	Forest Policy & Administration .....3	Fy	7	Silvics (Forest Ecology) .....4
S	3	Forest Soil Science .....3	Fy	127	Wildlife Biology .....4
Fy	60	Seminar .....2	AnV	144	Disease & Parasites of Wildlife .....3
		Forest Protection Elective .....4			
Fy	41s	Practice of Forestry .....6	Fy	60	Seminar .....2
		45			45

*Does not include Wood Science and Technology, Forest Engineering and Natural Resource Management.

Forest Management Sequence			Wildlife Management Sequence		
Ge	12	Basic Graphics & Cartography .....2	Ce	5	Surveying .....3
Gy	6	Geology for Engineers .....3	Fy	6	Photogram. & Remote Sensing .....3
En	26A	Intro. to Entomology .....4	S	50	Soil & Water Conservation .....2
Fy	6	Photogram. & Remote Sensing ...3	Ba	9	Accounting .....3
Fy	19	Ecology .....3	IDL		Land Use Planning .....3
Fy	11	Forest Fire Control .....2	Zo	171	Fishery Biology .....4
Fy	8s	Silviculture Trip .....1	Fy	149	Timber Mgt. & Valuation .....4
Fy	13	Forest Harvesting .....2	Fy	53	Forest Recreation Mgt. ....2
Fy	128	Wildlife Management .....2	Fy	144	Forest Economics .....3
Fy	157	Forest Watershed Mgt. ....3	Ba	161	Personnel Management .....3
Ba	9	Principles of Accounting .....3			
Fy	53	Forest Recreation Mgt. ....2			
Fy	156	Forest Pathology .....4			

Forest Utilization Sequence			Wildlife Ecology Sequence		
Ge	12	Basic Graphics & Cartography .....2	Bc	21	Organic Chemistry .....4
Bt	135	Plant Anatomy .....4	ARE	171	Land Resource Economics or Fy 144 Forest Economics .....3
Fy	112	Wood Technology I (Lab.) .....1	Ms	181	Intro. to Computer Science .....3
Fy	116	Wood Anatomy .....4	Pa	1a, 2a	General Physics .....3
Fy	14	Primary Wood Processing .....4			
Fy	125	Wood Technology II .....3			
Fy	13	Forest Harvesting .....2			
Fy	13s	Utilization Trip .....1			
Ba	9	Principles of Accounting3			
Fy	11	Forest Fire Control2			
En	26A	Forest Entomology4			

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Forestry (General)*

Fy	19	Ecology	3
		Professional Electives	15-20
		Conservation Education	
		Conservation Information	
		and Education	
		Forest Products Marketing	
		Forest Protection	
		Forest Recreation	
		Land Use Planning	
		Science	
		Urban and Community Forestry	
		Watershed Management	
		Wildlife Management	

Wildlife (General)*

ARE	171	Land Resource Economics	
		or Fy 144 Forest Economics	3
		Professional Electives	15-20
		Conservation Education	
		Conservation Information	
		and Education	
		Conservation Law Enforcement	
		Fishery Management	
		Forest Recreation	
		Forestry	
		Land Use Planning	
		Natural History Interpretation	

*The general curricula provide students an opportunity to specialize in various options. Students must select 15 to 20 credits in one of the listed options. Options should be selected by the start of the junior year.

Wood Science and Technology

Fy	1	Intro. to Forest Resources	2
Fy	4	Stat. Inf. in For. Res.	3
En	26A	Intro. to Entomology	4
Fy	5	Forest Biometry	3
Fy	112	Wood Technology I	3
Bt	135	Plant Anatomy	4
Fy	116	Wood Anatomy	4
Ms	27	Analytical Geo. & Calculus	4
Fy	7	Silvics	4
Fy	14	Primary Wood Processing	4
Fy	125	Wood Technology II	3
Ps	1, 2	Physics	8
Fy	144	Forest Economics	3
Bt	156	Forest Pathology	4
Fy	60	Seminar	2

Forest Engineering

		Basic Sciences & Math	48
		Basic Engineering	25
		Engineering—Professional	
		Field	17
		Forestry—Professional Field	28
		Humanities, Social Sciences	
		and Communications	18
		Details presented on page	269
		Natural Resource Management	
		(Forest Resources Con-	
		servation Option)	
		Core Courses in Nat. Res. Mgt. ...	72
		Option specialization	48
		Details are presented on	
		pages 262-264.	

Courses in the School of Forest Resources (Fy)

1. Introduction to Forest Resources—Instruments and techniques for field measurements— orientation. Required of freshmen in the School of Forest Resources. *Rec 1, Lab 3, Cr 2.* MR. GIDDINGS AND STAFF

4. Statistical Inference in Forest Resources—Elementary statistical background and sampling procedures based on statistics in forestry and wildlife. Use of desk calculators and introduction to electronic computers. Prerequisite: Ms 4. *Rec 2, Lab 3, Cr 3.* MR. ASHLEY

5. Forest Biometry—Determination of volume of standing and felled timber. Construction of log rules, volume tables, and yield tables. Determination of growth and yield. Prerequisite: Fy 1, 4. *Rec 2, Lab 3, Cr 3.* MR. ASHLEY

6. Photogrammetry and Remote Sensing—Construction of planimetric and topographic maps by photogrammetric methods. Determination of forest types and stand composition by interpretation and measurements of air photos. *Rec 2, Lab 3, Cr 3.* MR. ASHLEY

7. Silvics (Forest Ecology)—Biological principles and environmental factors governing the natural establishment and development of forest trees and stands. Prerequisite: Bt 33, Fy 1 or permission. *Rec 2, Lab 3, Cr 4.* MR. GRIFFIN

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8. Silviculture—Technical methods of controlling the composition, growth, quality, and regeneration of forest stands. Prerequisite: Fy 7. *Rec 2, Lab 3, Cr 3.*
MR. GRIFFIN

8s. Silviculture Trip—One week is spent visiting public and private forests of the Northeast. Silvicultural problems and methods of managing important forest types of the region are studied. *Cr 1.*
MR. GRIFFIN

10. Forest Planting—The planting, care, and selection of stock in nursery and field plantings. Seed collecting and processing. Mechanical planting and field techniques. One-day field trip required. *Rec 1, Lab 3, Cr 2.* (Not offered 1973-74)
STAFF

11. Forest Fire Control—Forest fire behavior as influenced by fuels, weather, topography. Ecological effects of fire. Methods of preventing and controlling fires. Use of fire in forest management. *Rec 2, Cr 2.*
MR. RANDALL

13. Harvesting of Forest Crops—Harvesting methods in the various regions of the United States and Canada, with special emphasis on the Northeast. Discussion of organization, costs, equipment, and trends. *Rec 2, Cr 2.*
MR. PLUMMER

13s. Utilization Trip—One-week field trip to northern New England and adjacent Canadian provinces to visit woods operations and forest management projects. *Cr 1.*
MR. PLUMMER AND STAFF

14 Primary Wood Processes — Introduction to the conversion processes involved with the principal primary forest products, such as lumber, pulp, veneer, and derived products. Characteristic properties of typical products; effect of raw material on processing technology. *Rec 2, Lab 3, Cr 4.*
MR. HALE

17. Wood Preservation—Causes of deterioration of wood in service; preservatives, preparation of material; wood preserving process. *Rec 2, one-half semester, Cr 1.*
MR. HALE

19. Ecology—Study of the relationships between living organisms and their environment with emphasis upon the ecosystem, ecological factors, succession, community distribution, populations and the role of ecology in natural resources. This course and Bt 130 and Zo 156 all cover basic ecological principles but with different emphases. It is recommended that only one of these ecology courses be taken for credit. No freshmen. *Rec 3, Cr 3.*
MR. COULTER, MR. KNIGHT, MR. OWEN, MR. ZAGATA

20s. Wildlife Field Trip—One-week field trip for majors only. *Cr 1.* STAFF

21s. Wildlife Ecology—Field problems in forest-wildlife ecology. Recognition, measurement analysis and interpretation of problems in forest-wildlife relationships. Six weeks in summer session.

- | | |
|--|-------------|
| A. Plant Communities, Sampling and Analysis | <i>Cr 2</i> |
| B. Ecosystem Analysis | <i>Cr 2</i> |
| C. Wildlife Ecology | <i>Cr 2</i> |

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6

MR. ZAGATA AND STAFF

22. Biological Characteristics of Birds and Mammals—Major characteristics and adaptations of birds and mammals. Emphasis on identification, distribution, habits and habitat requirements. *Rec 2, Lab 2, Cr 3.*
MR. SCHEMNITZ

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24. Range Management—History and economic importance of the range livestock industry. Utilization and management of the forage resource; relation to other land use. National and regional problems in grazing use; administration of public grazing lands. *Rec 2, Cr 2.* MR. RANDALL

30. Wildlife Law Enforcement—The role of law enforcement in modern wildlife management. History and development of law and relationship to present policies. Description of organizations. Operations and duties of personnel. *Rec 2, Cr 2.* MR. SCHEMNITZ

41& Forest Resources (Summer Camp)—Field practice in methods and problems involved in the management of a large forest property. Made up of 4 courses as follows

A. Forest Resource Management—*Cr 2.*

B. Forest Biology—*Cr 1.*

D. Forest Resource Sampling—*Cr 2.*

E. Forest Land Surveying—*Cr 1.* Prerequisite *Fy 5.*

MR. ASHLEY AND STAFF

45. 46. Special Problems—Original investigation in forestry and wildlife work, the subject to be chosen after consultation with the staff. Open to high-ranking juniors and seniors. *Cr Ar.* STAFF

48. Natural Resources—The characteristics, status, utilization, and management of natural resources. The social aspects of resources management. Open to juniors and seniors. *Rec 2, Cr 2.* MR. ZAGATA AND STAFF

53. Forest Recreation Management—Methods of evaluation, planning and development of wildlands for recreation. Importance, problems and trends. Public and private programs and policies. Offered to Forest Resources majors or by permission of instructor. Two Saturday field trips required. *Rec 2, Cr 2.*

MR. WHITTAKER

60. Seminar—Reviews of literature measurement and analysis of specific problems in forest and wildlife resources. Majors, Forest Resources. *Rec 4, Cr 2.* STAFF

112. Wood Technology I—The structural and physio-chemical nature of wood and its response to environmental, physical, and chemical influences. Study of growth-material relationships and basic laboratory techniques. Prerequisites: Bt 1. Without lab: *Rec 2, Cr 2; Lab, 2 hrs, Cr 1.* (Lab required of Utilization and Wood Technology majors.) MR. SHULER

116. Wood Anatomy—Identification and anatomical characteristics of wood and wood fibers by gross and microscopic features. Prerequisite: Bt 135 or permission of instructor. *Lec 2, Lab 4, Cr 4.* MR. KUTSCHA

125. Wood Technology II—The mechanical properties of wood and wood composites and their use in structural applications. The relationship of mechanical and physical properties to basic processing techniques. Prerequisite: *Fy 112.* *Rec 2, Lab 2, Cr 3.* MR. SHOTTAFFER

126. Process Analysis in Forest Utilization—Processing research and development problems and review of current methods of analysis and solution. Application of process design, systems analysis and materials technology in the investigative situation. Prerequisite: permission of instructor. *Rec 2, Lab 2, Cr 3.*

MR. SHOTTAFFER AND STAFF

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127. Wildlife Biology—The principles of wildlife biology. Study of the biological, economic and human relations factors influencing wildlife resources. Prerequisite: Fy 19, Bt 164, Fy 7, Zo 131, or equivalents. *Rec 2, Lab 4, Cr 4.*

MR. SCHEMNITZ

128. Wildlife Management—The practice of wildlife management. Study of the biological, economic and human relations factors influencing management programs. For non-wildlife majors. *Rec 2, Cr 2.*

MR. RICHENS

129. Research Methods in Wood Technology—Advanced methods of evaluating wood, wood based, and related materials. Introduction to techniques and concepts of evaluation design. Review of pertinent laboratory equipment and its applications. Prerequisite: Fy 4, Fy 125. *Rec 1, Lab 4, Cr 3.*

MR. SHOTTAFFER AND STAFF

144. Forestry Economics—Forest resources of U. S. and the world and prospects of meeting increased demand for forest products. Economic factors in forest production and use of economic analysis in making forest management decisions. Prerequisite: Ec 10. *Rec 3, Cr 3.*

MR. CORCORAN

146. Forest Policy and Administration—Federal, state and private forest policies in U. S. Comparisons to foreign countries. Land ownership and usage. Administration of national, state and private forests. Organizing, staffing, and equipping forestry enterprises. Majors, Forest Resources. *Rec 3, Cr 3.*

MR. WHITTAKER

149. Timber Management and Valuation—Managing forest properties for sustained yield of timber products. Determination of annual cut and effect of taxation. Evaluating forest investments. Preparation of management plans. Majors, Forest Resources. Prerequisite: permission of instructor. *Rec 3, Lab 2, Cr 4.*

MR. GIDDINGS

157. Forest Watershed Management—Role of forests in water cycle. Effect of logging, recreation, mining, and other forest land uses on water resources. Prerequisite: Fy 4, Fy 7, or their equivalents, or permission of instructor. *Rec 2, Lab 2, Cr 3.*

MR. SCHOMAKER

IDL 162 Recreation and Park Management—Fundamental management consideration related to the administration of recreation and park programs. Prerequisite IDL 161 or permission. *Rec 3, C 3.*

MR. TOBEY AND MR. WHITTAKER

IDL 170. Forest Machinery—Power sources for forest operations, construction principles, testing and rating, design and use of forest machinery, power requirements, selection, and engineering aspects of machinery systems design. Prerequisite: Ps 1 or Ps 6. *Lec 2, Lab 3, Cr 3.*

171. Production Analysis in Forestry—Introduction to concepts and procedures used in the evaluation of timber production and forest production manufacturing with emphasis on study organization, work measurement, inventory control, capital budgeting, cost control, network analysis and schematic models. Seniors, graduate students, or consent of instructor. *Rec 2, Cr 2.*

MR. CORCORAN

172. Planning and Control of Forestry Operations—Applications of scientific methods to management decision problems of forestry operations. Emphasis on mathematical programming, markov processes, waiting-line analysis sequencing, simulation, and competitive strategies. Seniors, graduate students, or consent of instructor. *Rec 2, Cr 2.*

MR. CORCORAN

IDL 173. Forest Roads and Structures—Design construction, and maintenance of improvised road systems and bridges; road-vehicle interactions; design

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and construction of light buildings for forest and recreational use. Prerequisite: Ps 1 or Ps 6. *Lec 2, Lab 3, Cr 3.*

209. Regional Silviculture—Applied silvicultural practices and results of current silvicultural research in important forest types of the United States. Prerequisite: Fy 8. *Rec 2, Cr 2.* MR. GRIFFIN

215. Research Techniques in Wood Anatomy—Preparation of woody tissue for light microscopic examination and recording, including microtechniques and photomicrographic methods. Introduction to electron microscopy and interpretation of wood ultrastructure. Prerequisites: Bt 150 and Fy 116, or permission. *Lec 2, Lab 4, Cr 4.* MR. KUTSCHA

228. Advanced Wildlife Ecology—A study of the factors affecting the distribution, abundance, and physiology of wildlife species. Prerequisite: Fy 127, or permission of instructor. *Rec 3, Lab 2, and occasionally Saturday field trips. Cr 4.* MR. OWEN

230. Wood Physics—Study and evaluation of non-mechanical physical properties of wood; principally response to liquids, vibrational stimulation, heat, electricity and ionizing radiation. Prerequisite: an understanding of basic physics and wood anatomy or permission of instructor. *Rec 2, Lab 2, Cr 3.* MR. SHULER

232. Forest Influences—Effects of forest vegetation upon climatic factors, soil water, stream flow, floods, erosion, and soil productivity. Prerequisite: Fy 7 and S 3. *Rec 2, Cr 2.* MR. GRIFFIN

247. Advanced Forest Biometry—Sampling methods and the principles of regression analysis as applied to forest resources and the biological sciences. Prerequisite: Fy 4, Ms 19 or S 271 or equivalent. *Rec 3, Cr 3.* MR. YOUNG

254. Forest Recreation Planning—Methods of measuring, analyzing, and forecasting recreational use of forest lands. Concepts of planning, and their application to forest recreation management. Prerequisite: Fy 53, Are 171, or permission of instructor. *Rec 3, Cr 3.* MR. WHITTAKER, MR. CORCORAN

276. Forest Inventory and Growth—Principles and exploration in detail of approaches to inventory and growth. Field trips will be required. Forestry juniors, seniors, graduate students, and consent of instructor. Prerequisite: Fy 4 and 5. *Rec 2, Cr 2.* MR. YOUNG

301. 302. Forest Mensuration Problems—*Cr Ar.*

MR. YOUNG AND MR. ASHLEY

303. 304. Forest Management Problems—*Cr Ar.*

STAFF

305. 306. Wildlife Management Problems—*Cr Ar.*

STAFF

307. 308. Silviculture Problems—*Cr Ar.*

MR. GRIFFIN

309. 310. Photogrammetry Problems—*Cr Ar.*

MR. YOUNG AND MR. ASHLEY

311. 312. Research Problems in Forestry Economics—*Cr Ar.*

MR. CORCORAN

313. 314. Forest Recreation Problems—*Cr Ar.*

MR. WHITTAKER

315. 316. Problems in Wood Technology—*Cr Ar.*

STAFF

IDL 340. Seminar in Ecology—*Cr Ar.*

STAFF

350. Graduate Seminar in Wildlife Science—*Cr Ar.*

STAFF

399. Graduate Thesis—*Cr Ar.*

STAFF

School of Human Development

DIRECTOR THORNBURY; ASSOCIATE PROFESSORS MCINTIRE, OLIVER, SCHOMAKER;
ASSISTANT PROFESSORS BRIGHTMAN, FRASER, ROTHMAN, WEBBER; INSTRUCTORS
DALTON, HYATT, JENNEWEIN, LAFFERTY, MUSGRAVE, SMALTZ

Human development encompasses physical, social, economic, and aesthetic aspects of living in complex, technologically advancing societies. Emphasis is given to the unique combination of needs of family units at a given time for food, housing, clothing, management of resources, human development, and interpersonal relationships with training designed to prepare the student for employment or family life. This involves coordinating knowledge from fields of learning that contribute to understanding needs and helping people to use this information to solve human problems.

The undergraduate curriculum leads to a bachelor of science degree. About half of the student's program includes courses in the arts, humanities, social and biological sciences, and specialized subjects offered within the school in child development, family relationships, clothing, design, food, nutrition, home economics education, home management and housing. The other half of the student's program is designed to meet demands of preprofessional or professional employment as follows:

Food and Nutrition Programs—Dietetic intern in programs approved by the American Dietetic Association; food service administrator in commercial, industrial, publicly owned, or private food establishments; research assistant in food and nutrition; product development supervisor.

Education Programs—Teacher in childhood education in nursery and elementary schools; consultant in child development for a social service agency; teacher of home economics in public schools; teacher of youth and adults through extension activities; teacher of health and family life; educational director for consumer services.

Individual sequences of courses may be developed for students from other countries and persons not attempting to qualify for any of the recognized home economics professions covered in other sequences. These sequences will consist of selected advanced human development courses and related subjects in other divisions of the University.

A minimum of 120 semester hours is required for graduation at an accumulative grade point average of 2.0.

CURRICULUM FOR B.S. DEGREE IN HUMAN DEVELOPMENT

All students are required to take the following 34 hours

Communications		6 hours
Oral	3	
Written	3	
Physical Sciences		8 hours
To be selected from botany, geology, chemistry, entomology, physics, bacteriology or zoology. One year of this work must be basic courses in laboratory science.		

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Social Sciences

Py 1 is required and others to be selected from sociology, psychology, history, government, economics or modern society. Introductory courses are not to exceed 9 hours.

Humanities

Philosophy, art, literature, music, intermediate and advanced levels of language and honors. (Must represent two fields)

Requirements in pre-professional and professional sequences, and electives to make a total of the required 120 hours.

Additional Required Courses in Professional Sequences

I. FOOD AND NUTRITION SEQUENCES:

(Science requirements depend upon option)

Option A—Dietetic Intern *

Ba	9	Principles of Accounting	3	Hm	93	Equipment	3
Mb	127	Intro. to Bacteriology	3	Py	111	Business & Industrial Personnel	
Fn	41	Intro. to Food & Nutrition	3	or Ba	161	Management Psychology	3
Fn	42	Family Food Management	3	Py	117	Educational Psychology	3
Fn	43	Experimental Foods	4	Zo	8	Anatomy & Physiology	4
Fn	152	Human Nutrition	3				
Fn	155	Abnormal Nutrition	3				
Fn	61	Quantity Food	3				
Fn	62	Food Service Management	3				
Fn	63	Food Service Administration					
		and Cost Control	3			Total	44

* Approved by American Dietetic Association and recommended for all dietitians.

Option B—Food Service Administrators

Same as Option A, except that additional courses in business, economics, food and nutrition may be substituted for Fn 155, Py 111, and Py 117.

Option C — Nutritionists, research assistants in food and nutrition and supervisors in product development

Same as Option A, except courses in chemistry, math and physics may be substituted for Fn 61, Fn 62, Fn 63, Hm 93, Ba 9, Py 111, and Py 117.

II. EDUCATION SEQUENCES

A limited number of students may arrange to spend two semesters at the Merrill-Palmer Institute in Detroit, Michigan.

CHILD DEVELOPMENT

Basic Core

Cf	2	Introduction to Child Development	3
Cf	3	Development of the Preschool Child	3
Cf	4	Development of the Young School Child	3
Cf	111	Family Relationships	3
Cf	155	The Adolescent & His Culture	3
Fn	41	Intro. to Food & Nutrition	3
Hm	185	The Family's Financial Problems	3
		Total	21

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Option A—Elementary School Teachers (for certification to teach kindergarten through grade 8)

Cf	120	Creative Activities for the Young Child	3
Cf	121	Foundations for Academic Learning	3
Ed	B2	The American School	3
Ed	B4	The Teaching Process	3
Ed	M13	Teaching of Reading	3
Ed	M18	Teaching of Language Arts	3
Ed	M114	Teaching Arithmetic	3
Ed	M115	Teaching Social Studies	3
Ed	M116	Teaching Science	3
Ed	M190	Student Teaching	6
Ms	7	Structure of Arithmetic	3
Py	117	Education Psychology	3
Total			39

Option B—Nursery, Kindergarten School Teachers

Cf	109	Special Problems in Child Development	3
Cf	119	Supervised Student Teaching in a Selected School	6
Cf	120	Creative Activities for the Young Child	3
Cf	121	Foundations for Academic Learning	3
Ed	B2	The American School	3
Ed	M13	The Teaching of Reading	3
or			
Ed	M18	Teaching of Language Arts	
Ed	M116	Teaching of Science	3
Ed	X198	Problems in Education	3
Py	117	Educational Psychology	3
		Psychology Electives	9
Total			39

Option C—Social Service Work in Child Development and Family Life

Hm	81	Home Management Principles & Theories	3
Hm	82	Management in Homes	3
Hm	191	Housing	3
Py	130	Social Psychology	3
Py	133	Abnormal Psychology	3
Sy	3/4	Intro. to Sociology	6
IDL	24	(ARE, Sy) Sociology of Rural Life	
or			
Sy	126	Sociology of Urban Life	3
Sw	150/151	Social Welfare	6
Sw	152	Social Work as a Profession	3
Total			33

HOME ECONOMICS EDUCATION

To meet certification requirements for home economics teacher in the secondary school.

General education (34 hours from basic core)

50 hours

Professional

19 hours

He	71	Tech. in Teaching Home Ec.	2
He	72	Curr. Dev. in Home Ec.	3
Ed	B2	The American School	3

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He	176	Adult Education	3	
	or			
He	180	Evaluation	3	
He	73	Supervised Student Teaching	8	
Home Economics				40 hours
		Child Development & Family Relationships	8	
		Clothing & Textiles	8	
		Clothing & Textiles	8	
		Housing, Home Furnishings & Equipment	8	
		Family Economics & Management	8	

GENERAL HOME ECONOMICS

The 40 hours of home economics courses as required under Home Economics Education

It is recommended that additional hours be elected in either Clothing and Textiles or Foods and Nutrition.

HEALTH AND FAMILY LIFE EDUCATION

This program is designed to give professional preparation for those persons who want to become public school teachers or supervisors in the newer fields of health and family life education. The program includes general health education. The content of the curriculum has been designed to fulfill national and state recommendations regarding the preparation needed for such teachers. Graduates receive the degree of bachelor of science in health and family life education and are qualified for special certification at both the elementary and secondary levels.

Communications 6 hours

Eh	1	College Composition (3)
Sh	3	Fundamentals of Public Speaking (3)
	or	
Sh	6	Fundamentals of Interpretation (3)

Physical Sciences 12 hours

Bc	7	Fundamentals of Chemistry (4)
Bc	8	Elementary Physiological Chemistry (4)
Zo	8	Anatomy and Physiology (4)

Social Sciences 12 hours

Py	1	General Psychology
Sy	3	Introduction to Sociology
(Introductory courses cannot exceed 9 hours.)		

Humanities 8 hours

Philosophy, art, literature or music
(must represent two fields)

Professional 20 hours

Pe	178	Health Education	3
Pe	183	Planning the Health Education Curriculum	3
Ed	B2	The American School	3
Ed	B4	The Teaching Process	3
He	73	Supervised Student Teaching	8

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Specialized Field

50 hours

Health (30 hours)

Pe	198	Problems in Health or Physical Education & Recreation	3
Mb	30	Fundamental of Public Health	2
Fn	41	Introduction to Food & Nutrition	3
Mb	127	General Bacteriology	3
Mb	21A	Elementary Microbiology Laboratory	1
Py	132	Mental Hygiene	3
Py	133	Abnormal Psychology	3
Cf	215	Sex Education of the Child from 5 to 12	3
Cf	216	Family Life & Sex Education of Youth	3
Pe	168	Protective Practices & Safety in Physical Education & Athletics	3
Pe	283	Administration of Elementary & Secondary School Health Program	3

Family Living (23 hours)

12 hours

Cf	2	Introduction to Child Development	3
Cf	3	Development of the Preschool Child	3
Cf	4	Development of the Young School Child	3
Cf	111	Family Relationships	3
Cf	155	The Adolescent & His Culture	3
Cf	109	Special Problems in Child Development	3
Hm	185	The Family's Financial Problems	3
Cf	285	New Findings in Child Development & Family Relationships	2

Electives

12 hours

Should be selected primarily from the social sciences (sociology, history, government, economics or modern society) emphasizing especially sociology with such courses as ARE/Sy 24 (Sociology of Rural Life), Sy 110 (Social Organization), Sy 113 Social Disorganization), Sy 126 (Sociology of Urban Life, or Sy 129 (The Individual and the Community).

50 hours

*8 hours of specialized courses count as liberal education in addition to these 52.

COURSES IN THE SCHOOL OF HUMAN DEVELOPMENT

Child Development and Family Relationships (Cf)

2. *Introduction to Child Development*—Observations and study of inter-personal relations of young children are used as a basis for understanding human relations (and the "self"). Observation in the nursery school. Cr 3. Open to Freshmen. STAFF

3. *Development of the Preschool Child*—Development of children from infancy through the preschool years and factors affecting it. Special emphasis on the role of the family. Laboratory experience in the nursery school. Prerequisite: Cf 2. Rec 2, Lab 2, Cr 3.

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4. Development of the Young School Child—Developmental study of children of six through 12 years of age. Influencing factors, especially home and school, are given special consideration. Laboratory observations in nursery school and public schools. Prerequisite: Cf 3, Py 1. *Rec 2, Lab 2, Cr 3.*

109. Special Problems in Child Development—Prerequisite: permission.
STAFF

111. Family Relationships—Interpersonal relationships in marriage preparation, courtship, choosing a mate, engagement. Husband-wife relationships in fulfilling physical, emotional, social, intellectual, spiritual needs. Parent-child relationships. Prerequisite: sophomore. *Cr 3.*

119. Supervised Student Teaching in a Selected School—A student teaching program in the Child Development Nursery School to be arranged on a full-day basis for one half of the semester or one half day for the full semester. Prerequisite: Cf 120, 121, and senior standing. *Cr 6.*

120. Creative Activities for the Young Child—Contributions of the areas of play, art, literature, dramatics and music to the development of creativity in children 3 to 8 years of age. Experience with children in all four areas. Prerequisite: junior standing. Cf 2, 3 or equivalent. *Cr 3.*

121. Foundations for Academic Learning—Readiness programs for the kindergarten and primary child in four academic areas: reading, mathematics, social studies and science. Prerequisite: junior standing. Cf 4, 120. *Cr 3.*

153. The Older Adult—The years from middle age through senility. Physical, social, psychological, familial, emotional, and material aspects of the adult's life, his adjustments and relationships. Older persons in our culture, preparation for and adjustments to retirement, senior citizens' problems, programs. *Cr 3.*

155. The Adolescent and His Culture—The problems of youth and the role of parents, teachers and leaders in guiding him toward physical, intellectual, social, emotional, and spiritual maturity in the family, school, church, and community. Undergraduate or graduate credit. *Cr 3.*

211. Seminar in Family Relationships—Reports and discussions of current literature in family relationship and related social sciences with special attention to critical analysis. *Cr 3.*

215. Sex Education of the Child from 5 to 12—Why, what, when, and how of sex education based upon knowledge of the psycho-sexual-social development of the child. Methods materials curricula useful at home and in the classroom. Undergraduate or graduate credit. *Cr 3.*

216. Family Life and Sex Education of Youth—The roles of the home, school, community in preparing youth for marriage and family living. Goals, content, methods, materials, and curricula in family life and sex education of junior high and senior high youth. Undergraduate or graduate credit. *Cr 3.*

260. Seminar in Child Development—Reports and discussions of research finding in child development. *Cr 3.*

285. New Findings in Child Development and Family Relationships—Recent findings in child development and family relationships selected to help teachers interpret children's interaction and adjustment to peers, to family, to school and to society. *Cr 2.*

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Clothing and Design (Cd)

22. Principles of Clothing Construction—Principles involved in clothing construction with application to garments; practice in communications of principles for teaching. *Rec 1, Lab 4, Cr 3.* MISS LAFFERTY

25. Textiles—Fibers, yarns, fabrications, finishes, labels; end-uses in home and clothing. Consumer education and protection. *Rec 3, Cr 3.* MISS LAFFERTY

31. Design—Selection and organization of design elements in two- and three-dimensional space. Study of principles of design to achieve visual order in compositions. Experimentation with various media and techniques. Practice in critical thinking and discriminating attitudes toward design forms. *Rec 2, Lab 2, Cr 3.*

33. Applied Textile Design—Application of design principles to such textile problems as block printing, batik, decorative needlework, and hand weaving. Prerequisite: Cd 31 or 32, or permission. *Lab 4, Cr 2.*

38. Special Problems in Design—*Cr 1-3.* MISS SMALTZ

39. Special Problems in Interiors—*Cr 1-3.* MISS SMALTZ

124. Creativity in Clothing Construction—Development of three dimensional form in constructing tailored garments, in manipulating basic patterns for garment design, and in draping. Prerequisite: Cd 22 or permission of instructor. *Rec 1, Lab 4, Cr 3.* MISS LAFFERTY

129. Special Problems in Clothing and Textiles—*Cr 1 to 3.*

192. Interior Design—Planning residential interiors to meet human needs of individuals and families. Selections, organization of furnishings and materials. Layout in floor plans and wall elevations. Study of historic and contemporary interiors and furnishings. Prerequisite: Cd 31 or permission. *Rec 2, Lab 2, Cr 3.*

Food and Nutrition (Fn)

41. Introduction to Nutrition—Consideration of basic human nutrition related to food and health problems in the present socio-economic and cultural environment. *Rec 3, Cr 3.*

42. Family Food Management—Analysis of the criteria for making intelligent food choices. Application of those standards in the planning of family meals. Limited amount of food preparation and service. *Rec 2, Lab 2, Cr 3.* STAFF

43. Experimental Foods—An experimental approach to the preparation of foods. Emphasis on the scientific interpretation of results. Prerequisite: Fn 42 and Bc 8 or equivalent. *Rec 2, Lab 4, Cr 4.* STAFF

61. Quantity Food—Principles basic for retention of nutritive value and quality in the production and service of quantity food; preparation techniques; recipe standardization; portion control; sanitation and use and care of equipment. *Rec 2, Lab 2, Cr 3.* MRS. WEBBER

62. Food Service Management—Organization structure, efficient methods, and controls utilized by management in menu planning, purchasing, receiving, storing, preparing and serving food and beverages. *Rec 2, Lab 2, Cr 3.*

MRS. WEBBER

63. Food Service Administration and Cost Control—Supervised administration of selected food services. Theory of cost control; pricing; techniques for controlling costs through standardized procedures, purchasing practices, efficient management, and training of personnel. Prerequisite: Fn 62. *Rec 2, Lab 2, Cr 3.*

MRS. WEBBER

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149. *Special Problems in Foods*—Cr 1-3.

STAFF

152. *Human Nutrition*—Body metabolism and requirements for nutrients by normal individuals. Prerequisite: Bc 8, and Zo 8 or equivalent. *Rec 3, Cr 3.*

MISS THORNBURY

‡155. *Nutrition in Abnormal Conditions*—Principles involved in adjusting diets for diseases and abnormal conditions that may be benefited by variations from normal diets. Prerequisite: Fn 152. *Rec 3, Cr 3.*

STAFF

156. *The Nutrition of Children*—Relationship between nutrition and growth. Study of newer findings on nutritional requirements of children from infancy through adolescence. Prerequisite: a course in nutrition or chemistry and physiology, acceptable to instructor. *Cr 2.*

258. *Seminar in Nutrition*—Reports and discussions of recent developments in nutrition and related fields. Special attention to critical analysis. Prerequisite: Fn 152 or equivalent. *Rec 1-2, Cr 1-2.*

MISS THORNBURY

259. *Special Problems in Nutrition*—Cr 1-3.

300. *Readings in Nutrition*—Critical review of the literature on energy metabolism, proteins, lipids, minerals and vitamins. Attention to historical basis of present knowledge and to interpretation and application of experimental data. Content will vary, and the course may be repeated with credit. Background in biochemistry and physiology required. *Cr 2-3.*

MISS THORNBURY

Home Economics Education (He)

70. *Senior Seminar in Home Economics*—History, philosophy, present organization, and future development of professional home economics. *Rec 1, Cr 1.*

STAFF

71. *Techniques in Teaching Home Economics*—Selection and use of teaching methods, techniques, and materials to promote development of concepts and thinking processes in the classroom. Observation of home economics classes in junior and senior high school. Prerequisite: junior standing. *Lab 4, Cr 2.*

MISS FRASER

72. *Curriculum Development in Home Economics Education*—Current educational philosophies, principles, and practices; their application to home economics education through program planning and curriculum development. Prerequisite: He 71 concurrently, or permission. *Rec 3, Cr 3.*

MISS FRASER

73. *Supervised Student Teaching*—Concept development in selected subject areas with attendant unit development. Problems pertinent to teaching home economics. Observations, participation, and teaching in a selected junior or senior high school in the state, under immediate direction of the local teacher with supervision from University staff. Evaluation of this experience. Students live in the school communities for eight weeks. Prerequisite: He 72. *Cr 8.*

MISS FRASER

†176. *Adult Education*—Need for and purpose of adult education programs. Consideration of learning program development, organization, and administration of programs. Emphasis on adult education through the public schools, Cooperative Extension Service, and community agencies. *Rec 3, Cr 3.*

STAFF

279. *Special Problems in Home Economics Education*—Cr 1-3.

399. *Graduate Thesis*—Cr Ar.

STAFF

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Home Management and Housing (Hm)

81. Home Management Principles and Theory—Analysis of the managerial process and its relationship to decision making. Emphasis is placed on the use of resources including time and energy to attain family goals. *Rec 3, Cr 3.*

MRS. SCHOMAKER

82. Management in Homes—Experiences with families in observing different ways they manage resources to achieve goals. Work with families of various socio-economic levels toward solving management problems. Field trips included. *Rec 2, Lab 1, Cr 3.*

MRS. HYATT

89. Special Problems in Home Management—*Cr 1-3.*

93. Equipment—Elementary principles of physics as a basis for understanding the selection, operation, care and maintenance of equipment. Prerequisite; junior standing. *Rec 2, Lab 2, Cr 3.*

MRS. SCHOMAKER

185. The Family's Financial Problems—Influence of outside economic conditions and personal circumstances on family financial problems. The management process applied to family problems involving finances—economic position, meeting current living costs, protection against financial contingencies, credit, developing a savings and investment program, legal aspects of transactions. Prerequisite: senior standing or by permission. *Rec 3, Cr 3.*

MRS. DALTON

191. Housing—Physical, social and emotional aspects of the housing environment. Floor plan principles in relation to family life cycle. Local government controls; natural problems in housing. Prerequisite: junior standing. *Rec 2, Lab 2, Cr 3.*

STAFF

COURSES GIVEN ONLY THROUGH CONTINUING EDUCATION DIVISION, OR SUMMER SESSION

The following courses are given through the Continuing Education Division, or in Summer Sessions.

Food and Nutrition (Fn)

69. Special Problems in Food Service Management—Individual investigation of aspects of institutional management. Emphasis on advanced problems in standardization, marketing, quality base for food cost, and/or personal management. Prerequisite: Fn 62 or permission. *Cr 1-3.*

145. Recent Advances in Food and Nutrition—Results of recent research and trends in food and nutrition. Emphasis on their significance for professional home economics. Prerequisite: a nutrition course or permission. *Rec 3, Cr 3.*

148. New Developments in Foods—Developments in food processing and marketing; overview of world food situation. Social and economic influence of trends on meal patterns, human satisfactions, and food management. *Rec 3, Cr 3.*

257. Modern Concepts in Food and Nutrition—Selected basic knowledge, principles, and concepts in the area of food and nutrition; adaption for use at various age levels in diverse educational situations. Prerequisite: permission. *Cr 3.*

Home Economics Education (He)

75. Advanced Home Economics Education—Current philosophy of teaching home economics; concept development in selected areas of the field with at-

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tendant unit development. Study of department management selection and use of space and equipment, and other pertinent problems related to teaching home economics in secondary schools. *Cr 3.*

90. *Methods of Teaching Home Economics*—Study of methodology effective in teaching at different development levels, in several subject areas, according to objectives of programs. Experimentation in methods and teaching aids, considering class size and time schedule. Emphasis on creative teaching. Review of research in methodology. *Rec 3, Cr 3.*

111. *Supervision of Student Teaching in Home Economics*—Theory and principles of supervision for improved educational programs; procedures for improved communication between supervisor and other personnel; evaluation of growth within individuals and programs. *Cr 3.*

Note: Designed for supervisory teachers, city/county/state supervisors, extension agents, and others in a supervisory capacity. Supervising teachers participating in student teaching programs do so on an individual basis. They must participate in a workshop or institute on the application of supervision theory to student teachers following a course which includes supervision principles and theory. These workshops will be sponsored by the institution with which the teacher will work.

320. *Seminar in Home Economics Education*—*Cr 3.*

Home Management (Hm)

186. *Management of Household Resources*—Current philosophy and literature in the field with respect to use and interaction of time, energy, money, and other resources. *Rec 3, Cr 3.*

187. *The Consumer in the Present Economy*—Distribution of consumer goods through the marketing system, change of marketing institutions; consumer information available, and consumer protection in the market. Emphasis on joint interest of those in marketing, the consumer, and the government in an efficient marketing system. *Rec 3, Cr 3.*

199. *Special Problems in Housing*—*Cr 1-3.*

Agricultural Science Division

AGRICULTURAL ENGINEERING

PROFESSORS SMITH, RHOADS, KLINGE, ROWE; ASSOCIATE PROFESSORS HUFF
SOULE; ASSISTANT PROFESSOR GRAY

The Agricultural Engineering Department offers major work leading to the degree of bachelor of science in agricultural engineering, to the degree of bachelor of science in Agricultural Mechanization and jointly administers the degree of bachelor of science in Forest Engineering with the School of Forest Resources.

B.S. in Agricultural Engineering

The Agricultural Engineering curriculum combines study in the biological sciences and the physical sciences with mathematics and engineering to provide a unique background for solving engineering problems associated with agriculture.

The basic curriculum is strengthened by elective options which permit the student to specialize in one of four areas according to his interests and needs. Areas of specialization are: (1) Design and application of machinery and power units for the agricultural industry; (2) Design and application of food and fiber processing systems; (3) Design of agricultural structures; and (4) Soil and water conservation engineering. Electives in engineering and the life sciences aid in providing a broad base of knowledge for engineering practice.

Employment opportunities for agricultural engineers are as diverse as the agricultural industry itself. Graduates in agricultural engineering may be employed as design engineers by machinery and farmstead systems manufacturers; as sales engineers by machinery food or chemical companies; as research engineers by industry government or state experiment stations or in teaching or extension positions by universities. Some practice as consulting engineers. An increasing number of opportunities for foreign service are opening up.

The curriculum in Agricultural Engineering is a joint responsibility of the College of Technology and the College of Life Sciences and Agriculture.

This degree requires satisfactory completion of at least 130 degree hours at an accumulative grade point average of not less than 2.0 in a course of study which conforms to the following curriculum:

Curriculum for the B.S. Degree in Agricultural Engineering
Freshman Year. See Page 243.

			Credit Hours	Minimum Degree Hours Required
A. AGRICULTURAL ENGINEERING				29
AE	20	Prin. of Mechanization	3	
AE	55	Materials in Ag. Eng.	3	
AE	80	Senior Seminar	1	
*AE	81	Department Seminar	0	
AE	82	Intro. to Ag. Eng.	2	
AE	83	Spec. Prob. in Ag. Eng.	1	
AE	160	Agr. Machinery	3	
AE	163	Farm Structures Design	3	
AE	164	Instrumentation and Control Sys.		
AE	165	Soil & Water Eng.	4	
AE	167	Agricultural Power	3	
AE	169	Agr. Processing	3	
B. BASIC ENGINEERING				28
Ge	1	Intro. to Eng. Design	2	
Ge	2	Intro. to Eng. Design	2	
Ge	7	Computer Programming	2	
Me	33	Thermodynamics	3	
Me	53	Statics & Kinematics	4	
Me	54	Kinetics	4	
Me	51	Strength of Materials	4	
Ce	26	Hydraulics (or Me 59 Fluid Mechanics)	4	
Ee	41	Elementary Circuits	3	
C. TECHNICAL ELECTIVES (A group of engineering courses selected by the student approved by his adviser)				9

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D. BASIC PHYSICAL SCIENCE				32
Ch	13	Chemical Principles	4	
Ch	14	Chemical Principles	4	
Me	26	Analytic Geom. & Cal.	4	
Ms	27	Analytic Geom. & Cal.	4	
Ms	28	Analytic Geom. & Cal.	4	
Ms	29	Differential Equations	4	
Ps	1	General Physics	4	
Ps	2	General Physics	4	
E. AGRICULTURAL AND BIOLOGICAL SCIENCE				10
Bt	1	Plant Biology (or Zo 3, Animal Biology)	4	
S	2	Soils	3	
		Electives	3	
F. COMMUNICATIONS, HUMANITIES AND SOCIAL SCIENCE				21
G. OTHER				
LSA	1	University Life	0	
Ge	5	Engineering Orientation	0	
Ge	6	Ag. Eng. Orientation	0	
Pe	1	Physical Education	1	
				1
Minimum Degree Hours Required for Graduation				<hr/> 130

*Required each semester

Students transferring to University of Maine from the Universities of Massachusetts, New Hampshire, or Rhode Island under the Regional Program should check the bulletins of those institutions for the first two years in Agricultural Engineering.

Graduate Work in Agricultural Engineering

The degrees of master of science (Agricultural Engineering) and master of engineering (Agricultural Engineering) are offered with options for specialization in soil and water engineering, farm structures, agricultural power and machinery, and electric power and processing.

Several research assistantships are available each year. Incumbents devote half time to research on approved projects of the Agricultural Experiment Station.

B.S. in Forest Engineering

See page 271 for a description of the curriculum and opportunities in Forest Engineering.

B.S. in Agricultural Mechanization

The curriculum in Agricultural Mechanization provides training in specific aspects of engineering technology and couples this with training in business, economics, and agricultural subjects. It is designed to prepare graduates for work in the application of equipment and systems to food production, processing and handling either as field representatives of industrial concerns or as management personnel on mechanized farms.

Graduates find employment as technical sales representatives for machinery companies, farm service advisers for electric power companies, field advisers for fuel companies, machinery managers on corporation farms, field managers for food processors, and as agricultural contractors. Positions are also available with

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equipment companies in the field of product development and product education.

Graduates of the Engineering Technology programs in the College of Technology who are qualified for transfer into baccalaureate programs may transfer up to 60 credits for courses in which they have received a grade of C or better. Two additional years will be required to complete the degree of B.S. in Agricultural Mechanization.

This degree requires satisfactory completion of at least 120 degree hours at an accumulative grade point average of not less than 2.0 in a course of study which conforms to the following curriculum

Curriculum for Agricultural Mechanization

Freshman Year. See Page 243.

			Credit Hours	Minimum Degree Hours Required
A. AGRICULTURAL MECHANIZATION PROFESSIONAL COURSES				25
AE	20	Principles of Mechanization	3	
AE	31	Field Machinery Management	3	
AE	32	Farm Buildings & Equipment	3	
AE	34	Instrumentation	3	
AE	35	Soil Water Control	3	
AE	36	Farm & Forestry Power	3	
AE	38	Electrification	3	
AE	39	Agric. Processing Tech.	3	
AE	80	Senior Seminar	1	
*AE	81	Department Seminar	0	
B. PROFESSIONAL FIELD SUPPORTING COURSES				24
Ec	10	Principles of Economics	3	
Ba	9	Principles of Accounting	3	
Fs	101	Food Processing Industry	3	
		Electives	15	
		(9 hours must be in LSA courses)		
C. BASIC SCIENCES AND ENGINEERING				23
Ge	1	Introduction to Eng. Design	2	
Ge	2	Introduction to Eng. Design	2	
Ms	4	Algebra & Trigonometry	4	
Ms 19 (or Fy 4		Principles of Statistical Inference	3	
Ps	1a	General Physics	4	
Ps	2a	General Physics	4	
Ch 11 or Bc 7		Chemistry	4	
D. AGRICULTURAL AND BIOLOGICAL SCIENCES				16
Bt	1	Plant Biology	4	
AnV	45	Animal Science	3	
S	2	Soils	3	
		Electives	6	
E. COMMUNICATIONS				6
F. HUMANITIES AND SOCIAL SCIENCES				15

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G. OTHER

LSA	1	Orientation	0
Pc	1	Physical Education	1
		Free Electives	10

11

Minimum Degree Hours for Graduation

120

•Required each semester

Courses in Agricultural Engineering (AE)

Courses numbered below 50 or 101-150 are intended primarily for the Agricultural Mechanization curriculum or as service courses for students in other departments of the College of Life Sciences and Agriculture.

20. Principles of Mechanization—Basic concepts of farm and forest mechanization; functional analysis and organization of machine systems and materials handling operations. Prerequisite: Ms 4. *Rec 2, Lab 2, Cr 3.* MR. SMITH

‡31. Field Machinery Management—Economic selection of machinery to integrate field operations in food and fiber production systems; efficient management and use of machines and applications of power to field operations. Prerequisite: Ms 4, Ae 20 or permission of instructor. *Rec 2, Lab 2, Cr 3.*

MR. SOULE

†32. Farm Buildings and Equipment—Consideration of environmental control; methods and materials of construction; functional requirements and system economics of production, processing and storage buildings. Prerequisite: Ms 4. *Rec 2, Lab 2, Cr 3.*

MR. KLINGE

†34. Instrumentation—A study of the basic principles and applications of instruments or measuring and controlling such phenomena as temperature, force, pressure, humidity, moisture content and flow rate. Applications to agriculture and biological sciences are stressed. Prerequisite: Ps 1a or Ps 6. *Rec 2, Lab 2, Cr 3.*

MR. ROWE

‡35. Soil Water Control—Field surveying, planning, layout and construction of soil and water control structures such as farm ponds, drainage systems, irrigation systems and soil erosion control systems. *Rec 2, Lab 3, Cr 3.*

†36. Farm and Forestry Power—Principles of construction, operation, and maintenance of internal combustion engines, tractors, and related equipment. Selection, application, and management of power equipment in farm and forestry activities. Prerequisite: Ms 4. *Rec 2, Lab 2, Cr 3.*

MR. GRAY

38. Electrification—Supply, use, and potential of electricity in farm, forest and other rural settings; selection, use, and care of electrical devices and controls used in agriculture and forestry. Emphasis on practical applications. Prerequisite: Ms 4. *Rec 2, Lab 2, Cr 3.*

MR. HUFF

39. Agricultural Processing Technology—A study of unit operations involved in on-farm and in-plant processing of agricultural products, with emphasis on sizing and selecting equipment. Prerequisite: Ms 4, Ps 1a, Ps 2a. *Rec 2, Lab 3, Cr 3.*

MR. RHOADS

41. Energy and Man—Sources of energy, the "Energy Crisis." The extent of our demand for energy and the forms in which we need it. Methods of matching sources to demands, with a view to insuring continuous availability and conserving our environment. *Lec 2, Rec 1, Cr 3.*

MR. HUFF

42, 42a. Metals and Man—The influence of metals technology on man's existence. A practical look at testing, properties manipulation, fabrication, and utilization of metals is included. Production and processing methods will be

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examined with consideration of environmental effects. Welding instruction available at the student's option. No prerequisite: *Lec 2, Cr 2. AE 42a. Lab 2, Cr 1* (cannot be taken with AE 42). MR. SOULE

55. *Materials in Agricultural Engineering*—An introduction to physical and rheological properties of structural and biological materials useful in agricultural design and application. Prerequisite: Ps 2 or permission of instructor. *Rec 2, Lab 2, Cr 3.* MR. SOULE

80. *Senior Seminar*—Problems associated with professionalism and the first employment of the young agricultural engineer. *Rec 1, Cr 1.* MR. KLINGE

81. *Departmental Seminar*—Presentation and discussion of current developments and problems that affect agricultural engineering and agricultural engineers. *Rec 1 (monthly), Cr 0.* STAFF

82. *Introduction to Agricultural Engineering*—An introduction to engineering experimentation involving biological material. Primarily for sophomores majoring in agricultural engineering. *Rec 1, Lab 2, Cr 2.* MR. SMITH

83. 84. *Special Problems in Agricultural Engineering*—Available as a five-week block course. *Cr Ar.* STAFF

†**160. *Agricultural Machinery***—Analysis of functional and power requirements, capacity, and economics of agricultural machines. Principles of design; laboratory and field test. Prerequisite: Me 51. *Rec 2, Lab 3, Cr 3.* MR. SOULE

†**163. *Farm Structures Design***—Structural design and environmental control in production, processing and storage buildings; consideration of functional requirements, system economics and methods and materials of construction. Prerequisite: Me 51. *Rec 2, Lab 3, Cr 3.* MR. KLINGE

‡**164. *Instrumentation and Control Systems***—Application of instrumentation to physical and biological measurements. Analysis of dynamic measurement and control systems, including electronic signal processing and recording instruments, and hydraulic power transmission systems. Prerequisite: Ps 2 and Ms 28. *Rec 2, Lab 3, Cr 3.* MR. ROWE AND MR. GRAY

†**165. *Soil and Water Engineering***—Study of rainfall and runoff, flood control, land clearing techniques, and water resources engineering. Design of erosion control structures, small earth dams and farm reservoirs, drainage and irrigation systems. Prerequisite: Ce 26 or Me 59. *Rec 3, Lab 3, Cr 4.* MR. KLINGE

‡**167. *Agricultural Power***—Tractor power units, construction, operating principles, testing and rating; vehicle mechanics as applied to tractors and other cross country vehicles; farm electrification; new energy sources and applications for agriculture. Prerequisite: Me 33. *Rec 2, Lab 3, Cr 3.* MR. HUFF

‡**169. *Agricultural Process Engineering***—Unit operations such as size reduction, separation, heating, drying and refrigeration and their application to short-line agricultural processing. Psychrometrics, heat transfer, fluid flow, process analysis and plant design are included. Prerequisite: Me 33 and Me 59 or Ce 26 (may be taken concurrently). *Rec 2, Lab 3, Cr 3.* MR. ROWE

170. *Forest Machinery*—Power sources for forest operations, construction principles, testing and rating. Design and use of forest machinery; power requirements, selection, management and engineering aspects of machinery systems design. Prerequisite: Ps 1 or Ps 6. *Rec 2, Lab 3, Cr 3.* MR. GRAY

173. *Forest Roads and Structures*—Design, construction and maintenance of improvised road systems and bridges. Road-vehicle interactions. Design and

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construction of light buildings for forest and recreational use. Prerequisite: Ps 1 or Ps 6. *Rec 2, Lab 3, Cr 3.*

380. Graduate Seminar—*Rec 1, Cr 1.*

STAFF

383/384. Problems in Agricultural Engineering—*Cr Ar.*

STAFF

399. Graduate Thesis—*Cr Ar.*

STAFF

AGRICULTURAL AND RESOURCE ECONOMICS

ASSOCIATE PROFESSOR WING (Chairman); PROFESSORS DELPHENDAHL, METZGER, PLOCH, PULLEN; ASSOCIATE PROFESSORS DUNHAM, HARLAN*, JOHNSTON, KROFTA, MICKA; ASSISTANT PROFESSORS BENSON, KING, PELSUE, TOBEY, WATKINS

The Department of Agricultural and Resource Economics offers a curriculum leading to the B.S. degree in agricultural and resource economics, with emphasis in agricultural business management and marketing, and resource and production economics. Options in sociology of rural life and international affairs are also available. The department's program is designed to develop abilities to handle managerial responsibilities in the economic and social aspects of the food and fiber industries and allied fields, and the development of human and natural resources. The program provides a broad education in agricultural business, economics, and rural sociology.

Areas of instruction include the business and economic aspects of production, with emphasis on the economic use and management of capital, labor, and land and water resources; the business aspects of marketing, with emphasis on pricing, financing, merchandising, and consumption; the economics related to development of area resources. Also stressed are the social and human factors associated with food production, processing, distribution, consumption, and community development; the political, legal, and economic aspects of international relations. In addition, training is complemented by a comprehensive, integrated program of courses in the life sciences, other social sciences, communication, arts, and humanities.

Employment opportunities exist in sales, service, research and management positions, with food, agricultural, and other businesses such as manufacturing and processing firms, wholesale and retail distribution firms, insurance and credit agencies, cooperatives, feed, fertilizer, and farm supply companies. Graduates also are frequently employed by federal and state governments, by colleges and universities, and by international organizations. Opportunities for students majoring in Sociology of Rural Life include employment as case workers in social service organizations, as camp directors, and community organizers and planners.

The department participates in offering an interdisciplinary curriculum leading to the B.S. degree in National Resource Management. (See page 260). The curriculum consists of a common core program emphasizing the physical, biological, and earth sciences, and the humanities and social sciences, plus a choice of five areas of professional specialization, two of which are resource economics and recreation and park management.

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Curriculum for Agricultural and Resource Economics (Except Rural Sociology and International Affairs Options)

Required Courses			Credit Hours	Minimum Degree Hours Required
A. UNIVERSITY LIFE			0	0
PHYSICAL EDUCATION			1	1
B. BASIC SCIENCES				17
Ms	13 & 14	Math for Social Sciences	6	
		Electives*	11	
* On leave 1973-74.				
C. COMMUNICATIONS				9
Eh	1	College Composition	3	
Eh	17	Advanced Professional Exposition	3	
Sh	3	Fundamentals of Public Speaking	3	
D. HUMANITIES AND SOCIAL SCIENCES				15
Electives**				
E. LIFE SCIENCES AND AGRICULTURE				12
Electives (Any course in the College of Life Sciences & Agriculture, except Agricultural & Resource Economics courses)				
F. BUSINESS AND ECONOMICS				12
Ba	9	Principles of Accounting I	3	
Ec	10	Principles of Economics	3	
Ec	132	Macroeconomics	3	
Ec	153	Money and Banking	3	
Ec	173	Economics Analysis	3	
G. AGRICULTURAL AND RESOURCE ECONOMICS				29
IDL	24	Sociology of Rural Life	3	
ARE	92	Seminar	0	
ARE	154	Introduction to Production Economics	3	
ARE	159	Agricultural Business Management	3	
ARE	165	Food and Fiber Marketing	3	
ARE	168	Price Analysis and Forecasting	3	
ARE	171	Land Resource Economics	3	
ARE	186	Government Policies Affecting Rural America	3	
ARE	194	Seminar	3	
Electives (Any ARE courses except ARE 48)			6	
H. RESEARCH METHODS AND STATISTICS				9
Ms	15 & 16	Introduction to Statistical Analysis	6	
Ms	81 or 181	Computer Programming or Introduction to Computer Science	3	

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I. FREE ELECTIVES Any course in the University for which the student is qualified 16

Minimum Degree Hours for Graduation 120

- *Choose from the following fields: Botany, Microbiology, Biochemistry, Chemistry, Geology, Mathematics, Physics, Zoology.
- **Choose from the following fields: Agricultural and Resource Economics, Anthropology, Art, Economics, Education (EdB 2, EdB 3, EdB 4), English, History, Journalism (Jr 22, Jr 75), Language, Literature, Modern Society, Music, Philosophy, Political Science, Psychology, Sociology, Speech.

Curriculum for Sociology of Rural Life

Required Courses			Credit Hours	Minimum Degree Hours Required
A.	UNIVERSITY LIFE		0	0
	PHYSICAL EDUCATION		1	1
B.	BASIC SCIENCES			17
	Ms	13 & 14 Mathematics for the Social Sciences	6	
		Electives*	11	
C.	COMMUNICATIONS			9
	Eh	1 College Composition	3	
	Eh	17 Advanced Professional Exposition	3	
	Sh	3 Fundamentals of Public Speaking	3	
D.	HUMANITIES AND SOCIAL SCIENCES			15
	Electives**			
E.	LIFE SCIENCES AND AGRICULTURE			12
	Electives (Any course in the College of Life Sciences & Agriculture, except Agricultural & Resource Economics courses.)			
F.	BUSINESS AND ECONOMICS AND AGRICULTURAL AND RESOURCE ECONOMICS			11
	ARE	48 or Ec 10 Principles of Agricultural Economics or Principles of Economics	3	
	ARE	81 Agriculture and Economic Growth	3	
	ARE	92 Seminar	0	
	ARE	194 Seminar	2	
	Electives (Any Agricultural & Resource Economics course)		3	
G.	RURAL SOCIOLOGY, SOCIOLOGY AND PSYCHOLOGY			30
	IDL	24 Sociology of Rural Life	3	
	IDL	124 Contemporary Rural Problems	3	
	IDL	129 The Individual and the Community	3	
	ARE	150 Human Factors in Resource Development	3	
	Py	1 General Psychology	3	
	Py	130 Social Psychology	3	
	Sy	3,4/Ay 1,2 Intro. Sociology or Anthropology	6	
	Electives (Sociology, Anthropology, Psychology)		6	

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H. RESEARCH METHODS AND STATISTICS		6
Ms 15 & 16 or	Introduction to Statistical Analysis or	
Ms 19 and Sy	Principles of Statistical Inference	
190 or 191	Research & Methods of Social Research	6
	Sociological Research	

I. FREE ELECTIVES	Any course in the University for which the student is qualified	19
Minimum Degree Hours for Graduation		120

- *Choose from the following fields: Botany, Microbiology, Biochemistry, Chemistry, Geology, Mathematics, Physics, Zoology.
- **Choose from the following fields: Agricultural and Resource Economics, Anthropology, Art, Economics, Education (EdB 2, EdB 3, EdB 4), English, History, Journalism (Jr 22, Jr 75), Language, Literature, Modern Society, Music, Philosophy, Political Science, Psychology, Sociology, Speech.

Curriculum for International Affairs

Required Courses		Credit Hours	Minimum Degree Hours Required
Orientation			0
Physical Education			1
BASIC SCIENCES			17
Ms 13 & 14	Math for Social Sciences	6	
	Electives	11	
MODERN FOREIGN LANGUAGE			12
	First Year	6	
	Second Year	6	
COMMUNICATIONS			9
Eh 1	College Composition	3	
Eh 17	Advanced Professional Exposition	3	
Sh 3	Fundamentals of Public Speaking	3	
HUMANITIES AND SOCIAL SCIENCES			15
Pol 1	Introduction to Government	3	
Pol 173 & 174	International Relations	6	
Pol 187	International Law	3	
Pol 188	International Organization	3	
LIFE SCIENCES AND AGRICULTURE			8
	Electives	8	
BUSINESS AND ECONOMICS			15
Ba 9	Principles of Economics	3	
Ec 10	Principles of Accounting	3	
Ec 137	Comparative Economic Systems	3	
Ec 139	International Trade and Commercial policy	3	
	Electives (Any Ba or Ec course)	3	

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AGRICULTURAL AND RESOURCE ECONOMICS			23
IDL 24	Sociology of Rural Life	3	
ARE 81	Agriculture and Economic Growth	3	
ARE 92	Seminar	10	
ARE 150	Human Factors in Resource Development	3	
ARE 154	Introduction to Production Economics	3	
ARE 165	Food & Fiber Marketing	3	
ARE 171	Land Resource Economics	3	
ARE 186	Government Policies Affecting Rural America	3	
ARE 194	Seminar	2	
RESEARCH METHODS AND STATISTICS			
Ms 15 & 16	Introduction to Statistical Analysis	3	
Ms 81	Computer Programming, or	3	
181	Introduction to Computer Science	3	
ELECTIVES			14
	Any course in the University for which the student is qualified	10	
Minimum Degree Hours for Graduation			120

• Elect from fields of: Botany, Biochemistry, Chemistry, Geology, Mathematics, Microbiology, Physics, Zoology.

Courses in Agricultural and Resource Economics (ARE)

48. Principles of Agricultural Economics—A study of economic principles applied to the business firm, with consideration given to production, marketing, use of human and natural resources, and governmental policy. *Rec 3, Cr 3.* Not open to ARE majors, except Rural Sociology option. MR. DUNHAM

71. Economics of Environmental Quality—Examination of economic aspects of environmental issues. Attention to maintenance of quality of natural resource base. Economic implications of private and public patterns of environmental use. Prerequisites: none. *Rec 3, Cr 3.* MR. TOBEY

81. Agriculture and Economic Growth—Principles and factors of economic development. Resource allocation in emerging nations. The role of agriculture in developing economics. Effect of transition to market economy on social and economic institutions. Function of national economic planning. *Rec 3, Cr 3.* MR. DELPHENDAHL

92. Seminar—Discussion of and orientation to the fields of agricultural economics, resource economics, and sociology of rural life; emphasis on employment opportunities and requirements, professional associations, and professional literature. Sophomores. *Rec 1, Cr 0.* MR. DUNHAM

154. Introduction to Production Economics—The application of economic relationships and principles to problems of resource allocation at the firm level. Prerequisite: Ec 10 or ARE 48. *Rec 3, Cr 3.* MR. KROFTA

159. Agricultural Business Management—Discussion of the management principles and procedures applicable to agricultural businesses. Prerequisite: ARE 48 or Ec 10; and Ba 9. *Rec 3, Cr 3.* MR. WING

IDL 161 Park Planning and Design—Basic planning and design principles of space, scale and circulation applied to recreation areas and park facilities.

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ties with special emphasis on visitor use. Prerequisite: junior, senior standing or permission. *Rec 2, Lab 2, Cr 3.*

MR. TOBEY, AND MR. WHITTAKER

IDL 162 Recreation and Park Management—Fundamental management considerations related to the administration of recreation and park programs. Prerequisite IDL 161 or permission. *Rec 3, Cr 3.*

MR. TOBEY, AND MR. WHITTAKER

162. Consumer Economic Behavior—The basic concepts of consumer behavior and how consumer purchasing decisions are made. The conflict between our desires as consumers and our needs as citizens. The effect of consumer decision making on the economy. Prerequisite: Ec 10 or ARE 48 or permission of instructor. *Cr 3.*

MR. DUNHAM

ARE 164 Consumer Economic Behavior—Designed to acquaint the student with the basic concepts of consumer behavior and to develop an understanding of how consumer purchasing decisions are made. The conflict between our desires as consumers and our needs as citizens is considered. The effect of consumer decision making on the economy. Prerequisite: Ec 10 or ARE 48 or permissions. *Rec 3, Cr 3.*

165. Food and Fiber Marketing—Economic principles applied to marketing structures, services and agencies, analysis of costs and efficiencies; impact of industry organization and government. Prerequisite: Ec 10 or permission of instructor. *Rec 3, Cr 3.*

MR. KING

168. Price Analysis and Forecasting—The analysis and measurement of factors affecting supply, demand, and elasticity, their relation to the level and changes of market prices, and the use of quantitative techniques in forecasting. Prerequisite: Ec 10 and Ms 15/16, or permission of instructor. *Rec 3, Cr 3.*

MR. PELSUE

171. Land Resource Economics—Principal economic and institutional factors affecting man in his use of land and resources; supply, demand, and future requirements; input-output relationships, location and resource use, benefit cost analysis; planning for more efficient use of resources. Prerequisite: Ec 10. *Rec 3, Cr 3.*

MR. DELPHENDAHL

186. Government Policies Affecting Rural America—Description and analysis of contemporary government policies and programs affecting rural America. Emphasis on policies affecting economic structure, rural poverty, natural resource management, and agriculture. Interrelationship of national and international policies. Prerequisite: Ec 10 or ARE 48 or permission of instructor. *Rec 3, Cr 3.*

MR. DELPHENDAHL AND STAFF

194. Seminar—Discussion of current economic and social problems. Prerequisite: seniors and graduates. *Rec 2, Cr 2.*

STAFF

197. 198. Independent Studies—Analysis of and readings on current problems in agricultural and resource economics, rural sociology, and community development. Prerequisite: permission of instructor. *Cr 1-3.*

STAFF

IDL 225. Mathematical Economics—Advanced economic theory presented mathematically. Prerequisites: Ec 180, Ec 210, Ec 211 or permission of instructor. *Cr 3.*

MR. PELSUE

IDL 230. Econometrics—An introduction to economic concepts and relationships expressed in statistical terms. Major emphasis will be given to economic models related to demand, supply, production and cost functions; input-

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output analysis and other models will also be considered. Prerequisite: Ms 15 and 16, Ec 173 or permission of instructor. *Rec 3, Cr 3.*

250. Community Development—Principles—Study of the sociological and psychological principles related to the community development processes. Emphasis on the development of an understanding of interpersonal dynamics internal to social systems and the development of change agent roles. Prerequisite: 6 hours in sociology plus introductory social psychology, or permission of instructor. *Cr 3.* MR. WATKINS

251. Community Development—Applications—Application of the principles of the procedures of problem solving in the context of community development programs. Use of a wide variety of teaching techniques including original video tapes, student-community development practitioner panels, field trips, group dynamics. Prerequisite: ARE 250. *Cr 3.* MR. PLOCH

272. Resource Use and Economic Growth—Resource utilization and economic growth in retrospect. Importance of resources. Theories measurements of economic development. Public policies and planning for resource development. Prerequisite: ARE 171 or permission of instructor. *Rec 3, Cr 3.* MR. DELPHENDAHL

293. 294. Graduate Seminar—Identification and analysis of current problems related to community development and resource use and management. Emphasis on economic and social effects. Problem areas for discussion and analysis will vary from semester to semester. May be repeated for a total of six credits. Prerequisite: permission of instructor. *Rec 2, Cr 2.* STAFF

297. 298. Independent Studies—Analysis of readings on current problems in agricultural and resource economics; rural sociology, and community development. A maximum of six credits allowed. Prerequisite: permission of instructor. *Cr 1-3.* STAFF

304. Marketing Theory and Concepts—Economics theory underlying the policies of marketing firms; the study of current marketing problems and current market practices for selected commodities. Prerequisite: permission. *Rec 3, Cr 3.* MR. KING

307. Production Economics—The principles of optimum resource allocation applied to agricultural business under perfect knowledge and with consideration of uncertainties. The use of linear programming as a tool for attaining optimum resource allocation. Prerequisite: permission. *Rec 3, Cr 3.* MR. KROFTA

352. Practicum in Community Development—Under the direction of a staff member each student assumes an active role in a community development project which will provide opportunities to apply knowledge and experience gained in ARE 250 and 251. Learning is enhanced through scheduled group seminars and the preparation of required analytical progress reports. Prerequisite: ARE 250 and ARE 251. *Cr 6.* STAFF

359. Research Methods in Agricultural and Resource Economics—Nature of economic and social analysis; scientific objectivity; individual and public problems; formulation of hypotheses and models; empirical techniques; evaluation of current research procedures. Prerequisite: permission of instructor. *Rec 3, Cr 3.* MR. METZGER

399. Graduate Thesis—*Cr Ar.* STAFF

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Courses in Sociology of Rural Life (IDL and ARE)

IDL 24. *Sociology of Rural Life*—Significance of rural society in American culture. The impact of forces of change, including population movement. The significance of changes in the social systems of community, family, religion, education, and stratification. *Rec 3, Cr 3.* MR. PLOCH

IDL 124. *Contemporary Rural Problems*—A problem-oriented, class participation course focusing on the trends taking place in contemporary rural society. Includes rural population displacement and mobility, poverty, industrialization; consequent changes in occupational composition, and related changes. Prerequisite: IDL 24 or equivalent. *Rec 3, Cr 3.* MR. WATKINS

IDL 129. *The Individual and the Community*—Analysis of the functioning and structure of the community. Emphasis on ways in which individuals and groups are affected by community dynamics. Community project. Prerequisite: IDL 24 or Sy 126 or permission. *Rec 3, Cr 3.* MR. PLOCH

150. *Human Factors in Resource Development*—Methods of applied social change in community and development. Community and individual resistances to, and acceptance of, development programs. Consequences of development for community social systems. Development as an interactive force in the community. Prerequisite: IDL 24 or permission. *Rec 3, Cr 3.* MR. PLOCH

Graduate Work in ARE and in Community Development

The M.S. degree in agricultural and resource economics is offered with opportunity for study in marketing, production economics, resource economics, and sociology of rural life. The M.S. degree in community development is offered with opportunity for study of the principles and applications of community development.

M.S. degrees in agricultural and resource economics and in community development are offered. Candidates for these degrees are not required to write a thesis. They need not meet the full-time residence requirement.

Students are encouraged to develop broad interdisciplinary programs combining departmental area requirements and approved electives. Candidates are encouraged to elect graduate level courses in the Department of Agricultural and Resource Economics and other departments and colleges of the University.

Full descriptions of these graduate degree programs are presented in the Graduate School Catalog.

ANIMAL AND VETERINARY SCIENCES

PROFESSORS GIBBS (Acting Chairman), BIRD, CHUTE, DICKEY, HOOVER, H. LEONARD, MUSGRAVE, POULTON; ASSOCIATE PROFESSORS APGAR, BRUGMAN, HARRIS, O'MEARA, GERSHMAN; ASSISTANT PROFESSORS BAYER, BRYAN, GOATER, MUIR, SNIFFEN, WALKER; LECTURERS DEHOFF, FOX, HERBETS, KAY, SAWIN, TASHJIAN

The Animal Sciences curriculum is designed to provide a broad biological training as well as a thorough understanding of the anatomy, behavior, breeding, disease, genetics, management, nutrition and physiology of large animals, poultry and laboratory animals.

COLLEGE OF LIFE SCIENCES AND AGRICULTURE

Because a basic knowledge in animal sciences is fundamental to successful work in many job situations, the curriculum offers a wide choice of electives in order that students may adapt their courses of study to meet special professional interests or needs. Through the proper use of options, students can prepare for admission to graduate school or veterinary college, teaching sciences in secondary schools, pursuing technical sales and service work in the animal and poultry industries, careers as laboratory animal technicians, or developing animal production enterprises such as dairy, poultry, or livestock farming.

Courses in Animal Health are offered to support the curriculum in the department and the curriculum in Wildlife Management. They also serve as elective opportunities for students in other agricultural and life sciences, and in other colleges. This department also administers the Pre-Veterinary Science program (see page 315).

Superior students should consider continuing their studies at the graduate level. The Department of Animal and Veterinary Sciences offers the master of science degree in animal science for a program of study in animal nutrition, behavior, health, physiology, management, or breeding. The doctor of philosophy degree may be earned in animal nutrition.

Curriculum Options for the B.S. Degree in Animal and Veterinary Sciences*

Freshman Year. See Page 243.

Animal Sciences Option

*Effective for all incoming freshmen as of the fall of 1972 and for transfers or readmissions who have matriculated as of the above date.

			Credit Hours	Minimum Degree Hours Required
A. BASIC AND LIFE SCIENCES				45
Ch	11/12	General Chemistry	8	45
Ms	4	Algebra and Trigonometry	4	
Ms	26	Analytic Geometry and Calculus	4	
Bc	21	Organic Chemistry	4	
Bc	122	Biochemistry	4	
Mb	127	General Microbiology	3	
Mb	128	General Microbiology Laboratory	2	
Ps	1a/2a	General Physics	8	
Zo	3/4	Animal Biology	8	
B. ANIMAL AND VETERINARY SCIENCES				34
AnV	45	Animal Science	3	
AnV	63	Seminar	1	
AnV	74	Seminar	2	
AnV	135/136	Anatomy and Physiology of Domestic Animals	6	
AnV	155	Animal Nutrition	3	
AnV	156	Applied Animal Nutrition	3	
AnV	160	Animal Genetics and Breeding	3	
AnV	172	Endocrinology	4	
		Electives—1 Management Course	9	
C. COMMUNICATIONS (See College Requirements)				
Eh		Written	3	
Sh		Oral	3	
D. HUMANITIES AND SOCIAL SCIENCES				15

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E. ELECTIVES			19
F. OTHER			1
Pe	1	Physical Education	1
LSA	1	University Life	0
Total			120

Animal Medical Science Option

A. BASIC AND LIFE SCIENCES			49
Ch	11/12	General Chemistry	8
Ms	4	Algebra and Trigonometry	4
Zo	3/4	Animal Biology	8
Bc	21	Organic Chemistry	4
Bc	122	Biochemistry	4
Ps	1a/2a	General Physics	8
Mb	127	General Microbiology	3
Mb	128	General Microbiology Laboratory	2
Mb	152	Pathogenic Bacteriology and Serology	4
Mb	176	Virology	4
B. ANIMAL AND VETERINARY SCIENCES			42
AnV	45	Animal Science	3
AnV	63	Seminar	1
AnV	74	Seminar	2
AnV	135/136	Anatomy and Physiology of Domestic Animals	6
AnV	137	Animal Diseases	3
AnV	155	Animal Nutrition	3
AnV	156	Applied Animal Nutrition	3
AnV	160	Animal Genetics and Breeding	3
AnV	168	Independent Study (Breeding)	5
		(Disease)	1
		(Nutrition)	1
		(Management)	2
AnV	172	Endocrinology	4
AnV	175	Behavior of Domestic Animals	3
AnV	180	Physiol. of Reproduction & Lactation	3
AnV	186	Bioassay	3

C. COMMUNICATIONS (See College Requirements)			
Eh		Written	3
Sh		Oral	3
D. HUMANITIES AND SOCIAL SCIENCES			15
E. ELECTIVES			7
F. OTHER			1
Pe	1	Physical Education	1
LSA	1	University Life	0
Total			120

Animal Agribusiness Option

A. BASIC SCIENCES			20
Ch	11/12	General Chemistry (Bc 7/8 in special cases only)	8
Ms	4	Algebra and Trigonometry	4
Zo	3/4	Animal Biology	8

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B. ANIMAL AND VETERINARY SCIENCES			43
AnV 45	Animal Science	3	
AnV 46	Dairy Cattle Technology*	3	
AnV 47	Equine Science*	3	
AnV 48	Livestock Management*	4	
AnV 63	Seminar	1	
AnV 65	Meat Technology*	3	
AnV 66	Dairy Technology*	3	
AnV 74	Seminar	2	
AnV 85	Poultry Technology*	3	
AnV 135/136	Anatomy and Physiology of Domestic Animals	6	
AnV 137	Animal Diseases	3	
AnV 155	Animal Nutrition	3	
AnV 156	Applied Animal Nutrition	3	
AnV 160	Animal Genetics and Breeding	3	
* 5 or 6 production courses should be taken.			
C. COMMUNICATIONS (See College Requirements)			6
Eh	Written	3	
Sh	Oral	3	
D. HUMANITIES AND SOCIAL SCIENCES			15
E. LIFE SCIENCES AND AGRICULTURE AND BUSINESS			15
ARE 48	Principles of Agricultural Economics	3	
Ba 9	Principles of Accounting	3	
ARE 165	Food and Fiber Marketing	3	
ARE 154	Introduction to Production Economics	3	
ARE 159	Agricultural Business Management	3	
Recommend courses also from Departments of Plant and Soil Sciences and Agricultural Engineering			
F. ELECTIVES			20
G. OTHER			1
Pe 1	Physical Education	1	
LSA 1	University Life	0	
Total			120

Animal Sciences and Teaching Option

			Credit Hours	Minimum Degree Hours Required
A. BASIC SCIENCES				20
Ch 11/12	General Chemistry	8		
Ms 4	Algebra and Trigonometry	4		
Zo 3/4	Animal Biology	8		
B. LIFE SCIENCES AND AGRICULTURE (Electives)				12
C. ANIMAL AND VETERINARY SCIENCES				31
AnV 45	Animal Science	3		
AnV 63	Seminar	1		
AnV 74	Seminar	2		
AnV 135/136	Anatomy and Physiology of Domestic Animals	6		
AnV 155	Animal Nutrition	3		
AnV 156	Applied Animal Nutrition	3		
AnV 160	Animal Genetics and Breeding	3		
AnV 46	Dairy Cattle Technology	3		
AnV 48	Livestock Management	4		
AnV 85	Poultry Technology	3		

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D. COMMUNICATIONS (See College Requirements)			6
Eh	Written	3	
Sh	Oral	3	
E. HUMANITIES AND SOCIAL SCIENCES			15*
F. EDUCATION			12* of 21
Py 1	General Psychology	3*	
Ed B2	The American School or equivalent	3*	
Ed B3	The Growth-Learning Process or equivalent	3*	
Ed B4	The Teaching Process	3	
Ed M142		3	
Ed M191 or	Teaching Science in Secondary Schools		
Ed M193	Student Teaching	6**	
G. ELECTIVES			23
H. OTHER			1
Pe 1	Physical Education	1	
LSA 1	University Life	0	
Total			120

*These courses (Py 1, ED B2 and Ed B3 or their equivalents) are considered necessary for student certification. However, they may also be considered as Social Sciences and thus may be applied toward the College minimum requirements for Humanities and Social Sciences.

**Student teaching should be taken if immediate certification is desired. A conditional certification may be obtained without student teaching.

***Electives that have proven very helpful in teaching biology have been introductory courses in Botany, Entomology and Microbiology. These courses may serve in meeting the College minimum requirements in Life Sciences and Agriculture.

Courses in Animal and Veterinary Sciences (AnV)

IDL 43. (P/AnV) Tropical Agriculture—A consideration of the characteristics and problems of the soils, plants, and animals of the tropics. Programs and methods for stimulating their potential productivity will be explored. Course same as P 43. *Rec 3, Cr 3.* MR. MUSGRAVE, MR. STRUCHTEMEYER, MR. BROWN

45. Animal Science—Fundamental principles of the animal sciences, including animal genetics, breeding systems, the physiology of reproduction, animal nutrition and the physiology of lactation. *Rec 3, Cr 3.* MR. MUSGRAVE

‡46. Dairy Cattle Technology—The application of breeding, feeding, housing, selection, care, records, breed association programs and recent research findings to herd management. The laboratory is devoted to problems in and techniques of dairy cattle management. Field trip fee \$5. Prerequisite: AnV 45. *Rec 2, Lab 2, Cr 3.* MR. H. LEONARD

47. Equine Science—Principles of equine science including breeds, breeding, conformation, nutrition, management, unsoundness, health program, selection, housing, and training. *Rec 2, Lab 2, Cr 3.* MR. GOATER

48. Livestock Management—The selection, breeding, feeding, care and management of beef cattle, sheep, and swine. Prerequisite: AnV 45. *Rec 3, Lab 2, Cr 4.* MR. BRUGMANN

AnV 50. Equine Behavior and Training—The physiological development, control and education of the horse—stressing biting, longeing, collection and schooling for saddle and driving. Prerequisite AnV 47. *Lec 2, Lab 2, Cr 3.*

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AnV 51. Horsemanship—Instruction in equitation under the supervision of riding instructor (limited number of students). This course can also be taken as an elective in Physical Education credits. Two hours of riding per week for which a fee of \$80 per semester per student is charged. *Lab 2, Cr 1.*

63. Seminar—Discussion and evaluation of the areas of animal, dairy, poultry, and veterinary sciences; emphasis on requirements, employment opportunities, professional associations, and professional literature. Freshmen or sophomores. *Rec 1, Cr 1.* MR. SNIFFEN

65. Meat Technology—The basic science of meat and meat processing, packing house methods and cutting of meat. *Rec 2, Lab 2, Cr 3.*

MR. BRUGMAN, MR. GERRY

†66. Milk Technology—Studies in the composition and properties of milk and milk products, and common dairy processes such as pasteurization, homogenization and quality control methods. Testing dairy products for fat, solids, adulteration and acidity. Field trip fee \$5. *Rec 2, Lab 2, Cr 3.* MR. H. LEONARD

74. Seminar—Preparation and presentation of papers dealing with research in the animal and veterinary sciences. Evaluation of current literature in the animal and veterinary sciences. Senior students. *Rec 2, Cr 2.* MR. SNIFFEN

‡85. Poultry Technology—The science of the biology, breeding, feeding, incubation, and diseases of the domestic fowl; and the application of housing, management, and business practices of the table egg, hatching egg, and broiler industries. Field trips are arranged to acquaint students with industry. Field trip fee \$8. *Rec 2, Lab 2, Cr 3.* MR. HARRIS

135/136. Anatomy and Physiology of Domestic Animals—A basic, two-semester course in the comparative anatomy and physiology of domestic mammals and birds. Gross and histological features of animal systems involved in major physiological processes, meat uses, and disease. Prerequisite: Zo 4 or equivalent. *Rec 2, Lab 2, Cr 3.* MR. BRYAN

137. Animal Diseases—Principles of herd health programs. The pathology, control, and prevention of important diseases and parasites of domestic animals. Juniors and seniors. Prerequisite: AnV 135 or permission. *Rec 3, Cr 3.* MR. GIBBS

‡140. Poultry Diseases—Principles of hygiene and sanitation applied to the prevention and control of the diseases of poultry, including a detailed consideration of the pathological processes involved in the common diseases. Prerequisite: permission of instructor. *Rec 3, Cr 3.* MR. BRYAN

144. Diseases and Parasites of Wildlife—Known infectious and parasitic diseases of game and fur-bearing animals, zoonoses, emphasizing preventive and control measures and practice in autopsy and diagnostic techniques. Wildlife majors. *Rec 2, Lab 2, Cr 3.* MR. GIBBS

†150. Animal Mycopathology—Fungi of avian and mammalian importance including isolation, identification, pathogenicity indicators, tissue invasion, toxin assay and laboratory safety. Prerequisite: By 128 or equivalent. *Rec 2, Lab 2, Cr 3.* MR. O'MEARA

155. Animal Nutrition—Principles of nutrition, methods of experimentation and discussion of nutritional balances. Prerequisite: Zo 4, Ch 12 or equivalent. *Cr 3.* MR. APGAR

156. Applied Animal Nutrition—A study of the nutrient requirements of livestock and avian species. The nutritive value and characteristics of feedstuffs

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are studied as well as methods of formulating balanced nutrient intakes. Prerequisite: AnV 155. *Rec 2, Lab 2, Cr 3.* MR. HOOVER, MR. GERRY

160. Animal Genetics and Breeding—The principles of genetics. The transmission and expression of hereditary factors in animal breeding. Prerequisite: Zo 4. *Rec 3, Cr 3.* MR. DICKEY

161. Advanced Animal Breeding—The inheritance of the commercially valuable characteristics of animals. Mating systems and their effects. Progeny testing, selection indices and other methods to increase intensity and accuracy of selection. Prerequisite: AnV 160 or equivalent. *Rec 3, Cr 3.* MR. DICKEY

168. 169. Independent Study in the Animal Sciences—An in-depth study into a specific area to be approved by the staff adviser at time of registration. (1) anatomy, (2) behavior, (3) breeding, (4) disease, (5) management, (6) nutrition, (7) physiological. Not more than five credit hours will be permitted in this course toward graduation requirements during a student's undergraduate program. Prerequisite: AnV 45 or permission. *Cr Ar.* STAFF

172. Endocrinology—A detailed study of the animal endocrine system and functional relationships of each of the endocrine glands to growth, reproduction and lactation. Prerequisite: Zo 4, AnV 136 or equivalent. *Rec 3, Lab 2, Cr 4.* MR. BAYER

175. Behavior of Domestic Animals—A survey of factors encompassing the fundamentals of behavior in domestic animals, including interrelationships of behavior and domestication. Special attention is given to social, mating, and feeding behavior of several mammalian and avian species. Prerequisite: juniors or seniors or permission. *Rec 3, Cr 3.* MR. APGAR

180. Physiology of Reproduction and Lactation—The comparative development and function of the glands and organs of reproduction and lactation in domestic animals. Special emphasis on the problem areas commonly associated with infertility and milk secretion. Prerequisite: AnV 172 or permission. *Rec 2, Lab 2, Cr 3.* MR. MUSGRAVE

†**182. Avian Physiology**—Anatomy and physiology of the fowl with emphasis on the physiology of reproduction; special attention will be given to the current literature. Prerequisite: AnV 136 or permission of the instructor. *Rec 2, Lab 2, Cr 3.* MR. HARRIS

186. Bioassay—A study of various bioassay techniques and associated problems illustrated by laboratory exercises. Prerequisite: permission of instructor. *Rec 1, Lab 4, Cr 3.* MR. BIRD

†**200. Advanced Animal Pathology**—The gross and histopathology of the reaction of domestic animals to nutritional disorders and various etiologic agents, such as bacteria, viruses, fungi, parasites, poisons, and toxins. Prerequisite: AnV 35, 36, Zo 51, Bc 60 or equivalent courses. *Rec 2, Lab 2, Cr 3.* MR. GIBBS

†**212. Advanced Ruminant Nutrition**—The nutrition of ruminants as contrasted to non-ruminants; with special emphasis on rumen physiology, nutrient absorption and the role of rumen microorganisms in feed utilization. Prerequisite: permission. *Rec 2, Lab 2, Cr 4.* MR. HOOVER

‡**214. Energy Metabolism**—Principles of direct and indirect calorimetry and the application of these principles to research methods. Prerequisite: AnV 155, 212. *Rec 2, Lab 2, Cr 3.* MR. SNIFFEN

218. Population Genetics—Application of genetic and biometric principles to the characteristics of populations. Prerequisite: AnV 161. *Rec 3, Cr 3.* MR. DICKEY

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†220. *Gastrointestinal Physiology*—A study of the anatomy and physiology of the gastrointestinal tract and the accessory organs of digestion in monogastric animals. Prerequisite: permission of instructor. *Cr* 3. MR. BIRD

310. *Research Methods in Animal Science*—A comprehensive study of statistical techniques applied to animal research. Includes principles of setting up experiments, analysis and interpretation of data and methods of reporting results. Prerequisite: Ms 167 or permission of instructor. *Rec* 4, *Cr* 3. MR. APGAR

†316. *Advanced Animal Nutrition*—Nutrition of monogastric animals with emphasis on protein and amino acids; laboratory studies include evaluation of protein quality. Prerequisite: AnV 155 or permission. *Cr* 3. MR. BAYER

363. 364. *Graduate Seminar in Animal Science*—*Cr* 1.

390. *Graduate Research in Animal Science*—*Cr* *Ar*. STAFF

399. *Graduate Thesis*—*Cr* *Ar*. STAFF

POULTRY SCIENCE

Students desiring training in poultry science will major in the animal and veterinary sciences and will select courses with the sequence described on page 298. Students interested in this specialty may receive training in nutrition, physiology, genetics, and management technology and will have ample opportunity to select elective courses to prepare for a wide variety of career opportunities.

PLANT AND SOIL SCIENCES

PROFESSOR GLENN (Chairman); PROFESSORS BROWN, STILES, STRUCHTEMEYER; ASSOCIATE PROFESSORS CARPENTER, HEPLER, HOLYOKE, LANGILLE, LOTSE, H. MURPHY, WAVE; ASSISTANT PROFESSORS ERHARDT, GOLTZ, ISMAIL, LITTLEFIELD, SWASEY

The curriculum in the Department of Plant and Soil Sciences has been organized to provide a well-balanced educational program for students interested in the study of plants, soils and natural resources. The program provides students with a knowledge of basic sciences, soils, plants, landscaping and natural resources.

Students with primary interest in soils can get specialized training in soil fertility, conservation, chemistry, physics and classification. Those with an interest in plants can obtain training in forages, fruits, vegetables, ornamental horticulture and landscaping.

Students can also obtain training in the management and conservation of natural resources. For further information on the Natural Resources program see page 260.

Upon meeting the requirements established by the University and the department, students will receive a B.S. degree in plant and soil sciences. Training received will qualify the students for careers in teaching, extension work, production and service functions for industry, Soil Conservation Service and other related government agencies, farming, landscaping, consulting, inspections, communications and sales.

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Students who are well qualified and are interested in doing graduate work should plan early to go beyond the B.S. degree. Graduate programs at the M.S. and Ph.D. levels are available and qualified students should be encouraged to continue their education for an advanced degree.

Curriculum in Plants or Soils			Credit Hours	Minimum Degree Hours Required
Required Courses				
A. ORIENTATION				0
B. BASIC SCIENCES				36
9-10				
Ch	11-12 or 13-14	Chemistry	8	
Bc	21 & Bc 122	Organic & Biochemistry	8	
Bt	1	Botany	4	
Bt	153, 153a	Plant Physiology	4	
Ms	4 or 12	Mathematics	4	
Gy	6	Geology	3	
Ps	6	Physics	5	
C. PLANT SEQUENCE				28
P	21	Crop Science	3	
P	22	Crop Management	4	
P	173 & 174	Seminar	2	
S	2	Soil Science	4	
or				
S	3	Forest Soil Science		
S	151	Soil Fertility	3	
		Departmental Electives	12	
D. SOIL SEQUENCE				28
P	21	Crop Science	3	
P	22	Crop Management	4	
P	173 & 174	Seminar	2	
S	2	Soil Science	4	
or				
S	3	Forest Soil Science		
S	151	Soil Fertility	3	
S	152	Soil Classification	3	
S	154	Chemical Properties of Soil	3	
S	156	Physical Properties of Soil	3	
		Departmental Electives	3	
E. LIFE SCIENCES AND AGRICULTURE ELECTIVES				12
F. COMMUNICATIONS				9
Eh	1	College Composition	3	
Eh	17	Adv. Prof. Writing	3	
Sh	3	Fundamentals of Public Speaking	3	
G. HUMANITIES AND SOIL SCIENCES				15
H. PHYSICAL EDUCATION				1
I. FREE ELECTIVES				19
Any course in the University for which the student is qualified				
Minimum Degree Hours Required for Graduation				120

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Soils Courses (S)

2. Soil Science—A study of the chemical, physical and biological properties of soil. Also considers origin, management, and interrelationships of soils to plant growth. Prerequisite: Ch 11, 13 or Bc 7. *Rec 3, Cr 3 or Rec 3, Lab 2, Cr 4.*

MR. STRUCHTEMEYER

3. Forest Soil Science—Fundamentals of soil science including the study of development, properties, and management of soils and the interrelationships of soils to forest growth. Prerequisite: Ch 11 or 13. *Rec 2, Lab 2, Cr 3.*

MR. STRUCHTEMEYER

50. Soil and Water Conservation—Management of our soil and water resources in accordance with the multiple use concept for these resources and the capabilities of the land. *Rec 2, Cr 2.*

MR. STRUCHTEMEYER

52. Land Use Planning-Soil Aspects—A consideration of basic soil characteristics and properties as they influence land use and aid regional planning. *Rec 2, Cr 2.*

MR. GLENN

140. Seminar in Quaternary Studies—A multidisciplinary seminar concerned with selected areas of study (physical, biological, and anthropological) related to the Quaternary Period. Subject areas will vary each semester; may be taken more than once for credit. (Some as Ay, Bt, Gy, Zo 140). Prerequisite: consent of instructor. *Rec 2, Cr 2.*

MR. DAVIS, MR. DEARBORN, MR. DENTON, MR. LOTSE, MR. SANGER

151. Soil Fertility—A study of soil as a source of the essential nutrients needed for plant growth and the properties and use of fertilizers, liming materials, and manures. Prerequisite: S 2 or S 3. *Rec 3, Cr 3.*

MR. ERHARDT

†**152. Soil Classification**—Morphology, classification, and mapping of soils. Interpretation of soil survey reports. Prerequisite: S 2 or S 3 and Gy 1a. *Rec 2, Lab 3, Cr 3.*

†**154. Chemical Properties of Soils**—Composition and chemical properties of soils and their effect on plant growth. Prerequisite: S 2 or S 3 and S 151. *Rec 2, Lab 3, Cr 3.*

MR. LOTSE

‡**156. Physical Properties of Soils**—An intensive consideration of the physical properties of the soil and their effect on plant growth. Prerequisite: S 2 or S 3 and Ps 1, 3 or 6. *Rec 2, Lab 3, Cr 3.*

MR. GOLTZ

157. 158. Problems in Soils—Opportunity is provided for specialization in specific areas of soil science. *Cr Ar.*

STAFF

203. Radiobiology—Principles for the use, detection, and effects of radioisotopes in biological systems. *Rec 2, Lab 4, Cr 4.*

MR. LANGILLE

252. Spectrochemical Analysis—The theory and practice of colorimetry, flame photometry, spectroscopy and other allied instruments in quantitative chemical analysis. Prerequisites: Ch 140, Ps 1, Ps 2 or permission of instructor. *Rec 2, Lab 4, Cr 4.*

MR. CARPENTER

‡**254. Chemistry of Soils**—Colloquia and laboratories on chemical transformation in soils, chemical relationships of soils and plants, and effects on organic and inorganic plant nutrition. Prerequisite: S 2, S 151, S 154, and Ch 140. *Rec 2, Lab 4, Cr 4.*

MR. LOTSE

255. Clay Mineralogy of Soils—Structure, composition, properties, and X-ray diffraction analysis of clay minerals in soils. Chemical weathering and clay formation. Prerequisite: Ch 140, Gy 111, and Gy 212. *Rec 2, Lab 4, Cr 4.*

MR. LOTSE

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271. *Experimental Design*—Principles of research in biological sciences design of experiments, statistical analyses and interpretation of data. Permission of instructor. *Rec 3, Lab 2, Cr 4.* MR. HEPLER

399. *Graduate Thesis*—*Cr Ar.* STAFF

Plant Courses (P)

1. *Horticulture*—A course pertaining to general horticultural principles and practices as related to fruits, vegetables and ornamentals. Special aspects relating to plant propagation, home landscaping, and home gardens. *Rec 3, Cr 3.*

MR. LITTLEFIELD

21. *Crop Science*—Application of environmental sciences to growth of agricultural crops. Response of crops to moisture, temperature, light and soil fertility. Effects of weeds, diseases and insect pests. Prerequisite: Bt 1 or permission. *Rec 3, Cr 3.*

MR. BROWN

22. *Crop Management*—Principles and practices in the management of selected agricultural crops and field ornamentals. Includes weekly guest lecturers illustrating major species of the Northeast. Prerequisite: P 21 or permission. *Rec 4, Cr 4.*

MR. BROWN

Ornamental Horticulture and Landscape Courses

30. *Ornamental Horticulture*—The principles and practices of growing ornamental plants (houseplants and garden flowers) in the home and on home grounds. *Rec 2, Lab 2, Cr 3.*

MR. SWASEY

31. *Landscape Plant Material*—Study of the woody plants suitable for landscape design in New England including their selection, arrangement, planting, and care. Prerequisite: junior or senior standing. *Rec 2, Lab 2, Cr 3.*

MR. SWASEY

33. *Greenhouse Management*—The application of plant science to growing plants in commercial, school, and home greenhouses. Emphasis on specialized cultural techniques, structures, and marketing. Field trips. *Rec 3, Lab 2, Cr 4.*

MR. LITTLEFIELD

‡34. *Agostology*—The identification, fertilization, mowing, pest control, and soil requirements of grasses suitable for use on lawns, golf courses, athletic areas, cemeteries and parks. *Rec 3, Cr 3.*

MR. HOLYOKE

35. *The Art of Home Landscaping*—The principles of home landscaping as applied to the planning and planting of property in making it useful and an attractive place to live. *Rec 2, Lab 2, Cr 3.*

MR. SWASEY

IDL 43. (P, AnV) *Tropical Agriculture*—A consideration of the characteristics and problems of the soils, plants, and animals of the tropics. Programs and methods for stimulating their potential productivity will be explored. *Rec 3, Cr 3.*

MR. STRUCHTEMEYER, MR. BROWN, MR. MUSGRAVE

IDL 161. *Park Planning and Design*—Basic planning and design principles of space, scale and circulation applied to recreation areas and park facilities with special emphasis on visitor use. Prerequisite: junior, senior standing or permission. *Rec 2, Lab 2, Cr 3.*

MR. MONTVILLE, MR. SWASEY

163. *Bioclimatology*—An introduction to forces governing weather and climate with emphasis on interrelationships of atmospheric and biological processes and solutions to problems of plant and animal responses to the microclimate. Prerequisites Ps 1, 3, or 6; Ms 4 or permission. *Rec 3, Cr 3.*

MR. GOLTZ

COLLEGE OF LIFE SCIENCES AND AGRICULTURE

166. Plant Propagation—The principles and methods involved in the propagation of herbaceous and woody plants by seeds, division, layering, cutting, budding, and grafting. Prerequisite: Bt 153. *Rec 2, Lab 2, Cr 3.*

167. 168. Problems in Plant Science—Persons wishing to specialize in potatoes, vegetable crops, forage crops and pomology can do so by developing problems in their areas of interest. *Cr Ar.* STAFF

173/174. Seminar—Review of literature, problems, and research as related to the areas of plants and soils. *Rec 1, Cr 1.* STAFF

177. 178. Advanced Studies in Crop Science (Study Area)—Comprehensive study of basic practices in the production of certain agricultural crops. Group discussions of selected readings. Students may register for one or more of optional study areas including (1) apple production, (2) forage management, (3) potato production, and (4) sugar beet culture. Prerequisite: P 21 or P 22 or permission. *Cr 3.*

MR. STILES, MR. BROWN, MR. MURPHY, MR. HEPLER

‡201. Plant Growth Regulators—Concepts and techniques in the study of plant growth and development with emphasis on phytohormones and synthetic growth substances in relation to economic plants. Prerequisite: Bt 153. *Rec 3, Lab 3, Cr 3.* MR. LANGILLE

†265. Post Harvest Physiology and Storage—Discussion of biochemical and physiological processes associated with ripening and keeping quality of harvested plant products. Includes temperature, humidity, growth regulators, types of storage, handling and physiological disorders. Prerequisite: Bt 153 or permission. *Rec 2, Lab 2, Cr 3.* MR. ISMAIL

‡278. Mineral Nutrition of Plants—History of plant nutrition, establishing the essential elements, plant composition and function of essential elements, mechanisms of uptake, movement, distribution and selective uptake and a list of optional topics chosen by the class which includes: mineral nutrient budgets, mineral nutrition and plant breeding and mineral nutrition and plant ecology. Prerequisite: S 151 and Bt 153 or permission. *Rec 3, Cr 3.* MR. ERHARDT

399. Graduate Thesis—*Cr Ar.* STAFF

SPECIAL PROGRAM, MINORS, AND COURSES

HONORS PROGRAM

DEAN PULLEN (Chairman); PROFESSORS METZGER (Secretary), CAMPANA, DIMOND, E. MURPHY, SIMPSON; ASSOCIATE PROFESSORS GERSHMAN, KROFTA, LANGILLE, O'MEARA, VADAS, WHITTAKER; ASSISTANT PROFESSOR LABER

Freshmen and sophomores of marked academic ability, interested in independent study and research in a tutorial relationship with a faculty member, are invited to apply to the secretary for admission to the sequence of honors courses described below.

The work of the freshman and sophomore years (Hr 41 Hr 45 Hr 47, 48) provides the stimulus and guidance that should enable a superior student to begin building a perspective view of the liberal arts and sciences and to lay a foundation for more specialized work in the major field. The work is taken in common with students from other colleges, with courses taught by staff drawn from all colleges of the University.

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The work of the junior and senior years (Hr 51, 52, Hr 53, 54) provides for concentration in the student's major field and culminates in an honors thesis and comprehensive oral examination during the senior year. This work is conducted by the various departments, with the student directed by a faculty member specializing in his field of interest.

To receive a degree with Honors, a student must have a minimum of four semesters of work in the Honors Program and either Hr 47 or Hr 48. Honors courses normally substitute for course or credit requirements of the curriculum in which the student is enrolled. Such substitution are made through the student's academic adviser with the approval of the dean and department chairman. Letter grades are given in all honors courses. A minimum of 'B' grade level of performance in all work is expected for continuance in the Honors Program.

For additional information refer to the Honors section of this catalog, page 134, or contact the secretary of the College Honors Committee, Prof. Homer B. Metzger. For admission to the program apply to the secretary.

41. *Distinguished Freshman Seminar*—Limited to 72 freshman students, by invitation. Discussions and demonstrations displaying the range and nature of the liberal arts and the sciences. *Cr 3.* MR. REYNOLDS, Chairman

45. *Honors Colloquium*—Readings and discussions on the basic concepts of Western civilization. *Cr 3.*

47. 48. *Honors Group Tutorial*—Oral and written reports, under tutorial direction upon a planned sequence of books representative of the various fields of liberal education. Hr 47. 48 fulfills the sophomore humanities requirement for those students registered in the Honors Program. *Cr 3.* MR. THOMSON, Chairman

51. 52. *Honors: Specialized Studies*—A tutorially conducted survey of the student's major field, issuing in the choice of an approved thesis topic. *Cr 3.*

53. 54. *Honors Thesis*—The planning and completion of an honors thesis or research project. *Cr 3.*

Further information concerning the availability of other Honors courses may be obtained from the Secretary of the College Honors Committee.

COOPERATIVE PROGRAM WITH BANGOR THEOLOGICAL SEMINARY

Regularly enrolled students in the College of Life Sciences and Agriculture may register for courses at the Bangor Theological Seminary, not to exceed six credit hours per semester, without paying additional fees. The college extends a like privilege to students regularly enrolled at the Seminary. All registrations must have the approval of the academic deans of both institutions and the instructors involved. Credit for courses so taken will be considered a part of the student's program at the institution where enrolled.

While enrolled at the Seminary, a student may, with the approval of his dean and the Admissions Office of the University, also register as a special student in the College of Life Sciences and Agriculture on the established fee basis for such courses. Work so taken, if it does not represent duplicate courses taken in the Seminary program, may be counted as advanced standing credit toward the degree in the event a student later registers for a degree program at the University.

COLLEGE OF LIFE SCIENCES AND AGRICULTURE

MINOR AREAS OF CONCENTRATION

In addition to a program major, a student may elect a minor area of concentration. Minors have been approved and established in International Agriculture, Journalism, Food Science, Agricultural and Conservation Education, and Rural Sociology. Requirements in each area include the completion of specified courses and a minimum of 15 credit hours of courses above the introductory level. Students who decide to pursue a minor area of specialization make a declaration by the beginning of the junior year. A "minor selection card," available at the Dean's office, must be completed and processed in order to establish official recognition of a minor program.

INTERNATIONAL AGRICULTURAL DEVELOPMENT

This minor in International Agriculture is available to any student in the College of Life Sciences and Agriculture. The student would have as his primary emphasis an existing major field of study and become involved in international agriculture by selecting this option as a minor field of study. Such supplemental training is intended to give the student a better understanding of developmental problems in the underdeveloped countries of the world, and to provide useful skills for active involvement.

Curriculum for Minor in International Agricultural Development

Required Courses 15 Hours

IDL

(P/AnV) 43	Tropical Agriculture	3
ARE 81	Agriculture and Economics	3
AE 37	Agricultural Engineering for Developing Countries	3
Foreign Language	(Two semesters one language)	6

Elective Courses (Recommended) 11 Hours

(Minimum of 11 credit hours selected from the following:)

ARE 24	Sociology of Rural Life	3
ARE 124	Contemporary Rural Problems	3
ARE 150	Human Factors in Resource Development	3
ARE 186	Government Policies Affecting Rural America	3
Ay 141, 153, 155	People and Cultures	3
Ay 165	Political Anthropology	3
Ay 167	Peasant Societies	3
Ec 139	International Trade and Commercial Policy	3
Fn 1	Principles of Nutrition	3
Ge 2	World Regional Geography	3
Hy 7, 8	Asian Civilization	3/3
Hy 138	Problems of Southeast Asia	3
Hy 149	Argentina, Brazil, and Chile	3
Hy 150	Mexico	3
Hy 152	Problems of Latin America	3
Pol 165	International Relations	3/3
Pol 166	Government of South Asia	3
Pol 167	Government of East Asia	3
Pol 168	Emerging Africa	3
Pol 173/174	Government in Latin America	3
Pol 194	Asian Political Ideas	3
Pol 196	International Affairs Internship	3

Intermediate Foreign Language (Maximum 6 hours)

Total Hours

26 hours

JOURNALISM

The minor in journalism is available to any student in College of Life Sciences and Agriculture. The student has his primary emphasis in one of the major fields of study in the college and adds journalism as a secondary field of study. The general electives in the various programs allow flexibility and permit selection of courses for a journalism minor.

This minor is designed to prepare a student for a career in agricultural and biological science magazine or newspaper work, publication writing and editing, radio and television.

Curriculum for Minor in Journalism

Required Courses	Credit Hours
Jr 22, Survey of Mass Communications	3
Jr 75, Law of Publications*	3
Jr 31, Functional Writing	3
Jr 32, Reporting and News Writing	3
(Above courses are prerequisite)	
Jr 95, Journalism Laboratories (both print and broadcast media)	3
Jr 96, Journalism Laboratories	3
Jr 93, Problems in Journalism	3
Jr 82, News Editing	3
	<hr/>
Total Required	24

* Acceptable as social science course

Note: Suggest Sh 171, Writing and Broadcast (3 cr. hr.) may be substituted for one semester of Jr 31-32; Sh 173, Television Production Laboratory, may be substituted for one semester of Jr 95-96

SECONDARY SCHOOL TEACHER OF AGRICULTURAL AND CONSERVATION EDUCATION

Students may qualify for a minor in secondary school teacher of agricultural and conservation education upon meeting the baccalaureate degree requirements in one of several programs in the College of Life Sciences and Agriculture, plus background courses in certain subject matter areas, and in education. This program also leads to state certification.

A. TO TEACH VOCATIONAL AGRICULTURE:

Students seeking a B.S. degree in Agricultural Engineering, Agricultural Mechanization, Animal and Veterinary Sciences, Agricultural and Resource Economics, Plant and Soil Sciences, and Biology must meet the requirements of their particular degree plus an emphasis in *agriculture* by taking a minimum of six credit hours in each of four areas:

1. Agricultural Engineering
2. Animal and Veterinary Sciences
3. Agricultural and Resource Economics
4. Plant and Soil Sciences

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B. TO TEACH FOREST AND WILDLIFE CONSERVATION:

Students seeking a B.S. degree in Forestry and Wildlife must meet the requirements of their particular degree which must include a minimum of six credit hours in each of two areas: (1) Forestry and (2) Wildlife

All students seeking certification are required, in addition, to complete the following Professional Education courses:

	Credit Hours
1. Ed B2, American School*	3
2. Ed B3, Growth Learning Process*	3
3. Ed B4, Teaching Process	3
4. Ed X198, Problems in Education (Agricultural and Conservation Education)	3
5. Ed M, Student Teaching (First year of successful teaching)	6
	<hr/> 18

* May be considered as social science courses

While not required for certification, students are encouraged to take courses in two areas:

	Credit Hours
1. Social Sciences Economics, Sociology, Psychology	9
2. Professional Vocational Courses (during senior year or first or second year of teaching): Philosophy of Education; Shop Organization and Management; Methods and Materials of Instruction in Vocational Education; and Trade Analysis (Offered as extension courses through UM, Gorham and Vocational Technical Institutes)	12

SOCIOLOGY OF RURAL LIFE

The minor in the Sociology of Rural Life is designed to provide a substantive foundation in rural sociology. At the same time the curriculum provides an opportunity for the student to obtain a sampling of social science courses which could serve as a valuable foundation in many fields of endeavor.

Curriculum

	Credit Hours
IDL 24 Sociology of Rural Life	3
IDL 124 Contemporary Rural Problems	3
IDL 129 The Individual and the Community	3
ARE 150 Human Factors in Resource Development	3
Py 1 General Psychology	3
Py 130 Social Psychology	3
Sy 3, 4 Introductory Sociology	
Ay 1, 2 or Anthropology	6

FOOD SCIENCE AND TECHNOLOGY

PROFESSORS HOGAN, MURPHY; ASSISTANT PROFESSORS BARDEN, BREKKE, SLABYJ, WILSON; RESEARCH ASSOCIATES RIDLEY, TRUE

The Department of Food Science offers courses leading to a minor in food processing. Emphasis is on application of the basic sciences, mathematics, and economics to problems of evaluation, prediction, preservation, and control of quality of foods during handling, storage, processing, distribution, and preparation

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for consumption. Ordinarily the course work in food processing occurs in the last two years of study. Students interested in preparing for careers in the food industry should consult with the department chairman regarding specific courses in food science that should be added to their major program of study.

Curriculum

			Credit Hours	Minimum Degree Hours Required
A.	Required Courses			18
	Fs	101	Food Processing Industry	3
	Fs	98.99	Independent Studies	12
	Fn	152	Human Nutrition	3
B.	Recommended Courses			24
	Bc	164	Biochemical Laboratory Methods	4
	ARE	159	Agricultural Business Management	3
	ChE	1, 2	Fundamentals of Chemical Engineering	8
			or	
	Me	33, 39 and 62.	Mechanical Engineering	9

Courses in Food Science (Fs)

Fs 98. Independent Studies—In-depth studies in restricted areas of food science. (1) special topics, (2) food chemistry, (3) food microbiology. Prerequisite: Fs 101 and permission of the department. *Cr Ar.* STAFF

Fs 99. Independent Studies—In-depth studies in restricted areas of food technology. (1) special topics, (2) food preservation, (3) quality evaluation, (4) food processing. Prerequisite: Fs 101 and permission of the department. *Cr Ar.* STAFF

101. Food Processing Industry Principles and Problems—Scope of the food manufacturing industry, processing principles and practices discussed in relation to product quality and problems involved. *Rec 3, Cr 3.* MR. HOGAN

202. Food Industry Quality Control—Formulation of product criteria, quality evaluation (sensory and objective procedures) and quality control procedures. Prerequisite: permission of the instructor. *Rec 2, Lab 2, Cr 3.* MR. HOGAN

282. 283. Problems in Food Science—Enrollment by permission. *Cr Ar.* STAFF

399. Graduate Thesis—*Cr Ar.* STAFF

GENERAL COURSES

LSA 1. University Life—Several weekly group meetings on academic policies and aspects of university life are followed by periodic adviser-advisee meetings. *Lec 1, Cr 0.*

LSA 17. 18. Freshman Seminar—Small group discussions of topics dealing with various issues of modern society. Open to all freshmen in the College of Life Sciences and Agriculture other than those enrolled in the University's Honors Program. *Rec 1, Cr 1.* MR. PULLEN, Chairman

Mhe. 50. Man and His Environment—Effect of the biological and physical environment on life and man. Block course of 8 weeks for seniors in practice teaching. *Rec 3, Cr 3.*

MR. GERSHMAN, (Chairman), ERHARDT, GOLTZ, HOLYOKE, LANGILLE

COLLEGE OF LIFE SCIENCES AND AGRICULTURE

**PRE-PROFESSIONAL PROGRAMS IN
AGRICULTURAL EDUCATION, DAIRY MANUFACTURING
FOOD PROCESSING, AND PRE-VETERINARY**

A. Agricultural Education

The University offers the first two years of a four-year professional curriculum to prepare for teaching high school vocational agriculture. The last two years of the curriculum may be secured at the University of New Hampshire, or may be admitted directly as freshmen, under provisions of a cooperative agreement whereby Maine students may enroll at the New Hampshire resident tuition rate.

The following is a recommended two-year course of study to be taken at the University of Maine by students contemplating a major in Agricultural Education who desire to take the last two years of the four-year sequence at the University of New Hampshire.

Pre-Agricultural Education Curriculum

First Year

FALL SEMESTER			SPRING SEMESTER		
Course		Credit Hours	Course		Credit Hours
LSA	1	University Life .....0	Ch 10/12	Gen. Chemistry .....4	
AnV	45	Animal Science .....3	P	1 Horticulture .....3	
Bt	1	Plant Biology .....4	S	2 Soils .....4	
Ch	9/11	Gen. Chemistry .....4	Bt	2 Plant Kingdom or	
Eh	1	College Comp. ....3	Zo	4 Animal Biology .....4	
Pe	1	Physical Education .....1			
		<hr/>			<hr/>
		15			15

Second Year

AE	36	Farm and Forestry Power	3	AE	32	Farm Buildings & Equip.	3
AnV	49	Livestock Feeding	3	#Ms	4	Algebra and Trigonometry	4
Ec	10	Prin. of Economics	3	P	21	Crop Science	4
Py	1	Gen. Psychology	3	Elective	(En 26 or Ps 6 or		
Sh	3	Public Speaking	3			humanities)	5
			<hr/>				<hr/>
			15				15

#Ms 4 is required if the student completed two years of high school algebra, one year of plane geometry, and one half year of trigonometry.

B. Pre-Veterinary

The University offers a three-year pre-veterinary curriculum that prepares the student to apply for admission to a veterinary college. The University does not offer a veterinary medical degree program. Students who do exceptionally well in the pre-veterinary program may successfully compete for admission to a veterinary college at that point; however, the majority of students interested in veterinary medicine attend the University of Maine at Orono for four years as candidates

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for the B.S. degree in Animal and Veterinary Sciences. Students transferring at the end of three years may apply to the University of Maine, at the time they receive their D.V.M. degree for transfer credit from this professional degree so they may also qualify for their B.S. degree from Maine. The three- and four-year pattern is a national trend and, therefore, not peculiar to Maine.

As a guide for the prospective student who is interested in veterinary medicine, the following three-year curriculum is suggested. Adjustments may be made in the selection of courses to fit the specific requirements for a particular veterinary college. The student and his adviser may develop a specific program that will also have the alternatives of preparation for a B.S. degree in Animal and Veterinary Science that will enable him to enter Graduate College in an animal oriented specialty.

Freshman Year

FALL SEMESTER				SPRING SEMESTER			
Subject			Credit Hours	Subject			Credit Hours
LSA	1	University Life	0				10
AnV	45	Animal Science	3	Ch 12 or	General Chemistry		4
	9						14
Ch 11 or				Eh	1	College Composition	3
	13	General Chemistry	4	Ms	26	Anal. Geometry &	
Ms	4	Algebra & Trigonometry	4			Calculus	4
Pe	1	Physical Education	1			(Optional)	
Zo	3	Animal Biology	4	Zo	4	Animal Biology	4
LSA	17	Freshman Seminar	1				
			17				15

Sophomore Year

AnV	135	Anatomy and Physiology of Domestic Animals	3-4	AnV	136	Anatomy and Physiol. of Domestic Animals	3
		or		Ay	2	Intro. to Anthropology	3
Zo	133	Comparative Anatomy		Bc	122	Biochemistry	3
AnV	160	Animal Genetics & Breeding ...	3			Elective	4
Ay	1	Intro. to Anthropology	3			Foreign Language	3
Bc	21	Organic Chemistry	4				
		Foreign Language	3				
			16-17				15-17

Junior Year

AnV	155	Animal Nutrition	3	AnV	156	Applied Animal Nutrition	3
AnV	172	Endocrinology	4	Ps	2a	General Physics	4
Mb	127	General Microbiology	3	Sh	3	Fund. of Public Speaking	3
Mb	128	Microbiology	2	Zo	136	Development Biology	4
Ps	1a	General Physics	4			Elective	2
		Elective	2				
			18				16

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C. Dairy Manufacture

A cooperative agreement with the University of Vermont offers an opportunity for students to secure training in dairy manufacturing. The first two years of a four-year course are offered at the University of Maine. The final two years are completed at the University of Vermont. Residents of Maine are admitted to the University of Vermont for the last two years of the course at the Vermont resident tuition rate. The first two years of this program at Maine are supervised by the Department of Animal Sciences.

D. Food Processing

As part of the New England Board of Higher Education plan for regional cooperation, the first two years of a program in Food Science and Technology may be taken at the University of Maine (Department of Food Science) and the final two years of specialized training at the University of Massachusetts. Residents of Maine are admitted to the University of Massachusetts for the last two years at the Massachusetts resident tuition rate.

Alternately, students wishing to complete their training at the University of Maine may do so by enrolling in their last two years in the Food Science option in Biology (see page 247).

Curriculum

Freshman Year

FALL SEMESTER			SPRING SEMESTER		
		Credit Hours			Credit Hours
	Subject			Subject	
LSA	1 University Life	0	Ch	14 Chemistry	4
Ch	13 Chemistry	4	Ms	27 Calculus	4
Ms	26 Anal. Geometry and Calculus ..	4	ARE	48 Economics	3
Eh	1 College Composition	3	Zo	4 Animal Biology	4
Bt	1 Plant Biology	4			
Pe	1 Physical Education	1			
		<hr/>			
		16			
					<hr/>
					15

Sophomore Year

Ch	151	Org. Chem. Lecture	3	Ch	152	Org. Chem. Lecture	3
Ch	161	Org. Chem. Lab	2	Ch	162	Org. Chem. Lab	2
Mb	127,			Mb	136	Determinative	
	128,	Microbiology	5			Microbiology	4
Ps	1a	Physics	4	Pe	2a	Physics	4
AnV	135	Anatomy	3	Bt	2	Plant Kingdom	4

17

17

TECHNICAL DIVISION

ASSOCIATE DIRECTOR ROBERT B. RHOADS

Seven associate degree programs are offered at the University of Maine at Orono by the College of Life Sciences and Agriculture through its Technical Division. Dormitory students enrolled in the programs live on the Bangor campus. Students have lectures and laboratories on both the Bangor and the Orono campuses (shuttle bus service is provided at no cost to the students). The programs are administered through their respective Life Sciences and Agriculture departments at Orono and the technical courses are taught by the LSA faculty. Non-technical courses are taught by the faculty of the University of Maine at Bangor.

The basic objectives of educational programs in the Two-Year Technical Division are: 1) to provide a practical working knowledge of fundamental principles in specific technical fields which will develop competence for gainful employment; 2) to develop competence in written and oral communication; 3) to contribute to the development of the student's intellectual capacity and personal growth; and 4) to prepare graduates for roles as citizens and effective community leaders. While the specific objective of the program is not to provide a preparatory course for four-year professional curricula, students whose educational objectives change and who demonstrate superior academic performance may transfer to a four-year program upon successful completion of an Associate Degree program.

Course offerings in the technical program are distinct and separate from those offered for baccalaureate degree students. Technical courses are of a practical nature and place emphasis upon the development of skills for immediate application. Instruction is provided by regular University staff who are specialists in their fields. Laboratory instruction and field experience represent an essential part of the technical training program.

An associate of science degree is awarded to graduates of the program. Requirements for this degree include the satisfactory completion of a prescribed technical curriculum with a minimum of 64 credit hours earned at an accumulative grade average of at least 2.00.

Seven curricula are offered covering a variety of fields of study.

A basic core curriculum of general education subjects is required in most programs, along with the technical subjects.

BASIC CORE CURRICULUM

All students enrolled in the Two-Year Technical Division are expected to complete the following group of courses representing a basic core requirement:

		Subject	Hours
1	LSA	University Life1	1
13	LSA	Applied Mathematics2	3
3	ENG	Critical Written Expression	3
4	ENG	Speech	3
1	Pe	Physical Education	1
HY or POL		Elective13	3

1 3 FY is substituted for Forest Management students.

2 2 MST is substituted for students in Forest Management. Other students with permission

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may take 2 MST or other appropriate courses.

3 MHE 50 is substituted for students in Animal Medical Technology.

I. Animal Medical Technology Curriculum

The course of animal study provides technical training and experience for careers as laboratory animal technicians in biological and medical research laboratories, small animal hospitals, commercial testing laboratories for pharmaceutical and feed industries and veterinary aides. The curriculum provides specialized courses in animal care, handling, breeding, feeding, health, anatomy, and physiology, and in laboratory clinical work. Eight weeks of training is required at the Animal Medical Center in New York Cty during the student's final semester. Students will be expected to pay the usual tuition charges to the University and Room and Board charges while at the Animal Medical Center.

			Required Hours
A. BASIC CORE CURRICULUM			14
1 LSA	University Life	1	
13 LSA	Applied Mathematics	3	
3 Eng	Critical Written Expression	3	
4 Eng	Speech	3	
Mhe 50	Man & His Environment	3	
Pe 1	Physical Education	1	
B. FUNDAMENTAL SCIENCES			28
4 Anv	Animal Genetics & Breeding	3	
6 AnV	Animal Feeding	3	
9 AnV	Mammalian Anatomy	4	
10 AnV	Mammalian Physiology	4	
12 AnV	Reproduction & Breeding	3	
19 AnV	Lab Animal Diseases	3	
5 Bc	Biochemistry	4	
2 Mb	Food Bacteriology & Sanitation	4	
C. APPLIED TECHNOLOGY			14
14 AnV	Animal Care	3	
16 AnV	Laboratory Animal Techniques	4	
20 AnV	Pathogenic Microbiology	4	
24 AnV	Laboratory Methods	3	
D. TRAINING AT THE ANIMAL MEDICAL CENTER NEW YORK CITY			9
30 AnV	Radiology	2	
32 AnV	Surgery and Medicine	3	
34 AnV	Clinical Lab Methods	2	
36 AnV	Gross & Histopathological Techniques	2	
E. ELECTIVE CREDITS			1-3
Total			66-68

II. Animal Technology Curriculum

This program of study provides technical training and experience for careers in animal production in dairy cattle, poultry, beef cattle, pleasure horses, sheep, swine, and the related sales and service industries. Previous farm experience is considered helpful for enrollees. Graduates frequently return to the home farm or are employed as herdsman or foreman on other farms. An increasing number of graduates are employed in the integrated broiler or market egg industries or in sales and service in the feed, fertilizer, and machinery industries. Other employment opportunities include soil conservation service, breeding technicians, D.H.I.A. field men, and the Peace Corps.

			Required Hours
A. BASIC CORE CURRICULUM			14
B. ANIMAL & VETERINARY SCIENCE			26(27)
1 Anv	Dairy Cattle	3	
2 AnV	Animal Production	3	
3 AnV	Animal Selection	2	
4 AnV	Animal Breeding	3	
5 AnV	Milk Composition and Testing	3	
6 AnV	Animal Feeding	3	
7 AnV	Poultry Production	3 (4)	
12 AnV	Reproduction and Breeding	3	
15 AnV	Livestock Diseases	3	
C. AGRICULTURE TECHNOLOGY			10
3 ARE	Farm Management	3	
2 S	Soils and Fertilizers	4	
3 P	Forage Management	3	
D. FREE ELECTIVES			13(14)
Total			64

III. Food Service Management Curriculum

The two-year technical program in Food Service Management is designed to prepare individuals for supervisory or managerial positions in commercial and inplant feeding establishments, school lunch programs, and public and private institutions. The curriculum provides technical courses in food purchasing, quantity food production, food handling and food technology.

A seven-month placement training program at the completion of the second semester is offered in cooperation with The Maine Merchants Association. This course is designed to provide on-the-job training. The cooperating merchant compensates the student at the same wage level as other beginning employes in his organization. The student who does not elect Placement Training substitutes pertinent academic courses in the third semester.

			Required Hours
A. BASIC CORE CURRICULUM			14

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B. TECHNICAL FOOD SERVICE MANAGEMENT			15
1 Fn	Nutrition in Human Development	3	
2 Fn	Principles of Food Preparation	3	
3 Fn	Quantity Food Production	3	
4 Fn	Menu Planning and Analysis	3	
6 Fn	Food and Beverage Purchasing and Control	3	
C. BUSINESS AND ECONOMICS			6
2 ARE	Economics	3	
8 ARE	Accounting	3	
D. SOCIOLOGY			3
6 ARE	Dynamics of Human Behavior	3	
E. FOOD TECHNOLOGY AND HANDLING			12
2 Bc	Food Chemistry	4	
5 Bc	Biochemistry	4	
2 Mb	Food Bacteriology and Sanitation	4	
F. PLACEMENT TRAINING OR ELECTIVES			16 or 14
Total			66 or 64

IV. Forest Management Curriculum

Forest industries and federal and state resource agencies indicate a need for increasing numbers of forest technicians over the next few years. Many positions are salaried and are supervisory in nature. Duties may include timber cruising, scaling and marking, administration of recreation, or assisting in forestry research. Much of the work will be in attractive outdoor surroundings. The curriculum includes six weeks of summer camp at Camp R. I. Ashman near Princeton, Maine. Students may not register for the third semester until summer camp requirements have been satisfied.

			Required Hours
A. BASIC CORE CURRICULUM			16
3 Eng	Critical Written Expression	3	
4 Eng	Speech	3	
5 Eng	Technical Writing	3	
	History or Political Science Elective	3	
2 Mst	Mathematics I	3	
	(Substituted for 13 LSA, Applied Mathematics)		
1 Pe	Physical Education	1	
B. TECHNICAL FORESTRY			21
2 Fy	Applied Silviculture	4	
3 Fy	Intro. to Forest Technology	1	
4 Fy	Aerial Photo Interpretation	3	
5 Fy	Forest Measurements	4	
6 Fy	Wood Products Utilization	3	
7 Fy	Forest Protection	2	
8 Fy	Seminar	1	
9 Fy	Forest Land Management	3	

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C. SUPPORTING SUBJECT MATTER			26
2 Are	Economics	3	
6 Are	Dynamics of Human Behavior	3	
8 Are	Accounting	3	
1 Bt	Introductory Botany	3	
5 Ae	Forestry Power and Equipment	3	
16 Ae	Work Simplification	3	
5 Get	Forestry Drawing	2	
4 Cet	Elements of Surveying	3	
1 S	Fundamentals of Forest Soils	3	
D. OTHER			3
Elective		3	
Total			66

Summer Camp			
(All students are required to attend summer camp before registering for the third semester)			
10s Fy	Field Measurements	2	
12s Fy	Harvesting and Manufacturing	2	
13s Fy	Recreation and Wildlife	2	
		6	

V. Merchandising (Home Furnishings and Clothing) Curriculum

In recent years the rapid technological development of new textiles, new finishing processes for existing textiles, and new materials for home furnishings has created a need for personnel in the retail field at the supervisory and managerial level who have an understanding of these materials. The curriculum provides specialized courses in textiles, clothing, home furnishings, commerical and advertising design and fashion merchandising.

A seven-month placement training program at the completion of the second semester is offered in cooperation with The Maine Merchants Association. This course is designed to provide on-the-job training. The cooperating merchant compensates the student at the same wage level as other beginning employes in his organization. The student who does not elect Placement Training substitutes pertinent academic courses in the third semester.

			Required Hours
A. BASIC CORE CURRICULUM			14
B. TECHNICAL HOME FURNISHING AND CLOTHING			19
1 Cd	Introduction to Design	3	
3 Cd	Textiles in Home and Clothing	3	
4 Cd	Furnishing and Decorating the Home	4	
6 Cd	Clothing the Family	3	
7 Cd	Commercial and Advertising Design	3	
8 Cd	Fashion Merchandising	3	
C. BUSINESS AND ECONOMICS			9
2 ARE	Economics	3	
8 ARE	Accounting	3	
10 ARE	Sales Promotion	9	

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D. SOCIOLOGY	6
6 ARE Dynamics of Human Behavior	3
7 ARE Sociology and the Individual	3
E. PLACEMENT TRAINING OR ELECTIVES	16
	<hr/>
Total	64

VI. Plant and Soil Technology Curriculum (Landscape and Nursery Management)

The Landscape and Nursery Management program is offered cooperatively by the Department of Plant and Soil Sciences of the University of Maine at Orono and the Southern Maine Vocational Technical Institute of South Portland. Students may enroll and take their freshman year at either the University of Maine at Orono or at the Southern Maine Vocational Technical Institute. The second year of the program is taken at Orono and the student receives an associate of science degree from the University of Maine at Orono.

The curriculum focuses on preparing the student for designing and interpreting landscape plans; planting and cultivating trees, shrubs, and flowers; building and maintaining lawns; constructing landscape features including walks, paths, small pools, and walls; and the production, harvesting and sale of ornamental plants. The program also provides a background in mathematics, English and those areas important to businessmen dealing with the public. All students in the program are required to earn four credit hours of specialized on-the-job training before beginning the second year.

Required Courses			Required Hours
A.	1 LSA University Life		1
	1 Pe Physical Education		1
B.	COMMUNICATIONS		9
	3 Eng Critical Written Expression	3	
	4 Eng Speech	3	
	5 Eng Technical Writing	3	
C.	MATHEMATICS		3
	13LSA Applied Mathematics	3	
D.	HUMANITIES & SOIL SCIENCES		6
	5 Pol State and Local Government	3	
		Elective	3
E.	BASIC SCIENCES		6
	1 Bt Introduction to Botany	3	
	1 En Applied Entomology	3	

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F.	APPLIED SCIENCES	34
15 LSA	Placement Training		4
5 Ae	Forestry Power and Equipment		3
11 Ae	Soil and Water Management		3
7 P	Landscape Design		3
8 P	Turfgrass Management		3
10 P	Landscaping		3
11 P	Nursery and Garden Center Oper.		3
2 S	Soil and Fertilizers		3
P 30	Ornamental Horticulture*		3
P 31	Landscape Plant Material*		3
P 33	Greenhouse Management*		3
G.	ELECTIVES	.....	8
Total			68

* See plant and soil sciences section for course descriptions.

VII. Resource and Business Management Curriculum

This curriculum places major emphasis on the principles of business management and economics and provides practical training in preparation for business management careers in the food and fiber industries and recreation industries.

Students will be prepared for managerial, supervisory, sales, and service positions with business firms and government agencies. Opportunities are available in such fields as finance, feeds, farm machinery, food processing, food inspection, retail food stores, floral stores, wholesale nurseries, golf courses, campgrounds, recreation parks, and game farms.

Students will have the opportunity to apply for placement training with a business firm in Maine as an integral part of their academic program. Students who apply for the placement training option must be accepted by a committee composed of merchants and faculty. Students selected for this option will spend approximately six months working in a management training program away from campus. For successful completion of this program, students receive up to 16 hours of academic credit. This program takes place during the summer and fall following the first year on campus. Students not electing this option remain on campus in regular academic classes. Both groups complete their programs in two academic years.

The training in business management includes courses in economics, marketing, accounting, data processing, statistics, sales promotion, and business management.

Three general areas of specialization are available for those students who desire additional technical training for specific job opportunities. A student may select courses from one or a combination of these areas, depending upon his employment goals and interests.

Resource and Business Management Curriculum

Required Courses	Credit Hours	Required Hours
A. UNIVERSITY LIFE—1 LSA	1
PHYSICAL EDUCATION—Pe 1,		1

COLLEGE OF LIFE SCIENCES AND AGRICULTURE

B. COMMUNICATIONS		9
3 Eng	Critical Written Expression	3
4 Eng	Speech	3
5 Eng	Technical Writing	3
C. MATHEMATICS		3
13 LSA	Applied Mathematics	3
D. SOCIAL SCIENCE		9
6 ARE	Dynamics of Human Behavior	3
7 ARE	Sociology and the Individual	3
Hy or Pol	Elective	3
E. BUSINESS AND ECONOMICS		21
2 ARE	Economics	3
4 ARE	Marketing	3
8 ARE	Accounting	3
10 ARE	Sales Promotion	3
12 ARE	Statistics	3
20 ARE	Business Management	3
22 ARE	Data Processing	3
ELECTIVE COURSES		20
Total Hours		64

SPECIALIZATION AREAS

Electives may be selected from among courses offered in the Associate Degree Division of the College of Life Sciences and Agriculture. Suggested electives are listed below for those students who wish to specialize in a particular area.

I. Agricultural Business Management

3 ARE	Farm Management	3
8 Ae	Farm Machinery & Tractors	4
16 Ae	Work Simplification	3
4 AnV	Animal Breeding	3
6 AnV	Animal Feeding	3
1 En	Applied Entomology	3
1 P	Potato Production	3
2 S	Soils and Fertilizers	4

II. Food Industry Management

24 ARE	Food Distribution Management	3
15 Ae	Refrigeration and Transportation Engineering	3
2 Bc	Food Chemistry	4
7 Cd	Commercial and Advertising Design	3
6 Fn	Food and Beverage Purchasing Control	3
2 Mb	Food Bacteriology and Sanitation	4

III. Resource Management

26 ARE	Recreation Management	3
11 Ae	Soil and Water Management	3
1 Fy	Forestry	3
9 Fy	Forest Land Management	3
7 P	Landscape Design	3
1 S	Fundamentals of Forest Soils	3

TECHNICAL COURSE DESCRIPTIONS
AGRICULTURAL AND RESOURCE ECONOMICS (ARE)

2. Economics—A study of economic principles applied to the economy as a whole and to the business firm. Consideration will be given to money and banking, government, demand, supply, competition and pricing. *Rec 3, Cr 3.* MR. TOBEY

3. Farm Management—Managing the farm business for optimum returns; economic guides to decision making; management tools and their application; organizing resources for production; adjustments to change. *Rec 3, Cr 3.*

MR. KROFTA

4. Marketing—A study of marketing and the basic activities involved in this function of modern business. Covers theoretical principles, consumer and product characteristics, trade practices, market channels, and the improvement of markets and marketing. *Rec 3, Cr 3.*

MR. KING

6. Dynamics of Human Behavior—An introductory course which explores the applications of social psychology. Five major areas will be covered: social basis of personality, status-roles, socialization, development of meanings and the individual and the group. Attention will be given to work situations involving human relationships, leadership, and supervision. *Rec 3, Cr 3.*

MR. WATKINS

7. Sociology and the Individual—Emphasis is placed upon the relationship of the individual to the various social systems of which society is composed. An action approach is taken. The social system of community, family, religion, education, and economics is especially emphasized. In addition, leadership, power structure, and social stratification are analyzed. *Rec 3, Cr 3.*

MR. WATKINS

8. Accounting—The principles and procedures used in the preparation of balance sheets and income statements. Deals with the systematic recording, classifying, and analyzing of business transactions. Emphasis is on the preparation and presentation of accounting information. *Rec 2, Lab 2, Cr 3.*

MR. DUNHAM

10. Sales Promotion—The use of advertising, sales techniques and merchandising in food marketing. Consideration also given to training of sales and service personnel. Case studies are used to develop an interdisciplinary approach to promotion. *Rec 3, Cr 3.*

MR. DUNHAM

12. Statistics—The nature and use of statistics, including methods of collecting, organizing, interpreting, and reporting data for business management decisions. Topics include measurement of central tendency, trends and relationships, sampling variability, and quality control. *Rec 2, Lab 2, Cr 3.*

MR. JOHNSTON

14. 15. Independent Studies in Business Management—Analysis of and readings on current management problems in production, processing, distribution, and marketing. Prerequisite: permission of instructor. *Cr 1.*

STAFF

20. Business Management—Forms of business organization, economic framework, the managerial functions, techniques of financial and credit management, the application of business records in managerial decision making and the concepts of managerial economics are presented in light of the needs of a firm. *Rec 3, Cr 3.*

MR. KING

22. Data Processing—The principles and techniques of electronic data processing. Special case studies will be used to give the student training in the practical application of the principles and operation of electronic data processing equipment and the use of the results in business management. *Rec 3, Cr 3.*

MR. PELSUE

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24. Food Distribution Management—The management approach to food marketing. Study of food distribution channels, including supermarkets, warehouse distribution centers, and other types of outlets. Case studies in management policies, facility layout procedures, merchandising, price policies, sales promotion and advertising will be used. Firm visits (Lab fee \$5.00). Prerequisite: 4 ARE. *Rec 2, Lab 2, Cr 3.* MR. DUNHAM

26. Recreation Management—Planning, developing, and operating the commercial recreation firm, with emphasis on economic considerations. Examination of the socio-economic aspects of recreation, the relationship of recreation to the environment, and analysis of characteristics of different types of recreation enterprises. Prerequisite: 2 ARE. *Rec 3, Cr 3.* MR. TOBEY

AGRICULTURAL ENGINEERING (Ae)

5. Forestry Power and Equipment—The construction principles and maintenance of spark ignition and diesel engines, power transmission and hydraulic systems for tractors, skidders and mobile equipment used in forestry operations. *Rec 2, Lab 2, Cr 3.* MR. RILEY

8. Farm Machinery and Tractors—The principles of construction, operation and adjustment of farm machinery, tractors and related equipment. Emphasis is on economic selection and management of optimum systems. Laboratory work includes testing and adjustment of internal combustion engines as well as testing and calibration of field machinery. *Rec 2, Lab 2, Cr 4.* MR. ROWE

9. Farm Buildings—Functional planning and economic considerations, materials, methods of construction and environmental control for production, processing and storage buildings. *Rec 2, Lab 2, Cr 3.* MR. KLINGE

10. Electrification—Electrical terms and circuits. Electrical equipment for heat and power. Basic wiring techniques including planning of wiring systems, *Rec 2, Lab 2, Cr 3.* MR. HUFF

11. Soil and Water Management—Elementary farm surveying. Application of soil and water structures such as farm ponds, drainage systems, irrigation systems, and soil erosion control systems. *Rec 2, Lab 2, Cr 3.* MR. KLINGE

15. Refrigeration Technology—The principles, selection, and operation of refrigeration unit and materials handling equipment associated with refrigerated storages and transportation. *Rec 2, Lab 2, Cr 3.* MR. RHOADS

16. Work Simplification—A study of the principles and methods for accomplishing work. Procedures cover: (1) measuring and improving efficiency of labor, and (2) comparing alternative methods of performing an operation. Problems furnish practice in planning improved work methods and managerial procedures. *Rec 2, Lab 2, Cr 3.* MR. RHOADS

ANIMAL SCIENCE (AnV)

1. Dairy Cattle—The practical application to herd management of lactation, environment, reproduction, sanitation, housing, and breed association programs. The laboratory is devoted to practical problems in the management of a herd of dairy cattle. Field trip fee \$5.00. *Rec 2, Lab 2, Cr 3.* MR. LEONARD

2. Animal Production—Breeds and types of beef cattle, sheep, swine and pleasure horses; their care, feed, and management. *Rec 2, Lab 2, Cr 3.*

MR. BRUGMAN

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3. Animal Selection—A study of the principles of animal selection. *Rec 1, Lab 2, Cr 2.* MR. LEONARD

4. Animal Breeding—Animal genetics, systems of breeding and principles of selecting farmland laboratory animals. *Rec 3, Cr 3.* MR. DICKEY

5. Milk Composition and Testing—A study of milk constituents and properties. Emphasis on testing milk and milk products for fat and solids; methods of milk processing. *Rec 2, Lab 2, Cr 3.* MR. HOOVER

6. Animal Feeding—A study of the principles of nutrition, feeds and their values, and the nutritive requirements of animals. The laboratory is devoted to the principles of nutrition and ration formulation; one section for farm animals and one section for laboratory animals. Field trip fee \$5. *Rec 2, Lab 2, Cr 3.* MR. LEONARD, MR. GERRY

7. Poultry Production—A general survey course to introduce students to the many aspects of the poultry industry. Guest speakers and field trips (which are part of laboratory) to visit the industry are featured. Lecture section may be taken without laboratory. Field trip fee \$8. *Rec 3, Cr 3 or Rec 3, Lab 2, Cr 4.* MR. HARRIS

8. Meat and Meat Products—Methods of handling and preparing livestock for market, packing house methods, cutting and curing of meats with special emphasis on retailing of meat and poultry products. Laboratory fee of \$5. *Rec 1, Lab 4, Cr 3.* MR. BRUGMAN, MR. GERRY

9. 10. Mammalian Anatomy and Physiology—A descriptive course covering the structure and function of the various tissues, organs and systems of common laboratory and domestic animals. Laboratory space limited. Priority given to Animal Medical Technology students. Lecture section may be taken without laboratory. *Rec 3, Cr 3 or Rec 3, Lab 2, Cr 4.* MR. HARRIS

12. Reproduction and Breeding—A practical course in breeding of cattle, sheep, hogs and laboratory animals, with emphasis on the reproductive cycle, handling of semen, and management of the breeding programs. *Rec 2, Lab 2, Cr 3.* MR. BRUGMAN

14. Laboratory Animal Care—The principles and practices of laboratory animal care in clinics, hospitals and research laboratories; animal house design, equipment, management, and legal regulations. *Rec 3, Cr 3.* MR. BIRD

15. Livestock Diseases—Principles of hygiene and sanitation applied to the prevention and control of the common diseases of dairy cattle. *Rec 3, Cr 3.* MR. GIBBS

16. Laboratory Animal Techniques—Principles and practices of animal handling, management and restraint. Emphasis is placed, from a management and research viewpoint, on coordinating new information with that gained from previous courses. Taken for one-half semester. *Rec 3, Lab 6, Cr 4.* MR. BAYER

19. Laboratory Animal Diseases—Principles of disease prevention and control as they apply to common laboratory rodents, carnivores, primates, and birds. *Rec 3, Cr 3.* MR. GIBBS

20. Pathogenic Microbiology—Laboratory techniques and procedures for identification and isolation of pathogenic and parasitic organisms. *Rec 1, Lec 2, Lab 2, Cr 4.* MR. GERSHMAN, MR. O'MEARA

21. 22. Problems in Animal and Poultry Production—*Cr Ar.* STAFF

24. Laboratory Methods—A descriptive and laboratory course studying animal clinical procedures in microscopy, urinalysis, hematological methods, blood analysis, and basic instrumentation. *Rec 2, Lab 2, Cr 3.* MR. O'MEARA

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30. Radiology—The basic fundamentals of radiological techniques. Emphasis is placed on applied aspects of radiology as practiced in modern animal medical hospitals. Taken for one-half semester. *Rec 1, Lab 6, Cr 2.* MR. HERBERTS

32. Surgery and Medicine—A course designed to train students in the procedures and techniques involved in practical animal medicine and surgery. Taken for one-half semester. *Rec 1, Lab 10, Cr 3.*

MR. KAY, MR. DE HOFF, MR. TASHJIAN

34. Clinical Laboratory Methods—A course designed to train students in practical clinical laboratory techniques in use in modern animal medical hospitals. Taken for one-half semester. *Rec 1, Lab 6, Cr 2.* MR. HERBERTS

36. Gross and Histopathological Techniques—A course designed to train students in the principles and techniques of anatomic pathology and histopathology. Taken for one-half semester. *Rec 1, Lab 6, Cr 2.* MR. HERBERTS

FOREST MANAGEMENT (Fy)

1. Forestry—Establishment and care of woodlots. Tree identification. Methods of estimating volume of standing timber and measuring forest products. Measurement of forest land. *Rec 2, Lab 3, Cr 3.* (Not open to forest technicians.) Fall Semester odd numbered years.

2. Applied Silviculture—Practices and basic concepts in the regeneration management and cultural treatments of forest stands in order to produce desired timber crops and recreational and other forest values. Field practice in planting, thinning, weeding and pruning and observation of various harvesting methods. *Lec 2, Lab 4, Cr 4.*

3. Introduction to Forest Technology—A review of the development of forestry in the United States and a survey of career opportunities with emphasis on the technical level. Suggestions for setting guidelines for education and self-development. *Lec 2, Cr 1.*

4. Aerial Photo Interpretation—Use of aerial photographs in connection with forest inventory techniques, locating and mapping forest areas resources, and improvements. *Rec 2, Lab 3, Cr 3.*

5. Forest Measurements—Methods of estimating the cubic volume of forest trees and stands and the volumes of useful products in logs, bolts and standing trees. Determination of growth rate as a basis for management practices. Sampling procedures. Field practice in measuring logs, trees and plots. *Rec 2, Lab 4, Cr 4.*

6. Wood Products Utilization—A survey of the major forest products industries to give the student an understanding of how the products of the forest are utilized and marketed. Effect of wood quality requirements on forest management. Inspection trips to local wood-using plants. *Rec 2, Lab 3, Cr 3.*

7. Forest Protection—Problems involved and practices used in the prevention and control of forest fires, insects, diseases and other causes of loss or damage. *Rec 2, Cr 2.*

8. Seminar for Forest Technicians—Discussion of developments affecting technicians, current activities in forestry, and evaluation of training. Subjects chosen by class members. *Rec 1, Cr 1.*

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9. Forest Land Management—Land titles, surveys, owner's rights and liabilities, trespass and relations with the public. Organization and management of properties for timber production and other uses. Predicting returns from investment. *Rec 2, Lab 3, Cr 3.*

SUMMER CAMP

Forty-eight hours a week. Credit 6.

10s. Field Measurements—Practice in several cruising methods. Locating boundaries and mapping a forest area, field work and office calculations in estimating volume. Preparation of operation report. Fire and pest control problems. Three weeks of camp.

12s. Harvesting and Manufacturing—Practice in felling, yarding, backing and piling and studying operation layout, supervision and safety. Observation of one or more harvesting systems. Studies at lumber and pulp and paper manufacturing plants. Marking of operation area for cutting. One and one-half weeks of camp.

13s. Recreation and Wildlife—Types of recreation development and examination of specific examples. Preparation of a development plan; wildlife in relation to forest management. Treatment of stands to produce more favorable habitat for wildlife. One and one-half weeks of camp.

HUMAN DEVELOPMENT

1 Fn. Nutrition in Human Development—Basic nutrition knowledge interpreted in light of the contribution good nutritional practices can make to the welfare of the individual and the community. *Rec 3, Cr 3.* STAFF

2 Fn. Principles of Food Preparation—Influence of kind and proportion of ingredients, methods of manipulation, and cookery on food products. Standards for acceptable products. Experience with a wide variety of foods under varied conditions. *Rec 1, Lab 4, Cr 3.* STAFF

3 Fn. Quantity Food Production—Recipe standardization portion and quality control; the sanitary, safe and economical use of food and equipment. Emphasis on principles and practices of food preparation that underlie the service of high quality, nutritious food in quantity. Prerequisite: 1, 2 Fn. *Rec 1, Lab 4, Cr 3.* MISS YOUNG

4. Menu Planning and Analysis—Principles of menu planning, types and uses, format, organization and pricing. Prerequisite: 1, 2 Fn. *Rec 3, Cr 3.* STAFF

5 Fn. Food Service Equipment: Layout and Design—The use, care, maintenance, and selection of small wares and heavy duty equipment. Study of general and itemized specifications; bid analysis and awarding of contracts. Consideration of sanitary codes that affect layouts; blueprint analysis through studies of schematic drawings of equipment, departmental and overall food service layouts. *Rec 2, Lab 2, Cr 3.* STAFF

6 Fn. Food and Beverage Purchasing and Control—A discussion of sources, grades, methods of purchase, care, and storage of foods; principles of food control, cost analysis and inventory procedures. *Rec 3, Cr 3.* STAFF

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1 Cd. Introduction to Design—Selection and organization of visual elements and principles of design to create harmony in compositions and to obtain function, economy, beauty, and individuality in daily living. *Rec 2, Lab 2, Cr 3.*

3 Cd. Textiles in Home and Clothing—Learning to recognize quality features of fabrics and to understand labels for fiber content, functional finish, and care. Fiber properties and performance data. Fair claim policy. Names and consumer uses of fabrics. *Rec 3, Cr 3.* STAFF

4 Cd. Designing and Furnishing the Home—Planning functional and aesthetic qualities of the home for individual and family situations. Focus on selection, organization, and evaluation of furnishings and materials for residential interiors. Layout in floor plans and wall elevations. *Rec 2, Lab 4, Cr 4.*

6 Cd. Clothing the Family—Clothing and accessories for physical, social, and economic needs of various age groups. Size, cut, fit, construction, and price level. Hanger appeal and combining value in the wardrobe. Studies of consumers' satisfaction. *Rec 3, Cr 3.* STAFF

7 Cd. Commercial and Advertising Design—Creation of visually stimulating designs to focus and hold people's interest on a product, service, or idea. Problems in visual communication such as trademarks, advertisements, posters, package designs, and displays. Lettering, illustration, layout. *Rec 1, Lab 4, Cr 3.*

8 Cd. Fashion Merchandising—Sources of fashion with charting of trends. Promotion of fashion in home furnishings and clothing. Comparative shopping and evaluation of perishability. Prerequisite: 1-7 Cd. *Rec 3, Cr 3.*

PLANT AND SOIL SCIENCES

1 P. Potato Production—Production of potatoes for seed, tablestock and processing. *Rec 2, Lab 2, Cr 3.* MR. MURPHY

3 P. Forage Management—Production of hay, silage, and pasture crops. Selection of seeding mixtures, establishment of forage seedings; use of lime and fertilizers to maintain forage productivity. Pasture management; harvesting and preservation of hay and silage. *Rec 2, Lab 2, Cr 3.* MR. BROWN

7 P. Landscape Design—The principles of landscape design as applied to selected problems. The course is designed to prepare students for situations similar to those in the industry. *Rec 2, Lab 2, Cr 3.* MR. SWASEY, MR. CARMICHAEL

8 P. Turfgrass Management—The characteristics, soil and environmental adaptation, propagation, specific uses and management requirements of grasses for turf. Emphasis on identification, fertilizing, clipping, watering and controlling weeds, insects, and diseases of turf grasses. Renovation and construction of turf areas by seeding and sodding. *Rec 2, Lab 2, Cr 3.* MR. HOLYOKE, MR. STAFFORD

10 P. Landscape Construction—Techniques and use of construction materials used in the landscapes. It provides the basic knowledge and skills for planning and construction of garden terraces, walks, steps, walls, fences, benches, garden pools. *Rec 2, Lab 2, Cr 3.* MR. SWASEY, MR. KLINGE

11 P. Nursery and Garden Center Operations—A course in nursery and garden center management designed mainly to acquaint students with the diversity of nursery plant production, equipment and retail store operations. *Cr 3.*

MR. CARMICHAEL

1 S. Fundamentals of Forest Soils—Study of the properties of forest soils with interpretations of these properties in terms of tree growth. *Rec 2, Lab 2, Cr 3.*

MR. STRUCHTEMEYER

UNIVERSITY OF MAINE

2 S. Soils and Fertilizers—Soil properties and their relation to crop production with special emphasis on management and use of commercial fertilizers. *Rec 3, Lab 2, Cr 3.* MR. MURPHY

SERVICE COURSES

1 LSA. University Life—Understanding the University; adjusting to an academic environment; providing guidelines for accepting responsibilities in business and social situations. *Rec 1, Cr 1.* MR. RHOADS AND STAFF

13 LSA. Applied Mathematics—Use of graphical and statistical methods, slide rules and other mechanical aids, solution of problems in business, mechanics, agricultural production, and institutional management. *Cr 3.* STAFF

15 LSA. Placement Training—Provides “on-the-job” training in field related to program of study. Work is to be under supervision of employer and appropriate department or school in the College of Life Sciences and Agriculture. Prerequisite: C average. *Cr 4.* STAFF

1 Bt. Introductory Botany—The structure and life processes of seed plants, their propagation, breeding, classification, and relation to their environment. *Rec 2, Lab 3, Cr 3.* MR. HOMOLA

2 MB. Food Bacteriology and Sanitation—Basic principles of food microbiology together with illustrations of these principles to serve as an aid to workers in the fields related to food industries. *Rec 2, Lab 2, Cr 3.* MR. GERSHMAN

2 Bc. Food Chemistry—Chemical composition and reaction of materials encountered in the processing and preservation of foods. *Rec 3, Lab 2, Cr 4.* MR. RADKE

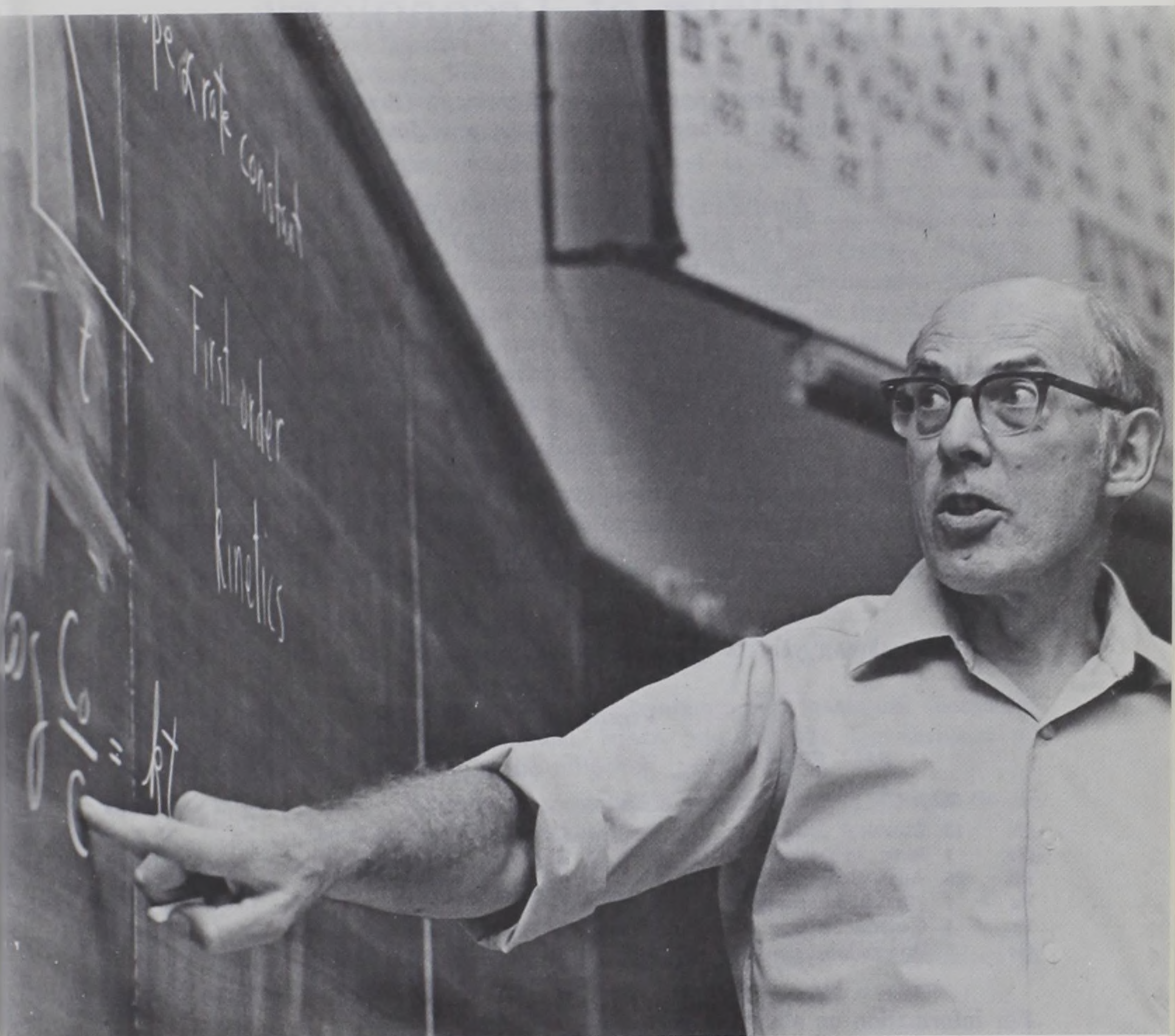
5 Bc. Animal Biochemistry—An introduction to the principles of inorganic, organic, and biochemistry. *Rec 3, Lab 2, Cr 4.* MR. WRATTEN

1 En. Applied Entomology—Consideration of insect benefits and detriments to man. General structure, classification, habits, and life histories of representative pest species. Study of all phases of control with emphasis on development, use of implication of pesticides to production and marketing. *Rec 2, Lab 2, Cr 3.* MR. FORSYTHE

5 Get. Forestry Drawing—An introduction to the basic graphical construction techniques, orthographic projection and cartography. *Rec and Lab 4, Cr 2.* STAFF

COLLEGE OF TECHNOLOGY

ELDRED W. HOUGH, DEAN



College of Technology

The College of Technology, which recommends the degree of bachelor of science upon completion of any of its curricula, provides instruction in the following:

- Agricultural Engineering (Jointly with College of Life Sciences and Agriculture)
- Chemical Engineering
- Chemistry
- Civil Engineering
- Electrical Engineering
- Engineering Physics
- Mechanical Engineering
- Pulp and Paper Technology

By special arrangement, a five-year Pulp and Paper Program is available in conjunction with any of the above curricula or the Forestry curriculum.

For information on the two-year programs in Engineering Technology see page 270.

The freshman year is common to all engineering curricula and chemistry.

Freshman Year

FALL SEMESTER

	Subject	Hours
Ch	13 Chemical Princ.	3 3 4
Ge	1 Intro. to Design	0 4 2
Ms	26 Anal. Geom. & Cal.	4 0 4
Pe	1 Physical Education	0 2 0
Ps	1 General Physics	3 3 4
Ge	5 Orientation	1 0 0

SPRING SEMESTER

	Subject	Hours
Ch	14 Chemical Princ.	3 3 4
Eh	1 Freshman Comp.	3 0 3
Ge	2 Intro. to Design	0 4 2
Ms	27 Calculus	4 0 4
Pe	2 Physical Education	0 2 0
Ps	2 General Physics	3 3 4
Ge	6 Orientation	1 0 0

For information on advanced placement, see page 44.

GRADUATION REQUIREMENTS

(Common to all curricula in the College of Technology beginning with the Class of 1971)

I. An accumulative average of 1.80. (Effective with the Class of 1974, the College of Technology will require an accumulative grade point average of 2.00 for graduation.)

II. Passing grades in all courses required by College and major department.

1. For department requirement see subsequent sections.

2. College requirements.

a. Common freshman year shown on page 334.

b. Ms 28 and 29, or equivalent, (Ms 29 is not required of Chemistry majors.

c. Non-technical courses: Eighteen credit hours are required. In general these courses will be

- 1) distributed between the Social Sciences and Humanities, but
- 2) tailored to student's interests if recommended by adviser.

The Social Sciences include courses listed in the catalog under Business, Economics, Modern Society, Psychology, Sociology and Anthropology. Courses in Accounting, Industry, Management, Finance and Personnel Administration are excluded.

The Humanities include courses listed in the catalog under Art, English, Foreign Languages and Classics, (elementary language courses taken after the fall semester of 1972 will not be allowed in fulfillment of the Humanities requirement of the College of Technology) History, Political Science, Music and Philosophy. Courses of a cultural and non-technical nature offered in the Speech Department, namely, American Public Address, Theatre History and Theatre Today, and a maximum of three additional credits in Theatre will be accepted. No more than three credits will be accepted in applied music (band, chorus, instrumental or voice music lessons). Humanities and Social Science courses, available only on a pass-fail basis, may count for Humanities or Social Science credit at the discretion of the departmental advisers. Courses in Scientific German (Gm 13 and 14) and English Composition are excluded.

III. Degree credit for ROTC is not allowed.

Course Expenses

For College of Technology students the minimum and maximum course expenses (inclusive of required equipment, books, and supplies, but exclusive of Military deposit) are indicated in the following table

Freshmen	\$150 per-year, of which approximately \$100 will be required the first semester
Sophomores	\$100—140 per year
Juniors	\$100—160 per year
Seniors	\$100—160 per year

In chemistry and chemical engineering courses, students may be required to pay for apparatus broken or lost and for certain non-returnable supplies.

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Graduate Study

Graduates from accredited undergraduate programs are eligible for graduate study in the College of Technology, provided their undergraduate records meet general requirements. (See general requirements in the catalog section on Graduate Study). Candidates must complete, without credit, any undergraduate courses which may be prerequisite to courses included in the program of graduate study. In the master's degree program, in general, from 6 to 10 credit hours will be devoted to a thesis in the field of major interest. Selection of courses must conform to a general plan laid down either before study begins or very soon after registration.

Cooperative Work-Study

There are a number of cooperative work-study programs being planned in the College of Technology. For further details see the Dean.

Honors Program

Honors courses listed on page 134 are available to students in the College of Technology. The University Honors Program is described on page 37. The successful completion of Hr 41 or Hr 45 will exempt a student from Eh 1. Hr 41, Hr 45 (if not used to replace Eh 1), Hr 47, and Hr 48 may be applied to the non-technical elective requirement. Subsequent honors work will replace portions of the standard curriculum as specified by the student's department head. The area of honors work will be shown on the student's transcript.

TECH COURSES WITHOUT ANY MATH REQUIREMENTS

(Beyond Algebra and Trigonometry)

Available to any student in the University

Ae	20	Principles of Agricultural Mechanization
Ae	32	Farm Buildings and Equipment
Ae	35	Soil Water Control
Ce	5	Plane Surveying
Ce	175	Contemporary Environmental Pollution
Ee	192	Elements of Electrical Measurements
Ee	193	Space Science and Applications
Ge	12 & 14	Forestry Drawing/Architectural Drawing
Ge	120	Engineering Decision Making
Ps	3	Descriptive Physics
Ps	5	Essentials of Physics
Ps	9	Climatology
Me	7 & 8	Machine Processes/Manufacturing Processes
Me	11	Introductory Engineering Metallurgy
Me	12	Elementary Heat Power
Ch	13, 14	Chemical Principles
Ms	12	Analytic Geometry and Calculus

DEPARTMENTS OF INSTRUCTION

Courses numbered 1 to 99 are undergraduate courses. They are open to graduate students but credit earned in these courses may not be used to satisfy advanced degree requirements. Courses numbered 100 to 199 are upperclass undergraduate courses which may be used for graduate degree credit by graduate students if given prior approval by the graduate students' advisory committee. Courses numbered 200 to 299 are graduate courses which may be elected by undergraduate honor students, or those undergraduates whose advancements in the field will permit their taking a graduate level course among graduate students without disadvantage to themselves. Courses numbered 300 to 399 are graduate level courses which may be taken only by students admitted to the Graduate School.

One number is used for a course which is given both fall and spring.

When a slant is used between the two numbers (e.g., 1/2), the first semester may be taken by itself, but the second cannot be taken unless the first is taken previously; when a period is used (e.g., 1.2), either semester may be taken for credit; when a dash is used (1-2), both semesters must be taken to obtain credit.

AGRICULTURAL ENGINEERING

PROFESSORS SMITH, KLINGE, RHOADS, ROWE; ASSOCIATE PROFESSORS HUFF, SOULE; ASSISTANT PROFESSORS GRAY, RILEY

The Agricultural Engineering curriculum combines study in the biological sciences and the physical sciences with mathematics and engineering to provide a unique background for solving engineering problems associated with agriculture.

The basic curriculum is strengthened by elective options which permit the student to specialize in one of four areas according to his interests and needs. Areas of specialization are: (1) Design and application of machinery and power units for the agricultural and forest industries; (2) Design and application of food and fiber processing systems; (3) Design of agricultural structures; and (4) Soil and water conservation engineering. Electives in engineering and the life sciences aid in providing a broad base of knowledge for engineering practice.

With the rapidly expanding world population, a rising demand for higher standards of living and with limited natural resources, agricultural engineering graduates are in great demand. Employment opportunities are as diverse as the agricultural industry itself. Graduates in Agricultural Engineering may be employed as design engineers by machinery and farmstead systems manufacturers; as sales engineers by machinery, food or chemical companies; as research engineers by industry, government or state experiment stations or in teaching or extension positions by universities. Some practice as consulting engineers. An increasing number of opportunities for foreign service are opening.

The curriculum in Agricultural Engineering is a joint responsibility of the College of Technology and the College of Life Sciences and Agriculture.

UNIVERSITY OF MAINE

Graduate Work in Agricultural Engineering

The degree of master of science (Agricultural Engineering) and master of engineering (Agricultural Engineering) is offered with options for specialization in soil and water engineering, farm structures, agricultural power and machinery, and electric power and processing.

Several research assistantships are available each year. Incumbents devote half time to research work on approved projects of the Agricultural Experiment Station.

AGRICULTURAL ENGINEERING CURRICULUM

Freshman Year. See Page 334.

			Hours Credit	Hours Required Minimum Degree
A. AGRICULTURAL ENGINEERING				29
Ae	20	Prin. of Mechanization	3	
Ae	55	Materials in Ag. Eng.	3	
Ae	80	Senior Seminar	1	
*Ae	81	Department Seminar	0	
Ae	82	Intro. to Ag. Eng.	2	
Ae	83	Spec. Prob. in Ag. Eng.	1	
Ae	160	Agr. Machinery	3	
Ae	163	Farm Structures Design	3	
Ae	164	Instr. and Controls	3	
Ae	165	Soil & Water Eng.	4	
Ae	167	Agricultural Power	3	
Ae	169	Agr. Processing	3	
B. BASIC ENGINEERING				28
Ge	1	Intro. to Eng. Design	2	
Ge	2	Intro. to Eng. Design	2	
Ge	7	Computer Programming	2	
Me	33	Thermodynamics	3	
Me	53	Statics & Kinematics	4	
Me	54	Kinetics	4	
Me	51	Strength of Materials	4	
Ce	26	Hydraulics (or Me 59 Fluid Mechanics)	4	
Ee	41	Elementary Circuits	3	
C. TECHNICAL ELECTIVES (A group of engineering courses selected by the student approved by his adviser)				9
D. BASIC PHYSICAL SCIENCE				32
Ch	13	Chemical Principles	4	
Ch	14	Chemical Principles	4	
Ms	26	Analytic Geom. & Cal.	4	
Ms	27	Analytic Geom. & Cal.	4	
Ms	28	Analytic Geom. & Cal.	4	
Ms	29	Differential Equations	4	
Ps	1	General Physics	4	
Ps	2	General Physics	4	
E. AGRICULTURAL AND BIOLOGICAL SCIENCE				10
Bt	1	Plant Biology (or Zo 3, Animal Biology)	4	
S	2	Soils	3	
		Electives	3	

COLLEGE OF TECHNOLOGY

F. COMMUNICATIONS, HUMANITIES AND SOCIAL SCIENCE			21
G. OTHER			1
LSA	1	University Life	0
Ge	5	Engineering Orientation	0
Ge	6	Ag. Eng. Orientation	0
Pe	1	Physical Education	1

Minimum Degree Hours Required for Graduation			130
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*Required each semester.

Students transferring to the University of Maine under the Regional Program from the Universities of Massachusetts, New Hampshire, Rhode Island, or Vermont should check the bulletins for those institutions for the first two years in Agricultural Engineering.

CHEMICAL ENGINEERING

(Including Pulp and Paper Technology)

PROFESSORS BOBALEK (CHAIRMAN), CHASE, HOUGH, ZABEL; RESEARCH PROFESSORS DURST, ZIEMINSKI; ASSOCIATE PROFESSORS CECKLER, GORHAM, MUMMÉ, SHELDEN, SIMARD, THOMPSON, WILHELM; LECTURER MARSHALL

The basic Chemical Engineering curriculum for the first professional degree aims to provide the education necessary for versatile work in the design, operation and improvement of the processes of chemical industry. The curriculum provides a broad background in the humanities and in the fundamentals of science and engineering, and affords the opportunity for the integrative application of these fundamentals in professional courses which illustrate how comprehensive problems are solved in design of products and processes that involve chemical change.

Since it is essential that chemical engineers have a sound understanding of the chemical sciences, the curriculum includes courses in both fundamental and applied chemistry. So that the student may gain an early understanding of the significance of his major field, design oriented chemical engineering courses are introduced in the sophomore year and are continued through three years in logical sequence. Necessary basic knowledge of electrical, mechanical, and general engineering is provided by courses in the appropriate departments. Also, the faculty counselor will assist in defining a program of elective courses which allows each student to develop special interests where chemical engineering science is important. The four-year curriculum program leads to the basic degree of bachelor of science in chemical engineering which is accredited by the Engineers' Council for Professional Development.

Division of Pulp and Paper Technology

Manufacture of pulp and paper products from wood and other renewable fiber resources is one of the largest industries in the United States and the world which depends upon chemical engineering for research, design, and management of a wide range of both organic and inorganic chemical processes in complex and integrated systems.

UNIVERSITY OF MAINE

The Department of Chemical Engineering at the University of Maine at Orono pioneered the first paper studies program in the United States, and continues to teach multidisciplinary application of engineering sciences to the varied and complex operations of this forest resources industry. The modern and rapidly expanding paper industry of this state provides an exceptional opportunity for co-operative interaction of University-based programs with real life problems of industrial development.

Students with a B.S. degree in several scientific or engineering disciplines can program a fifth year extension of their undergraduate curriculum to fulfill requirements for a *Certificate of Advanced Study in Pulp and Paper Management*. One half of the fifth year covers basic fiber science and the engineering technology of pulp and paper production. The other half can be an elective sequence to develop special interests in systems engineering, environmental engineering, applied computer sciences, polymer science, process control, plant design, operations economy, engineering management, and others.

Students at the University of Maine who are enrolled in basic curricula for a B.S. degree in engineering or science can include the fifth-year option. The option can be either an extension of a completed four-year program, or an integrated program where the requirements of the fourth year of their basic curriculum and the additional courses of the five-year option are distributed to reinforce each other over the last two years of a five-year program. Where the integrated option is selected, the B.S. degree and the certificate are awarded concurrently at the end of the fifth year.

Students with a special interest in Pulp and Paper Technology, whose commitment to the full curriculum for the B.S. degree in chemical engineering is deferred or subordinate to other goals, can elect a four-year program for a B.S. in pulp and paper technology. This curriculum is more flexible in allowing substitution of higher level courses in basic sciences and engineering with more specialized practical courses, both technical and non-technical, which prepare the student to serve a responsible supporting role to engineers in functions such as production supervision, marketing, technical services, technical writing, teaching of industrial arts, and others. The B.S. degree in pulp and paper technology is not recognized as a basic professional degree by the Engineers' Council for Professional Development as is the B.S. in Chemical Engineering. What it provides is the development of technical communications skills which, combined with technical knowledge, allow the graduate to fulfill the job function between the skilled craftsman and the engineer at the end of the spectrum closest to the engineer. As an engineering technologist the graduate will have the capacity to achieve a material result based upon concepts and designs developed by professional engineers.

The design of the four-year Pulp and Paper curriculum is such that transfer to junior standing is possible after completion of an appropriate Associate in Science degree or the equivalent in the Technical Institute Division of the College of Technology or elsewhere, including other campus locations of the University of Maine system.

Cooperative "Work-Study" Program Option in Chemical Engineering

Students with a satisfactory academic standing at the conclusion of their fourth semester in the B.S. curriculum of Chemical Engineering or Pulp and Paper Technology may petition for and accept opportunities provided by co-

operating industries to undertake the special "Co-op" program option. This involves work-study as a chemical engineering intern, with college credit allowed, for two periods of supervised and paid professional experience which alternate with two regular terms of study, over a continuous 15-month period normally beginning in June of the sophomore year and ending in September immediately before the fall semester of the senior year. Students in the "Co-op" program can complete their study program to graduate with a B.S. degree at the same time as do other members of their class who do not elect the "Co-op" option. Consult with the chairman or faculty advisers of the Department of Chemical Engineering for additional details, including procedure for application.

The "Co-op" program positions are awarded on a competitive basis, with common consent of the faculty, the selected student, and the industrial "Co-op" sponsor.

Graduate Work in Chemical Engineering

Candidates for the degree of master of science in chemical engineering must have received the degree of bachelor of science. They must also have completed a curriculum consistent with the B.S. degree in chemical engineering or take the necessary courses to accomplish that objective without receiving graduate credit for some or all of them. Graduate credit for the advanced degree generally consists of a minimum of 20 hours of graduate level courses and 10 hours of thesis. Some industrial fellowships and assistantships are available to graduate students. A candidate who accepts either of these usually requires two years to complete the requirements for the master of science degree in chemical engineering.

Graduate work leading to the master of science degree is also offered in the Pulp and Paper Division interdisciplinary and in the graduate faculty program in systems engineering. Candidates who complete, concurrently, in a five-year program, requirements for both the B.S. degree and certificate in Pulp and Paper may receive graduate credit for 20 hours of suitable courses taken in the fifth year, provided that they have been admitted tentatively to Graduate School before beginning their fifth year. Admission to Graduate School is required only of those students in the Certificate Program who wish to obtain graduate program degree hour credit for a part of the study which overlaps requirements for the certificate, and which is not included as a requirement for the B.S. degree.

Graduate programs are also available that lead to the doctor of philosophy degree in chemical engineering.

Curriculum for the Basic Professional Degree of B.S. in Chemical Engineering

Freshman Year. See Page 334. (31 Credit Hours)

A. TECHNICAL COURSES REQUIRING A FIXED TIME SCHEDULE FOR COMPLETION OF ALL IN FOUR YEARS. (44 credit hours)

Sophomore Year

FALL SEMESTER				SPRING SEMESTER			
Subject		Hours		Subject		Hours	
ChE	1 Fund. of Chem. Eng.	2	4 4	ChE	2 Fund. of Chem. Eng.	2	4 4
Ms	28 Calculus	4	0 0	Ms	29 Differential Equations	4	0 4
				Ch	169 Physical Chemistry	4	0 4

UNIVERSITY OF MAINE

Junior Year

ChE	160	Elem. of Chem. Eng.	.....4	0	4	ChE	162	Elem. of Chem. Eng.	.....4	0	4
Ch	170	Physical Chemistry	.....4	0	4	ChE	195	Chem. Eng. Thermo.	.....4	0	4
Ch	171	Phys. Chem. Lab0	4	2	Ch	172	Phys. Chem. Lab0	4	2

Senior Year

ChE	161	Chem. Eng. Lab0	4	2	ChE	163	Chem. Eng. Lab0	4	2
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Additional requirements for the degree of bachelor of science in Chemical Engineering are as follows:

B. OTHER REQUIRED TECHNICAL COURSES TO BE SCHEDULED ON A MORE FLEXIBLE OPTION FROM SOPHOMORE THROUGH SENIOR YEAR (21 credit hours)

ChE	196*	Process Control	3	0	3
ChE	178*	Elements of Chemical Plant Design	3	0	3
ChE	168	Chem. Eng. Kinetics	3	0	3
Ch	151	Organic Chemistry	3	0	3
Ch	152	Organic Chemistry	3	0	3
or					
ChE	177*	Chemical Processes			
Me	55	Statics and Strength of Materials	3	0	3
Ee	41	Electrical Circuits	3	0	3

*These courses will be offered in both fall and spring semesters to facilitate programming of studies for students in the cooperative work-study in chemical engineering.

C. OTHER REQUIREMENTS—RESTRICTED AND UNRESTRICTED ELECTIVES (33 credit hours)

A minimum of 33 credit hours of elective courses. At least 18 elective credit hours must be in non-technical courses as specified under Graduation Requirements, College of Technology. A minimum of 9 credit hours must be in technical courses. (Some 100-level chemistry course in the Department of Chemistry of the College of Technology must be included in this 9 credit hour minimum requirement for technical electives.) Six credit hours of the total elective requirements are open electives, technical or non-technical, including options in business or other departments which are excluded normally from the College of Technology requirements for 18 credit hours in the humanities or social sciences.

The timing and sequence by which those courses in (B) and (C) are taken will be determined by the student subject to approval by his faculty adviser.

The four-year program, including the requirements of the freshman year, (31 credit hours) plus requirements specified in groups A, B, C (98 credit hours) will total to a minimum of 129 degree hours.

Five-Year Curriculum in Chemical Engineering and Pulp and Paper Technology

In the fourth and fifth years a minimum of 30 credit hours beyond the B.S. degree are required, including the required courses: Pa 165, Pa 166, Pa 295, Pa 173, and Pa 174. Pa 199 may be substituted for either Pa 173 or Pa 174, but not for both. A variety of course programs can be developed by the student with consultation and approval of his adviser which complete, by the end of the fifth year, the requirements for a B.S. degree and a certificate for advanced study in Pulp and Paper Management. Also, the Certificate Program may be taken concurrently with some approved M.S. programs, after receiving the B.S. degree. It should be recognized, however, that the Certificate Program is a fifth-year extension of studies at the undergraduate level in those courses which are required, and all courses

taken in this fifth year may not apply as degree requirements for the M.S. program. The fifth-year option for the certificate in Pulp and Paper Management can be added to the B.S. degree for other disciplines in science or engineering. Program details will vary for each special case, and can be arranged by conferring with appropriate advisers in the Department of Chemical Engineering.

The Four-Year Curriculum for the Bachelor of Science in Pulp and Paper Technology

Freshman Year. See Page 334. (31 Credit Hours)

A. TECHNICAL COURSES REQUIRING A FIXED TIME SCHEDULE FOR COMPLETION OF ALL COURSE REQUIREMENTS IN FOUR YEARS. (44 credit hours)

Sophomore Year

FALL SEMESTER				SPRING SEMESTER			
R L C				R L C			
ChE	1	Fund. of Chem. Eng.	2 4 4	ChE	2	Fund. of Chem. Eng.	2 4 4

Junior Year

Pa	165	Pulp Technology	3 0 3	Pa	166	Paper Technology	3 0 3
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Senior Year

Pa	173	Pulp Mfg. & Testing	0 8 4	Pa	174	Paper Mfg. & Testing	0 8 4
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B. OTHER REQUIREMENTS—RESTRICTED AND UNRESTRICTED ELECTIVES

- Mathematics—A course in statistics and a course in computer programming are required.
- Communications—A total of 9 credit hours.
- Humanities—A total of 18 credit hours as specified under Graduation Requirements, College of Technology.
- Technical Electives—The student with the guidance of his academic adviser will select a sequence of not less than 18 credit hours of technical electives. This sequence should be chosen to provide academic background relating to the student's chosen vocational preference, and include at least two additional courses in chemical engineering.
- Free Electives—A total of 20 credit hours.
- Required for Graduation—A minimum of 120 credit hours.

Examples of Electives which Satisfy Curriculum Requirements

- To satisfy minimal mathematics requirements beyond Ms 27 students might select
 - Statistics—Ms 19
 - Computer Programming—Ms 169 or Ge 7
- To satisfy the communications requirements students might select
 - Composition—Eh 7, 8 or Eh 17
 - Speech—Sh 1, Sh 4, Sh 101, Sh 105
- To satisfy the humanities requirements students should follow the guidelines presented for all degrees in the College of Technology.

UNIVERSITY OF MAINE

To satisfy the technical electives requirements students might select for Chemical Engineering—ChE 33, ChE 37, ChE 43, ChE 154, and to achieve breadth engineering courses offered at the appropriate level by other departments within the College of Technology.

Also, to satisfy technical electives requirements, some students may elect to extend their study of mathematics to Ms 29 and in this way meet the prerequisites for advanced engineering courses such as ChE 160/162, ChE 195, and others. The free electives may be used to give added emphasis to a chosen vocational objective such as a sequence in business administration or increased depth in technological studies: for instance, a sequence in sanitary engineering or biochemistry. The suggestions above illustrate alternatives, but do not exhaust program possibilities for elective programs.

Courses in Chemical Engineering (ChE)

(In each laboratory course a breakage card is required.)

1/2. Fundamentals of Chemical Engineering—The application of the principles of material and energy balances to the solution of problems in chemical engineering operations and processes through quantitative correlation of basic concepts of chemistry, physics, and mathematics. Laboratory work includes the use of basic chemical engineering equipment and analytical devices, and the fundamentals of report writing. Prerequisite: Ch 14. *Rec 2, Lab 4, Cr 4.*

MR. CECKLER, MR. THOMPSON AND STAFF

33. Stoichiometry—Application of the principles of heat and material balances to the solution of problems in combustion and industrial chemistry. An elective course. Recommended for students whose major is not in chemical engineering. Prerequisite: Ch 14. *Rec 3, Cr 3.*

MR. BOBALEK

37. Introduction to Thermodynamics—Development of the first law of thermodynamics and its application to engineering problems of both the batch and the flow type. Consideration of the second law. Recommended elective for students whose major is not in chemical engineering. Prerequisite: Ch 14, Ms 27. *Rec 3, Cr 3.*

MR. BOBALEK

43. Plastics Technology—An introductory course in the chemistry and physics of high polymeric substances. Practical applications and commercial practice in this field are considered. Lectures, demonstrations, reports. Recommended elective for students whose major is not in chemical engineering. *Rec 3, Cr 3.*

MR. BOBALEK

130. (Same as Ch 130) Polymer Chemistry and Reaction Engineering—The synthesis and production of polymeric materials from monomers or by modification of natural polymers. The various types of polymer-forming reactions, their catalysis, and the industrial reaction systems used comprise the major subject areas. Topics include characteristics of chain and step-reaction polymerization, free radical, ionic and coordination complex catalysis, stereochemistry, thermochemistry, polymerization techniques, and influence of reactor type and reaction system on products. The relation of theory and practice is stressed throughout. Prerequisite: Ch 151 or equivalent and Ch 170 or equivalent. *Cr 3.*

MR. SHELDEN

131. (Same as Ch 131) Polymer Structure and Properties—The structure and properties of polymeric materials, and the principles underlying the processing of such materials. Polymer structure and morphology, transitional phenomena, polymer crystallinity, the rubbery and glassy states, solution behavior, rheology, mechanical properties, and the relation to chain structure are considered. The relation of theory and practice are stressed throughout. Prerequisite: Ch 170 or equivalent. *Cr 3.*

MR. THOMPSON

COLLEGE OF TECHNOLOGY

150. Analog Computer Applications—Fundamentals of linear and non-linear analog computer programming. Solutions of ordinary and partial linear and non-linear equations. Techniques of time and voltage scaling and estimation of maximum values in dynamic systems. Major emphasis on simulation of physical systems representing various engineering and scientific disciplines. Simulation of process control systems. Prerequisite: Ms 29 (or concurrent). *Rec 2, Lab 2, Cr 3.*

MR. MUMMÉ

151. Digital Computer and Data Processing Technology—Introduction to the IBM 1800 process control computer system. Major emphasis on the use of FORTRAN in an interruptible process control computer; use of disk files; process programs of varying priorities; plotters; the time sharing Executive system. Unique features of process control computers are stressed. Use of the equipment in solving laboratory problems, especially examples of applications in engineering and science is encouraged. Knowledge of FORTRAN is assumed. *Lec 2, Lab 2, Cr 3.*

MR. MUMMÉ

154. Elements and Applications of the Theory of Automatic Control—An introductory survey of the theory of automatic control systems with sufficient emphasis on operational techniques to support laboratory practice by the student in application of the theory to some specific examples of industrial process control problems. Recommended for students whose major is not in chemical engineering. Prerequisite: Ms 29. *Rec 2, Lab 2, Cr 3.*

MR. MUMMÉ

160/162. Elements of Chemical Engineering—Introduction to rate operations, stage operations, and the principles of molecular and turbulent transport of mass, momentum, and energy. Application of these principles to the chemical engineering unit operations. Prerequisite: ChE 2. *Rec 4, Cr 4.*

MR. CHASE

161/163. Chemical Engineering Laboratory—Begins with application of the principles of the unit operations in the laboratory, using pilot scale equipment and terminates with work in solving more comprehensive problems of process design. These courses complement ChE 178. Emphasis is placed upon the preparation of formal reports. Prerequisite: ChE 162. *Lab 4, Cr 2.*

STAFF

168. Chemical Engineering Kinetics—A study of the rates and mechanisms of ordinary and catalyzed reactions with the view of providing the data for process design. Prerequisite: Ch 170. *Rec 3, Cr 3.*

MR. SHELDEN

177. Chemical Processes—A course for chemists and for engineers on how communications are established and decisions made at the interface between chemical research and engineering design, with special emphasis on integrative analysis of chemical data and concepts, and techniques for approximating missing data to guide optimal selection of chemical paths for the design of chemical process systems. Prerequisites: Ch 151, Ch 169, knowledge of FORTRAN. *Rec 3, Cr 3.*

MR. BOBALEK

178. Elements of Chemical Process Design—Special studies of principles and methods in coordination of engineering data and theory to problems in plant design. Majors in chemical engineering should schedule this course concurrently with or before ChE 163. *Rec 3, Cr 3.*

MR. CECKLER

187. 188. Chemical Engineering Practice—Investigation of some commercial operations of the chemical process industry. Prerequisite: Permission. *Cr Ar.* May be taken more than once until a total of 6 credit hours is accumulated for each course.

MR. BOBALEK

UNIVERSITY OF MAINE

195. Chemical Engineering Thermodynamics—Application for thermodynamics to the analysis of systems of interest to chemical engineers. Topics include the first and second laws of thermodynamics, thermodynamic properties, chemical equilibrium, and an introduction to statistical and irreversible thermodynamics. Prerequisite: ChE 2. Rec 4, Cr 4. MR. THOMPSON, MR. SHELDEN

196. Process Control—Process dynamics described by ordinary differential equations and by linearized approximations. Solution of system equations by use of Laplace transforms. Concepts of feedback control and close-loop system analysis. Prerequisite: ChE 2 and Ms 29. Rec 3, Cr 3. MR. ZABEL

199. Undergraduate Thesis—Original investigation of a chemical engineering problem, and reporting of the results. Cr Ar; Accumulative credit hours for 2 or more semesters is 3-6. STAFF

Graduate Courses

- 220. Colloid Technology**—Rec 3, Cr 3.
221. Intermediate Chemical Engineering Thermodynamics—Rec 3, Cr 3.
222. Chemical Engineering Plant Design—Rec 3, Cr 3.
223. Economic Balance—Rec 3, Cr 3.
230. Polymer Science—Rec 3, Cr 3.
242. Advanced Process Dynamics and Control—Rec 3, Cr 3.
252-253. Special Problems in Computer Programming and Systems Analysis.
260. Heat Transfer—Rec 3, Cr 3.
262. Mass Transfer—Rec 3, Cr 3.
270. Chemical Engineering of Pulp and Paper Manufacturing—Rec 3, Cr 3.
280. Chemical Engineering Analysis—Rec 3, Cr 3.
287. Chemical Engineering Practice. Time and credit to be arranged.
330. Advanced Chemical Engineering Thermodynamics—Rec 3, Cr 3.
331. Kinetics and Catalysis—Rec 3, Cr 3.
351. Transport Phenomena—Momentum—Rec 3, Cr 3.
352. Transport Phenomena—Mass and Energy—Rec 3, Cr 3.
362. Fluid Dynamics—Rec 3, Cr 3.
363. Topics in Advanced Chemical Engineering Unit Operations—Rec 3, Cr 3.
364. Topics in Advanced Chemical Engineering Technology—Rec 3, Cr 3.
365. Topics in Advanced Chemical Engineering Science—Rec 3, Cr 3.
395. Graduate Seminar—Rec 1, Cr 0.
396. Graduate Seminar—Pre. ChE 295. Rec 1, Cr 1.
399. Graduate Thesis—Cr Ar.

Courses in Pulp and Paper Technology

40s. Summer Mill Practice—Summer internship in engineering practice in an industrial plant of the pulp and paper or allied industries. Cr 2. STAFF

165. Pulp Technology—The chemical and engineering principles of manufacturing various wood pulps. Prerequisite: Ch 12 or 14. Rec 3, Cr 3.

MR. MARSHALL

COLLEGE OF TECHNOLOGY

166. Paper Technology—The principles of paper manufacturing from the preparation of fiber furnishes to the final stage of surface coating. *Rec 3, Cr 3.*

MR. BOBALEK, MR. SIMARD, MR. ZABEL

172. Pulp and Paper Equipment—A lecture and recitation course involving the description and production calculations of pulping, stock preparation, stock flow, paper formation, power plant and auxiliary equipment. Prerequisite: 12 credit hours of engineering. *Rec 3, Cr 3.*

MR. GORHAM

173. Pulp Manufacture and Testing—A problem-oriented laboratory course involving the process design criteria for the production of semi-chemical and chemical wood pulps. Prerequisite: Pa 165 (may be taken concurrently). *Lab 8, Cr 4.*

MR. ZABEL, MR. GORHAM

174. Paper Manufacture and Testing—A problem-oriented laboratory course involving the process design of paper making and finishing systems. Prerequisite: Pa 166 (may be taken concurrently). *Lab 8, Cr 4.*

MR. ZABEL

189. Pulp and Paper Mill Inspection—A study of the operations in various types of pulp and paper plants. Must be taken concurrently with Pa 172. *Lab 4, Cr 2.*

MR. GORHAM

199. Undergraduate Thesis—Original investigation of a pulp and paper problem and reporting of the results: Prerequisite: permission. *Cr Ar.*

STAFF

Graduate Courses

284. Decision Techniques in Management of Engineering Projects—*Rec 3, Cr 3.*

295. Graduate Seminar—*Rec 1, Cr 0.*

296. Graduate Seminar—Prerequisite: Pa 295. *Rec 1, Cr 1.*

399. Graduate Thesis—*Cr Ar.*

CHEMISTRY

PROFESSORS WOLFHAGEN, BEAMESDERFER, DUNLAP, GOODFRIEND; ASSOCIATE

PROFESSORS BENTLEY, GEORGITIS, GREEN, PATTERSON, RASIAH, RUSS,

WEAVER; ASSISTANT PROFESSORS JENSEN, ZOLLWEG;

LECTURER MRS. WOLFHAGEN

The Chemistry curriculum is designed to give the student a thorough understanding of the fundamental nature of material substances, the changes they undergo and the laws governing such changes. It also aims to develop skill in those laboratory techniques required to synthesize and to analyze substances and to study their properties.

Because a knowledge of chemistry is fundamental to successful work in so many fields, the Chemistry curriculum affords an unusual opportunity for a wide choice of electives so that the chemistry major may adapt his program to his individual interest and future needs. The curriculum leading to American Chemical Society certification prepares the student, upon graduation, for employment in the chemical industry in the fields of production and control, development, or research. Maine graduates in chemistry who attain better than average levels of proficiency are exceptionally well qualified for graduate study in chemistry.

UNIVERSITY OF MAINE

The proper choice of electives will enable the student to enter related fields of industrial management, technical sales and service, and teaching, or may qualify him for medical school or graduate work in one of the newer interdisciplinary fields such as oceanography. Students interested in these fields, or those who have special interests in the biological sciences, geology, mathematics, or chemical physics should discuss their goals with departmental advisers, who can suggest elective sequences. Up to 18 semester hours of free electives may be taken while remaining within a normal five course per semester load. Better students may elect additional courses. Some variation in the order in which courses are taken is possible. For example, Organic Chemistry may be taken during the sophomore year, postponing the sequence Ch 140 - Ch 169/170 and subsequent courses by one year. Consult the department for recommendations.

The chemistry major, in order to qualify for a degree in the College of Technology, must complete all the courses listed in the specimen curriculum except those marked with an asterisk, which are required for certification by the American Chemical Society Committee on Professional Training.

Superior students should seriously consider continuing their studies at the graduate level and should plan on meeting only minimum ACS requirements so that they can include in the undergraduate program a second language, advanced mathematics, and advanced physics.

For chemistry courses in the Summer Session, see the Summer Session catalog.

For a description of courses in biochemistry, see the list of courses given by the Department of Biochemistry.

Graduate Work in Chemistry

The Department of Chemistry offers a program of study and research leading to the M.S. and Ph.D. degrees. The general requirements for advanced degrees are described in the general section of the Graduate School Catalog. Specific requirements for admission to advanced study in chemistry and information about the programs of study offered are given in the chemistry section of the catalog.

CURRICULUM IN CHEMISTRY

Freshman Year

See general requirements of the College of Technology, page 335.

A. REQUIRED TECHNICAL COURSES

Sophomore Year

FALL SEMESTER				SPRING SEMESTER			
			Hours				Hours
Ch	140	Anal. Chemistry	4	Ch	169	Physical Chemistry	4
Ms	28	Anal. Geom. and Calculus	4	Ch	171	Physical Chemistry	
		Other	6-9			Laboratory	2
				*Ms	29	Analytical Geometry	
						and Calculus	4
				Ge	7	Computer Programming	2
						Other	3
			14-17				15

COLLEGE OF TECHNOLOGY

Junior Year

Ch 170	Physical Chemistry	4	Ch 152	Organic Chemistry	3
Ch 172	Physical Chemistry Lab	2	Ch 162	Organic Chemistry Lab	2
Ch 151	Organic Chemistry	3	*Ch 164	Instrumental Anal.	4
Ch 161	Organic Chemistry Lab	2	**Gm 2	Elementary German	3
**Gm 1	Elementary German	3	Other		3-6
	Other	0-3			
		<hr/>			<hr/>
		14-17			15-18

Senior Year

Ch 154	Adv. Inorganic Chem.	3	*Ch 190	Intermediate Organic	
*Ch 185	Chem. Literature	2		Chem. Lab	3
**Gm 13	Scientific German or			Other	9-12
Gm 3	Intermediate German	3			
	Other	6			
		<hr/>			<hr/>
		14			12-15

*Required for certification by the American Chemical Society. Certain substitutions may be permitted.

**Strongly recommended.

B. ADDITIONAL REQUIREMENTS

One course selected from Sh 3, 45 or 47.

Reading knowledge of German or other major foreign language designated by department. German is recommended for ACS certification.

A total of 15 hours in social science, humanities, or fine arts, including at least one course in literature.

Courses in Chemistry (Ch)

9/10. General Chemistry—Approximately the same material as Ch 11/12, but with somewhat more individual study based on a detailed list of objectives. Frequent examinations with opportunity of repeating in order to meet course objectives. *Rec 3, Lab 3, Cr 4.*

11/12. General Chemistry—Descriptive chemistry and qualitative applications of principles are stressed. History of some of the concepts of modern chemistry is explored. Sufficient familiarity with high school algebra to handle elementary problems is presumed. Recommended as a terminal course. *Rec 3, Lab 3, Cr 4.*

13/14. Chemical Principles—Study of a restricted number of topics in sufficient detail to provide the student with a foundation for subsequent work in more advanced courses in science and engineering. Quantitative application are stressed. Recommended for students seriously interested in science, engineering and the teaching of secondary school science. *Rec 3, Lab 3, Cr 4.*

41. Quantitative Analysis—Similar to Ch 140 except that fewer laboratory determinations are made. Prerequisite: Ch 14. *Rec 2, Lab 3, Cr 3.*

99. Undergraduate Thesis—The thesis will embody the result of an original investigation carried out in the library and in the laboratory. Open only to seniors with the consent of the department head. *Cr 1 to 3.*

IDL 130. (Same as ChE 130)—Polymer Chemistry and Reaction Engineering—The synthesis and production of polymeric materials from monomers

or by modification of natural polymers. The various types of polymer-forming reactions, their catalysis, and the industrial reaction systems used comprise the major subject areas. Topics include characteristics of chain and step-reaction polymerization, free radical, ionic and coordination complex catalysis, stereochemistry, thermochemistry, polymerization techniques, and influence of reactor type and reaction system on products. The relation of theory and practice is stressed throughout. Prerequisite: Ch 151 or equivalent and Ch 170 or equivalent. *Rec 3, Cr 3.*

IDL 131. (Same as ChE 131)—Polymer Structure and Properties—The structure and properties of polymeric materials, and the principles underlying the processing of such materials. Polymer structure and morphology, transitional phenomena, polymer crystallinity, the rubbery and glassy states, solution behavior, rheology, mechanical properties and the relation to chain structure are considered. The relation of theory and practice are stressed throughout. Prerequisite: Ch 170 or equivalent. *Rec 3, Cr 3.*

140. Quantitative Analysis—An introductory course illustrating the fundamental principles of gravimetric and volumetric analysis. Prerequisite: Ch 14, *Rec 2, Lab 6, Cr 4.*

151/152. Organic Chemistry Lecture—An introduction to the chemistry of carbon compounds. Prerequisite: Ch 14. *Rec 3, Cr 3.*

154. Advanced Inorganic Chemistry—Advanced theoretical and descriptive inorganic chemistry emphasizing periodic relationships. Prerequisite: Ch 14, 140 and 169. *Rec 3, Cr 3.*

155. Advanced Inorganic Chemistry—A systematic study of the preparation and physical and chemical properties of nonorganic materials emphasizing periodic trends. Prerequisite: Ch 154 and Ch 170. *Rec 3, Lab 3, Cr 4.*

161/162. Organic Chemistry Laboratory—An introduction to the synthesis and study of organic compounds in the laboratory. Prerequisite: credit or concurrent registration in Ch 151/152. *Lab 4, Cr 2.*

164. Instrumental Analysis—Emphasis on instrumental methods. Prerequisite: Ch 140 and Ch 172. *Rec 2, Lab 6, Cr 4.*

169/170. Physical Chemistry—Applications of classical and statistical thermodynamics, quantum mechanics and principles of kinetics to chemical and electrochemical systems. Prerequisite: Ch 14, Ps 2 or 2a, Ms 28 or equivalent. *Rec 4, Cr 4.*

171. 172. Physical Chemistry Laboratory—First semester: Properties of gases, thermochemistry and phase equilibria. Second semester: Aqueous solution equilibria, including electrochemistry, and kinetics. Special attention to development of research techniques and attitudes. Prerequisite: credit or concurrent registration in Ch 169/170; additionally Ch 140 or permission for Ch 172. *Lab 4, Cr 2.*

174. Quantum Chemistry — An introduction to chemical bonding and the methods of modern quantum chemistry. Prerequisite: Ch 170, or equivalent background in physics. Ms 29 recommended. *Rec 3, Cr 3.*

179. Advanced Physical Chemistry Laboratory—An advanced laboratory course with emphasis on the use of physico-chemical methods. Given on sufficient demand. Prerequisite: Ch 172. *Lab 6 or 8, Cr 3 or 4.*

185. Chemical Literature—A study of methods for searching the chemical literature. Prerequisite: Ch 152 and elementary German. *Rec 2, Cr 2.*

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190. Intermediate Organic Chemistry Laboratory—An introduction to the isolation, identification and semi-micro scale preparation of organic compounds. Prerequisite: Ch 152; Ch 162. *Rec 1, Lab 4, Cr 3.*

Graduate Courses in Chemistry

- 213. The Chemistry of Cellulose and Wood Components**—*Rec 3, Cr 3.*
- 251. Topics in Advanced Organic Chemistry**—*Cr Ar.*
- 256. Theoretical Organic Chemistry**—*Rec 3, Cr 3.*
- 271. Topics in Advanced Physical Chemistry**—*Cr Ar.*
- 276. Physico-Chemical Methods**—*Rec 2, Cr 2.*
- 277. Intermediate Physical Chemistry**—*Rec 3, Cr 3.*
- 278. Intermediate Physical Chemistry**—*Rec 3, Cr 3.*
- 289. Advanced Organic Chemistry Laboratory**—*Lab 6 or 8, Cr 3 or 4.*
- 290. Organic Qualitative Analysis**—*Lab 8, Cr 4.*
- 291. Intermediate Organic Chemistry**—*Rec 3, Cr 3.*
- 295. Chemical Thermodynamics**—*Rec 3, Cr 3.*
- 351. Topics in Advanced Organic Chemistry**—*Cr Ar.*
- 353. The Chemistry of Organic Sulfur Compounds**—*Rec 2, Cr 2.*
- 354. The Chemistry of Heterocyclic Compounds**—*Rec 2, Cr 2.*
- 361. Topics in Advanced Inorganic Chemistry**—*Cr Ar.*
- 371. Topics in Advanced Physical Chemistry**—*Rec 2, Cr 2.*
- 373. Statistical Thermodynamics**—*Rec 3, Cr 3.*
- 374. Colloid and Surface Chemistry**—*Rec 2, Cr 2.*
- 395. Graduate Seminar**—*Rec 1, Cr 1.*
- 398. Graduate Research**—*Cr Ar.*
- 399. Graduate Thesis**—*Cr Ar.*

CIVIL ENGINEERING

PROFESSORS GORRILL, GREENWOOD, HAMILTON (Chairman), SPROUL; ASSOCIATE PROFESSORS ALEXANDER, GHOSH, NIGHTINGALE, WOODARD; ASSISTANT PROFESSORS BRUTSAERT, CARPENTER, FRIEL, SHEA, TYLER, WILSON

The Civil Engineering curriculum provides a broad understanding of engineering problems in general and at the same time provides for specialization in several branches of civil engineering and in the field of public management. The curriculum is broad enough to qualify graduates with the bachelor of science degree to start in any field of civil engineering. However, special emphasis is placed upon transportation engineering, sanitary engineering, and structural engineering.

While the foundation of all engineering is highly technical, an attempt is made throughout to help the student sense the broader aspects of engineering problems. In addition to this, studies in the social sciences and humanities are included to assist the graduate to place his education within the perspective of man and society.

A Pulp and Paper Option is available in collaboration with the Chemical Engineering Department. This five-year program leads to the degree of bachelor of

science in civil engineering and a certificate in Pulp and Paper. See page 342 for course requirements.

Graduate Program in Civil Engineering

Graduate programs are well established in the fields of sanitary engineering, transportation engineering, soils and structural engineering. The graduate program is flexible enough to meet the student's personal desires. The general program will include advanced courses in the student's major field which will constitute approximately half to three-quarters of his requirements. The remainder of the program will consist of advanced courses in mathematics, non-technical courses, and the graduate thesis. This general program leads to the degree of master of science in civil engineering. A graduate program is also available that leads to the doctor of philosophy degree in sanitary engineering.

Master of Public Administration

The Master of Public Administration is a professional degree intended primarily for employees of state, federal and municipal government. Study may be pursued as either a part-time or full-time graduate student. Candidates for the M.P.A. must have completed as prerequisites: Pol 1, Ec 10 and Pol 151, or their equivalents. The program of study is listed under the Department of Political Science in the Graduate School Catalog.

CIVIL ENGINEERING CURRICULUM

A minimum of 127 degree hours

Freshman Year. See Page 334.

Sophomore Year

FALL SEMESTER				SPRING SEMESTER			
Subject		Hours		Subject		Hours	
		R	L C			R	L C
Ms	28	Calculus	4 0 4	Ms	29	Cal. Diff. Equ.	4 0 4
Ce	5	Surveying	2 3 3	Ce	30	Transportation Systems	3 0 3
Me	50	Statics	3 0 3	Me	51	Strength of Mat'l.	4 0 4
Gc	7	Computer Prog.	1 2 2	Ee	41	Elec. Circuits	3 0 3
		Non Tech. Elective	3			Non Tech. Elective	3
			15				17

Junior Year

		R L C				R L C	
Ce	40	Structures I	3 3 4	Ce	41	Structures II	3 3 4
Ce	31	Sanitary Eng. I	3 0 3	Ce	32	Sanitary Eng. II	3 0 3
Ce	26	Hydraulics	3 3 4	Gy	6	Geology	2 2 3
Ce	28	Highway Eng. Funds	3 0 3	Ce	20	C. E. Mat'l.	3 3 4
		Non Tech. Elective	3			Non Tech. Elective	3
			17				17

Senior Year

R L C				R L C			
Ce	61	Engr. Relations	2 0 2	Me	52	Dynamics	3 0 3
Ce	42	Structures III	3 3 4	Ce	176	Soils Eng.	3 0 3
Ce	65	Soils Mechanics	2 2 3	Ce	101	Planning Eng. Proj.	3 0 3
		Tech. Elective	3			Tech. Elective	3
		Non Tech. Elective	3			Non Tech. Elective	3
<hr/>				<hr/>			
15				15			

Courses in Civil Engineering (Ce)

5. Plane Surveying—Surveying instruments and their use and the various methods commonly used for plane surveying. The geometry of simple and vertical curves. *Rec 2, Lab 3, Cr 3.*

20. Materials—The structure, properties, and testing of engineering materials and their use in constructed facilities. Topics include: metals, woods, concrete, bituminous mixtures. photoelasticity and electrical strain gages. Prerequisite: Me 51. *Rec 3, Lab 3, Cr 4.*

26. Hydraulics—An elementary course presenting fundamental principles of fluid flow and their applications to engineering problems. Includes study of hydrostatics, liquid measuring devices, and channel and pipe flow. Prerequisite: Me 50. *Rec 3, Lab 2, Cr 4.*

28. Highway Engineering Fundamentals—The principles of highway economics, finance and planning are presented and utilized in the basic analysis, location, and geometric design of highway transportation routes. Prerequisite: Ce 5 or with consent of instructor. *Rec 3, Cr 3.*

30. Transportation Systems—This subject is studied in the context of the planning process and applicable systems analysis concepts. Topics include the history and development of transportation modes, components of transport systems, operating characteristics and economic evaluation. *Rec 3, Cr 3.*

31. Water Supply Engineering—Determination of water volume and quality requirements; unit operations in water treatment; development and distribution of water. Prerequisite: Ce 26 or equivalent or concurrently. *Rec 3, Cr 3.*

32. Wastewater and Pollution Control—Study and design in problems involved in providing sewers, wastewater treatment and stream pollution control. Prerequisite: Ce 31 and Ce 26. *Rec 3, Cr 3.*

40. (Structures I) Determinate Structural Analysis and Design—The analysis of determinate beams, frames, and trusses. The selection of members and the design of beams, columns and connections. Prerequisite: Me 51. *Rec 3, Lab 3, Cr 4.*

41. (Structures II) Indeterminate Structural Analysis and Design—The analysis of indeterminate beams, frames, and trusses using virtual work, moment area, slope deflection and moment distribution. The design and detailing of steel frames and trusses. Prerequisite: Ce 40. *Rec 3, Lab 3, Cr 4.*

42. (Structures III) Reinforced Concrete Structures—The design and detailing of reinforced concrete structures; buildings, retaining walls and footings. Prerequisite: Ce 40. *Rec 3, Lab 3, Cr 4.*

60. Structural Design—The designing and detailing of structural systems. Special design projects to be completed by the student. Prerequisite: Ce 41. *Rec 2, Lab 6, Cr 3.*

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61. Engineering Relations—The business, legal, and ethical phases of engineering. Contract specifications and professional registration laws. *Rec 2, Cr 2.*

65. Soil Mechanics—A study of the fundamental physical properties, behavior and performance of soil as a construction material. Prerequisite: Me 51. *Rec 2, Lab 2, Cr 3.*

68. Highway Engineering I—Highway location, design and construction. Topics include criteria for geometric design, safety aspects of design, and the design and construction of drainage structures, embankments, base courses, and low-cost pavements. Prerequisite: Ce 28. *Rec 2, Lab 3, Cr 3.*

99. Thesis—The study of and report upon some original investigation of design. Time to be arranged. *Cr 2 or 3.*

101. Planning Engineering Projects—CPM, PERT, resource leveling, and basic operations research techniques applied to the planning and scheduling of engineering projects. Prerequisite: Ce 7 and senior standing or consent of instructor. *Rec 3, Cr 3.*

105. Land Surveying—Description and conveyancing of property, monumentation, legal aspects of land surveying interpretation of and writing land descriptions. Prerequisite: Ce 5; seniors or with permission. *Rec 3, Cr 3.*

155. Hydrology—Application of statistical analysis to rainfall and runoff. The collection and presentation of factors affecting rainfall and runoff data. Methods for developing hydrographs and flood routing. Prerequisite: Ce 26 or the equivalent. *Rec 3, Cr 3.*

171. Sanitary Engineering—Water purification design and operational control of water treatment plants. Prerequisite: Ce 32. *Rec 2, Lab 3, Cr 3.*

172. Highway Engineering II—Continuing the study of highway engineering from Highway Engineering I. Topics include: surface treatment, thickness design of highway pavements, intersection capacity analysis, intersection geometric design. Prerequisite: Ce 68. *Rec 2, Lab 3, Cr 3.*

174. Sanitary Engineering—The theory and design of wastewater disposal works, followed by brief studies of municipal and rural sanitation. Prerequisite: Ce 171. *Rec 2, Lab 3, Cr 3.*

175. Contemporary Environmental Pollution—A study of causes, characteristics, effects and solutions to contemporary man's pollution of the air, land and water resources. Engineering and technological solutions. Legal, social, individual and technological obstacles to solutions. Prerequisites: junior class standing. *Rec 3, Cr 3.*

176. Soils Engineering—The application of soil mechanics to common engineering design and construction. Prerequisite: Ce 65. *Rec 3, Cr 3.*

178. Chemistry in Sanitary Engineering—Elementary principles of organic, physical and colloidal chemistry and their use and significance in sanitary engineering practice. Analytical chemistry and tests as related to water. Prerequisite: Ch 2 or equivalent and Ce 131. *Rec 2, Lab 3, Cr 3.*

179. Microbiology in Sanitary Engineering—Basic principles of biochemistry and microbiology disinfection, enteric organisms, biology of wastewater treatment, natural purification of streams and disease-producing organisms. Prerequisite: Ce 178 or equivalent; may be taken concurrently. *Rec 2, Lab 6, Cr 4.*

181. Seminar—Written and oral reports with discussions on assigned topics in any special branch of civil engineering. *Rec 1-3, Cr 1-3.*

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192. Indeterminate Structures—The analysis of statically and kinematically indeterminate structures by classical and/or numerical methods. Prerequisite: Ce 4. Rec 3, Cr 3.

Graduate Courses

- 200. City and Regional Planning**—Rec 2, Lab 2, Cr 3.
- 205. Traffic Operations and Geometric Design**—Rec 3, Lab 3, Cr 4.
- 206. Traffic Flow Theory**—Rec 2, Lab 2, Cr 3.
- 230. Water Resources Engineering**—Rec 3, Cr 3.
- 240. Radiological Health**—Rec 2, Lab 3, Cr 3.
- 300. Traffic Planning**—Rec 3, Cr 3.
- 301. Traffic Planning II**—Rec 3, Cr 3.
- 303. Urban Transportation Planning**—Rec 3, Lab 3, Cr 4.
- 310. Transportation Systems and Terminal Design**—Rec 3, Cr 3.
- 320. Physicochemical Processes for Water Quality Control**—Rec 3, Cr 3.
- 322. Biological Process for Wastewater Treatment**—Rec 3, Cr 3.
- 323. Industrial Wastes**—Rec 2, Lab 6, Cr 4.
- 324. Public Health Engineering**—Rec 3, Cr 3.
- 330. Sanitary Eng. Design I**—Rec 2, Lab 4, Cr 3.
- 331. Sanitary Eng. Design II**—Rec 2, Lab 4, Cr 3.
- 350. Sanitary Eng. Seminar**—Rec 1, Cr 1.
- 364. Engineering Properties of Soils**—Rec 2, Lab 6, Cr 4.
- 366. Highway Soils Engineering**—Rec 3, Lab 3, Cr 4.
- 376. Foundations and Underground Structures**—Rec 3, Cr 3.
- 390. Vibrations of Structures**—Rec 3, Cr 3.
- 391. Numerical Analysis of Structures**—Rec 3, Cr 3.
- 392. Rigid Frames and Arches**—Rec 3, Cr 3.
- 393. Folded Plates, Domes and Shells**—Rec 3, Cr 3.
- 394. Structural Members**—Rec 3, Cr 3.
- 395. Advanced Indeterminate Structures**—Rec 3, Cr 3.
- 396. Advanced Reinforced Concrete Structural Design**—Rec 3, Cr 3.
- 397. Plastic Design in Steel**—Rec 3, Cr 3.
- 398. Selected Civil Engineering Topics**
- 399. Graduate Thesis**

ELECTRICAL ENGINEERING

PROFESSORS GIBSON, CROSBY, LIBBEY, PARSONS, SHEPPARD, TURNER; ASSOCIATE
PROFESSORS BROWN, HAMILTON, IRONS, YOUNG; ASSISTANT
PROFESSORS FIELD, KAZMERSKI, OTTO, VETELINO

The Electrical Engineering undergraduate curriculum consists of a sequence of courses firmly rooted in basic science and mathematics, progressing upward through engineering sciences, and culminating in a wide variety of courses in the specific subject areas of electrical engineering.

Central to the curriculum are integrated course sequences in circuit and network analysis, solid-state electronics, fundamentals of electromechanical energy conversion and control, electromagnetic fields, and communication theory. Opportunity is provided in the senior year for each student to elect courses in electro-

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acoustics, communication theory and systems, digital and analog computer systems and applications, feedback control systems, illuminating engineering, electric power transmission and systems, engineering management, and advanced mathematics.

Through this solid foundation in electrical engineering, which is accompanied by introductory studies in chemistry, classical physics, thermodynamics, and properties of materials, the curriculum provides a sound educational base for graduate study as well as for employment in any of the broad spectrum of electrical and related industries.

Beginning with the Class of 1974 a candidate for the bachelor's degree in electrical engineering must maintain an average of not less than 1.80 in junior and senior Ee subjects, in addition to meeting those requirements shown in the General Information section of the catalog under "Grading System".

Special Program in Electrical Engineering

A special five-year program in Pulp and Paper Technology is available to electrical engineering students with options in management and computer engineering. This program superimposes certain requirements in the senior year, and provides for the awarding of the bachelor of science degree in electrical engineering at the end of the senior year and a certificate in pulp and paper management or pulp and paper computer engineering at the end of the fifth year.

Graduate Work in Electrical Engineering

A program of graduate study leading to the degree of master of science in electrical engineering provides course offerings in feedback control systems, solid state electronics, statistical communication theory, electroacoustics, electro-magnetic waves, microwave circuits, analog and digital computer systems, solid-state and integrated circuits, pulse and digital circuits, and network synthesis. As a condition for acceptance as a candidate for the degree, the student must have obtained honor grades in a large portion of his major undergraduate work.

Freshman Year. See Page 334.

Sophomore Year

FALL SEMESTER			SPRING SEMESTER		
	Subject	Hours		Subject	Hours
Ee	1 Circuit Anal. I	5	Ee	2 Circuit Anal. II	3
	Humanities Electives ²	3	Ee	12 Basic Elect. Lab.	2
Gc	7 Computer Programming	2	Ms	59 Diff. Eq.	4
Ms	28 Analyt. & Calculus	4	Me	52 Applied Mech.	3
Me	55 Statics and Strength	3	Ee	9 Electrical Eng. Materials	3
				Humanities Elect. ²	3

Junior Year

Ee	3	Circ. Anal. III	4	Ee	31	Elements of Comm.	3
Ee	13	Electronics I	3	Ee	14	Electronics II	3
Ee2	23	Electromech. Energy		Ee	25	Electromech. Energy Conv. II	3
		Conv. I2	3	Ee	18	Ee Laboratory	3
Ee	17	Ee Laboratory	3			Humanities Elect.2	3
		Humanities Elect.2	3				
<hr/>				<hr/>			
16				15			

Senior Year

Ee	150	E-M Fields	3	Me	33	Thermodynamics I	3
		Humanities Elect.2	3			Humanities Elect.2	3
		Technical Electives (2)3	6			Technical Electives (3)3	9
Ee	190	E.E. Design	3				
<hr/>				<hr/>			
15				15			

1 Ee 23 and Ee 25 may be postponed to senior year and replaced by Ee 150 and Ee 153.

2 Refers to non-technical Electives. 18 credit hours required, including the literature elective.

3 Technical electives include upper-level. Electrical Engineering courses, Ms 153/154, Ms 187 and Ms 196. Certain other mathematics, physics and engineering courses may be substituted with special permission. Each student's selection of technical electives must be approved by his adviser during preregistration in the spring semester of his junior year. One technical elective must be either Ee 153 or Ee 155. Ee 190 can be postponed until spring semester only upon written petition submitted to the Electrical Engineering faculty during spring semester of junior year, and subsequent approval by the faculty.

LOWER LEVEL COURSES

Circuits, Fields and Systems

1. **Basic Circuit Analysis I**—Basic laws and theorems of electric circuits; complete solution of first and second order systems; a-c steady state analysis. Prerequisite: Ps 2 and Ms 27. *Rec 4, Comp or Lab 3, Cr 5.*, for Ee majors; *Rec 4, Comp 1, Cr 4* for Eps majors.

2. **Basic Circuit Analysis II**—Complex frequency analysis, poles and zeroes, frequency response; transformers; three phase circuits; Fourier series. Prerequisite: Ee 1. *Rec 3, Cr 3.*

3. **Circuit Analysis III**—The complex frequency plane and its application; Fourier analysis; Fourier and LaPlace transforms; two-port networks: Prerequisite: Ms 59, Ee 2; Ee 17 required concurrently. *Rec 3, Comp 2, Cr 4.*

Materials, Electronic Devices and Electronics

9. **Electrical Engineering Materials**—Atomic theory; wave-particle experiments; introduction to quantum mechanics; static and dynamic behavior of dielectrics; magnetic properties of materials; conductivity in metals; properties of semiconductors; p-n junction theory; device physics, transistor, and diode. Prerequisite: Ps 2, Ch 13, Ms 27. *Rec 3, Cr 3.*

12. **Basic Electrical Laboratory**—Use of techniques developed in Ee 1, 2 for the analysis of circuits containing linear, nonlinear, passive and active elements; includes analysis of simple electronic circuits and the use of oscilloscope. Experiments relating to dielectric, magnetic and electrical properties of materials. Prerequisite: Ee 2 and Ee 9 required concurrently. *Rec 1, Lab 3, Cr 2.*

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13. Electronics I—Diode circuit analysis; power supplies; introduction to transistor circuits, device modeling, biasing; audio-frequency linear power amplifiers; analysis and design of small signal amplifiers; multiple-transistor circuits. Prerequisite: Ee 9, Ee 12; Ee 17 required concurrently. *Rec 3, Cr 3.*

14. Electronics II—Feedback amplifier fundamentals; integrated circuits; theory and applications of the field effect transistor; low-frequency amplifier response; high-frequency amplifier response; switching circuits; frequency response to feedback amplifiers; special devices. Prerequisite: Ee 13 or permission of the department; Ee 18 required concurrently. *Rec 3, Cr 3.*

17/18. Electrical Engineering Laboratory—A laboratory course concurrent with and related to Ee 13, 14 and Ee 23, 25. Written reports are required and techniques of presentation as well as technical accuracy are stressed. Prerequisite: Ee 12 or equivalent; concurrent Ee 13/14 or Ee 23/25. *Rec 1, Lab 3, Cr 1 to 3.*

Energy Conversion, Machines and Control

23. Electromechanical Energy Conversion I—Characteristics of transformers, the torque equation, three-phase induction motors, synchronous machines, direct-current machines. Prerequisite: Ee 2, co-requisite Ee 17. *Rec 3, Cr 3.*

25. Electromechanical Energy Conversion II—Characteristics of two-phase servo motors and single phase induction motors; a-c tachometer generators; synchros and induction resolvers; system dynamics and transfer functions; direct energy conversion. Prerequisite: Ee 23, co-requisite Ee 18. *Rec 3, Cr 3.*

Communication, Information Theory, and Computer Theory

31. Elements of Communication—Characteristics of the auditory and vocal systems; elements of vision; colorimetry; basic information theory; physiological probability; coding and decoding of information; cybernetics; noise; storage of information; switching circuits; principles of feedback and automation. Prerequisite: Ps 2 and Ms 27. *Rec 3, Cr 3.*

Service Courses

41. Elementary Circuits—An introduction to d-c and a-c circuits analysis for students majoring in fields other than electrical engineering. Prerequisite: Ms 27, Ps 2. *Rec 3, Cr 3.*

42. Electric Machinery—An introduction to magnetic circuits and electromechanical energy conversion devices for students majoring in fields other than electrical engineering. Prerequisite: Ee 41. *Rec 3, Cr 3.*

43. Electronics—An introduction to electronic devices and circuits for students majoring in fields other than electrical engineering. Prerequisite: Ee 41. *Rec 1½, Lab 1½, Cr 3.*

Upper Level Courses

Circuits, Fields, and Systems

150. Electromagnetic Fields—Solution of static electric and static magnetic field problems by methods of vector analysis; boundary value conditions; derivation of Maxwell's equations; introduction to time-varying electromagnetic fields. Prerequisite: Ms 59. *Rec 3, Cr 3.*

153. Microwave Transmission—High frequency lossy and lossless lines; propagation of waves in free space; antennas; wave guides. Prerequisite: Ee 150. *Rec 2, Lab 3, Cr 3.*

155. Electric Power Transmission—Line constants, EHV transmission calculations, distributed parameters, traveling waves and reflections, lighting, corona, ABCD constants, circle diagrams. Prerequisite: Ee 2, co-requisite: Ee 23. *Rec 2, Comp 3, Cr 3.*

156. Electric Power Systems—Power systems representing matrix formation, symmetrical component theory, stability and fault calculations. Load flow studies using digital computers and network analyzer techniques. Prerequisite: Ee 155. *Rec 2, Comp or Lab 3, Cr 3.*

Materials, Electronic Devices and Electronics

161. Electronics III—Advanced electronics—narrow-band amplifiers, modulation and demodulation circuits, switching circuits, waveform generation; applications of integrated circuits. Prerequisite: Ee 14, Ee 3, Ee 17/18. *Rec 3, Cr 3.*

164. Electronics and Communications Laboratory—Measurement techniques, generation, amplification, and shaping of waveforms; noise; modulation and demodulation; solid-state circuit design; integrated circuits. Prerequisite: Ee 161. *Rec 1, Lab 4, Cr 3.*

165. Microelectronics—Design principles and fabrication techniques of hybrid and monolithic integrated circuits. Characteristics and state-of-the-art technology of passive and active IC components and circuit design. Prerequisite: Ee 169 or equivalent. *Rec 2, Lab 1, Cr 3.*

169. Semiconductor Electronics—The electronic optical and magnetic properties of materials, with emphasis on the fundamental understanding of solid state devices. Quantum electronics, magneto-optics, photo-electric and thermo-electric effects and systems of solid state devices. Prerequisites: Ee 9, Ee 150. *Rec 3, Cr 3.*

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Energy Conversion, Machines, and Control

171. Servomechanism Fundamentals—Analysis of feedback control systems using frequency- and time-domain techniques, s-plane, Bode, Nichols and state-variable approaches. Introduction to compensation-network design. Prerequisite: Ee 3, Ee 25, Ms 29, or permission. *Rec 2, Comp or Lab 3, Cr 3.*

173. Industrial Electrical Control—Study of manual and automatic control of motors, and feedback methods in regulated systems using rotating amplifiers and static switching devices such as silicon-controlled rectifiers and magnetic amplifiers. Prerequisite: Ee 23. *Rec 3, Cr 3.*

Communications, Information Theory and Computer Theory

180. Analog and Digital Computer Systems—Analog computer applications, including iterative and approximation techniques; solution of non-linear and partial differential equations; use of special analog elements. Introduction to switching theory and logic design beginning with Boolean Algebra. Coding, error correction and binary arithmetic are considered in terms of both combinational and sequential systems. Prerequisite: Ms 59, Ee 14. *Rec 3, Cr 3.*

183/184. Communications Systems—This is a basic sequence of courses in modern communication systems which cover the representation of signals in both time and frequency domain. Emphasis is placed on practical and theoretical aspects of random signal processing. Linear and exponential modulation, sampling, digital modulation multiplexing, coding and basic information theory are also covered. Prerequisite: Ee 3 and Ms 59. *Rec 3, Cr 3.*

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Miscellaneous

190. *Electrical Engineering Design*—Design of a device or system to meet specified criteria. Laboratory testing where feasible or preparation of detailed drawings and specifications for construction. In special cases a computer simulation study may be substituted for laboratory testing. To be accomplished by a group of two or three students which will present both an oral and a written report. Senior standing required. *Cr 3*.

191. *Illuminating Engineering*—General and advanced illumination theory, illuminating sources and their application, photometry, interior and exterior lighting problems, national electric code, design of electric distribution systems for buildings and for exterior lighting. Prerequisite: Ee 2, or 41. *Rec 2½, Lab 1, Cr 3*.

192. *Elements of Electrical Measurements*—Basic operation of the oscilloscope, elementary circuit analysis, characteristics of indicating meters, bridges, potentiometers. Specialized instruments. Open only to students outside the Department of Electrical Engineering. *Rec 2, Lab 2, Cr 3*.

193. *Space Science and Applications*—Applications of mathematics, physical theory and engineering design practices in modern space exploration. Basic astronautics and orbital mechanics, space communications, and instrumentation are covered, as well as current applications of NASA projects to meet the many needs of society. Intended for students outside the Department of Electrical Engineering. Especially suitable for teachers of high school mathematics and science. Prerequisite: at least junior standing. *Rec 3, Cr 3*.

194. *Engineering Administration*—Executive techniques in engineering organizations, including capitalization and amortization, engineering surveys and planning, labor relations and utilization, time and motion study, statistical quality control, technical purchasing and inventory control, safety programs and patent applications. Open only to upperclass and graduate students. *Rec 3, Cr 3*.

196. *Electro-Acoustics*—Fundamentals of acoustic waves; electromechanical and acoustical circuits; radiation; electro-acoustic systems of microphones and loudspeakers; architectural acoustics; sound measuring systems; noise reduction. Prerequisite: Senior or Graduate standing. *Rec 3*, with four laboratory periods substituted for equivalent class time. *Cr 3*.

197. *Environmental Noise Control*—Transmission and radiation of acoustic waves by solid panels and structures containing materials; characteristics of acoustical materials; reactive and dissipative mufflers; vibration isolation; damage-risk criteria; criteria for acceptable noise in buildings and vehicles; noise control in ventilation systems, offices, homes, transportation; underwater acoustics. Prerequisite: Ee 196. *Rec 3, Cr 3*.

198. *Selected Topics in Electrical Engineering*—Topics in electrical engineering not regularly covered in other courses. The content is not fixed but can be varied to suit current needs. The course may, with permission of the department, be taken more than once. Prerequisite: consent of the department. *Cr 1-3*.

Thesis

199. *Thesis*—The study of and report upon some original investigation or design. See regulations regarding degrees. *Cr 1-3*.

Graduate Courses

- 222/223. *Transients in Linear Systems*—Rec 3, Cr 3.**
240/241. *Introductory and Applied Network Synthesis*—Rec 3, Cr 3.
242. *Computer Methods in Network Analysis*—Rec 3, Cr 3.
250. *Electromagnetic Waves*—Rec 3, Cr 3.
252. *Wave Propagation*—Rec 3, Cr 3.
253. *Microwave Circuits*—Rec 3, Cr 3.
260/261. *Pulse and Digital Circuits*—Rec 3, Cr 3.
269. *Solid State Devices*—Rec 3, Cr 3.
271/272. *Topics in Control Theory*—Rec 3, Cr 3.
280/281. *Communication Engineering*—Rec 3, Cr 3.
295. *Communication Seminar*—Rec 2, Cr 2.
298. *Selected Advanced Topics in Electrical Engineering*—Cr 1-2.
368. *Dynamical Theory of Crystal Lattices*—Rec 3, Cr 3.
399. *Graduate Thesis*—Cr 6-10.

ENGINEERING PHYSICS

PROFESSORS CAMP, BISCOE, CARR, HOOPER, (Chairman), KRUEGER; ASSOCIATE PROFESSORS BROWNSTEIN, CSAVINSZKY, HARMON, MORROW, TARR; ASSISTANT PROFESSORS CARNIGLIA, CLARK, HESS, ROONEY, SMITH, VIETTI; MR. R. H. LITTLEFIELD

This curriculum was developed to meet the needs of students who have a strong interest in engineering, but are not committed to a single traditional engineering field. It affords students, who are not yet sure of their specific career goals, the opportunity to maintain a high degree of flexibility. This program is basically one of applied science, supplemented by a sequence of technical electives in one or more of the well-defined engineering or science fields. It is developed around a framework of required courses in intermediate and advanced physics, mathematics, and chemistry, in addition to certain strictly engineering courses, some required and some elected in the last two years. Thus, the emphasis is placed upon both engineering and physics.

The curriculum also is suited for those students who, by virtue of their ability and interest, may be preparing to do graduate work. Graduates have successfully pursued graduate study in physics and in various fields of engineering.

Graduate Work in Physics

Graduate opportunities and requirements for the master of science degree and the doctor of philosophy degree in physics are given in the catalog of the Graduate School.

UNIVERSITY OF MAINE

Freshman Year. See Page 334.

Sophomore Year

FALL SEMESTER					SPRING SEMESTER				
Subject		Hours			Subject		Hours		
		R	L	C			R	L	C
Me	7	Hum. Elective1	3	0	3	Ge	7	Computer Programming	1 2 2
		Mach. Processes	0	3	1			Hum. Elective1	3 0 3
	28	Anal. Geom. & Calculus	4	0	4	Ms	29	Ord. Diff. Equations	4 0 4
	17	Intermed. Physics	2	0	3	Ps	18	Intermed. Physics	2 0 3
	19	Intermed. Laboratory	0	2	1	Ps	20	Intermed. Laboratory	0 2 1
Ps	36	Intro. to Modern Physics	3	0	3	Ps	172	Optics	3 0 3
Total		15			Total		16		

Junior Year

		R	L	C			R	L	C		
Ee	1	Electric Circuits	4	0	4	Ee	2	Electric Circuits	3	0	3
		Hum. Elective1	3	0	3			Hum. Elective1	3	0	3
Me	55	Statics & Strength of Materials			3	Me	33	Thermodynamics I	3	0	3
Ms	153	Part. Diff. Equations ...	3	0	3	Ms	154	Part. Diff. Equations	3	0	3
Ps	153	Elec. Measurements	0	4	2	Ps	169	Atomic Physics	3	0	3
Ps	155	Electricity & Magnetism ..	3	0	3	Ps	176	Phys. Measurements	0	4	2
		Total		18			Total		17		

Senior Year

		R	L	C			R	L	C
		Engineering Electives2	{	3 0 3			Engineering Electives2	{	3 0 3
				3 2 4					3 2 4
		Hum. Electives1	3	0	3			Free Elective	3 0 3
Ms		Math. Elective3	3	0	3			Hum. Elective	3 0 3
		Physics Elective4	3	0	3	Ps	182	Advanced Lab	0 6 3
Ps	181	Advanced Lab	0	6	3			Physics Elective4	3 0 3
Ps	198a	Seminar	1	0	0	Ps	198b	Seminar	1 0 1
Total		15-16			Total		16-17		

- 1 Humanity Electives—18 hours.
- 2 Engineering Elective—toward completion of 12 hours, but no less than 4 semester courses in an engineering sequence.
- 3 Math Elective may be postponed until spring semester or may be satisfied by Ps 191.
- 4 Senior Physics Electives—Fall Ps 191, Ps 170, Ps 163; Spring Ps 192, Ps 186, Ps 196, plus approved 200 series courses either semester.

PRE-NUCLEAR ENGINEERING OPTION

Students majoring in the physical sciences or engineering who wish to go to graduate school in nuclear engineering or wish to pursue careers in this field should make sure that at least one course in each of the following subject matter areas is included in their programs. Specific examples of suitable courses are listed in column 2. Students interested in pursuing careers in nuclear power, nuclear reactor design, nuclear reactor sales, applications of nuclear sources, nuclear radiation monitoring, or health physics should consult their departmental advisers for planning these courses.

COLLEGE OF TECHNOLOGY

Area	Typical Courses	Prerequisites
Introduction to Modern Physics, or equal	Ps 36 Ch 170, 174	Ps 2 Ch 14, Ps 2 or 2a, Ms 28
Thermodynamics	Me 33 ChE 37 ChE 195 Ps 162 Ch 169-170	Ps 2, Ms 27 Ch 14, Ms 27 ChE 2 Ps 2, Ms, 153 (corequisite) Ms 28, Ch 14, Ps 2 or 2a
Nuclear Engineering	Me 194	Ps 2, Ms 29, Ch 14
Nuclear Physics & Lab	Ps 170-170L	Ps 36, or Ch 170

GENERAL ENGINEERING

PROFESSOR MCNEARY; ASSOCIATE PROFESSORS DESCHANES, METCALF, WESTFALL;
ASSISTANT PROFESSOR VIGER; MR. PLISGA, MR. GRENCI

The Department of General Engineering does not have major students, but offers service courses to students majoring in other curricula, principally engineering and forestry.

Courses offered are those that are introductory and general, or commonly required, in all engineering curricula. Introduction to Engineering Design is taught to first-year students through the medium of engineering drawing. Basic instruction in computer programming, both digital and analog, is provided for sophomores in engineering.

The Department of General Engineering is responsible for the orientation and advising of freshman engineering students and offers an orientation course at the freshman level.

General Engineering (Ge)

1/2. Introduction to Engineering Design—Creative exercises in multi-view drawing using freehand and instrumental techniques. Course 2 introduces pictorial drawing, descriptive geometry, and concludes with the preparation of working drawings for an elementary design problem requiring creative thinking. *Rec & Lab 4, Cr 2.* STAFF

3. Descriptive Geometry—The solution of problems of a three-dimensional nature by graphic methods. Theoretical and applied problems are given. Prerequisite: Ge 1. *Rec & Lab 4, Cr 2.* STAFF

5/6. Orientation—A series of meetings involving lecturers and discussions, with frequent use of audio-visual material to acquaint engineering freshmen with the nature of engineering and science. *Rec 1, Cr 0.* MR. MCNEARY

7. Computer Programming for Engineers—Digital programming using Fortran IV language and appropriate numerical methods for the solution of applied problems involving roots of equations, numerical integration, and matrix algebra. The last five weeks of the semester are devoted to analog computer exercises, including time and magnitude scaling. Prerequisite: Ms 28 (may be taken concurrently). *Rec 1, Lab 2, Cr 2.* STAFF

UNIVERSITY OF MAINE

11/12. Basic Graphics and Cartography—An introduction to graphic principles involving creative exercises in orthographic projection, data analysis, and cartography. Course 12 offers a further study of cartography, pictorial drawing, and graphical mathematics, with applied problems related to the student's major interest. For Forest Resources students. *Rec & Lab 4, Cr 2.* MR. WESTFALL

14. Architectural Drawing—The preparation of floor plans, elevations, sections, and pictorial renderings of homes and small buildings. Prerequisite: Ge 1. *Rec & Lab 4, Cr 2.* MR. WESTFALL

120. Engineering Decision-Making—Application of the elements of engineering decision-making common to all disciplines in engineering. Explanation of the application of concepts of rate of return equivalents, annual cost, annual work and present worth to a variety of engineering concepts, such as economic lifetime depreciation, annual cost and engineering economic analysis. Prerequisite: college algebra and junior standing. Open to students in all colleges. *Rec 2, Cr 2.*

150. Nomography—The construction of graphical representations of equations which must be solved repeatedly. Prerequisite: Ge 1., Ms 27. *Rec 1, Lab 2 Cr 2.* MR. MCNEARY

MECHANICAL ENGINEERING

PROFESSORS LYMAN, CAMPBELL, CLIFFORD, HILL, SULLIVAN; ASSOCIATE PROFESSORS SCHNEIDER, WEBSTER, CHAPMAN, GRANT, SUCEC, LEE, JOHNSON; ASSISTANT PROFESSORS HOPKINS, SCHMIDT; MR. HALL, MR. MADDEN, MR. WHITING

The Mechanical Engineering curriculum uses a broad foundation of mathematics, basic science, and engineering science to prepare the student for more specialized training in advanced courses.

Mechanical engineering embraces two major areas of interest; heat power and mechanical design. Professional careers in mechanical engineering include design, development, research, teaching, management and sales.

The curriculum is designed to allow the student to select electives in the area of his interest and aptitude. Sequences of courses are available in fluid and solid mechanics, thermal science and heat power, mechanical design, and environmental design and control.

A Pulp and Paper Option is offered in cooperation with the Chemical Engineering Department. The five-year program includes all courses required in the Mechanical Engineering curriculum and leads to the degree of bachelor of science in mechanical engineering and a certificate indicating completion of the pulp and paper program.

The Mechanical Engineering Department also offers an opportunity for students to complete their senior year in a cooperative education program between the department and selected industries.

To participate in the program it is necessary to have a pair of students engaged in work-study for each job in industry so that the job is continuously covered during the work-study period by the pair. Also, the industrial employers prefer to have the students begin to work for them as late in their undergraduate careers as possible so that they may be assigned significant engineering work to do.

COLLEGE OF TECHNOLOGY

Two students, X and Y, may begin their alternating work-study schedule after completing their junior year and by completing their senior year over a two-year period as follows:

Student	1st summer	Fall Senior	Spring Senior	2nd Summer	Fall 5th year	Spring 5th year
X	Vacation	Work	Study	Work	Study	Work
Y	Work	Study	Work	Vacation	Work	Study

Graduate Work in Mechanical Engineering

The department offers programs leading to the degrees of master of science in mechanical engineering, master of mechanical engineering, and master of engineering (mechanical). The course of study may be chosen in any of the department's fields.

Freshman Year. See Page 334.

Sophomore Year

FALL SEMESTER						SPRING SEMESTER					
Subject			Hours			Subject			Hours		
			R	L	C				R	L	C
Ee	41	Elem. Circuits	3	0	3	Ge	7	Computer Programming	1	2	2
Ms	28	Anal. Geom. & Calculus ..	4	0	4	Ms	29	Diff. Eq.	4	0	4
Me	33	Thermodynamics I	3	0	3	Me	34	Thermodynamics II	3	0	3
Me	53	Appl. Mech. I, (Statics				Me	34	Appl. Mech. II,			
		and Kinematics)	4	0	4			(Kinetics)	4	0	4
		Elective			3			Elective			3
					<hr/>						<hr/>
					17						16

Junior Year

Ee	43 Elect. Instrumentation ...	2	2	3	Me	21 Mat. Engrg. & Sci.	3	0	3
Ms	8 Mfg. Processes ¹	1	4	3	Me	38 Mechanical Lab	1	3	3
Me	51 Str. of Materials	4	0	4	Me	164 Mech. Vibrations	3	0	3
Me	59 Fluid Mechanics	3	0	3		Technical Elective			3
	Elective			3		Elective ¹			3
				16					15

1 Alternated between semesters.

Senior Year

Me	71 Mechanical Lab	0	3	2	Ee	42 Electrical Mach.	3	0	3
Me	124 Design I	2	3	3	Me	72 Mechanical Lab	0	3	2
Me	160 Heat Transfer	3	0	3	Me	125 Design II	4	0	4
	Technical Elective			3		Technical Elective			3
	Elective			3		Elective			3
	Elective ²			3		Elective ²			3
				14 or 17					15 or 18

2 Technical or free, alternated between semesters.

M.E. Technical Electives

R L C					R L C				
Me	84	Indus. Management	3	0	3	Me	188	Dynamics of	
Me	94	Hydraulic Machinery	3	0	3			Machines	3 0 3
Me	101	Metallography	0	6	3	Me	189	Prin. Optimum Design	
Me	123	Kinematics of Linkages	3	0	3			& Reliability	3 0 3
Me	156	Theory of Elasticity	3	0	3	Me	190	Adv. Thermodynamics	3 0 3
Me	157	Adv. Dynamics	3	0	3	Me	191	Heat & Vent. Systems	3 0 3
Me	158	Adv. St. of Materials	3	0	3	Me	192	Aerodynamics	3 0 3
Me	167	Direct Energy				Me	193	I. C. Engines	3 0 3
		Conversion	3	0	3	Me	194	Intro. to Nuclear Engrg.	3 0 3
Me	181	Turbomachinery	3	0	3	Me	195	Gas Dynamics I	3 0 3
Me	186	Power Plants	3	0	3	Me	196	Air Condg. & Refrig.	3 0 3
Me	187	Mech. Des. II	2	3	3				

PULP AND PAPER OPTION IN MECHANICAL ENGINEERING

The first three years of this program are the same as the regular Mechanical Engineering program, including all specified courses through the junior year with the additional requirement of Ec 10, Principles of Economics. The specific requirements for the Pulp and Paper certificate as well as a sample program may be found in the Chemical Engineering section of this catalog.

Courses in Mechanical Engineering (Me)

7. Machine Processes—Theory of metal forming, the machine tools and materials of modern manufacturing, mass production processes, use of basic machine tools. *Rec & Lab 3, Cr 1.*

8. Manufacturing Processes—Theory and application of modern metal shaping machines and processes. Design analysis for economical fabrication. Characteristics and operation of machine tools. *Rec 1, Lab 4, Cr 3.*

11. Introductory Engineering Metallurgy—Methods of defining the microstructure of metals, phase diagrams, and mechanical properties. Thermal, mechanical, and chemical manipulation of microstructure. Not for mechanical engineering degree credit. *Rec 3, Cr 3.*

12. Elementary Heat Power—Elementary thermodynamics, mechanical apparatus, power plant equipment; engineering calculations relative to heat, power, work, and mechanical and electrical energy. Not for mechanical engineering degree credit. *Rec 3, Cr 3.*

21. Materials Engineering and Science—The principles of material science with emphasis on the relationship between structure and properties and their control through composition, mechanical working and thermal treatment. Prerequisite: Me 33, 51. *Rec 3, Cr 3.*

33. Thermodynamics I—Energy and energy transformations; the First and Second Laws applied to systems and to control volumes; thermodynamic properties of systems, availability of energy. Prerequisite: Ps 1, Ms 27. *Rec 3, Cr 3.*

34. Thermodynamics II—A continuation of Me 33. Thermodynamics of mixtures; chemical thermodynamics, thermodynamics of fluid flow, vapor and gas cycles, applicable to compressors, internal combustion engines and turbines. Prerequisite: Me 33. *Rec 3, Cr 3.*

38. Mechanical Laboratory—An introduction to experiment design, data analysis, laboratory techniques, instrumentation, and calibration of equipment. Application to thermodynamics, mechanics of materials, fluid mechanics and metallurgy. Prerequisite: M. E. junior. *Rec 1, Lab 3, Cr 3.*

50. Applied Mechanics, Statics—Force systems and equilibrium, trusses, frames, friction, distributed forces, centroids, and moments of inertia. Prerequisite: Ms 27. *Rec 3, Cr 3.*

51. Strength of Materials—The principles of solid mechanics and their applications to practical problems, stresses and deflections in axial loading, torsion, beams, columns, combined stresses. Prerequisite: Me 50 or Me 53 and Ms 28. *Rec 4, Cr 4.*

52. Applied Mechanics, Dynamics—Motion of particles and rigid bodies; force, mass and acceleration; impulse and momentum; work and energy and simple harmonic motion. Prerequisite: Me 50 or Me 55, Ms 28. *Rec 3, Cr 3.*

53. Applied Mechanics I—The study of force systems and equilibrium, structural models, friction, distributed forces, centroids, and moments of inertia. Analysis of mechanisms. Prerequisite: Ms 27 and Ps 1. *Rec 4, Cr 4.*

54. Applied Mechanics II—Motion of particles and rigid bodies; force, mass and acceleration; impulse and momentum; work and energy; harmonic motion. Prerequisite: Me 53 and Ms 28. *Rec 4, Cr 4.*

55. Statics and Strength of Materials—The basic principles of statics and their applications in strength of materials. Equilibrium of various systems. Stresses and deformations of axially loaded members, connections, circular shafts, beams and columns. Prerequisite: Ms 27 and Ps 1. *Rec 3, Cr 3.*

59. Fluid Mechanics—Fluid statics, kinematics, Bernoulli equation, momentum, free-surface flow, viscosity, friction, dimensional analysis and similitude, and an introduction to compressible flow. Prerequisite: Me 33 and Me 52 or Me 54. *Rec 3, Cr 3.*

62. Heat Transfer and Fluid Flow—For non-mechanical engineers. The laws of conduction, convection, and radiation of heat energy, Principles of fluid flow for non-viscous and viscous fluids. Application of the principles of heat transfer and fluid flow to engineering problems. Prerequisite: Me 33. *Rec 3, Cr 3.*

71/72. Mechanical Laboratory—A continuation of Me 38. Mechanical engineering problems in a laboratory setting. Prerequisite: M. E. senior. *Lab 3, Cr 2.*

84. Industrial Management—The relations between accounting, marketing, production and wage administration in the modern industrial plant. Prerequisite Ec 10. *Rec 3, Cr 3.*

94. Hydraulic Machinery—Prerequisite: Me 59. *Rec 3, Cr 3.*

99. Seminar—*Rec 1, Cr 1.*

101. Metallography—Methods of preparation of metal specimens for optical microstructure examination. Microstructure interpretation. Microstructure manipulation. Effect of processes on microstructure. Photomicroscopy. Microhardness testing. Experimental problems. Prerequisite: Me 21. *Lab 6, Cr 3.*

123. Kinematics of Linkages—Analysis of displacement, velocities, and acceleration in machine parts and linkages. Kinematic synthesis of mechanisms, analog and digital computer techniques. Prerequisite: Me 52 or 54. *Rec 3, Cr 3.*

124. Design I—Analysis of mechanical elements. Advanced concepts in mechanics of materials, stress concentration, fatigue, factor of safety. Introduction to creative synthesis and economic design. Prerequisite: Me 51 or 55 and Ms 29. *Rec 2, Comp 3, Cr 3.*

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125. Design II—Design of mechanical engineering systems, including problem definition, analysis, synthesis and optimization. Prerequisite: Me 59, Me 160, Me 124, or permission. *Rec 4, Cr 4.*

150. Experimental Mechanics—Experimental methods and techniques for analysis of stress and displacement and their engineering significance. Electric strain gages, brittle lacquers, mechanical and optical strain gages, and introduction to photoelasticity. Prerequisite: Me 51. *Rec 2, Lab 2, Cr 3.*

156. Theory of Elasticity—Plane stress and plane strain, stress function. Problems in Cartesian and polar coordinates. Photo-elasticity, strain energy. Three-dimensional problems. Prerequisite: Me 51. *Rec 3, Cr 3.*

157. Advanced Dynamics—Particle dynamics, vibrations, numerical methods, planetary motion, projectiles. Variable mass motion, angular, momentum, impact, engine balancing. Constraints, generalized coordinates and forces. Lagrange's equations. Hamilton's principle. Gyroscopes. Prerequisite: Me 52 or Me 54. *Rec 3, Cr 3.*

158. Advanced Strength of Materials—Limitations of elementary stress formulas, theories of failure, unsymmetrical bending, curved flexural members, flat plates, torsion of non-circular bars, thick-walled cylinders, stress concentrations, energy methods, and introduction to theory of elasticity. Prerequisite: Me 51. *Rec 3, Cr 3.*

160. Heat Transfer—The fundamental laws of heat transfer by conduction, convection and radiation. Application of the study of engineering problems via analytical, numerical, and graphical techniques. Prerequisite: Me 59. *Rec 3, Cr 3.*

164. Mechanical Vibrations—Free and forced vibrations with viscous damping for discrete and continuous mass systems. Derivation and application of energy methods. Applications. Prerequisite: Me 52 or Me 54. *Rec 3, Cr 3.*

167. Direct Energy Conversion—Direct energy conversion. Energy converters such as thermionic, thermoelectric, photoelectric, fuel cells, and magneto-hydrodynamic generators considered as components of power systems. Prerequisite: Me 33. *Rec 3, Cr 3.*

181. Turbomachinery—The theory and design of turbomachinery flow passages; control and performance of turbomachinery; gas-turbine engine process. Prerequisite: Me 34. *Rec 3, Cr 3.*

186. Power Plants—Power station engineering and economy. Design, construction and operating theory of steam, internal-combustion, and hydroelectric power plants. An introduction to nuclear power plants, utilization of solar energy, fuel cells, and associated problems. Prerequisite: Me 34. *Rec 3, Cr 3.*

187. Mechanical Design II—Formulation and design of mechanical elements and systems covering a variety of problems confronting the practicing mechanical engineer. Emphasis on original design problems and the development of creative ability. Prerequisite: Me 51. *Rec 2, Comp 3, Cr 3.*

188. Dynamics of Machines—The forces due to reciprocating and rotating masses with special application to balancing high-speed machinery, designing governors and flywheels. Prerequisite: Me 164. *Rec 3, Cr 3.*

189. Principles of Optimum Design and Reliability—Optimization of mechanical engineering systems, statistical treatment of systems breakdown, utilization of reliability theory in design. Prerequisite: Me 124 or permission. *Rec 3, Cr 3.*

190. Advanced Thermodynamics I—An introduction to combustion, with applications to the performance of propulsion systems, particularly rocket engines. Prerequisite: Me 34. *Rec 3, Cr 3.*

191. Heating and Ventilating System Design—Determination of heating ventilating requirements for buildings and industrial processes. Analysis of heat transfer devices and their applications. Heating and ventilating system designs, layout and control. Prerequisite: Me 34. Rec 3, Cr 3.

192. Aerodynamics—Flow of an ideal fluid; application of dimensional analysis to engineering problems; properties of airfoils; engine and propeller characteristics; airplane performance calculations; propeller theory. Prerequisite: Me 59. Rec 3, Cr 3.

193. Internal Combustion Engines—Application of thermodynamic laws and principles to internal combustion engine cycles, theory of design and operation; fuels and combustion, carburetion, detonation, cooling, and lubrication. Prerequisite: Me 34. Rec 3. Cr 3.

194. Introduction to Nuclear Engineering—Review of nuclear reactions. Neutron interactions and the fission process. Criticality calculations, the four factor equation. Steady state behavior of simple reactors. Transient behavior and control of reactors, effect of delayed neutrons, fission product poisoning upon shutdown. Prerequisite: Ch 14, Ps 2, Ms 29, or permission. Cr 3.

195. Gas Dynamics I—An introduction to the basic dynamics of compressible flows. Fundamental equations and concepts will be considered in isentropic flow, normal shock waves, flows in constant area ducts, and generalized one-dimensional continuous flow. Prerequisite: Me 34 and 59. Rec 3. Cr 3.

196. Refrigeration and Air Conditioning—Methods of producing artificial low temperatures. Refrigeration for controlled-temperature applications in comfort air conditioning and industrial manufacturing processes and their control. Prerequisite: Me 34. Rec 3, Cr 3.

Graduate Courses

202. Advanced Thermodynamics II—Rec 3, Cr 3.

203. Analytical Thermodynamics—Rec 3, Cr 3.

210. Advanced Heat Transfer I—Rec 3, Cr 3.

220. Advanced Fluid Mechanics I—Rec c, Cr 3.

222. Gas Dynamics II—Rec 3, Cr 3.

231. Fatigue Failure—Rec 3, Cr 3.

232. Nonlinear Vibrations—Rec 3, Cr 3.

233. Introduction to Continuum Mechanics—Rec 3, Cr 3.

234. Advanced Vibrations I—Rec 3, Cr 3.

235. 236. Mechanical Engineering Analysis—Rec 3, Cr 3.

238. Advanced Vibrations II—Rec 3, Cr 3.

304. Selected Topics in Advanced Thermodynamics—Rec 3, Cr 3.

311. Advanced Heat Transfer II—Rec 3, Cr 3.

312. Advanced Topics in Heat Transfer—Rec 3, Cr 3.

330. Theory of Plates and Shells—Rec 3, Cr 3.

391. Mechanical Engineering Projects—Cr Ar.

399. Graduate Thesis—Cr Ar.

UNIVERSITY OF MAINE

College of Technology

TECHNICAL INSTITUTE DIVISION

Associate Director—Robert B. Rhoads

Four Associate Degree programs in Engineering Technology are offered at the University of Maine at Orono by the College of Technology through its Technical Institute Division:

Chemical Engineering (Pulp and Paper) Technology

Civil Engineering Technology

Electrical Engineering Technical

Mechanical Engineering Technology

The Mechanical Engineering Department also offers the Bachelor of Mechanical Engineering Technology degree to those students who complete the four years of study which are described on page 364.

Commencing with the freshman class entering the fall of 1974, dormitory students will live on the Orono campus and all classes will be held on the Orono campus.

The programs are administered through the respective engineering departments at Orono and the technical courses are taught by the engineering faculty.

Successful completion of associate degree studies in Engineering Technology means that the graduate has acquired high technical competence and a foundation for performance as an engineering technician or for further study in Engineering Technology.

The primary objective of the Engineering Technology programs in the Technical Institute Division is to prepare the student for employment as an engineering technician or engineering aide with industry in production, design, sales, service, quality control, work simplification, and construction as well as with municipal governments, state highway departments, consulting firms and with their own companies.

A strong secondary objective is to provide students with an opportunity to prepare for transfer to bachelor degree programs in Engineering Technology. At this time, only two baccalaureate programs are offered in Engineering Technology on the Orono campus: Pulp and Paper Technology and Agricultural Mechanization. However, numerous transfer possibilities do exist for students to transfer to other schools in the Northeast to complete the Bachelor of Engineering Technology degree. This would generally require an additional two years. While the programs are not designed to prepare students for transfer to engineering curricula, graduates with superior records may be considered for admission to baccalaureate engineering programs at Orono with transfer credit determined on an individual basis.

Some students, after receiving their associate degree in Engineering Technology, transfer to other areas to study for baccalaureate degrees.

The Engineering Technology programs provide an opportunity for those persons interested in the application of scientific and engineering knowledge and methods to prepare for careers in Engineering Technology at the associate degree or baccalaureate degree level. The methods and applications studied are more specialized and application-oriented than those in engineering programs. Job opportunities for the engineering technician have been good.

COLLEGE OF TECHNOLOGY

Graduation Requirements

For the Associate of Science in Engineering Technology degree, a total of 72 credits are required for Chemical Engineering (Pulp and Paper) Technology and 73 credits are required for Civil Engineering Technology, Electrical Engineering Technology, and Mechanical Engineering Technology. A student must accumulate a minimum grade point average of 2.00 and receive a passing grade in all required courses in the program of study.

CHEMICAL ENGINEERING (PULP & PAPER) TECHNOLOGY

The curriculum in Chemical Engineering Technology provides classroom and laboratory training in the principles of chemical engineering practices with emphasis on pulp and paper technology. The program stresses engineering principles but instructs as well in the skills of laboratory research and testing. Training in data analysis, writing and speaking develop in the student an interest and proficiency for communicating his ideas and the results of his work. Successful completion of studies means that the student has acquired the technical competence to assume a strong supporting role in any engineering assignment. Students whose academic performance is above average may continue for an additional two years to obtain the baccalaureate degree in Pulp and Paper Technology, also offered by the Chemical Engineering Department.

CHEMICAL ENGINEERING (PULP & PAPER) TECHNOLOGY CURRICULUM

SEMESTER 1					SEMESTER 2				
		R	L	C			R	L	C
1 CheT	Chemical Science	3	0	3	2 CheT	Chemical Science	3	0	3
6 CheT	Data Analysis	2	0	2	3 CheT	Chemical Analysis	0	8	4
3 Eng	Critical Written Expression	3	0	3	4 Eng	Speech	3	0	3
2 MsT	Mathematics I	3	0	3	4 MsT	Mathematics II	3	0	3
1 PaT	Pulp Technology	3	0	3	2 PaT	Paper Technology	3	0	3
1 Pe	Physical Education	0	2	0	2 Pe	Physical Education	0	2	0
7 PsT	Basic Physics	4	2	5		Non-tech. Elective	3	0	3

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Courses in Chemical Engineering (Pulp & Paper Technology) (CheT)

1/2. Chemical Science—Principles of chemistry, with emphasis on their application to engineering. The basics of organic chemistry are introduced and used to discuss important areas of polymers and wood. *Rec 3, Cr 3.*

3. Analytical Chemistry—A study and training in analytical techniques of chemistry. Presentation is divided into volumetric, gravimetric and instrumental methods. Applications are to typical industrial materials. Prerequisite: 1 CheT. *Lab 8, Cr 4.*

4. Elementary Chemical Engineering—An introduction to the basics of chemical engineering. The physic-chemical principles underlying calculations are presented and their applications to processes are illustrated. Prerequisite: 2 CheT. *Rec 3, Cr 3.*

5. Process Instrumentation—An introduction to principles and techniques used for measuring industrial process variables such as temperature, pressure, flow, etc., and an introduction to process control. Prerequisite: 3 CheT. *Rec 1, Lab 2, Cr 2.*

6. Data Analysis I—A course to familiarize the student with published sources of technical data and methods of analyzing and summarizing the data. Elementary statistics, graphical presentations, and report writing will be emphasized. *Rec 2, Cr 2.*

7. Chemical Processes—An introduction to unit processes common to chemical process industries. Prerequisite: 4 CheT. *Rec 3, Cr 3.*

8. Data Analysis II—Continuing from Data Analysis I, a further study is made of statistics. Then, principles of designing experiments and optimizing results are discussed. The course concludes with instruction in Fortran programming and the use of computers for data analysis. Prerequisite: 6 CheT. *Rec 3, Cr 3.*

20. Selected Topics in Chemical Engineering Technology—Topics in engineering technology not regularly covered in other courses. The content is varied to suit individual needs. The course may be taken more than once. Prerequisite: consent of the instructor. *Cr Ar. 1-3 hr.*

PaT 1. Pulp Technology—A course on the manufacture of various kinds of wood pulp used in paper making. Wood as a raw material, the major pulping processes, and bleaching methods are discussed. Prerequisite: 1 CheT or concurrent. *Rec 3, Cr 3.*

PaT 2. Paper Technology—A course describing the processes for the manufacture of paper. Stock preparation, paper machines, surface, finishing and quality control are described. Prerequisite: 1 PaT. *Rec 3, Cr 3.*

PaT 3. Pulp and Paper Analysis—A laboratory course on the various physical and chemical tests to characterize pulp and paper. Prerequisite: 1 PaT. *2 PaT. Lab 12, Cr 6.*

PaT 4. Pulp and Paper Processes—A laboratory course covering the unit operations in the making of pulp and paper. Prerequisite: 3 PaT. *Lab 8, Cr 4.*

CIVIL ENGINEERING TECHNOLOGY

The curriculum is designed to provide the student with a basic grounding in the physical and mathematical sciences as preparation for his specialized studies in Civil Engineering Technology. These specialized studies are coordinated so as

to prepare the graduate to assist as an aide to professional civil engineers in the areas of surveying, materials testing, highway engineering, construction engineering and structural engineering.

The emphasis in all the work is on the practical aspects of civil engineering design and construction. Employment opportunities are excellent for the well-trained engineering technician in the construction field.

Civil Engineering Technology Curriculum
Starting with the Class of 1975

SEMESTER 1					SEMESTER 2				
Subject		R	L	C	Subject		R	L	C
1 CeT	Plane Surveying	3	3	4	2 CeT	Advanced Surveying	3	3	4
4 Eng	Speech	3	0	3	11 CeT	Structural Mech.	4	0	4
1 GeT	Technical Drawing	0	4	2	3 Eng	Crit. Written Expression ...	3	0	3
2 MsT	Math I	3	0	3	30 EeT	Circ. Mach. & Electronics ..	3	3	4
1 Pe	Physical Education	0	2	0	2 GeT	Technical Drawing	0	4	2
7 PsT	Basic Physics	4	2	5	4 MsT	Math II	3	0	3
				2 Pe	Physical Education	0	2	0	
				13 11 17					16 12 20
SEMESTER 3					SEMESTER 4				
2 ARE	Intro. to Economics	3	0	3	Psych. or Sociology				3
12 CeT	Structural Design	3	3	4	22 CeT	Soils Engineering	2	2	3
21 CeT	Materials, Prop. & Testing	2	2	3	31 CeT	Construction Engineering ..	3	3	4
30 CeT	Highway Operations	3	3	4	40 CeT	Civil Eng. Mgt.	3	0	3
**	Math	3	0	3	Elective				
	Elective			3					3
				20					16

**Math requirement may be fulfilled by a 3-hour math course
6MsT, Ms 26, Ms 19, Ms 69

7 ARE, Sociology and the Individual, 6 ARE Dynamics of Human Behavior or equivalent
73 credit hours required for graduation.

Courses in Civil Engineering Technology (CeT)

- 1. **Plane Surveying**—Surveying instruments and their use in line measurement, leveling and traversing. Construction and drawing of plans, profiles, and topographic maps. *Rec 2, Lab 6, Cr 4.*
- 2. **Advanced Surveying**—Curves and earthwork computation and field layout. Property surveys and legal aspects. Astronomical observations, triangulation, and precise leveling using precision surveying instruments. Prerequisite: 1 CeT. *Rec 3, Lab 3, Cr 4.*
- 3. **Construction Surveying**—Computation and layout of buildings, bridges, pipelines, and highways. Construction and quantity surveys together with appropriate mapping are undertaken. Problems in highway curves and earthwork of an advanced nature are worked. Prerequisite: 2 CeT or concurrent. *Rec 2, Lab 3, Cr 3.*

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4. Elementary Surveying—The use of surveying instruments and the various methods used for plane surveying. Stadia and mapping work. Course is for forestry technology students only. Prerequisite: 2 MsT or equivalent. *Rec 2, Lab 3, Cr 3.*

11. Structural Mechanics—Analytical and graphical solutions of force systems. Loads, shear, moment and deflection values are solved for in beams, trusses, and frames under static loading. Studies of stresses and strains that occur as structural members are subjected to shearing, tensile, compressive and flexural forces. Prerequisite: 7 PsT or concurrent. *Rec 3, Cr 3.*

12. Structural Design—Fundamental application of structural analysis principles to the design of steel, concrete and timber beams, trusses, and frames. Current design codes and practices are used. Prerequisite: 11 CeT. *Rec 3, Lab 3, Cr 4.*

13. Structural Design—Design projects in steel and concrete. Prerequisite: 12 CeT. *Rec 3, Lab 3, Cr 4.*

20. Selected Topics in Civil Engineering Technology—Topics in Engineering Technology not regularly covered in other courses. The content is varied to suit individual needs. The course may be taken more than once. Prerequisite: consent of the instructor. *Cr Ar. 1-4 hrs.*

21. Material Properties and Testing—The study and testing of the properties of materials used in the construction of civil engineering work. Timber, steel, concrete, soil aggregates, and bituminous materials are tested. Their selection and application to specific purposes are emphasized. *Rec 2, Lab 2, Cr 3.*

22. Soils Engineering—The study and testing of the properties of soils and the use of soils as a construction material. Includes the study of index properties, moisture and drainage, frost action, compression, shearing strength, lateral pressure, bearing capacity, and consolidation of soils. *Rec 2, Lab 2, Cr 3.*

30. Highway Engineering—Studies of the history and development of highways, systems and organizations. Highway financing and economy. Data collection and surveys for highway needs. Design of the horizontal and vertical alignments and design of the cross-section, base and pavements. Special topics of roadside developments, maintenance, rights of way and highway drainage. Study of construction of the roadway from clearing to paving, including use of the mass diagram. Prerequisite: 3 CeT or concurrent. *Rec 3, Lab 3, Cr 4.*

31. Construction Engineering—Field aspect of civil engineering management. Project analysis and scheduling using CPM-I. Studies of use, performance and economics of construction equipment. Laboratory consists of a design, materials take-off and cost estimate of a complete construction project plus field trips and movies showing various construction practices and safety. Prerequisite: 30 CeT. *Rec 3, Lab 3, Cr 4.*

40. Civil Engineering Management—Office aspect of civil engineering management. Basic principles of contract law. Writing specifications for a contract and interpreting specifications for inspection. Professional ethics, arbitration and the engineer as an expert witness. Study of the distinguishing relationships in partnerships and corporations. Prerequisite: 2 ARE or concurrent. *Rec 3, Cr 3.*

ELECTRICAL ENGINEERING TECHNOLOGY

The purpose of this two-year program is to prepare the student for practical work in the application of electrical engineering principles to equipment and in-

strumentation. Graduates will find employment opportunities in all types of industry, in large firms as responsible assistants to electrical engineers, and in small firms whose electrical needs require more than the talents of an electrician or an electrical technician.

In the first semester the groundwork is laid in algebra and trigonometry, mechanics and d-c circuits. In the second semester a-c circuits and laboratory techniques are introduced in the electrical courses, and the beginning of calculus in the math course. Fundamentals of computer programming are also studied. The third semester includes the introduction of electronics and machine theory along with courses in calculus and engineering materials. In the fourth semester applications are treated in electronics, control, and instrumentation, and an opportunity for independent work is provided in a semester projects course. The program is rounded out with courses in English, speech, machine shop, and technical drawing.

Electrical Engineering Technology Curriculum

SEMESTER 1						SEMESTER 2					
		R	C	L	C			R	C	L	C
11 EeT	Basic Electricity	2	0	3	3	21 EeT	Basic Circuits	3	3	3	3
1 GeT	Technical Drawing	0	0	4	2	22 EeT	Basic Methods of				
3 Eng	Crit. Written Expres.	3	0	0	3		Tech. Computation	0	4	0	2
9 MeT	Machine Shop	1	0	4	3	2 GeT	Technical Drawing	0	0	4	2
2 MsT	Mathematics I	3	0	0	3	2 Eng	Crit. App'n. of Lit.	3	0	0	3
1 Pe	Physical Education	0	0	2	0	4 MsT	Mathematics II	3	0	0	3
7 PsT	Basic Physics	4	0	2	5	2 Pe	Physical Education	0	0	2	0
						4 Eng	Speech	3	0	0	3
		13	0	15	19			12	7	9	18

SEMESTER 3						SEMESTER 4					
		R	C	L	C			R	C	L	C
33 EeT	Electronics	3	3	3	5	43 EeT	Applied Electronics	3	0	3	4
34 EeT	Eng. Materials	3	0	0	3	45 EeT	Power Distribution				
35 EeT	Elec. Machinery	3	3	3	5		Illu. of Acoustics	3	0	3	4
37 EeT	Tech. of Elec.					47 EeT	Elec. Instrumentation				
	Measurement	2	0	3	3		& Control	3	0	3	4
6 MsT	Mathematics III	3	0	0	3	48 EeT	Elec. Projects	0	0	6	2
							Non-tech. Elective	3	0	0	3
		14	6	9	19			12	0	15	17

Courses in Electrical Engineering Technology (EeT)

11. *Basic Electricity*—A non-calculus introduction to elementary electric and magnetic concepts, d-c networks and network theorems, and magnetic circuits; including laboratory use of instruments for making d-c circuit measurements. Prerequisite: 2 MsT concurrent. *Rec 2, Comp or Lab 3, Cr 3.*

20. *Selected Topics in Electrical Engineering Technology*—Topics in Engineering Technology not regularly covered in other courses. The content is varied to suit the needs of individuals. The course may be taken more than once. Prerequisite: consent of instructor. *Cr Ar. 1-3 hrs.*

21. *Basic Circuits*—Continuation of 11 EeT, constituting an introduction to reactive elements, and continuing into the phasor analysis of single-phase and

UNIVERSITY OF MAINE

polyphase a-c circuits in the steady state. Prerequisite: 11 EeT, 4 MsT concurrent. *Rec 3, Comp 3, Lab 3, Cr 5.*

22. Basic Methods of Technical Computation—Introduction to matrix analysis. Elements of digital computer programming and numerical analysis techniques. Prerequisite: 4 MsT concurrent. *Comp 4, Cr 2.*

30. Circuits, Machines, and Electronics—Electrical concepts and devices, elementary circuit analysis; fundamentals of AC and DC machinery; principles of electronic devices and circuits. Prerequisite: 7 PsT. Prerequisite or corequisite: 4 MsT. Fall: *Rec 4, Comp or Lab 3, Cr 5*, for mechanical engineering technicians. Spring: *Rec 3, Comp or Lab 3, Cr 4*, for civil and chemical engineering technicians.

33. Electronics—Basic physical principles and behavior of solid state electronic devices. Analysis of rectification, amplification, feedback, and signal generation circuits. Load line analysis and equivalent circuits. Prerequisite: 21 EeT. *Rec 3, Comp 3, Lab 3, Cr 5.*

34. Engineering Materials—Physical and electrical properties of materials used in electrical equipment and electronic devices. Emphasis on electrical insulation, semiconductor materials, and magnetic materials. *Rec 3, Cr 3.*

35. Electrical Machinery—Theory, performance characteristics and operational control of DC and AC machines. Prerequisite: 21 EeT. *Rec 3, Comp 3, Lab 3, Cr 5.*

37. Techniques of Electrical Measurement—The theory and operation of both basic and sophisticated measuring devices and equipment. *Rec 2, Lab 3, Cr 3.*

43. Applied Electronics—Industrial and commercial electronic circuits and systems, emphasizing amplitude and frequency modulation, detection, radio and television transmitters and receivers, and digital circuits and computers. Prerequisite: 33 EeT. *Rec 3, Lab 3, Cr 4.*

45. Power Distribution, Illumination and Acoustics—Distribution of electric power to load centers. losses, voltage regulation, power factor correction. General illumination theory; elementary acoustic theory. Prerequisite: 21 EeT. *Rec 3, Comp 4 or Lab 3, Cr 4.*

47. Electrical Instrumentation and Control—A study of controllers used for AC and DC motors; the use of selsyn devices, magnetic amplifiers, amplidynes, silicon controlled rectifiers and photo-electric devices in control systems. Prerequisite: 35 EeT. *Rec 3, Lab 3, Cr 4.*

48 Electrical Projects—The student will design, build and test a specific piece of equipment such as an amplifier, voltage regulator, or a piece of test equipment. *Lab 6, Cr 2.*

MECHANICAL ENGINEERING TECHNOLOGY

The field of mechanical engineering technology includes environmental control, mechanical design, manufacturing processes, heat power and internal combustion engines, and the many technical activities associated with them. The two-year program prepares its graduates for a variety of opportunities as engineering technicians in engineering departments, manufacturing operations and the mechanical service industries.

The curriculum provides a well-rounded education in mechanical engineering technology. Classroom instruction in the various subjects is supplemented by extensive training in their practical application in the laboratory and shop.

COLLEGE OF TECHNOLOGY

Students are urged to take technical or industrial employment during the summer between the two years.

Mechanical Engineering Technology Curriculum

SEMESTER 1					SEMESTER 2				
Subject		Hours					Hours		
		R	L	C			R	L	C
1 CheT	Chemical Science	3	0	3	2 ARE	Intro. to Econ.	3	0	3
1 GeT	Technical Drawing	0	4	2	2 GeT	Technical Drawing	0	4	2
3 Eng	Crit. Written Expr.	3	0	3	4 Eng	Speech	3	0	3
7 MeT	Mach. Tool Lab.	1	4	3	8 MeT	Mach. Tool Lab	1	3	2
1 MeT	Orientation	1	0	0	50 MeT	Statics & Kinematics	4	0	4
2 MsT	Math I	3	0	3	4 MsT	Math II	3	0	3
1 Pe	Phys. Ed.	0	2	0	2 Pe	Phys. Ed.	0	2	0
7 Pst	Basic Physics	4	2	5					
<hr/>					<hr/>				
15 12 19					14 9 17				
SEMESTER 3					SEMESTER 4				
		R L C					R L C		
30 EeT	Circuits, Machines				6 ARE	Dynamics of Human			
	& Electronics	4	3	5		Behavior	3	0	3
3 GeT	Mach. Drawing	0	4	2	34 MeT	Mech. Tech. Lab	2	4	3
5 MeT	Heat Treatment	1	2	2	36 MeT	Heat Engrg.	3	2	4
11 MeT	Mach. Tool Lab	0	3	1	61 MeT	Strength of Materials			
17 MeT	Dynamics	2	0	2		& Mach. Design	3	2	4
33 MeT	Heat Power Fund	3	2	4	70 MeT	Metal Product Mfg.	3	3	4
6 MsT	Math III	3	0	3					
<hr/>					<hr/>				
13 14 19					14 11 18				

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Total credit hours required for graduation BMeT = 135 (Min)

Technical Electives

Materials processing technology

Mechanisms

Vibrations

Special topics in technology I

Design projects

Heating, ventilating

Air Conditioning, Refrigeration

Experimental stress analysis

Automatic Control Systems

Special topics in technology II

Selected courses from other technical departments, (EeT, CeT, Food Technology, Forestry, other)

It is expected that at the end of the 1st two-year program, those students wishing to meet requirements in special areas of study, will concentrate electives in:

- a) Energy utilization
- b) Machine design
- c) Environmental control
- d) Manufacturing processes
- e) Other

Humanities and social science electives may be chosen from courses listed in the catalog under Business, Economics, Modern Society, Psychology, Sociology, Anthropology, Art, English, Foreign Languages, History, Political Science, Music, Philosophy, Theatre (except those indicated on page 335 of this catalogue.)

Courses in Mechanical Engineering Technology (MeT)

1. Orientation—A series of meetings involving lectures discussions, guest speakers and audio-visual aids. The purpose of the course is to inform students entering mechanical engineering technology about the field and opportunities in it. *Cr 0.*

5. Heat Treatment—Ferrous metal heat treating operations and the basic principles underlying them. Analysis of the effects of thermal and mechanical operations on microstructure and attendant mechanical properties. *Rec 1, Lab 2, Cr 2.*

7. Machine Tool Laboratory—Theory and application of fundamental metal removing processes. Basic metrology and tool nomenclature. *Rec 1, Lab 4, Cr 3.*

8. Machine Tool Laboratory—Class project, machine repair and maintenance, interdepartmental cooperation on student projects and advanced machine tool operation and set-up. Oxyacetylene welding and electric arc welding. Prerequisite: 7 MeT. *Rec 1, Lab 3, Cr 2.*

9. Machine Shop and Welding for Electrical Engineering Technicians—Fundamental bench work and light machine work using drill presses, lathes, milling machines, shapers and surface grinders. Familiarization with and use of oxyacetylene and electric arc welding equipment. *Rec 1, Lab 4, Cr 3.*

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10. Principles of Production Processes—The function of basic metal working machine tools in diversified manufacturing operations. Applications to maintenance, service, research, and industrial support. *Lec and Lab 3, Cr 3.*

11. Machine Tool Laboratory—Design and manufacture of prototype assembly in conjunction with GeT 3. Application of skill and theory in supervising group projects. Construction and use of production tooling set-ups. Advanced metrology. Prerequisite: 8 MeT. *Lab 3, Cr 1.*

17. Dynamics—Kinetics of particles; translation, rotation and plane motion of rigid bodies; work and energy impulse and momentum. Prerequisite: 50 MeT. *Rec 2, Cr 2.*

20. Selected Topics in Mechanical Engineering Technology—Topics in Engineering Technology not regularly covered in other courses. The content is varied to suit the needs of individuals. The course may be taken more than once. Prerequisite: consent of the instructor. *Cr Ar 1-3 hrs.*

25. Fluid Flow Techonology—Fluid statics, fluids in motion, flow measuring devices, pumps, compressors, hydraulics and pneumatics. Fluid power systems, components and control. Prerequisites: 33 MeT, 36 MeT. *Rec 3, Cr 3.*

MR. CLIFFORD

30. Analytical Methods in Mechanical Engineering Technology—Analysis of mechanical engineering technology problems. Formulation of mathematical models and their solution. Prerequisite: 6 MsT or Ms 12. *Rec 5, Cr 5.* MR. SULLIVAN

33. Heat Power Fundamentals—Elementary thermodynamics, mechanical apparatus, power plant equipment. Engineering calculations relative to heat, power, work and mechanical and electrical energy. Prerequisite: PsT 7. *Rec 3, Cr 3.*

34. Mechanical Technology Laboratory—Experimental application of solid and fluid mechanics, thermodynamics, and metallurgy. Introduction to digital computer programming.

35. Mechanical Technology Laboratory II—An introduction to instrumentation, data analysis, laboratory techniques and calibration of laboratory instruments. Applications to heat power, mechanical processes, and fluid mechanics. Prerequisite: 34 MeT. *Rec 1, Lab 3, Cr 3.*

STAFF

36. Heat Engineering—Heat transmission and properties of air. Heating systems, ventilation requirements and design. Refrigeration cycles, refrigerant properties, load calculations for summer air conditioning and industrial refrigeration. Refrigeration equipment and controls. Prerequisite: MeT 33. *Rec 3, Lab 2, Cr 4.*

50. Statics and Kinematics—The study of forces and rigid bodies in equilibrium, Properties of area and masses. The analysis of motion; linkages, cams, gear teeth and gear trains. Prerequisite: PsT 7. *Rec 4, Cr 4.*

61. Strength of Materials and Machine Design—Stress and strain in materials and members subject to tension, compression, torsion, and flexure. Study of columns, combined stresses, beam deflection indeterminate problems with axial loading. Design of machine elements, theories of failure, fatigue and stress concentration. *Rec 3, Lab 2, Cr 4.*

70. Metal Product Manufacturing Technology—A presentation of production processes and problems to include: process planning, automation, numerical control, quality analysis, quality control, specialized machine tools and current advances in the field of metal working. Completion of prototype assembly and evaluation of same. *Rec 3, Lab 3, Cr 4.*

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Service Courses for the Technical Institute Division

1/2. GeT. Technical Drawing—Exercises in instrumental drawing, multi-view drawing, freehand technical sketching, and lettering. Course 2 introduces instrumental pictorial drawing, threads and fasteners, and working drawings. *Lab 4, Cr 2.*

3. GeT. Machine Drawing—Analysis of space relationships with matching applied problems. Practical design problems utilizing various engineering materials. Preparation of complete working drawings. Prerequisite: 2 GeT. *Lab 4, Cr 2.*

5 GeT. Forestry Drawing—An introduction to basic graphical construction techniques, orthographic projection, and cartography. *Rec & Labs 4, Cr 2.*

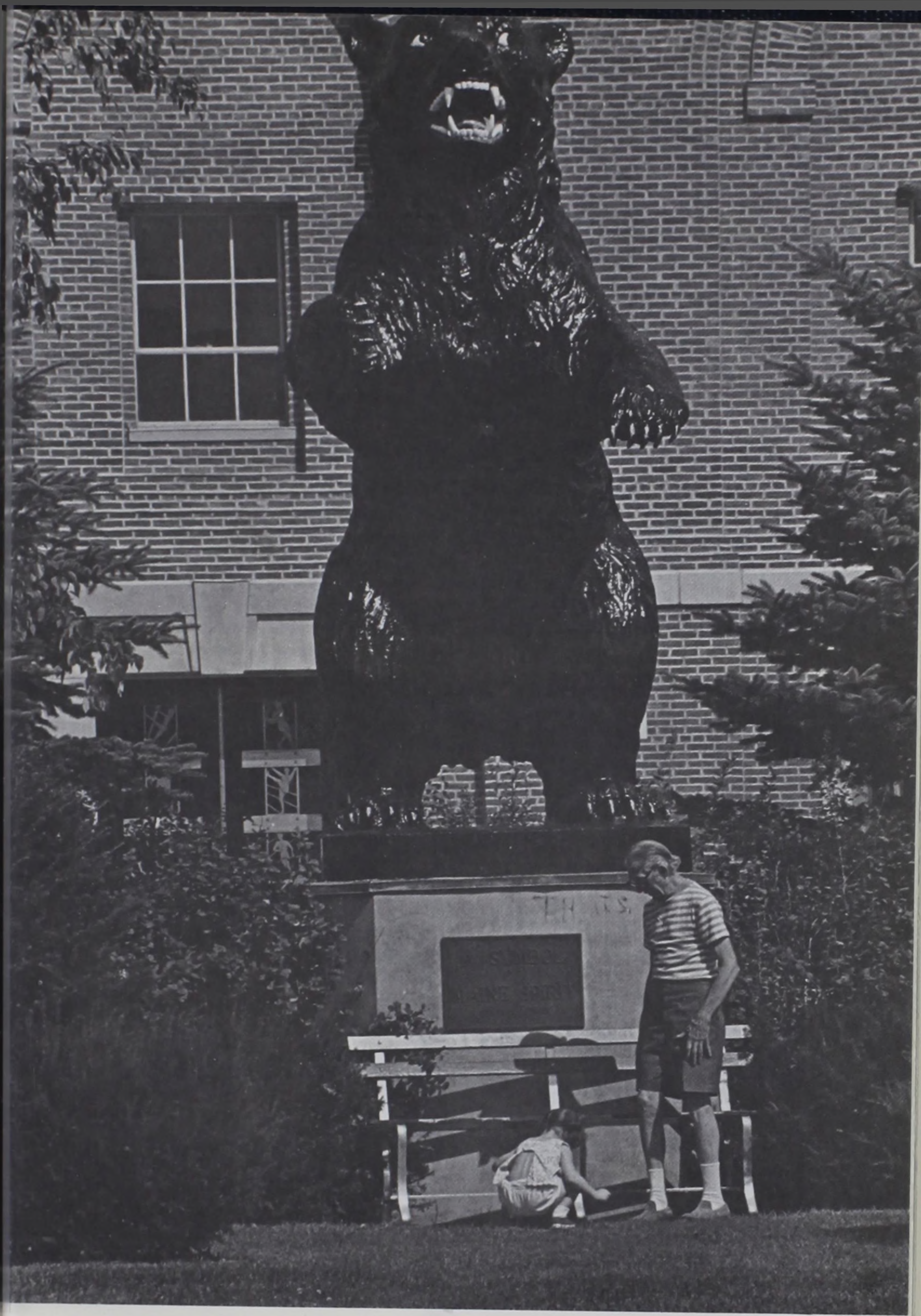
2. MsT. Mathematics I—Algebra and trigonometry, including numbers, functions, graphs, factoring and fractions, exponents and radicals, logarithms, linear equations, quadratic functions, equations of higher degree and solutions of triangles. *Rec 3, Cr 3.*

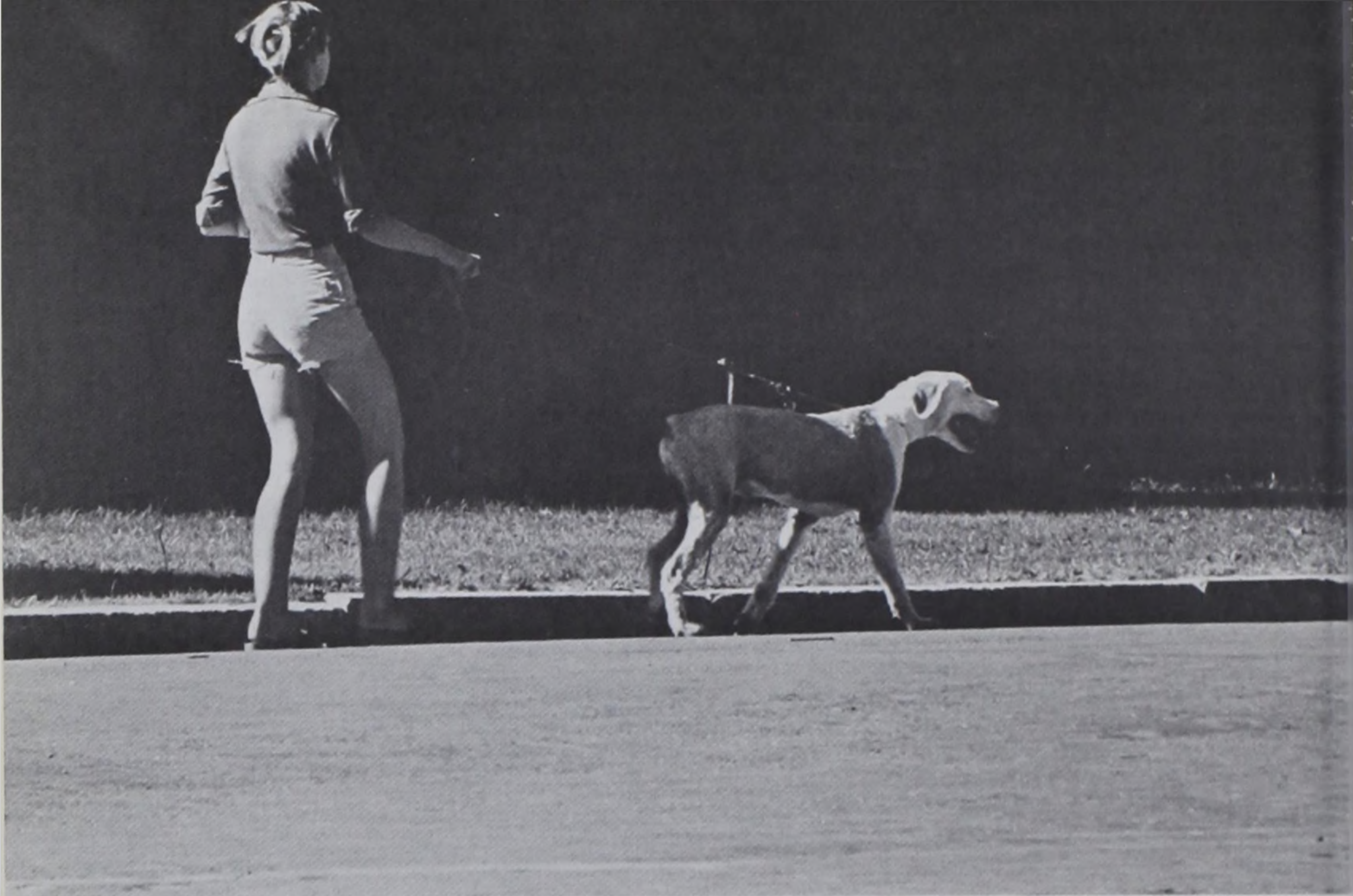
4. MsT. Mathematics II—Elements of analytic geometry and introductory calculus, including straight lines, conic sections, polar coordinates, and introduction to the derivatives and its applications. *Rec 3, Cr 3.*

6. MsT. Mathematics III—Further topics in the calculus, including an introduction to integration, derivatives of transcendental functions and techniques of integration. *Rec 3, Cr 3.*

7. PsT. Basic Physics—An introduction to the basic concepts of mechanics, sound and heat with illustrations taken from technical applications. Calculus is not used. *Lec with Dem 1, Rec 2, Lab 2, Cr 4.*







Graduate School

Programs of study leading to the degrees of Master of Arts, Master of Science, Master of Engineering, Master of Arts (Teaching of Foreign Languages), Master of Education, Master of Agricultural and Resource Economics, Master of Business Administration, Master of Community Development, Master of Library Service, Master of Mechanical Engineering, Master of Music, Master of Public Administration, Doctor of Philosophy and Doctor of Education are offered. Programs leading to the Ph.D. degree are available in animal nutrition, chemical engineering, chemistry, civil engineering, forest resources, history, oceanography, physics, plant science, general and experimental psychology, clinical psychology, and zoology. Doctor of Education programs are available in guidance and counseling, in the language arts, in social studies education and in science education.

The Certificate of Advanced Study, designed for teachers and school administrators, is awarded for the completion of a planned program of thirty hours of work beyond the master's degree.

Graduate programs in education and in certain other fields may be carried on, in whole or in part, during the Summer Session. A limited amount of credit toward the degree of master of education may be earned in continuing education courses given at various centers in the state and in the Continuing Education Division of the University. Candidates for the M.A. degree in English, history, foreign languages, political science, mathematics, and occasionally in other fields, may find it possible to complete a part of their work in C.E.D. classes.

The applicant who wishes to work toward the degree of master of arts or master of science is ordinarily expected to have had an undergraduate major or its equivalent in the field in which he proposes to do his advanced work. Applicants for most programs leading to the degree of master of education are expected to have had sufficient work in professional education to qualify for the appropriate type of certification. Teaching experience is also ordinarily expected.

A thesis usually is required of candidates for the M.A. and M.S. degrees, and is required for the Ph.D. degree and Ed.D. degrees.

Effective with students who entered in the fall 1971, all work for a master's degree and for the Certificate of Advanced Study must be completed within six years of the first registration for work presented for satisfaction of requirements for the degree or for the certificate. All work for a doctoral degree must be completed within four years of admission to candidacy. Students must be admitted to candidacy within four years of registration for the first work presented for satisfaction of degree requirements.

The catalog of the Graduate School, containing more detailed information concerning graduate programs and financial assistance, may be obtained from the Office of the Graduate School, 2 Winslow Hall, Orono.

Students may not register for graduate degree credit until duly admitted to a program of graduate study at the University of Maine.

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DIVISIONS OF THE GRADUATE SCHOOL LIBRARY SERVICE

PROFESSOR JAMES C. MACCAMPBELL, Department Chairman
ASSOCIATE PROFESSOR VAN LUIK; ASSISTANT PROFESSORS AHRENS,
DEARBORN; MR. GOULD, MRS. MCREEL, MRS. SALESI

Programs are offered in the field of Library Service which are planned to prepare students for professional work in school, public, and college libraries. These programs culminate in the degree of Master of Library Service (M.L.S.). Applicants for admission to the Graduate School in a program in Library Service are expected to:

1. Present an acceptable undergraduate academic record;
2. Submit scores on the aptitude portion of the Graduate Record Examination;
3. Present an undergraduate academic record which includes a minimum of 60 semester hours credit in the arts and sciences;
4. Present an undergraduate academic record which includes two years of study in a language other than English. (This requirement will become mandatory on January 1, 1974, and thereafter).

A complete description of requirements for the M.L.S. degree and of courses available may be found in the Graduate School catalog.

Graduate Courses in Librarianship (Ly)

217. *Literature for Children*—This course includes a study of the historical development of children's literature, types of literature for children, and the selection of children's books for the elementary school library and the public library. Emphasis is on the use of this literature with children. *Cr 3.* MRS. SALESI

218. *Literature for Young Adults*—This course provides a study of the development of the literature of adolescence and young adulthood as this literature is used in the secondary school and in the public library. Emphasis will be placed on the current publication of books of this nature as well as the important contributions of the past. *Cr 3.* MRS. SALESI

219. *Library Services to Children*—This course explores the ways in which school and public libraries can encourage and facilitate greater library use among children. Consideration is given to ways in which librarians can work with community leaders to facilitate objectives. *Cr 3.* STAFF

220. *Storytelling in the Public Library*—This course is designed for students who wish to work in children's services in the public library. Included are techniques and materials for storytelling. Some practice work with children in the library will be required. *Cr 3.* STAFF

221. *Bibliographical and Research Techniques*—A course designed to assist the graduate student and the advanced undergraduate to carry on bibliographical study especially as it relates to his especial research interests. Lectures, readings, and discussion concerned with the historical development of bibliographical techniques; bibliographical evidence; description of the printed book and its parts; bibliographical organization of knowledge; bibliographical control; documentation; information retrieval; and the various methods of research especially

GRADUATE SCHOOL

as they relate to the use of the library are provided. The course will include the development of a bibliographical essay on a subject of the student's individual choice. *Cr 3.* MR. VAN LUIK

225. *The Library in the School Program*—This course provides for consideration of the ways the librarian and the teacher can work together in programs and activities in developing learning and reading experiences for students. *Cr 3.* STAFF

227. *Audio-Visual Services in Libraries*—This course is an introduction to audio-visual work in libraries. It is designed to acquaint students with the types, functions, and responsibilities of audio-visual materials and programs in libraries. Emphasis is placed upon the relation of audio-visual services to the printed word, the school curriculum, and for the public library patron. *Cr 3.* MR. AHRENS

301. *Cataloging and Classification*—*Cr 3.* MRS. DEARBORN

302. *Advanced Cataloging and Classification*—*Cr 3.* MRS. DEARBORN

303. *Technical Services in Libraries*—*Cr 3.* MR. GOULD

310. *Introduction to Reference Materials and Services*—*Cr 3.*

MR. MACCAMPBELL

311. *Subject Reference Sources*—*Cr 3.* MR. MACCAMPBELL, MR. VAN LUIK

314. *Literature of the Social Sciences*—*Cr 3.* MR. VAN LUIK

315. *Literature of the Humanities*—*Cr 3.* MRS. MCREELE, MR. VAN LUIK

316. *Literature of Science and Technology*—*Cr 3.* MR. VAN LUIK

318. *Government Publications*—*Cr 3.* MR. MACCAMPBELL

330. *Library Organization and Administration*—*Cr 3.* MR. MACCAMPBELL

340. *Selection of Library Materials*—*Cr 3.*

MR. MACCAMPBELL, MR. VAN LUIK

350. *Documentation—Introduction to Information Sources*—*Cr 3.*

MR. VAN LUIK

360. *History of Books and Libraries*—*Cr 3.*

MR. MACCAMPBELL, MR. VAN LUIK

365. *Research Collections in American Libraries*—*Cr 3.*

MR. MACCAMPBELL, MR. VAN LUIK

398. *Problems in Librarianship*—*Cr 1-3.* MR. MACCAMPBELL

OCEANOGRAPHY

PROFESSORS DEAN (Acting Chairman), ALLEN; ASSOCIATE PROFESSORS DEARBORN, DEWITT, GREEN, HIDU, MCALICE, SCHNITKER, VADAS; ASSISTANT PROFESSORS FINK, MAZURKIEWICZ

Oceanography is an interdisciplinary area of science that is concerned with the study of the air-sea interface, the bottom and margins of the sea, the sea water itself, and the inhabitants of the sea. Because oceanography is not a single science but a combination of sciences, training in oceanography is usually begun at the graduate level—after a student has obtained a degree in a basic science. Students wishing to prepare for graduate work in oceanography should take at least a year each of biology (Zo 3/4 or Zo 3/Bt 1), chemistry (Ch 13/14), geology (Gy 1/2), and physics (Ps 1a/2a), a course in physical chemistry (Ch 169), and/or thermodynamics (Gy 157), and mathematics through calculus (Ms 28). An understanding of statistics will be helpful.

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Except for Professors Dearborn, Allen, and Vadas, all faculty of the Department of Oceanography are based at the marine facility, the Ira C. Darling Center for Research, Teaching and Service at Walpole, Maine. While the Department of Oceanography does not maintain an office in Orono at the present time, students wishing to discuss matters concerning programs and career opportunities may arrange appointments with oceanographic faculty members either through the Departments of Geological Sciences, Zoology, or Botany and Plant Pathology.

Persons trained in oceanography may find careers in business, education, industry, federal and state agencies, and research institutions.

Courses in Oceanography (Oc)

150. *Oceanography Today*—An introduction to current areas of research in the ocean, with emphasis on Maine's problems. *Rec 3, Cr 3.* STAFF

IDL 170. (Oc, Zo) *Introduction to Oceanography*—Basic concepts in physical, geological, chemical, and biological oceanography for science majors. Prerequisite: senior standing or permission of instructor. *Rec 3, Cr 3.* STAFF

GRADUATE STUDY IN OCEANOGRAPHY

The department offers work leading to the M.S. and Ph.D. degrees.

A reading proficiency in two foreign languages, ordinarily selected from French, German, Russian or Spanish, is required for the advanced degree. Other requirements are set forth in the Graduate School Catalog.

Specific fields of research include planktology, benthic and polar ecology, aquaculture, marine fishes, phycology, pollution, micropaleontology, paleomagnetism, tectonics, petrology, and chemistry.

Graduate Courses in Oceanography

IDL 201. (Oc, Zo) *Biological Oceanography*—The study of marine organisms and their interrelationships with the chemical, geological, and physical aspects of their environment. Prerequisite: a year of general biology and permission of instructor. *Rec 3, Cr 3.* MR. DEWITT

IDL 208. (Oc, Zo) *Anatomy and Classification of Fishes*—An introduction to the classification of fishes, including fossil forms, and a discussion of those aspects of fish anatomy of most value in systematics. Prerequisite: Zo 133 and/or 136 or permission of instructor. *Rec and Lab. Cr 5.* DR. DEWITT

IDL 210. (Oc, Zo) *Marine Invertebrate Zoology*—Systematics, adaptive-functional anatomy, and life histories of free-living marine invertebrates, excluding protozoans with laboratory emphasis on studies of living material from the local fauna. Numerous field trips required. Prerequisite: Zo 153 or equivalent. *Rec 2, Lab 6. Cr 5.* MR. MAZURKIEWICZ

IDL 211. (Oc, Zo) *Larval Biology of Marine Invertebrates*—Life histories of free-living marine invertebrates, excluding protozoans, with emphasis on development, behavior, and ecology of larval forms. Laboratory studies stress methods of procuring, handling, and culturing larvae for descriptive or experimental purposes. Numerous field trips required. Prerequisite: Zo 153 or equivalent. *Rec 2, Lab 6, Cr 5.* MR. MAZURKIEWICZ

220. Chemical Oceanography—The composition of sea water and processes influencing the distribution of chemical species over the world's oceans through geological time; the routes and rates of material transfer between the ocean, the atmosphere, sediments and the biosphere. Prerequisite: Ms 28, Ps 1/2, plus a course in physical chemistry or chemical thermodynamics such as Ch 169, Gy 157, or equivalent. *Rec 3, Cr 3.* MR. GREEN

241. Physical Oceanography—Physical properties of sea water; waves and tides; distribution of variables, dynamics, water masses and the general circulation. Prerequisite: Ps 1/2, Ms 26. *Rec 3, Cr 3.* MR. MCALICE

IDL 260. (Oc, Gy) Marine Geology—Current theories dealing with the origin of the earth as a planet and the development of continents and ocean basins. Morphology and structure of the sea floor. Interpretation of geological and geophysical evidence relevant to the origin and evolution of major tectonic features of ocean regions. Prerequisite: Gy 1/2 and permission of instructor. *Rec 3, Cr 3.* MR. FINK

IDL 263. (Bt, Oc, Zo) Marine Benthic Ecology—An advanced course emphasizing ecological studies on benthic intertidal and subtidal marine organisms. Includes discussions on limited factors, distributions, zonation, biotic interactions, food webs, succession, productivity energy, community structure and species diversity. Prerequisite: a course in ecology. *Lec 2, Rec 1, Cr 3.* MR. VADAS

IDL 264. (Oc, Gy) Structure and Tectonics of the Sea Floor—Sea floor crustal structure, with emphasis on the theory and application of geophysical methods employed in studies of the lithosphere. Evaluation of tectonic theories related to origin and evolution of the ocean basins and the development of their major structural features. Prerequisite: Gy 116 and IDL 260 and permission of instructor. *Rec 3, Cr 3.* MR. FINK

IDL 266. (Oc, Gy) Micropaleontology—Study of the major groups of microfossils, their biology, morphology, taxonomy; their use in ecologic and stratigraphic interpretation. Prerequisite: Gy 114 or Zo 153 plus Gy 1/2. *Rec 3, Lab 2, Cr 4.* MR. SCHNITKER

IDL 266. (Oc, Gy) Micropaleontology—Study of the major groups of microtheir relationship to their sedimentary environment. A study of the manifestation of life documented in marine sediments. A study of biotopes of sea animals in near-shore marine environments. This course will be conducted in the form of four full weekend field investigations starting from the Ira C. Darling Center at Walpole, Maine. Prerequisite: Gy 1/2; Gy 114 or 153. *Cr 2.* MR. SCHNITKER

302. Marine Plankton—Systematic ecology and quantitative dynamics of marine plankton, including morphology adaptations, physiology, trophic relationships, and temporal and spatial distribution. Prerequisite: IDL 201, Ms 166 or equivalent.

391. Oceanographic Seminar—*Rec 1, Cr 1.*

STAFF

393. Problems in Oceanography—*Cr Ar.*

STAFF

399. Graduate Thesis—*Cr Ar.*

STAFF



Military Science

PROFESSOR OF MILITARY SCIENCE LT. COL MAYER; ASSISTANT PROFESSORS MAJ. COWAN, MAJ. WINSLOW, CPT. MICHARD, CPT. KERR; INSTRUCTORS SGT. MAJ. SALLEY; SFC SHERREWSBURY; ADMINISTRATIVE SUPERVISOR MRS. LAFONTAINE; SECRETARY MRS. DUPUIS

General—The Department of Military Science conducts the General Military Science curriculum prescribed by the Department of the Army for the Senior Division, Army Reserve Officers Training Corps. This program provides for the awarding of Reserve commissions in the various branches of the Army after considering the individual's preference and qualifications, and the manpower needs of the Army.

Purpose—The purpose of the Army ROTC is to train college students who have the qualities and the attributes essential to their progressive development, as Army officers, with particular emphasis on the United States Army Reserve. Those students who have been designated Distinguished Military Graduates, based on their academic and military science performance, may, if they desire, apply for a direct appointment as Regular Army second lieutenants.

Curriculum—The complete course of instruction is four academic years plus a summer camp of six weeks between the junior and senior years. For students transferring from other institutions and for other selected students, the four-year course may be compressed into two years; however, to gain necessary credit, the compressing student must attend an additional six-week summer camp between the sophomore and junior year. The course is organized and correlated in sequence with the various four-year college curricula.

FIRST YEAR (MS I)

Mt 1 Introduction to ROTC—The purpose, history, organization, and administration of the ROTC program. Additionally, students receive instruction on riflery and marksmanship. Leadership laboratory introduces the student to small unit leadership. *Cr 0.*

Mt 2 United States Army and National Security—A survey of the evolution of warfare. The principles of war, technological advances and their influence on warfare, organization of the U. S. Army and national defense structure as related to overall national security. The factors and instruments of national power and the manner in which these instruments are used to attain national objectives. *Cr 0.*

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SECOND YEAR (MS II)

Mt 3 American Military History—An analysis of actions, battles, and campaigns that demonstrate significant lessons in military planning and development, tactical and leadership principles, and strategic considerations influencing the conduct of warfare. *Cr 0.*

Mt 4 Introduction to Tactics—The mission, organization, and composition of basic military teams to include rifle squads, platoons, and small combined arms teams. Introduction to map and aerial photograph reading. *Cr 0.*

THIRD YEAR (MS III)

Mt 5 Leadership, Development and Methods of Instruction—Instruction in leadership, management, and methods of instruction. The leadership portion presents an analysis of leadership problems, to include psychological, organizational, and sociological factors that influence human behavior. The methods of instruction portion consists of practical work in planning, preparation, presentation, and evaluation of instruction. *Cr 3.*

Mt 6 Fundamentals and Dynamics of the Military Team—Concepts and role of the combat arms, principles and fundamentals of small unit tactics, communications and security. *Cr 2.*

Mt 7 Military Management—Principles of Army administration, military law, personnel and logistics management, to include management of military assistance to developing nations. *Cr 2.*

Mt 8 Military Operations and Leadership Seminar—Analysis of military command and staff organization. In-depth examination of decision-making processes, techniques in intelligence data collection and processing. Students participate in practical exercises in the employment of battalion and brigade sized units. Leadership seminar consists of the study and discussion of current leadership problems. *Cr 3.*

During the freshman, junior and senior years, students complete some of the military instruction by taking selected subjects from a list of approved academic courses in the general areas of Science Comprehension, General Psychology, Effective Communication, and Political Institutions and Development. The academic subjects must be the equivalent of 30 hours for freshmen, 45 class hours for juniors, and 45 class hours for seniors.

FALL SEMESTER					SPRING SEMESTER						
Subject			Hours			Subject			Hours		
			Rec	Lab	Cr				Rec	Lab	Cr
Mt 1	Military Science					Mt 2	Military Science				
	Basic	1	1	0*	Basic		1	1	0*		
Mt 3	Military Science					Mt 4	Military Science				
	Basic	2	1	0*	Basic		2	1	0*		
Mt 5	Military Science					Mt 6	Military Science				
	Advanced	3	1	3	Advanced		2	1	2		
Mt 7	Military Science					Mt 8	Military Science				
	Advanced	2	1	2	Advanced		3	1	3		

*Grades included in College Accumulative.

General

Basic Military Science—(Mt 1, 2, 3, 4) — All physically fit citizens enrolled in the University of Maine are eligible for enrollment in the Basic Military Science Course (two years).

Advanced Military Sciences—(Mt 5, 6, 7, 8)—Students requesting admission to Advanced Military must: have completed Basic Military Science or have received credit for previous military training; meet the physical standards prescribed by the Department of the Army; be selected by the PMS based on their leadership, military ability, and potential as an Army officer.

Credits—Credit for placement due to previous active military service or ROTC training toward admission into Advanced Military Science may be granted on the following basis:

One year of active military service. Credit for Mt 1, 2, 3, 4.

Previous training in the Army, Navy, Air Force, Coast Guard Academies, and in the Army, Naval or Air Force ROTC. Credit for equivalent training.

Completion of Junior Division (high school) ROTC training. Credit may be given for Mt 1, 2.

Completion of the six-week basic summer camp is equivalent to credit for Mt 1, 2, 3, 4.

Enrollment—Basic Military Science cadets are issued modified officer-type uniforms free of charge for use during leadership laboratory. These uniforms must be returned to the Military Department at the end of each academic year and upon separation from the University.

Advanced Military Science cadets are provided modified officer-type uniforms which remain in their custody while enrolled in the course. Upon successful completion of the course and upon graduation and appointment, these uniforms become their personal property. These uniforms can be modified by the addition of braid to conform with uniforms worn by officers on active duty.

Pay—Advanced Military Science cadets are paid an allowance at the rate of \$100 per month during the academic year. (All scholarship students are paid an allowance of \$100 per month during the academic year for the term of their respective scholarship.) For the six-week period of summer camp, students receive pay (one-half the base pay of a second lieutenant) plus rations, quarters, all necessary uniforms, and equipment, and a monetary allowance for transportation at the rate of six cents per mile between their home of record, summer camp, and return.

Obligation—Upon completion of Mt 8 and concurrent with the award of a baccalaureate degree, qualified cadets are commissioned as second lieutenants in the U. S. Army Reserve. Cadets may elect to serve on active duty for two years or go directly to an active reserve status, (U. S. Army Reserve or National Guard). Individual elections are honored depending on the needs of the Army. Students completing the Flight Training Program are required to serve on active duty for three years. All students in the Scholarship Program are required to serve on active duty for four years. Students commissioned in the Regular Army are required to serve a minimum of three years active duty.

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SCHOLARSHIP PROGRAM

The Department of Army offers a three-, two-, and one-year ROTC Scholarship to select freshman, sophomore, and junior cadets, respectively, who are enrolled in the Military Program, and who have demonstrated outstanding leadership and scholastic qualities. This scholarship pays full tuition for the respective number of years, all textbooks and laboratory fees, plus \$100 per month during the academic year for the duration of the scholarship.

LEADERSHIP LABORATORY

General—The leadership laboratory period is designed to give the student experience in leadership situations. The laboratory period is organized, using the military structure, with individual cadets assigned to positions of leadership. Cadets are promoted to more advanced positions, based on their leadership performance and experience. Maximum stress is placed on improving leadership techniques through participation in varied activities.

ADDITIONAL ACTIVITIES

Flight Training—Army ROTC Flight Training is offered to selected senior ROTC cadets at no cost. Upon completion of 35 hours ground instruction and 37½ hours in-flight instruction, cadets are eligible for a FAA pilot's certificate and are qualified for further Army flight training when on active duty. U. S. Army flight uniforms are provided for this instruction.

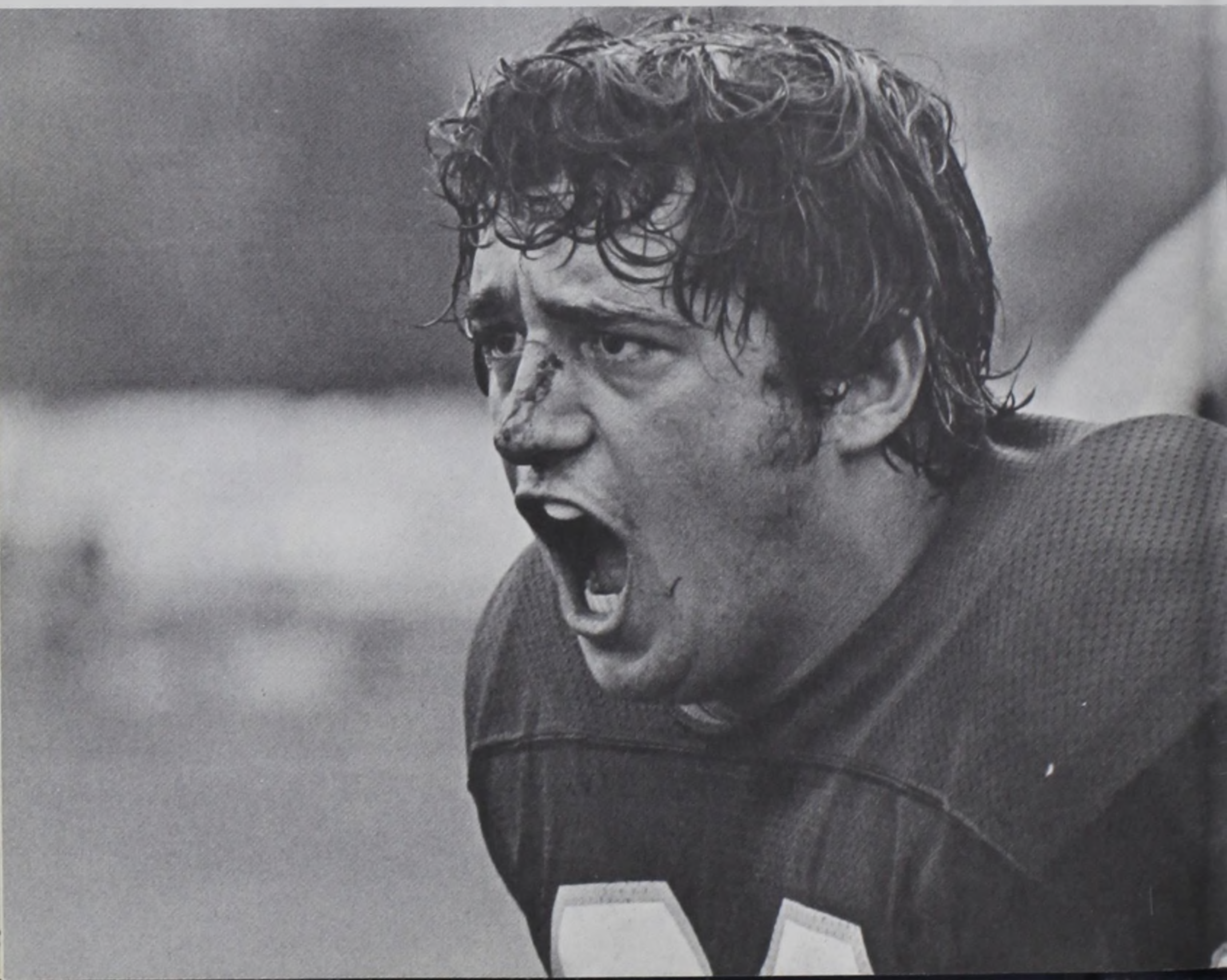
Rifle Marksmanship Training—Offered to all enrolled ROTC students. The ROTC Rifle Team has an enviable record and has won many trophies. Those qualifying may compete in the scheduled varsity and ROTC matches. Rifle marksmanship is also a major sport of the University and is coached by the Military Department. Participation in varsity riflery enables individuals to earn their freshman numeral and varsity letter.

Ranger Club—An organization devoted to rugged outdoor activities. Members participate in rapelling, mountain climbing, survival training, hiking and snowshoeing. Members also receive extensive first aid training on emergency medical care in a wilderness environment. (Open to all students).

Orienteering Club—A land navigation sport. Members participate in competitive matches that require the traverse of a prescribed course against time. Courses are designed by the members and are run over different types of terrain on foot, snowshoes, or skis. (Open to all students.)

Leadership Seminar—Members engage in leadership games and related activities, to include role-playing, competitive strategy, decision-making, negotiations, and communications. The program is supplemented by guest speakers who discuss aspects of leadership. (Open to all students.)





Physical Education and Athletics

PROFESSORS WESTERMAN (Director), WOODBURY; ASSOCIATE PROFESSORS BROWN, BUTTERFIELD, STYRNA, WALKUP; ASSISTANT PROFESSORS ABBOTT, AMES, ANDERSON, CARVILLE, FOLGER, JORDAN, PHILBRICK, STOYELL; INSTRUCTORS BALLINGER, CHAPPELLE, DEVARNEY, HARRIMAN, MALOON, MILLIGAN, SWITZER; LECTURERS MERRILL, MILLER; WILSON

The department offers programs in physical education, intercollegiate athletics, intramural sports, and related club activities. These programs are recognized as an integral part of the educational process which the University supports and controls within the limitations of budget, staff, equipment, and facilities. Our goals are to promote educational leadership, physical fitness, opportunity for recreational pursuits, and athletic excellence through instruction and competition. Through these programs, students are offered an opportunity to participate in leisure-time activities and life-time sports, each seeking his individual level of performance as a unique educational experience. All students are strongly encouraged to participate.

Immediate responsibility for instruction, supervision, and guidance in this area rests with the Department of Physical Education and Athletics, a department comprising three divisions: the Division of Physical Education for Men, the Division of Physical Education for Women, and the Division of Intercollegiate Athletics.

PHYSICAL EDUCATION FOR MEN AND WOMEN INSTRUCTIONAL PROGRAM

The Department of Physical Education and Athletics offers PE 1, Physical Education, 1 hour credit, and PE 2, Physical Education, 1 hour credit, on a pass-fail basis. For each hour of credit, two hours of instructional time per week, per semester, is required. Each college within the University system has its own basic requirements in respect to physical education and the acceptance of credits.

The instructional program for men and women is designed to provide the student with an opportunity to develop and refine and to add knowledge in a variety of physical activities which the student can use now and in his leisure time in later years. Emphasis is placed on presenting the student with an appre-

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ciation and understanding of the body and its movement, of exercise and its role in one's individual life. In an effort to promote and maintain one's individual physical fitness, each woman or man has the opportunity to select those activities in which she or he has an interest.

The program will include a wide choice of activities: archery, badminton, basketball, bowling, dance, fencing, field hockey (W), golf, gymnastics, handball, jogging, lacrosse (W), movement principles (W), paddle ball, recreational sports (W), riflery, sailing, slimnastics, soccer, softball, speedball, skiing, swimming, tennis, volleyball, weight training (M), wrestling (M)—(M = Men only, W = Women only). From these choices the students may either choose for depth in skill refinement in an activity or breadth in selection of several activities.

INTERCOLLEGIATE ATHLETICS MEN AND WOMEN

As an integral part of the University's program of physical education, intercollegiate athletics help to serve the general purposes of that program. In addition, they constitute an effective means of maintaining interest in all-round physical fitness; they set standards of excellence in physical efficiency; they provide a wholesome and natural common interest around which University loyalties may be rallied and institutional esprit developed; and they afford experience in emotional control and in the capacity to think quickly and act vigorously while under the pressure of strong opposition.

Intercollegiate athletics are governed by an Athletic Advisory Board, the membership of which is representative of the University faculty and administration, the alumni, and the undergraduates. Regular schedules are arranged and provide for competition in the following sports: baseball (M), badminton (W), basketball, cross country (M), football (M), field hockey (W), golf (M), riflery, sailing (M), soccer (M), swimming, tennis, track (M), winter sports, volleyball (W), wrestling (M). (M = Men only, W = Women only.)

FACILITIES

The University facilities for athletics and physical education are listed on page 25.



Continuing Education Division

The Continuing Education Division coordinates the part-time study of adults on the Orono campus and in a wide geographical area surrounding the Orono campus during late afternoon, evening and Saturday classes.

The Division provides a source of continuing education for mature and qualified persons who wish to supplement an earlier education. Courses offered may sometimes be applied toward degree programs or may be primarily for professional or personal use. However, all programs offered are designed to prepare adults to meet the challenge of change and to provide experiences in learning which will lead to a fuller and richer life.

Adult students in Continuing Education Division classes have varied backgrounds and interests. Most of them carry on full-time occupations, have graduated from high school some time ago and have determined for themselves the need for earning a degree or specific courses to be used for personal or occupational development. A number of students who are recent high school graduates are beginning their college career by enrollment in C.E.D. classes.

A large variety of degree credit, non-degree credit, and special short courses are available on the Orono campus in the program of the Continuing Education Division. Courses offered by the means of the Division may be for degree credit or non-degree credit.

Adults who wish to enroll in a C.E.D. course are encouraged to visit the C.E.D. office in Merrill Hall where C.E.D. personnel are available to advise students on course selection and registration procedures. Regular tuition charges or nominal fees are charged for programs offered.

Summer Session

The University offers a wide variety of courses during the 12-week Summer Session designed to meet the general and specific needs of educators, regularly enrolled undergraduates, and those who seek cultural and professional growth in specific fields.

Teachers and school administrators who desire to take professional courses in the field of education or to pursue other subjects which may be helpful to them in their work will find that special attention is given to teachers' courses in the various subjects offered. Professional courses in elementary and secondary education are offered throughout the Summer Session. In addition, special workshops both in elementary and secondary education are conducted for three-week periods. Some courses are also organized on a three-week basis, thereby enabling the student who enrolls for a workshop to complete a full six-week Summer Session schedule. Several conferences on special educational problems, usually lasting a week, also are offered. A few courses scheduled during the early evening hours to accommodate students who must be employed during the summer months.

The Summer Session offers a wide variety of academic courses to regularly enrolled students at the University of Maine in Orono and other collegiate institutions for credits toward a degree, thus enabling them to accelerate their undergraduate program. Other undergraduate students enroll in this session to make up work which they may have missed during previous semesters or to explore new fields of study.

The facilities of the Summer Session are open to both men and women, and students are admitted without examination. The requirements for admission are, in general, the same as those for the other sessions of the University. Students are expected to have completed as a minimum preparation a standard high school course or its equivalent.

As an integral part of the University organization, the Summer Session has similar standards of academic achievements. The faculty consists of members of the University staff and numerous visiting professors from other institutions.

Transcripts for work previously done are necessary only when the student plans to become a candidate for a degree at the University of Maine. New students who expect to become candidates for the master's degree should communicate with Dr. Franklin P. Eggert, Dean of the Graduate School.

Classes meet five times a week, Monday through Friday. The normal registration for the six-week session is for two or three courses.

The Summer Session begins in mid-May and ends in mid-August. The bulletin describing courses offered during this period is issued about March 15. For further information concerning the program address Director of the Summer Session, 14 Merrill Hall, University of Maine, Orono, Maine 04473.



During the 1960s, the East Gymnasium was used for a variety of activities. In the foreground, a young woman is performing a dance move. In the background, other students are watching or participating in the activity. The gymnasium is a large, open space with a wooden floor and a high ceiling.

Public Radio and Television

The University of Maine owns and operates WMEH-FM, Bangor; WMEB-TV, Channel 12, Orono; WMEM-TV, Channel 10, Presque Isle; WMED-TV, Channel 13, Calais; and translator stations WORAR, Channel 4, Madawaska and WORAY, Channel 4, St. Francis, which together comprise the State of Maine Public Broadcasting Network. These stations are interconnected by a privately owned microwave relay system with central programming source at the network headquarters on the Orono Campus of the University of Maine. The stations are interconnected with public TV stations WCBB, Augusta, Maine; WENH (New Hampshire Network), Durham, New Hampshire; the Vermont ETV Network; WGBH-TV and WGBX-TV, Boston, Massachusetts; the national Public Broadcasting Service and the Eastern Educational Network, as well as National Public Radio and Eastern Public Radio Network program services. The stations maintain a regular schedule of programs for adults and children, both for home and in-school use. Public Radio Service is available seven days a week and Public Television operates six days out of seven.

Studio and control facilities for the Maine Public Broadcasting Network are located in Alumni Hall on the Orono campus. The facilities consist of equipment for the production and recording of radio and television programs, and the distribution of these programs to each of the stations. In addition to programs produced by the Network, other sources of programming include national and regional broadcast libraries and networks, including: National Public Radio Network, Eastern Public Radio Network, National Educational Radio, Eastern Educational Television Network and Public Broadcasting Service. Of the locally produced programs, many are presented in cooperation with other educational, cultural, and public service agencies of the state. The network maintains a full-time professional staff of 54 people, supplemented by part-time student personnel.

An expanding closed circuit television system (CCTV) currently interconnects several classroom buildings on the Orono, Bangor, Portland and Gorham campuses with the Alumni Hall facilities.

The network radio and television operations offer students an excellent opportunity for part-time employment and training in the broadcast field.





University of Maine at Bangor

The University of Maine at Bangor is one of the first in the system of community colleges in the State of Maine. As a community college, the primary objectives are to offer a variety of associate degree programs, one-year certificate programs, and other short-term programs designed to meet special education needs.

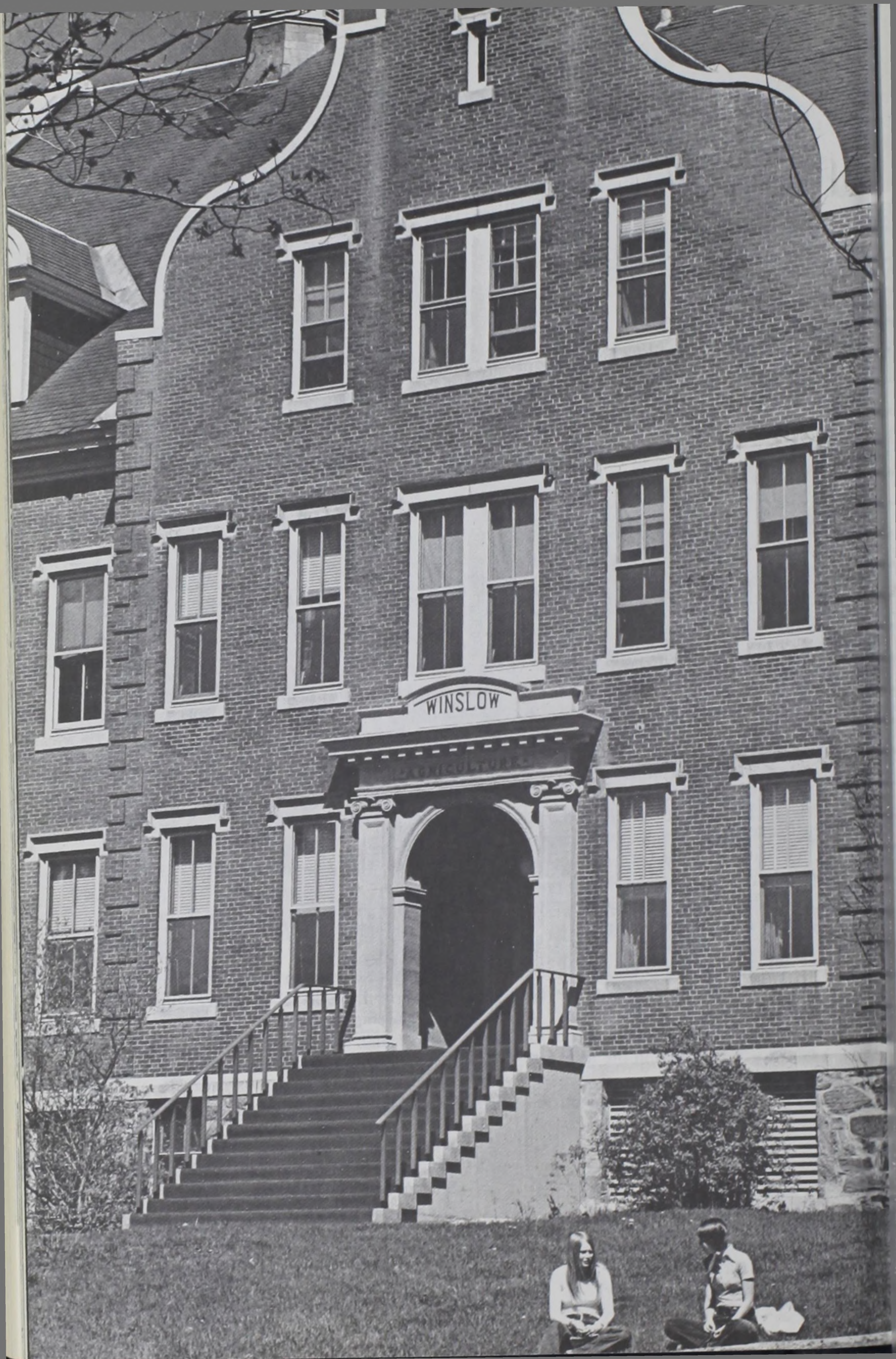
An "open door" policy is utilized for admission to the college, with acceptance into some of the programs on a more selective basis. The General Studies, Law Enforcement, Dental Hygiene, and Mental Health Technology programs are designed for citizens of all ages who wish to increase their general knowledge or prepare for a career. A program in Developmental Studies is provided for those individuals who demonstrate that their educational backgrounds are inadequate, but who have a strong desire for a college education.

There is a possibility that an additional program will be available by the fall of 1974—a one-year Dental Assisting Program that awards a certificate diploma.

The Bangor campus has several administration and classroom buildings, dormitories, and dining facilities; the library is located in Eastport Hall. Recreational facilities include a gymnasium, student union building and a 500-seat theatre. At present, intercollegiate sports include basketball and baseball. It is hoped that others will be added in the near future. There are many intramural sports available to UMB students.

For further information on the University of Maine at Bangor, contact:

Director of Admissions
University of Maine at Bangor
Student Services Building
Bangor, Maine 04401



Personnel

EMERITI

- ASHMAN, ROBERT IRVING (1930-1957); A.B., Cornell University, 1913; M.F., Yale, 1929; Sc.D., Maine, 1957; Professor Emeritus of Forestry.
- BAILEY, RUSSELL MANLEY (1931-1967); B.S., Maine, 1928; Associate Professor Emeritus of Genetics.
- BAKER, GREGORY (1935-1968); B.S., Maine, 1924; M.F., Yale, 1939; Professor Emeritus of Forestry.
- BENNETT, CLARENCE EDWIN (1934-1970); Ph.B., Brown, 1923; Sc.M., 1924; Ph.D., 1930; Professor Emeritus of Physics.
- BEVERLY, VERNE CURTIS (1923-1956); B.S., Maine, 1920; County Agent Emeritus.
- BEYER, FRANK KEMP (1947-1968); B.S., Cornell University, 1929; M.S., University of Wisconsin, 1930; Associate Professor Emeritus of Forestry.
- BISCOE, JONATHAN (1946-1973); B.S., Massachusetts Institute of Technology, 1931; M.S., 1932; Professor Emeritus of Physics.
- BOGAN, EDGAR JUNIOR (1929-1968); A.B., Miami (Ohio), 1926; A.M., Princeton, 1929; Ph.D., Ohio State, 1947; Professor Emeritus of Chemistry.
- BRICKER, HERSCHEL LEONARD (1928-1970); A.B., Coe, 1928; Professor Emeritus of Speech.
- BRIWA, KATHRYN ELIZABETH (1941-1960); A.B., Vassar, 1915; M.A., Columbia, 1929; Ph.D., 1940; Extension Nutrition Specialist Emerita.
- BRUSH, EDWARD NEWCOMB (1928-1970); A.B., Vermont, 1925; A.M., Harvard, 1926; Ph.D., 1932; Professor Emeritus of Psychology.
- BUZZELL, MARION STEPHANIE (1919-1958); B.A., Maine, 1914; M.A., 1915; Associate Professor Emerita of Romance Languages.
- CASSIDY, MARGARET EILEEN (1937-1973); Diploma, Sargent School of Physical Education, 1928; B.S. in Ed., Maine, 1939; Associate Professor Emerita of Physical Education.
- CLAPP, ROGER (1929-1969); B.S., Cornell University, 1928; M.S., Maine, 1932; Associate Professor Emeritus of Ornamental Horticulture.
- CLAYTON, MARY MORRIS (1934-1956); B.S., Columbia, 1918; M.S., Rochester, 1926; Ph.D., 1929; Nutritionist Emerita.
- COMEGYS, ESTHER (1941-1960); B.A., Wellesley, 1921; M.A., University of Pennsylvania, 1926; Ph.D., Radcliffe, 1941; Associate Professor Emerita of Mathematics.
- COOK, ARLIN MILLER (1930-34); (1959-1970); A.B., Western Reserve, 1927; M.A., Columbia, 1928; Associate Professor Emeritus of Speech.
- CORBETT, RALPH ASHTON (1930-1966); B.S., Maine, 1930; M.S., Wisconsin, 1949; Extension Dairy Specialist Emeritus.
- CRABTREE, KENNETH GERARD (1926-1964); S.B., Massachusetts Institute of Technology, 1923; P.E., (Maine); Professor Emeritus of Electrical Engineering.
- CRANE, PERCY FREMONT (1936-1958); B.S., Bowdoin, 1917; Director of Admissions Emeritus.
- CRAWFORD, JOHN RAYMOND (1930-1962); B.A., Culver-Stockton, 1924; M.A., State University of Iowa, 1929; Ph.D., 1931; Professor Emeritus of Education.

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CREAMER, WALTER JOSEPH (1919-1961); B.S., Maine, 1918; E.E., 1921; B.A., 1923; Professor Emeritus of Communication Engineering.

CROSBY, RUTH (1929-1962); A.B., Mount Holyoke, 1919; A.M., Radcliffe, 1920; Ph.D., 1929; Professor Emerita of English.

CROSSLAND, CHARLES EDWARD (1917-1961); B.S., Maine, 1917; LL.D., 1962; Vice President for Administration Emeritus.

CURTIS, THEODORE SMALL (1930-1966); B.S., Maine, 1923; Faculty Manager of Athletics Emeritus.

DAY, CLARENCE (1913-1953); M.S., Maine, 1929; Extension Editor Emeritus.

DECOTEAU, RUTH CALLAGHAN (1934-1941); (1951-1973); B.S., Maine, 1933; Extension Agent Emerita.

DINSMORE, FLORENCE ELIZABETH (1923-1971); Presidential Secretary Emerita.

DIRKS, CHARLES ORVILLE (1927-1960); B.S., Kansas State College, 1924; M.S., Iowa State College, 1925; Ph.D., Cornell University, 1935; Professor Emeritus of Entomology.

DOUGLASS, IRWIN BRUCE (1940-1970); B.S., Monmouth College, 1926; Ph.D., Kansas, 1932; Sc.D., Monmouth College, 1958; Professor Emeritus of Chemistry.

DOW, EDWARD FRENCH (1929-1969); B.S., Bowdoin, 1925; A.M., Harvard, 1926; Ph.D., 1932; Professor Emeritus of Government.

DOW, GEORGE FARRINGTON (1927-1969); B.S., Maine, 1927; M.S., 1929; Ph.D., Cornell University, 1938; Director Emeritus of the Maine Agricultural Experiment Station.

DURST, RICHARD EDWARD (1949-1971); B.S., Otterbein College, Westerville, Ohio, 1929; Ph.D., Ohio State, 1948; P.E., (Ohio, Maine); Professor Emeritus of Chemical Engineering.

EASTMAN, CHARLES LESLIE (1925-1966); B.S., Maine, 1922; Extension Agent Emeritus.

EDWARDS, HERBERT JOSEPH (1947-1969); Ohio State, 1923; A.M., Princeton, 1927; Ph.D., Ohio State, 1930; Professor Emeritus of English.

EVANS, WESTON SUMMER (1923-1962); B.S., Maine, 1918; M.S., 1923; Sc.D., 1962; P.E., (Maine); Dean Emeritus of Technology.

FIFE, HILDA MARY (1946-1969); A.B., Colby, 1926; A.M., Cornell University, 1933; Ph.D., 1941; Professor Emerita of English.

FLYNN, CARL MUNRO (1933-1936) (1940-1972); B.A., Maine, 1930; M.A., Wesleyan, 1932; M.A. Harvard, 1939; Ph.D., 1940; Professor Emeritus of Zoology and Assistant Dean Emeritus, College of Arts and Sciences.

FOBES, KENNETH BROWN (1948-1972); B.S. in Ed., Maine, 1949; Assistant Dean Emeritus, College of Education.

FOLSOM, DONALD (1918-1957); A.B., Nebraska, 1912; M.A., Minnesota, 1914; Ph.D., 1917; Plant Pathologist Emeritus.

GANNETT, JAMES ADRIAN (1908-1953); B.S., Maine, 1908; M.A., (Hon.), 1928; Registrar Emeritus.

GLANVILLE, ALBERT DOUGLAS (1937-1971); A.B., Cornell University; M.A., Illinois, 1928; Ph.D., Cornell University, 1932; Professor Emeritus of Psychology.

PERSONNEL

- GRANT, FREMA STAPLES (1955-1972); B.S., Farmington State Teachers College, 1929; Extension Agent Emerita.
- GREENE, PEARL STUART (1923-1948); B.A., Northwestern, 1909; B.S., Lewis Institute, 1914; A.M., Columbia, 1923; Professor Emerita of Home Economics.
- HALL, HOWE WIGGINS (1923-1956); B.S., Maine, 1914; M.S., 1925; Assistant Professor Emeritus of Animal Husbandry.
- HANKINS, JOHN ERSKINE (1956-1970); B.A., University of South Carolina, 1924; M.S., 1925; Ph.D., Yale University, 1929; Professor Emeritus of English.
- HAUCK, ARTHUR ANDREW (1934-1958); A.B., Reed, 1915; Ph.D., Columbia, 1932; LL.D., Lafayette, 1936; LL.D., New Hampshire, 1937; LL.D., Rhode Island, 1943; LL.D., New Brunswick, 1943; LL.D., Reed, 1946; LL.D., Bowdoin, 1947; LL.D., Boston University, 1948; L.H.D., Bates, 1950; L.H.D., Nasson College, 1952; L.H.D., University of Florida, 1953; LL.D., University of Kentucky, 1953; Litt.D., Colby, 1953; LL.D., Maine, 1958; President Emeritus.
- HAWLEY, HENRY CHARLES (1946-1965); A.B., Oberlin, 1923; M.B.A., Harvard, 1925; D.C.S., 1930; Professor Emeritus of Business and Economics.
- HIGHLANDS, MATTHEW EDWARD (1935-1946) (1947-1970); B.A., Maine, 1928; S.M., Massachusetts Institute of Technology, 1934; Ph.D., University of Massachusetts, 1951; Professor Emeritus of Food Science.
- HILBORN, MERLE TYSON (1935-1973); B.S., Maine, 1932; M.S., 1934; Ph.D., Yale, 1940; Professor Emeritus of Plant Pathology.
- HILL, RALPH ARTHUR (1957-1972); B.S., Maine, 1928; M.S., Vermont, 1930; Ph.D., Columbia, 1942; Research Associate Emeritus.
- HOBBS, SHIRLEY BROOKS (1950-1970); B.S., Farmington State Teachers College, 1929; Extension Agent Emerita.
- HYLAND, FAY (1926-1965); M.S., Michigan State College, 1925; M.S., Maine, 1929; Sc.D., 1965; Professor Emeritus of Botany.
- IBBOTSON, LOUIS TAPPE (1928-1963); A.B., Hamilton, 1922; B.L.S., New York State Library School, 1925; Librarian Emeritus.
- JENNESS, LYLE CLAYTON (1923-1966); B.S., New Hampshire, 1922; M.S., Maine, 1925; P.E., (Maine); Sc.D., New Hampshire, 1966; Professor Emeritus of Chemical Engineering.
- JORDAN, MAYNARD FRED (1917-1918; 1919-1921; 1925-1960); B.A., Maine, 1916; M.A., 1921; Professor Emeritus of Astronomy.
- LATHROP, FRANK HEIDMAN (1934-1954); B.S., Clemson, 1913; M.S., Ohio State, 1915; Ph.D., 1923; Entomologist Emeritus.
- LEVINSON, RONALD BARTLETT (1926-1962); A.B., Harvard, 1919; Ph.D., Chicago, 1924; L.H.D., Maine, 1962; Professor Emeritus of Philosophy.
- LIBBY, WINTHROP CHARLES (1934-1973); B.S., Maine, 1932; M.S., 1933; LL.D., Ricker College, 1968; Ped.D., Husson College, 1970; LL.D., Bates College, 1970; LL.D., Colby College, 1971; L.H.D., Unity College, 1972; Professor of Agronomy and Former President.
- LOVEJOY, MABEL KIRKPATRICK (1955-1973); B.S., Maine, 1928; Extension Agent Emerita.
- LUCAS, WARREN STANHOPE (1920-1958); B.A., Maine, 1914; M.A., 1922; Professor Emeritus of Mathematics.

UNIVERSITY OF MAINE

- McKAY, EDGAR B. (1947-1973); B.S., Colby, 1930; M.Ed., Maine, 1951; Associate Professor of Modern Society Emeritus.
- MARTIN, FREDERIC THURMAN (1934-1969); Ch.E., Lehigh University, 1925; Ph.D., Johns Hopkins, 1929; P.E., (Maine); Professor Emeritus of Chemistry.
- MERCHANT, CHARLES HENRY (1924-1962); B.S., Cornell University, 1920; M.S., 1922; Ph.D., 1928; Professor Emeritus of Agricultural Economics.
- MEYER, MARVIN CLINTON (1946-1973); B.S., Southeast Missouri State College, 1932; A.M., Ohio State University, 1936; Ph.D., University of Illinois, 1939; Professor Emeritus of Zoology.
- MILES, KATHERINE ADELE (1946-1969); B.A., Ohio State University, 1925; B.S. in Ed., 1925; M.A., 1927; Ph.D., University of Minnesota, 1945; Professor Emerita of Child Development.
- MILLER, STACY ROSS (1932-1973); B.S., Maine, 1932; Administrative Officer Emeritus, Cooperative Extension Service.
- MONROE, MERNA MYRTHA (1931-1966); B.S., Iowa State, 1929; M.S., Kansas State, 1932; Associate Professor Emerita of Housing.
- MURRAY, JOSEPH MAGEE (1934-1970); B.A., Maine, 1925; M.A., University of Michigan, 1927; Ph.D., 1929; LL.D., Maine, 1972; Dean Emeritus of Arts and Sciences and Professor Emeritus of Zoology.
- MUSGRAVE, MARGUERITE RUTH (1929-1962); B.S., Columbia, 1925; A.M., 1926; Lecturer Emerita in Design.
- NASON, ESTELLE (1922-1957); B.S., Maine, 1922; Home Demonstration Agent Leader Emerita.
- NESS, NORMAN RENFREW (1942-1973); B.S., Maine, 1938; Dairy Specialist Emeritus.
- NUTTING, ALBERT DEANE (1931-1948) (1958-1971); B.S., Maine, 1927; Director Emeritus, School of Forest Resources.
- OAK, JESSIE LAWRENCE (1955-1972); B.S., Maine, 1928; Extension Agent Emerita.
- PLUMMER, BERNIE ELLIOTT, JR. (1925-1968); B.S., Maine, 1924; M.S., 1925; Professor Emeritus of Biochemistry.
- PRAGEMAN, IRVING HENRY (1927-1962); Ph.B., Yale, 1918; M.E., 1923; P.E. (Maine); Professor Emeritus of Mechanical Engineering.
- PRATT, HORACE ASA (1930-1971); B.S., Maine, 1930; M.S., 1936; P.E., (Maine); Testing Engineer Emeritus.
- QUINSEY, DONALD LEROY (1942-1969); B.S., University of Illinois, 1924; M.S., 1932; Ph.D., 1935; Professor Emeritus of Psychology.
- RANKIN, ROME (1947-1967); M.A., University of Michigan, 1934; Ph.D., University of Kentucky, 1948; Professor Emeritus of Physical Education.
- REED, FRANK DUDLEY (1938-1972); B.S., New Hampshire, 1929; Extension Economist (Marketing) Emeritus.
- REED, MARY FLORENCE (1930-1971); B.A., Maine, 1929; B.S., Simmons College, 1930; Assistant University Librarian Emerita.

PERSONNEL

REYNOLDS, CECIL JOHN (1935-1972); B.S.C., Mount Allison, 1926; B.A., 1927; B.A., Oxford, 1929; B. Litt., 1930; A.M., Harvard, 1932; Professor Emeritus of English.

ROBERTS, LEWIS POLLARD (1935-1972); B.S., Maine, 1931; Sugar Beet Specialist Emeritus.

ROSS, RUTH VELMA (1960-1972); B.S., State Teachers College, Framingham, Massachusetts, 1928; Extension Agent Emerita.

SCHRUMPF, WILLIAM ERNEST (1928-1958); B.S., Maine, 1928; M.S., 1930; Associate Agricultural Economist Emeritus.

SEZAK, SAMUEL (1939-1971); B.A., Maine, 1931; M.Ed., 1953; Professor Emeritus of Physical Education and Athletics.

SHEIVE, LUCY FARRINGTON (1927-1936; 1943-1945; 1956-1969); B.S., Maine, 1927; Consumer Marketing Agent Emerita.

SHIBLES, LOANA SPEARIN (1946-1961); Castine Normal, 1926; Club Agent Emerita.

SHIBLES, MARK RICHARD (1947-1971); B.A., Colby, 1929; M.Ed., Boston University, 1935; L.H.D., Colby, 1954; Sc.D. in Ed., Boston University 1955; Ped.D., Maine, 1971; Dean Emeritus of Education and Professor Emeritus of Education.

SMITH, HARRY WOODBURY (1912-1952); B.S., Maine, 1909; M.S., 1922; Ph.D., Rutgers, 1934; Professor Emeritus of Biochemistry.

SNYDER, MARY ELLA (1936-1962); A.B., Gooding College, 1919; M.S., Iowa State College, 1936; Associate Professor Emerita of Food and Nutrition.

SPARROW, THERON ALONZO (1926-1964); B.S., Maine, 1924; M.S., 1938; P.E. (Maine), Professor Emeritus of Mechanical Engineering.

SWEETMAN, MARION DEYOE (1927-1961); B.S., Iowa State College, 1921; M.S., 1922; Ph.D., Minnesota, 1927; Professor Emerita of Home Economics.

SWIFT, HAROLD CLAYTON (1920-1961); B.S., Maine, 1918; M.S., 1923; Associate Professor Emeritus of Agricultural Engineering.

SWINFORD, LEE HOUGHTON (1959-1972); B.A., University of California, 1923; Ph.D., 1931; Professor Emeritus of Mathematics.

TAYLOR, EVELYN (1926-1972); Associate Registrar Emerita.

TAYLOR, FRANK MELROY (1940-1973); B.S., Lafayette College, 1928; C.E., 1937; M.S., Maine, 1951; P.E. (Maine); Professor Emeritus of Civil Engineering.

TODD, FRANK HAROLD (1946-1970); B.S., Bowdoin, 1935; M.A., Maine, 1936; Associate Professor Emeritus of Physics.

TREVETT, MOODY FRANCIS (1946-1972); B.S., Massachusetts State, 1929; M.S., 1940; Professor Emeritus of Plant and Soil Sciences.

TURNER, ALBERT MORTON (1922-1956); A.B., Harvard, 1912; A.M., 1914; Ph.D., 1920; Professor Emeritus of English and Comparative Literature.

WALLACE, STANLEY MOORE (1922-1959); Diploma, New Haven School of Gymnastics, 1917; Professor Emeritus of Physical Education.

WATSON, HARRY DEXTER (1920-1961); B.S., Maine, 1920; M.S., 1929; P.E. (Maine); Professor Emeritus of Mechanical Engineering.

WEBSTER, FRED LOT (1944-1961); County Agent Emeritus.

WELLS, WILLIAM CARL (1931-1945) (1947-1972); B.A., Maine, 1931; Director of Residence and Dining Halls Emeritus.

UNIVERSITY OF MAINE

WENCE, MILFORD EDWARD (1937-1973); B.A., State University of Iowa, 1933; M.A., 1934; Ph.D., 1937; Professor Emeritus of English.

WHITNEY, WALTER REGINALD (1928-1933) (1935-1965); B.S., Bowdoin, 1923; A.M., Harvard, 1935; Professor Emeritus of English.

WILSON, EDITH GRACE (1931-1970); B.A., Southern California, 1923; M.A., 1928; L.H.D., Maine, 1970; Dean of Women Emerita.

WITTER, JOHN FRANKLIN (1932-1971); B.S., Maryland, 1928; D.V.M., Michigan, 1932; Professor Emeritus of Animal Pathology.

ZIEMINSKI, STEFAN ANTONI (1954-1971); Dipl. Ing., Technical University (Lwow, Poland) 1927; Doctor of Technical Science, 1929; P.E., (Maine); Professor Emeritus of Chemical Engineering.

NAMED PROFESSORSHIPS

Adelaide C. Bird and Alan L. Bird Professor of American History, DR. ARTHUR M. JOHNSON.

Louis Calder Professor of Pulp and Paper Technology, MR. LOWELL ZABEL.

Dwight B. DeMeritt Professor of Forest Resources, DR. FRED B. KNIGHT.

Lloyd H. Elliott Professor of English, DR. WILLIAM P. RANDEL.

D. S. Gottesman Research Professor of Pulp and Paper Technology, DR. EDWARD BOBALEK.

John Homer Huddilston Professor of Art, MR. VINCENT A. HARTGEN.

Maine Bankers Association Professor of Finance, DR. NEIL B. MURPHY.

Nicolas M. Salgo Professor of Business Administration, DR. ROBERT E. JENSEN.

Arthur O. Willey Professor of Mechanical Engineering, DR. ASHLEY S. CAMPBELL.

FACULTY

(Dates in parentheses indicate year of initial appointment)

• Leave of absence spring 1974

•• Leave of absence fall 1973

† Leave of absence 1973-1974

ABBOTT, WALTER HICKS (1960); B.S., Maine, 1958; M.S. in Ed., 1965; Assistant Professor of Physical Education and Head Football Coach.

ABELSON, ROBERT M. (1967); B.S., Queens College, 1952; M.S., Virginia Polytechnic Institute, 1954; Ph.D., Boston University, 1961; Associate Professor of Psychology.

ACHESON, ANN W. (1969); A.B., Pembroke College, 1964; Assistant Professor of Anthropology.

PERSONNEL

- ACHESON, JAMES M. (1968); B.A., Colby College, 1962; Ph.D., University of Rochester, 1970; Associate Professor of Anthropology.
- AHRENS, WILLIAM C. (1968); B.A., Maine, 1965; M.L.S., Long Island University, 1968; Assistant University Librarian; Cooperating Assistant Professor of Library Service.
- AKELEY, ROBERT VINTON (1969); B.S., Maine, 1937; M.S., 1942; Associate Professor of Horticulture.
- ALEXANDER, JOHN A. (1970); B.S., Purdue, 1956; S.M., Massachusetts Institute of Technology, 1968; Ph.D., 1970; P.E., Associate Professor of Civil Engineering.
- ALLEN, KENNETH WILLIAM (1963); B.S., Wheaton College (Illinois), 1952; M.S., Maine, 1956; Ph.D., Rice University, 1959; Professor of Zoology and Oceanography, Acting Dean, College of Arts and Sciences.
- ALPANDER, GUVENC G. (1965); B.A., Middle East Technical University, Ankara, Turkey, 1962; M.P.A., Michigan State University, 1963; Ph.D., 1966; Professor of Management, College of Business Administration.
- AMES, DAVID MERTON (1968); B.S., Maine, 1967; M.Ed., 1968; Assistant Professor of Physical Education for Men.
- ANDERSEN, CHARLES LOWELL (1955); B.A., University of Utah, 1949; M.A., 1951; Assistant Professor of English.
- ANDERSON, JANET RAE (1966); B.A.E., Wayne State College, 1963; M.Ed., Maine, 1967; Assistant Professor of Physical Education, Women's Division.
- ANDERSON, WALTER A. (1973); B.S., University of Massachusetts, 1954; M.S., University of Rochester, 1956; Faculty Associate in Geological Sciences.
- ANNIS, C. HERBERT, JR. (1964); B.S., Kansas State University, 1959; Extension Agent (Waldo County); Cooperative Extension Service.
- ANTONITIS, JOSEPH JOHN (1950); A.B., Indiana University, 1946; A.M., Columbia, 1947; Ph.D., 1950; Professor of Psychology.
- APGAR, WILLIAM PETER (1963); B.S., Rutgers, 1954; M.S., 1961; Ph.D., 1963; Associate Professor of Animal Sciences.
- ARMS, CHADWICK CUMMINGS (1964); B.S., Vermont, 1951; M.S., 1960; Area Dairy Specialist, Cooperative Extension Service.
- ASHLEY, MARSHALL DOUGLAS (1969); B.S., Maine, 1965; M.S., 1968; Ph.D., Purdue University, 1969; Assistant Professor of Forest Resources.
- BAILEY, DONALD WAYNE (1969); B.S., University of California (Berkeley), 1949; Ph.D., 1953; Lecturer in Zoology (Jackson Laboratory).
- BAILEY, THOMAS EDWARD, JR. (1968); B.A., Fordham University, 1964; M.A., Queens College, 1966; Instructor in English.
- BAIN, W. MURRAY (1959); A.B., Indiana University, 1951; M.A., 1953; Ph.D., 1959; Associate Professor of Microbiology.
- BAKER, WILLIAM J. (1970); B.A., Furman University, 1960; B.D., Southeastern Seminary, 1963; Ph.D., Cambridge University, 1967; Associate Professor of History.
- BALAKRISHNAN, V. K. (1970); M.A., Madras University, 1956; M.A., Wisconsin, 1965; Ph.D., SUNY (Stony Brook), 1970; Associate Professor of Mathematics.
- BALLINGER, JAMES ORLA (1969); B.S. in Ed., Maine, 1966; M.Ed., 1969; Instructor in Physical Education, Coach, Cross Country; Assistant Coach, Track.
- BANASIAK, CHESTER F. (1973); B.S., Michigan State, 1948; M.S., University of Massachusetts, 1952; Assistant Professor of Forest Resources.

UNIVERSITY OF MAINE

- BANKS, RONALD FILLMORE (1963); B.S., Gorham State Teachers College, 1956; M.A., Maine, 1958; Ph.D., 1966; Associate Professor of History.
- **BARDEN, ALBERT ARNOLD, JR. (1946); A.B., Brown, 1932; Sc.M., 1934; Ph.D., Northwestern, 1941; Professor of Zoology.
- BARDEN, ELIZABETH S. (1970); A.B., Mount Holyoke College, 1937; M.S., Northwestern University, 1938; Ph.D., Maine, 1969; Assistant Professor of Food Science.
- BARR, RICHARD LORMOR (1968); B.S., Purdue University, 1964; M.S., Maine, 1968; Extension Agent (Franklin County); Cooperative Extension Service.
- BARRON, MARYANN C. (1971); B.A., Villa Maria College, 1969; M.A., University of Detroit, 1971; Instructor in Mathematics, University of Maine at Bangor.
- BARTLETT, MERRILL DAY (1958-59) (1961); B.A., Maine, 1952; M.A., 1958; Associate Professor of Business Administration; Associate Dean, College of Business Administration.
- BATES, EDWIN HILL (1953); B.S., Maine, 1937; M.S., University of Wisconsin, 1961; Director, Cooperative Extension Service.
- BATTICK, JOHN FRANCIS (1964); A.B., Boston University, 1958; A.M., 1959; Ph.D., 1967; Associate Professor of History.
- BAUSCHATZ, CATHLEEN M. (1972); B.A., Radcliffe, 1964; M.A., Columbia, 1965; Faculty Associate in Foreign Languages.
- BAUSCHATZ, PAUL C. (1969); B.S., Massachusetts Institute of Technology, 1957; M.A., Columbia, 1959; Ph.D., 1970; Assistant Professor of English.
- BEAMESDERFER, JOHN WILLIAM (1947); B.S., Gettysburg College, 1932; M.S., University of Michigan, 1939; Ph.D., 1947; Professor of Chemistry.
- BELL, HARRY ADELBERT (1956); B.S., Maine, 1949; Area Dairy Specialist, Cooperative Extension Service.
- BELYEA, PAUL RAYMOND (1958); B.S., Maine, 1956; M.S., 1958; Associate Chemist, Department of Biochemistry, Agricultural Experiment Station.
- †BENNETT, AUSTIN EDWARD (1963); B.S. in Ed., University of Connecticut, 1951; M.Ed., Colorado State University, 1962; Community Development Specialist, Cooperative Extension Service.
- BENNETT, JACOB (1963); A.B., Boston University, 1949; M.A., Columbia University, 1949; Ph.D., Boston University, 1960; Professor of English.
- BENOIT, JOHN R. (1966); B.S. in Ed., Maine, 1959; M.Ed., 1965; Director of Conferences and Institutes and Lecturer in Education.
- BENSON, FRED J. (1970); B.S., Western Illinois University, 1963; M.S., Southern Illinois University, 1965; Ph.D., University of Missouri, 1972; Agricultural Business Management Specialist; Assistant Professor of Agricultural and Resource Economics.
- BENSON, JAMES M., JR. (1971); B.S., University of Rochester, 1967; Instructor in Biological Sciences, University of Maine at Bangor.
- BENTLEY, MICHAEL D. (1969); B.S., Auburn University, 1963; M.S., 1965; Ph.D., University of Texas (Austin), 1969; Associate Professor of Chemistry.
- BENTON, ARTHUR L. (1971); B.S., Montana State, 1963; M.Ed., 1964; Ph.D., American University, 1971; Coordinator of Mental Health Technology and Associate Professor of Psychology, University of Maine at Bangor.
- BERCE, LEWIS CHARLES (1966); B.S., Maine, 1950; Extension Agent (Aroostook County) Cooperative Extension Service.

- BERNSTEIN, SELDON E. (1971); B.A., Maine, 1949; M.A., 1952; Ph.D., Brown University, 1956; Lecturer in Zoology.
- BILLINGTON, MURRAY R. (1961); B.S., Maine Maritime Academy, 1955; B.A., Maine, 1961; Director of Purchases.
- BIRD, FRANCIS H. (1961); B.S., University of Michigan, 1936; Ph.D., University of California (Berkeley), 1948; Professor of Poultry Science.
- BISHOP, DAVID WINN (1962); B.S., Harvard, 1949; M.A., Maine, 1951; Ed.D., New York University, 1970; Associate Professor of Education.
- BISSELL, LEWIS PROUTY (1949); B.S., New Hampshire, 1940; M.F., Yale, 1947; Forestry Specialist, Cooperative Extension Service.
- BLAKE, JOHN MORTIMER (1961); B.S., Boston University, 1941; I.A., Harvard, 1943; Vice President for Finance and Administration.
- BLAKE, STANLEY EARL, JR. (1968); B.S., Suffolk University, 1966; M.S., University of New Hampshire, 1968; Teaching Associate in Zoology.
- BLAMBERG, DONALD L. (1966); B.S., University of Maryland, 1954; M.S., 1956; Ph.D., 1960; Assistant to the Director, Maine Agricultural Experiment Station.
- BLANKE, RICHARD DONALD (1969); B.A., San Fernando Valley State, 1963; M.A., University of California at Berkeley, 1964; Ph.D., 1970; Assistant Professor of History.
- BLEASE, JOHN A. (1960); B.S., University of Rhode Island, 1960; Research Associate, Department of Biochemistry, Agricultural Experiment Station.
- BOBALEK, EDWARD GEORGE (1963); B.S., St. Mary's College (Winona, Minnesota), 1938; M.S., Creighton University, 1940; Ph.D., Indiana University, 1942; D.S. Gottesman Research Professor and Chairman, Department of Chemical Engineering.
- BORNS, HAROLD W., JR. (1955); B.S., Tufts, 1951; M.A., Boston University, 1955; Ph.D., 1959; Professor and Chairman of Geological Sciences and Director of the Institute for Quaternary Studies.
- BOST, JAMES STEPHEN (1962); A.B., University of Illinois, 1947; A.M., 1951; Ph.D., Indiana University, 1961; Professor of Speech.
- BOYCE, LESTER F. (1971); A.B., Dartmouth, 1946; M.C.S., 1947; Lecturer in Accounting.
- BRACCIOTTI, PAUL R. (1971); B.A., Amherst College, 1961; LL.B., University of Pennsylvania Law School, 1965; Community Development Specialist, Cooperative Extension Service.
- BRADBURY, HARRY EDWARD (1958); B.S., Maine, 1954; M.S., Rutgers, 1956; Associate Chemist, Department of Biochemistry, Agricultural Experiment Station.
- BREKKE, CLARK J. (1972); B.S., Rutgers University, 1966; M.S., Cornell University, 1968; Ph.D., University of Wisconsin (Madison), 1972; Assistant Professor of Food Science.
- BRESINSKY, HENRIK (1969); B.A., Western State College of Colorado, 1959; M.A., University of Wyoming, 1961; Ph.D., Arizona State University, 1969; Assistant Professor of Mathematics.
- BRIGHTMAN, LLOYD A. (1969); A.B., Brown, 1950; M.A., University of Rhode Island, 1958; Ph.D., Cornell, 1971; Assistant Professor of Child Development.
- BRIMMER, JAQUELINE DELOBEL (1964); Licence d'Anglais (licence d'enseignement), Université de Lille, France, 1935; Diplôme d'études supérieures, 1937; Assistant Professor of French.

UNIVERSITY OF MAINE

- BROCKWAY, PHILIP JUDD (1935); B.A., Maine, 1931; M.A., 1940; Director, Career Planning and Placement.
- BROGUNIER, JOSEPH E. (1969); A.B., Brown University, 1958; M.A., Purdue University, 1964; Ph.D., Minnesota, 1969; Assistant Professor of English.
- BROWER, AUBURN E. (1972); B.S., S.W. Missouri State College, 1927; Ph.D., Cornell University, 1931; Visiting Professor of Entomology.
- BROWN, CARLETON MERLE (1955); B.S., Maine, 1949; M.S., 1959; Associate Professor of Electrical Engineering.
- BROWN, CECIL SANFORD (1953); B.S., New Hampshire, 1949; M.S., Cornell University, 1951; Ph.D., 1955; Professor of Agronomy and Forage Crop Specialist.
- BROWN, ELEESE V. (1970); B.S., New Hampshire, 1963; M.A., University of Illinois, 1967; Ed.D., 1970; Assistant Professor of Art.
- BROWN, ELLA CORINNE (1962); B.S., University of Missouri, 1949; M.A., Montana State University, 1961; Associate Professor of Physical Education, Women's Division.
- BROWN, HAROLD HUSTON (1968); B.S., Maine, 1961; M.Ed., 1965; Extension Agent (Waldo County), Cooperative Extension Service.
- BROWN, LEROY C. (1959); B.S., Maine, 1941; Area Poultry Specialist, Cooperative Extension Service.
- BROWNSTEIN, ANDREA M. (1969-71) (1972); A.B., Fairfield University, 1967; M.A., University of Maine (Orono), 1969; Instructor in English.
- BROWNSTEIN, KENNETH ROBERT (1965); B.S., Rensselaer Polytechnic Institute, 1957; Ph.D., 1966; Associate Professor of Physics.
- BRUCE, DONALD MALCOLM (1967); B.S., Maine, 1960; M.Ed., 1967; Youth Education Specialist, Cooperative Extension Service.
- BRUGMAN, HERMAN HENRY (1950); B.S.A., University of Manitoba, 1944; M.S., University of Minnesota, 1947; Ph.D., 1948; Associate Professor of Animal Sciences.
- BRUTSAERT, WILLEM F. (1973); B.S., University of Ghent, 1963; M.S., University of Illinois, 1967; Ph.D., Colorado State, 1970; Assistant Professor of Civil Engineering.
- BRYAN, THOMAS A. (1972); B.A., Kansas State University, 1965; D.V.M., 1972; Assistant Professor of Animal and Veterinary Sciences (Pathology).
- BUCK, CHARLES ELON (1951); B.S., North Dakota State College, 1942; M.S., 1947; Ph.D., Ohio State University, 1951; Professor of Microbiology.
- BURKE, MELVIN (1966); B.A., Wayne State University, 1960; M.A., 1962; Ph.D., University of Pittsburgh, 1967; Associate Professor of Economics.
- BURNES, ANN P. (1972); B.A., Webster College, 1964; Instructor in English.
- BURNHAM, GREGORY SMITH (1968); B.A., University of Colorado, 1961; Assistant Professor of Management, College of Business Administration.
- BURNS, FRANCIS ROY (1969); B.S., Northern Michigan University, 1967; M.A., Western Michigan University, 1969; Instructor in Speech.
- BURNS, WARREN T. (1968); A.B., Muhlenberg College, 1950; M.A., Pennsylvania State University, 1963; Ph.D., 1969; Assistant Professor of Speech.
- BURRILL, PETER H. (1971); B.S., Maine (Orono), 1970; Instructor in Biochemistry (part-time).
- BUTLER, ALAN C. (1969); A.B., Clark University, 1964; M.A., University of Rhode Island, 1964; Ph.D., Maine, 1970; Staff Psychologist and Cooperating Assistant Professor of Psychology.

- BUTTERFIELD, JOHN EVERETT (1955); B.S., Maine, 1953; Associate Professor of Physical Education, Head Baseball Coach, Assistant Freshman Football Coach.
- BUTTON, LLOYD H., JR. (1954); B.S., Vermont, 1953; M.S., 1954; Area Dairy Specialist, Cooperative Extension Service.
- BUTZOW, JOHN WILLIAM, JR. (1968); B.S., Saint Bonaventure University, 1961; M.S., 1963; Ed.D., University of Rochester, 1968; Associate Professor of Education.
- BYTHER, THOMAS E. (1966); B.A., Ricker College, 1964; M.A., Maine, 1966; Associate Professor of Computer Science; Academic Coordinator, Computing and Processing Service.
- CALDWELL, JOHN T. (1972); B.M., University of Michigan, 1967; M.M., 1969; Instructor in Music.
- CAMP, PAUL RICE (1967); B.A., Wesleyan University, 1941; M.A., Harvard, 1947; Ph.D., Pennsylvania State University, 1951; Professor of Physics.
- CAMPANA, JEAN M. (1970); B.S., Maine, 1970; Head, Periodicals Division, Raymond H. Fogler Library.
- CAMPANA, RICHARD JOHN (1958); B.S., University of Idaho, 1943; M.F., Yale, 1947; Ph.D., 1952; Professor of Botany.
- CAMPBELL, ASHLEY SAWYER (1950-57) (1968); S.B., Harvard University, 1940; S.M., 1947; Sc.D., 1949; Arthur O. Willey Professor of Mechanical Engineering.
- CARLSON, CONSTANCE H. (1962); A.B., Vassar, 1937; M.A., Maine, 1945; Ph.D., Brown, 1971; Dean of Instruction, Professor of English and Coordinator of General Studies, University of Maine at Bangor.
- CARNIGLIA, CHARLES K. (1971); B.S., University of California (Berkeley), 1966; Ph.D., University of Rochester, 1971; Assistant Professor of Physics.
- CARPENTER, ELAINE SHAW (1949); Alma College; Head, Circulation Division, Raymond H. Fogler Library.
- CARPENTER, PAUL NATHANIEL (1943-44) (1946); B.S., Bates, 1933; M.S., Maine, 1949; Associate Professor of Agronomy, Soils Specialist.
- CARR, EDWARD FRANK (1957); B.S., Michigan State University, 1954; Ph.D., 1954; Professor of Physics.
- CARROLL, ROBERT C. (1970); B.A., Johns Hopkins University, 1964; Ph.D., 1969; Assistant Professor of French.
- CARVILLE, LINWOOD LELAND (1960); B.S., Maine, 1953; M.Ed., 1954; Assistant Director of Physical Education and Athletics; Assistant Professor of Physical Education.
- CASEY, ALLEN JAY, JR. (1969); B.A., Wake Forest College, 1964; M.A., 1965; Assistant Professor of History.
- CAUGHRAN, ALEX MADISON (1953-57) (1960); B.A., Drury College, 1937; M.Ed., University of Missouri, 1949; Ed.D., 1953; Professor of Education.
- CAYER, N. JOSEPH (1971); B.A., University of Colorado, 1964; M.P.A., 1966; Ph.D., University of Massachusetts, 1972; Assistant Professor of Political Science.
- CAZDEN, NORMAN (1969); B.S., The City College of New York, 1943; A.M., Harvard University, 1944; Ph.D., 1948; Professor of Music.

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- CECKLER, WILLIAM HERBERT (1969); B.S., University of Rochester, 1951; M.S., Massachusetts Institute of Technology, 1953; Sc.D., 1960; Associate Professor of Chemical Engineering.
- CHADWICK, LEIGH EDWARD (1970); B.S., Haverford, 1925; M.A., Pennsylvania, 1929; M.A., Harvard, Ph.D., 1939; Visiting Professor of Entomology.
- CHAPMAN, BEN ROBERTS (1956); B.S., Maine, 1952; M.S., 1963; Associate Professor of Mechanical Engineering.
- CHAPMAN, DORIS V. (1967); B.A., Maine, 1958; M.A., 1960; Bibliographer-Acquisitions Librarian.
- CHAPMAN, KENNETH S. (1957); B.S., Maine, 1954; M.S., Vermont, 1956; Area Potato Specialist, Cooperative Extension Service.
- CHAPPELLE, THOMAS NELSON (1968); B.S., Maine, 1962; Instructor in Physical Education; Head Basketball Coach; Head Golf Coach.
- CHASE, ANDREW JACKSON (1949); B.S., Maine, 1949; M.S., 1951; Professor of Chemical Engineering.
- CHASE, GEORGE OSCAR (1969); B.A., Duke University, 1947; M.D., 1951; Lecturer in Biochemistry.
- CHEN, CHAO-WEN (1970); B.S., Taipei Institute of Technology, 1960; M.A., Alabama, 1966; Ph.D., 1969; Assistant Professor of Mathematics.
- CHEN, HARRY W. (1973); B.A., National Cheng Chi University (Taiwan), 1960; Ph.D., University of Kansas, 1969; Lecturer in Biochemistry.
- CHERNOSKY, JOSEPH V., JR. (1973); A.B., Notre Dame, 1966; M.A., University of Wisconsin, 1968; Assistant Professor of Geological Sciences.
- CHERRY, MARIANNA (1969); B.A., Wheaton College (Mass.), 1946; M.A., Bryn Mawr College, 1951; Ph.D., Yale University, 1964; Lecturer in Zoology (Jackson Laboratory).
- CHERULNIK, PAUL DAVID (1969); B.A., SUNY (Buffalo), 1963; Ph.D., 1971; Assistant Professor of Psychology.
- CHESLEY, ROSS (1972); B.S., California State (Hayward), 1971; M.B.A., Golden State (San Francisco), 1973; Instructor in Law Enforcement, University of Maine at Bangor.
- CHIAPPONE, ANTHONY DONALD (1967); B.S., SUCE, Geneseo, New York, 1954; M.S., Syracuse University, 1961; Ed.D., 1963; Associate Professor of Education.
- CHUTE, HAROLD LEROY (1949); D.V.M., University of Toronto, 1949; V.S., Ontario Veterinary College, 1949; M.Sc., Ohio State, 1953; D.V.Sc., Toronto, 1955; Professor of Animal Pathology; Director of Development.
- CLARK, ALTON HAROLD (1968); B.A., Maine, 1961; M.S., University of Wisconsin, 1963; Ph.D., Cornell University, 1967; Associate Professor of Physics.
- CLARK, DAVID HENRY (1963); B.A., University of Oklahoma, 1954; M.S., University of Wisconsin, 1960; Ph.D., 1962; Professor of Economics.
- CLARK, JAMES MILFORD (1960); B.A., University of Michigan, 1952; M.A., University of the Philippines, 1955; Ph.D., University of Michigan, 1962; Associate Professor of Political Science, and Vice President for Academic Affairs.
- CLARK, RUSSELL EMERY (1958); B.S., Maine, 1957; Extension Agent (Oxford County), Cooperative Extension Service.
- CLASON, W. PAGE C. (1972); A.B., Princeton, 1950; M.D., Harvard Medical School, 1954; Lecturer in Electrical Engineering.
- CLIFFORD, GEORGE EDWIN (1946-51) (1954); B.S., Maine, 1943; M.S. in Education, 1951; Professor of Mechanical Engineering.

- COATES, DON E. (1972); B.S., Illinois College, 1946; M.Ed., University of Maine (Orono), 1960; Administrative Officer and Lecturer, College of Education.
- COBB, ROBERT A. (1969); B.S., Springfield College, 1964; M.S., 1967; D.P.E., 1970; Associate Professor of Physical Education and Education; Acting Coordinator of Health, Recreation and Physical Education.
- COHN, STEVEN F. (1971); A.B., Dartmouth, 1961; Assistant Professor of Sociology.
- COLBATH, JAMES A. (1968); B.S., Maine, 1948; M.A., Western Reserve University, 1950; M.F.A., 1951; Ph.D., 1962; Professor of Speech and Director of Maine Masque Theatre.
- COLLINS, EDWARD, JR. (1962); B.A., Marshall University, 1954; M.A., 1957; Ph.D., Emory University, 1959; Professor of Political Science.
- †COLLINS, MALVINA YERGER (1968); B. Mus., Texas, 1950; M. Mus., 1954; Instructor in Music (part-time).
- †COLLINS, ROBERT C. (1964); B.M., University of Texas, 1951; M.M., 1952; Associate Professor of Music.
- COOK, HENRY J., JR. (1959); B.S., University of Rhode Island, 1952; M.S., 1957; Area Dairy Specialist, Cooperative Extension Service.
- COOK, JAMES R. (1963); B.S., Concord College (Athens, West Virginia), 1950; M.S., West Virginia University, 1955; Ph.D., University of California (Los Angeles), 1960; Professor of Zoology and Botany.
- COOK, RICHARD ALFRED (1965); B.S., 1965; M.S., Maine, 1968; Assistant Nutritionist, School of Human Development, Agricultural Experiment Station.
- COOK, WILLIAM PAUL (1964); B.S., Maine, 1964; Assistant Chemist, Department of Biochemistry, Agricultural Experiment Station.
- COOPER, GEORGE RAYMOND (1950); B.A., Colorado State College of Education, 1942; M.S., Iowa State, 1948; Ph.D., 1950; Professor of Botany.
- CORCORAN, THOMAS JOSEPH (1961); B.S., Michigan College of Mining and Technology, 1955; M.S., Purdue, 1960; Ph.D., 1962; Professor of Forest Resources.
- CORMIER, MARY LOU (1970); R.N., Catherine Labouré, 1957; Instructor in Mental Health Technology, University of Maine at Bangor.
- COULTER, MALCOLM A. (1971); B.S., Notre Dame, 1966; Instructor in Mathematics, University of Maine at Bangor.
- COULTER, MALCOLM WILFORD (1948); B.S., Connecticut, 1942; M.S., Maine, 1948; Ph.D., Syracuse University, 1966; Professor of Wildlife Resources, Associate Director of Wildlife, School of Forest Resources.
- COUPE, JOHN DONALD (1958-1961) (1962); B.S., Worcester Polytechnic Institute, 1953; M.A., Clark University, 1957; Ph.D., 1960; Professor of Economics; Chairman, Department of Economics.
- COWAN, CATHARINE L. (1972); B.S., Western Illinois University, 1968; M.A., University of Iowa, 1971; Assistant Professor of Psychology.
- COWAN, CHARLES E. (1972); B.S., University of Maine (Orono), 1962; M.S., 1973; Assistant Professor of Military Science.
- CRAIG, ROBERT H. (1971); B.A., University of California, 1965; B.D., Union Theological Seminary, 1968; Instructor in Philosophy.
- CRAM, GORDON WILBUR (1956); B.S., Maine, 1953; Assistant Chemist, Department of Biochemistry, Agricultural Experiment Station.
- CROSBY, GEORGE HOWARD (1955); B.A., Colby, 1936; Registrar.
- CROSBY, HOWARD ALVAH (1946); B.S., Maine, 1943; E.E., 1959; P.E. (Maine); Professor of Electrical Engineering.

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- CSAVINSZKY, PETER (1970); Dipl. Ing. Chem., Technical University of Budapest, 1954; Ph.D., University of Ottawa, 1959; Associate Professor of Physics.
- CUNNINGHAM, GEORGE SNOWDEAL (1962-1963); (1967); B.A., Maine, 1933; M.Ed., 1958; Professor of Mathematics.
- CUNNINGHAM, MARY E. (1972); B.S., University of Maine (Orono), 1971; Extension Agent (Penobscot County).
- CUPRAK, LUCIAN J. (1973); B.S., University of Connecticut, 1943; D.M.D., Tufts, 1948; Ph.D., Brandeis, 1967; Lecturer in Biochemistry.
- CUSHMAN, PARKER GRINDELL (1940); B.S., Maine, 1931; Director of Physical Plant.
- CYR, THOMAS O. (1971); B.S., Maine, (1966); M.Ed., 1971; Instructor in Physical Education and Basketball Coach, University of Maine at Bangor.
- CYRUS, CLAUDIA M. (1966); B.A., University of North Carolina, 1959; M.A., Western Reserve, 1960; Assistant Professor of English, University of Maine at Bangor.
- CYRUS, EDGAR A. (1960); B.A., West Virginia University, 1958; M.A., Western Reserve University, 1960; M.F.A., 1966; Associate Professor of Speech.
- DAHL, BERNHOFF A. (1971); B.S., Wheaton College, Ill., 1960; M.D., Cornell University, 1964; Lecturer in Zoology.
- DAHLBERG, KRISTINE M. (1970); B.A., Lawrence University, 1966; M.A., University of North Carolina, 1970; Assistant Dean of Student Affairs.
- DALTON, DOROTHY B. (1955); B.S., Tufts, 1943; Part-time Instructor in Family Economics; Assistant to the Director, School of Human Development.
- DAS, KRUSHNA M. (1967); D.V.M., Bihar Veterinary College, 1946; M.S., Cornell University, 1960; Ph.D., 1962; Lecturer in Animal Sciences. (The Animal Medical Center, New York City.)
- DAVIS, GEORGE THEODORE (1951); A.B., Pennsylvania State University, 1935; M.S., 1941; Ed.D., Harvard, 1950; Professor of Education.
- DAVIS, RONALD B. (1970); B.A., Grinnell College, 1954; M.S., University of New Hampshire, 1956; Ph.D., Cornell University, 1961; Associate Professor of Botany and Quaternary Studies.
- DAVIS, WILLIAM EDMUND (1969); A.B., Providence College, 1958; M.S., University of Rhode Island, 1961; Ph.D., University of Connecticut, 1968; Associate Professor of Education.
- DAY, RICHARD B. (1956); B.S., Maine, 1942; Extension Agent (Franklin County), Cooperative Extension Service.
- DEAN, DAVID (1966); A.B., Lehigh University, 1949; Ph.D., Rutgers, 1957; Professor of Oceanography and Zoology; Acting Chairman, Department of Oceanography; Director of the Ira C. Darling Center for Research, Teaching and Service.
- DEAN, LOUISE H. (1969); B.A., Douglass College, 1948; M.L.S., Maine, 1970; Librarian, Ira C. Darling Center.
- DEARBORN, EVELYN E. (1966); B.A., Maine, 1949; M.L.I.S., University of Pittsburgh, 1965; Senior Cataloger, Raymond H. Fogler Library, and Cooperating Assistant Professor of Library Service.
- DEARBORN, JOHN HOLMES (1966); B.A., University of New Hampshire, 1955; M.S., Michigan State University, 1957; Ph.D., Stanford University, 1965; Associate Professor of Zoology and Oceanography.

- DEARBORN, VANCE EDWARD (1964); B.S., 1949; M.A., Maine, 1969; Public Affairs Specialist, Cooperative Extension Service.
- DECKER, DAVID O. (1965); B.A., Marlboro College, 1960; M.A., New York University, 1964; Associate Professor of Art.
- DEFROSCIA, PATRICK D. (1971); B.S., West Chester State College, 1958; M.A., Temple University, 1967; Associate Professor of History, University of Maine at Bangor.
- DEHAAS, HERMAN (1959); B.S., Westminster College, 1947; M.S., University of Michigan, 1950; Ph.D., 1955; Professor of Biochemistry.
- DEHOFF, WILLIAM D. (1967); B.S., Ohio State University, 1960; D.V.M., 1964; Lecturer in Animal Science (The Animal Medical Center, New York City).
- DELPHENDAHL, JOHANNES (1962); Dipl. Landw., University of Hohenheim, Germany, 1950; M.S., University of Massachusetts, 1956; Ph.D., Michigan State University, 1961; Professor of Resource Economics.
- DELPHENDAHL, RENATE (1967); B.A., Michigan State University, 1959; M.A., Maine, 1967; Assistant Professor of Latin and German.
- DENDURENT, HAROLD O. (1972); B.A., Sacramento State College, 1968; M.A., Northwestern University, 1969; Ph.D., 1972; Assistant Professor of English.
- DENTON, GEORGE HENRY (1969); B.S., Tufts University, 1961; M.S., Yale University, 1964; Ph.D., 1965; Associate Professor of Geological Sciences and Quaternary Studies.
- DESCHANES, BERNARD OLIVER (1957); B.S., Maine, 1955; M.S., 1962; Associate Professor of General Engineering.
- DESIERVO, AUGUST J. (1970); B.A., Rutgers, 1963; M.S., 1966; Ph.D., 1968; Assistant Professor of Microbiology.
- DEVARNEY, RICHARD WILLIAM (1968); B.S. in Ed., Maine, 1966; M.Ed., 1972; Instructor in Physical Education; Assistant Football Coach; Freshman Baseball Coach.
- DEVINO, WILLIAM STANLEY (1960); B.A., University of Vermont, 1951; M.A., University of Connecticut, 1953; Ph.D., Michigan State University, 1959; Professor of Business and Economics; Dean, College of Business Administration.
- DEWITT, HUGH H. (1969); B.A., Stanford University, 1955; M.A., 1960; Ph.D., 1966; Associate Professor of Oceanography, Ira C. Darling Center; Co-operating Associate Professor of Zoology.
- DICKEY, HOWARD CHESTER (1947); B.S., Michigan State, 1934; M.S., West Virginia University, 1936; Ph.D., Iowa State, 1939; Professor of Animal Sciences.
- DIMOND, JOHN BARNET (1959); B.S., University of Rhode Island, 1951; M.S., 1943; Ph.D., Ohio State University, 1957; Professor of Entomology; Coordinator, Division of Biological Sciences.
- DOANE, JAMES W. (1970); A.B., Middlebury, 1964; Assistant Professor of Economics.
- DOCKERY, CHARLES DWIN (1969); B.A., Earlham College, 1961; M.A., University of Iowa, 1963; Assistant Professor of French.
- DODGE, CLAYTON WILLARD (1956); B.A., Maine, 1956; M.A., 1959; Associate Professor of Mathematics.
- DONNINI, MARY WRIGHT (1955); B.S., Maine, 1938; M.Ed., Boston University, 1964; Extension Agent (Cumberland County), Cooperative Extension Service.
- DONOVAN, JOHN WILLIAM (1969); B.S., Husson, 1964; M.S., Rhode Island, 1969; Extension Agent (Cumberland County), Cooperative Extension Service.

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- DOPHEIDE, WILLIAM RAYMOND (1968); B.S., Western Michigan University, 1952; M.S., Pennsylvania State University, 1955; Ph.D., Michigan State University, 1968; Director of Speech and Hearing Clinic; Professor of Speech.
- DOTY, CHARLES STEWART (1964); B.A., Washburn Municipal University, 1950; M.A., University of Kansas, 1955; Ph.D., Ohio State University, 1964; Associate Professor of History.
- DOUGLASS, RODNEY B. (1968); B.A., Maine, 1965; M.A., Pennsylvania State University, 1967; Assistant Professor of Speech.
- DOWE, PAUL JONES (1948); B.S., Maine, 1948; Extension Agent (Androscoggin-Sagadahoc Counties), Cooperative Extension Service.
- DOYLE, ROBERT G. (1973); B.A., Harvard; M.A., Kansas University; Faculty Associate in Geological Sciences.
- DRUMMOND, ROBERT JOHN (1969); A.B., Waynesburg College, 1949; A.M., Columbia University, 1952; A.M., Teachers College, Columbia University, 1956; Ed.D., 1959; Associate Professor of Education.
- DUBE, GERALD FRELENCE (1964); B.A., Maine, 1963; M.A., 1964; Associate Professor of Computer Science; Assistant Director, Computing and Processing Service.
- DUBORD, OLIVE CONANT (1957); B.S., Maine, 1957; Extension Agent (Franklin County), Cooperative Extension Service.
- DUCHESNEAU, THOMAS D. (1967); A.B., St. Anselm's College, 1963; Ph.D., Boston College, 1969; Associate Professor of Economics.
- DUFOUR, F. PHILIP (1966); B.A., Maine, 1957; Director, State Technical Services; Director, Special Programs.
- DULLEA, GERARD J. (1970); A.B., Boston College, 1965; M.A., Lehigh University, 1967; Instructor in English.
- DUNHAM, WALLACE C. (1966); B.S., University of Vermont, 1952; M.S., Ohio State University, 1956; Ph.D., Cornell, 1971; Associate Professor of Agricultural and Resource Economics.
- DUNLAP, ROBERT DOWNING (1949); B.A., Colgate, 1943; M.S., Pennsylvania State University, 1949; Ph.D., Professor of Chemistry.
- DUNNING, CLEMENT STEVENS (1947); B.S., Maine, 1947; Extension Agent (Cumberland County), Cooperative Extension Service.
- DUPLISEA, ERIC A. (1969); B.S. in Ed., Kent State University, 1963; M.A., 1965; Ed.D., Indiana University, 1969; Assistant Professor of Education.
- DYER, ALICE F. (1969); B.S., Farmington, 1965; M.S., Gorham, 1969; Extension Agent, (Cumberland County), Cooperative Extension Service.
- EGGERT, FRANKLIN PAUL (1949); B.S., Cornell University, 1942; M.S., 1947; Ph.D., 1949; Professor of Horticulture; Dean of Graduate School.
- EISEMAN, JOHN H. II (1971); B.S., University of Delaware, 1969; Extension Agent (Washington County).
- ELLIS, WAYNE (1971); B.A., Columbia Bible College, 1957; B.D., Th.M., Northern Baptist Theological Seminary, 1964; Extension Agent (Kennebec County).
- EMERICK, RICHARD GIBBS (1958); B.A., Syracuse University, 1950; M.A., University of Pennsylvania, 1954; Ph.D., 1960; Professor and Chairman, Department of Anthropology; Director of the Anthropology Museum.
- ERHARDT, WILFRED HENRY (1966); B.S., Southern Illinois University, 1958; M.S., University of Nebraska, 1961; Ph.D., University of Wisconsin, 1966; Vege-

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- table Crops Specialist, Cooperative Extension Service; Assistant Professor of Plant and Soil Sciences.
- EVANS, EMILY BLAIR (1968); B.S., Pennsylvania State University, 1938; M.S., 1943; Extension Agent, (Aroostook County), Cooperative Extension Service.
- EVANS, ROBERT E. (1968); B.S., Pennsylvania State University, 1938; M.S., 1946; Extension Agent, (Aroostook County), Cooperative Extension Service.
- EVERETT, DANIEL C. (1969); B.A., Maine, 1972; Faculty Associate in Journalism.
- EVES, HOWARD WHITNEY (1954); B.S., University of Virginia, 1934; M.S., Harvard, 1936; Ph.D., Oregon State College, 1948; Professor of Mathematics.
- FARLOW, STANLEY JEROME (1968); B.S., Iowa State University, 1959; M.S., State University of Iowa, 1961; Ph.D., Oregon State University, 1967; Associate Professor of Mathematics.
- FARTHING, GENE WILLIAM, JR. (1969); B.A., Grinnell College (Iowa), 1965; M.A., 1967; Ph.D., University of Missouri, 1969; Assistant Professor of Psychology.
- FEICHTINGER, OSKAR (1970); B.A., Wisconsin State University, 1961; M.A., Nebraska, 1964; Ph.D., Montana State, 1969; Associate Professor of Mathematics.
- FELL, HOWARD BARRACLOUGH (1968); M.Sc., Victoria University, 1939; Ph.D., Edinburgh, 1941; D.Sc., 1949; Lecturer in Zoology (Harvard Museum of Comparative Zoology).
- FENN, RICHARD K. (1973); B.A., Yale, 1955; B.D., Episcopal Theological School, Cambridge, Mass., 1958; Th.M., Princeton Theological Seminary, 1966; Ph.D., Bryn Mawr Graduate School, 1970; Associate Professor of Sociology.
- FERGUSON, EDWARD NEIL (1970); B.S., Rensselaer Polytechnic Institute, 1961; M.A., University of Oregon, 1963; Ph.D., 1967; Associate Professor of Mathematics.
- FERWERDA, JOHN A. (1973); Lecturer in Soils.
versity, 1969; Assistant Professor of Electrical Engineering.
- FINK, LLOYD KENNETH, JR. (1969); B.S., University of Illinois, 1961; Ph.D., University of Miami, 1968; Assistant Professor of Oceanography and Cooperating Assistant Professor of Geological Sciences, Ira C. Darling Center.
- FITZGERALD, PETER H. (1966); A.B., Manhattan College, 1961; M.A., Maine, 1965; Ph.D., Stanford, 1972; Assistant Professor of Education and Planning Officer.
- FLOWER, CLARA K. (1969); B.A., Maine, 1968; M.L.S., 1971; Reference Librarian, Raymond H. Fogler Library.
- FLOWER, ERIC S. (1970); B.A., C.W. Post College, 1970; M.L.S., University of Maine (Orono), 1972; Reference Librarian, Raymond H. Fogler Library.
- FOLEY, HOWARD M. (1970); B.S., Maine, 1952; J.D., University of Virginia, 1955; Coordinator and Associate Professor of Law Enforcement, University of Maine at Bangor.
- FOLEY, KATHRYN A. (1964); B.M., Manhattanville College, 1957; M.M., Villa Schifanoia, 1958; Associate Professor of Music.
- FOLGER, PHILLIP EMMONS, JR. (1966); B.A., Middlebury College, 1962; Instructor in Physical Education, Head Coach of Skiing and Tennis, Freshman Soccer Coach.
- FOLSOM, CLYDE H., JR. (1965-67), (1968-69), (1970); B.A., Ricker College, 1959; M.Ed., Pennsylvania State University, 1965; Ed.D., Maine, 1971; Staff Counselor and Cooperating Assistant Professor of Education.
- FORSGREN, RODERICK ALFRED (1965); B.B.A., University of Minnesota, 1952; B.S., St. Cloud State, 1956; M.B.A., University of Denver, 1959; D.B.A., Univer-

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- sity of Colorado, 1965; Professor of Management, College of Business Administration; Associate Dean of the Graduate School.
- FORSYTHE, HOWARD YOST, JR. (1969); B.S., Maine, M.S., Cornell University, 1960; Ph.D., 1962; Associate Professor of Entomology.
- FOX, JOSEPH M. (1955-1971) (1971); B.S., Gorham State College, 1949; M.Ed., Maine, 1959; Director of Admissions and Counseling, University of Maine at Bangor.
- FOX, RICHARD R. (1961); B.S., University of Connecticut, 1956; M.S., University of Minnesota, 1958; Ph.D., 1959; Lecturer in Animal and Veterinary Sciences.
- FRANK, JAMES A. (1971); B.S., Ohio University, 1963; M.S., University of Illinois, 1969; Ph.D., 1970; Faculty Associate in Botany and Plant Pathology.
- FRASER, BARBARA JOAN (1969); B.S., Cornell University, 1956, M.Ed., Maine, 1968; Assistant Professor of Home Economics Education.
- FREEMAN, STANLEY LEONARD, JR. (1952); B.A., Bates, 1948; M.A., Teachers College, Columbia University, 1950; Ed.D., 1957; Professor of Education; Vice Chancellor for Academic Affairs.
- FRENCH, FOREST M. (1971); B.A., Maine, 1961; M.A.R.E., 1970; Assistant Resource Economist and Community Development Specialist.
- †FRENCH, PAULETTE (1969); B.A., Colby College, 1963; Certificat de Professeur de Français a l'étranger, University of Paris, 1964; M.A., University of Maryland, 1967; Ph.D., University of Colorado, 1971; Assistant Professor of Romance Languages and Assistant to the Vice President for Academic Affairs.
- FREY, ROGER B. (1962); B.A., 1956; M.A., 1960; Ph.D., Maine, 1966; Associate Professor of Psychology and Assistant Dean, College of Arts and Sciences.
- FRIEL, LEROY LAWRENCE (1970); B.S., West Virginia University, 1962; M.S., 1963; Assistant Professor of Civil Engineering.
- FRIES, RUSSELL I. (1973); B.A., Yale, 1963; M.A., Johns Hopkins, 1970; Ph.D., 1972; Assistant Professor of History.
- FUENTES, GREGORIO J. (1967); Litentiate in Mathematical Sciences, University of Madrid, 1953; M.A., Rutgers University, 1966; Assistant Professor of Mathematics.
- GALBIS, IGNACIO RICARDO (1966); LL.D., University of Havana, 1952; M.A., Mississippi State University, 1966; Ph.D., Syracuse, 1973; Associate Professor of Spanish.
- GALL, ARTHUR (1965); B.S., North Dakota State University, 1951; M.S., 1965; Extension Entomologist, Cooperative Extension Service.
- GALLAGHER, JAMES E. (1971); A.B., Middlebury College, 1962; M.A., Indiana University, 1968; Ph.D., 1972; Assistant Professor of Sociology.
- GARDNER, WOFFORD GORDON (1946); A.B., Southwestern College, 1935; M.A., Northwestern University, 1941; Ph.D., 1952; Professor and Chairman, Department of Speech.
- GARWOOD, LILLIAN W. (1972); B.S.M., Nyack Missionary College, 1955; M.M., Manhattan School of Music, 1958; Instructor in Music (part-time).
- GARWOOD, SAM (1971); B.S., Nyack Missionary College, 1958; M.A., New York University, 1962; M.L.S., Rutgers University, 1966; Head, Cataloging Division, Raymond H. Fogler Library.
- GEIGER, WILLIAM ROGER (1965); B.E.S., Fenn College, 1961; M.S., Western Reserve University, 1964; Ph.D., 1965; Associate Professor of Mathematics.

PERSONNEL

- GELINAS, DOUGLAS ALFRED (1968); B.S., Fitchburg State College, 1963; M.S., Purdue University, 1966; Ph.D., 1968; Associate Professor of Botany.
- GEORGITIS, WILLIAM J. (1956); B.S., Bowdoin, 1942; M.S., Maine, 1949; Associate Professor of Chemistry.
- GERRY, RICHARD WOODMAN (1948); B.S., Maine, 1938; M.S., Purdue, 1946; Ph.D., 1948; Professor of Poultry Science.
- GERSHMAN, ELAINE SONIA (1965); B.S., Maine, 1963; M.Ed., 1965; Assistant Professor of Psychology and Assistant Dean, College of Arts and Sciences.
- GERSHMAN, MELVIN (1958); B.Sc., Ohio State University, 1954; M.Sc., University of Massachusetts, 1957; Associate Professor of Microbiology, Associate Professor of Animal Pathology, Agricultural Experiment Station.
- GETCHELL, AMASA STANLEY (1941); B.S., Maine, 1938; M.S., 1940; Associate Professor of Chemistry, Agricultural Experiment Station.
- GHIZ, RONALD G. (1966); B.F.A., Massachusetts College of Art, 1964; M.F.A., Ohio State University, 1966; Associate Professor of Art.
- GHOSH, MRIGANKA MOULI (1968); B. Tech., Indian Institute of Technology, 1958; M.S., University of Illinois, 1962; Ph.D., 1965; Associate Professor of Civil Engineering.
- GIBBS, HAROLD C. (1971); B.S., McGill University, 1951; V.S. D.V.M., Ontario Veterinary College, 1955; M.S., McGill, 1956; Ph.D., 1958; Professor of Animal and Veterinary Sciences; Extension Veterinarian; Acting Chairman, Department of Animal and Veterinary Sciences.
- GIBBS, KATHLEEN E. (1971); B.S., McGill University, 1952; M.S., 1957; Ph.D., 1971; Faculty Associate in Entomology.
- GIBSON, RICHARD CUSHING (1967); S.B., Massachusetts Institute of Technology, 1942; S.M., 1946; Sc.D., 1953; Professor and Chairman, Department of Electrical Engineering.
- GIDDINGS, EDWIN LATHROP (1946-48) (1968); B.S., Maine, 1933; M.F., Yale University, 1934; Associate Professor of Forest Resources; Forestry Specialist; Assistant to the Director, School of Forest Resources.
- GILLESPIE, JAMES DUFF (1950); B.S., Bradley University, 1949; M.A., 1951; Associate Professor of Speech.
- GLENN, ROLLIN C. (1973); B.S., Virginia Polytechnic, 1955; M.S., 1957; Ph.D., University of Wisconsin, 1959; Professor and Chairman, Department of Plant and Soil Sciences.
- GOATER, JOHN C., JR. (1955); B.S., Virginia Polytechnic Institute, 1948; M.S., New Hampshire, 1970; Assistant Professor of Animal Sciences and Livestock Specialist, Cooperative Extension Service.
- GODOMSKY, STEPHEN F., JR. (1972); B.S., Central Connecticut State College, 1960; M.A.T., Indiana University, 1966; Ed.D., 1970; Lecturer in Education.
- GODWIN, KATHRYN H. (1967); B.A., Otterbein College, 1950; Administrative Officer, Bureau of Public Administration.
- GODWIN, ROBERT C. (1967); B. Mus., University of Jacksonville, 1956; M. Mus., Eastman School of Music, University of Rochester, 1957; D.M.A., University of Illinois, 1966; Professor and Chairman, Department of Music.
- GOLD, JOEL A. (1968); B.A., Toledo University, 1961; M.A., 1963; Ph.D., Colorado State University, 1966; Associate Professor of Psychology.
- GOLTZ, STEWART M. (1973); B.S., Los Angeles City College, 1952; M.S., University of California (Davis); Ph.D., University of Wisconsin, 1971; Assistant Professor of Climatology.

UNIVERSITY OF MAINE

- GOODFRIEND, PAUL LOUIS (1966); B.S., The University of Virginia, 1952; Ph.D., Georgia Institute of Technology, 1957; Professor of Chemistry.
- GOODMAN, JEAN SALZMANN (1963); Ph.B., University of Wisconsin, 1942; M.S., University of Minnesota, 1963; C.P.A., State of Wisconsin, 1947; Associate Professor of Accounting, College of Business Administration.
- GORHAM, JOHN FRANCIS (1953); B.S., Maine, 1950; M.S., 1952; Associate Professor of Chemical Engineering.
- GORRILL, WILLIAM ROY (1948); Northeastern University, 1948; M.S., Maine, 1956; P.E., (Maine); Professor of Civil Engineering.
- GOUIN, ARTHUR NELSON, JR. (1967); B.A., Maine, 1953; M.Ed., 1962; Extension Agent (Oxford County), Cooperative Extension Service.
- GOULD, CHARLES SEWELL (1966); B.S., Rutgers, 1949; M.S., 1951; Extension Agent (Androscoggin-Sagadahoc Counties), Cooperative Extension Service.
- GRAN, TRACY R. (1972); B.A., University of Minnesota, 1961; M.A., University of Massachusetts, 1963; Assistant Professor of Sociology, University of Maine at Bangor.
- GRANT, CHARLES OSCAR (1962); B.A., Maine, 1958; Ph.D., University of Buffalo, 1962; Lecturer in Psychology; Director, Counseling Center.
- GRANT, DONALD ANDREW (1956); B.S., Maine, 1956; M.S., 1963; P.E. (Maine); Ph.D., Rhode Island, 1969; Associate Professor of Mechanical Engineering.
- GRANT, WALTER J. (1960); B.S., Maine, 1955; M.S., 1957; Faculty Associate in Plant and Soil Sciences.
- GRAVES, ROBERT ALEXANDER (1959); M.D., University of Rochester, 1948; Director, Student Health Center.
- GRAY, ASHLEY CLEMENT (1968); B.S., Farmington State College, 1952; M.Ed., Maine, 1955; Ph.D., University of Connecticut, 1967; Associate Professor of Education.
- GRAY, DURWOOD EARL (1963); B.S., Maine, 1963; Extension Agent (Washington County), Cooperative Extension Service.
- GRAY, GLEASON LINWOOD (1968); B.S., Maine, 1968; M.S., 1970; Assistant Professor of Agricultural Engineering.
- GREEN, BRIAN (1962-63) (1965); B.Sc., Liverpool University, England, 1956; Ph.D., 1959; Associate Professor of Chemistry.
- GREEN, EDWARD J. (1971); B.A., University of California at Santa Barbara, 1958; Ph.D., Massachusetts Institute of Technology, 1965; Associate Professor of Oceanography and Cooperating Associate Professor of Geological Sciences, Darling Center.
- GREENWOOD, GEORGE WATKINS (1963); B.S., Maine, 1951; M.S., University of Illinois, 1960; Ph.D., 1963; Professor of Civil Engineering.
- GREGORY, RICHARD W. (1969); B.S., Colorado State University, 1958; M.S., University of Washington, 1962; Ph.D., Colorado State, 1969; Assistant Professor of Zoology; Assistant Leader, Cooperative Fisheries Unit.
- GRENCI, BRUNO M. (1966); B.S., Maine, 1953; Instructor in General Engineering Technology.
- GRIFFIN, CONRAD WILSON (1963); B.S., University of Connecticut, 1955; M.S., Kansas State University, 1960; Administrative Officer, Cooperative Extension Service.
- GRIFFIN, RALPH HAWKINS (1956); B.S., Virginia Polytechnic Institute, 1943; M.F., Yale University, 1947; D.F., Duke University, 1956; Professor of Forest Resources.

- GROSS, MARY L. (1959); B.A., Stanford University, 1934; M.A., 1936; Assistant Professor of Spanish.
- GROSS, STUART MURRAY (1948); A.B., Stanford University, 1932; M.A., 1936; Professor of Spanish.
- GUESMAN, ARTHUR O. (1973); B.A., University of Pittsburgh, 1954; M.A., 1957; Assistant Professor of Journalism.
- GUPTA, RAMESH C. (1972); B.A., Pangal University, 1955; M.A., University of Delhi, 1958; M.S., University of Illinois, 1966; Ph.D., Wayne State University, 1970; Assistant Professor of Mathematics.
- GUPTILL, CARLETON S. (1970); A.B., Emory University, 1950; M.A., 1951; Ph.D., Duke University, 1965; Associate Professor of Sociology; Chairman, Department of Sociology.
- GUSHEE, NELLIE IRENE (1966); B.S., Maine, 1962; M.S., 1966; Nutrition Specialist, Cooperative Extension Service.
- GUTMAN, DANIEL (1968); B.S., City College of New York, 1946; Licence-es-lettres, University of Paris, 1950; Ph.D., University of Texas, 1970; Associate Professor of Linguistics.
- HAAS, MARY ANN (1965); B.A., Nemo State Teachers College, Missouri, 1954; M.A., 1955; Ph.D., University of Iowa, 1966; Associate Professor of Physical Education and Education; Assistant Vice Chancellor for Academic Affairs.
- HACKETT, EDWARD W., JR. (1963); B.A., Maine, 1952; M.Ed., 1953; Director, Continuing Education Division at Orono; Director of Summer Session at Orono.
- HAGGARD, GARY (1970); B.S., Seattle University, 1962; M.S., Purdue, 1964; Ph.D., 1968; Associate professor of Mathematics.
- HAKOLA, JOHN WILLIAM (1959); B.A., Montana State University, 1950; M.A., 1951; Ph.D., Indiana University, 1961; Professor of History and Research Associate, Bureau of Labor Education.
- HAKOLA, JUDITH A. (1965); B.A., Colby College, 1961; M.A., Maine, 1965; Instructor in Special Studies (part-time).
- HALE, RICHARD AUGUSTUS, II (1966); B.S., Maine, 1947; M.F., Yale University, 1948; Associate Professor of Wood Technology.
- HALL, AVAIRD EDWARD (1965); Instructor in Mechanical Engineering (Technical Institute Division).
- HALL, BRADFORD ALLYN (1962); B.A., Maine, 1955; M.Sc., Brown University, 1959; Ph.D., Yale, 1964; Associate Professor of Geological Sciences.
- HALL, DOUGLAS AREY (1965); B.A., Maine, 1959; M.A., University of Colorado, 1965; Assistant Professor of German.
- HALL, LOUIS O. (1971); B.S., University of Illinois, M.S., 1971; Instructor in Music.
- HALL, MILLARD WAYNE (1966); B.E., Vanderbilt University, 1962; M.S., University of Illinois, 1963; Ph.D., 1968; Director, Land and Water Resources Center and Associate Professor of Civil Engineering.
- HALLEE, NEAL D. (1967); B.S., Maine, 1966; M.S., 1968; Agricultural Engineer (Marketing), Cooperative Extension Service.
- HALLMAN, LUDLOW B. (1970); B. Mus., Oberlin, 1963; M. Mus., Southern Illinois University, 1965; Kapellmeister Diplom, Mozarteum, Salzburg, Austria, 1970; Assistant Professor of Music.
- HAMILTON, BROOKS WITHAM (1952); A.B., Bates, 1941; Professor of Journalism.

UNIVERSITY OF MAINE

- HAMILTON, KEITH E. (1966); B.S.E.E., Rutgers University, 1960; M.S., University of Colorado, 1966; P.E. (Maine); Associate Professor of Electrical Engineering Technology.
- HAMILTON, WAYNE ANDREW (1960); B.S., Ohio Northern University, 1958; M.S., Case Institute of Technology, 1960; Ph.D., Oklahoma State University, 1967; P.E., (Ohio, Maine), Professor and Chairman, Department of Civil Engineering.
- HAMM, PHILLIP LORD (1952); B.S. in Ed., Maine, 1943; M.A., 1955; Associate Professor of Mathematics.
- HAMMER, MAX (1961); B.S., City College of New York, 1956; Ph.D., University of North Dakota, 1961; Professor of Psychology.
- HANNULA, THOMAS ANDREW (1966); B.S., University of Illinois, 1962; M.S., 1964; Ph.D., 1967; Associate Professor of Mathematics.
- HARLAN, REGINALD KELSEY (1968); B.S., Texas Technical College, 1949; M.S., 1954; Ph.D., Ohio State University, 1961; Associate Professor of Agricultural and Resource Economics.
- HARMON, GERALD STEARNS (1953-1956) (1962); B.A., Maine, 1953; M.S., 1956; Ph.D., Agricultural and Mechanical College of Texas, 1962; Associate Professor of Physics.
- HARMON, JAMES ARNOLD (1946-1955) (1956); B.S. in Ed., Maine, 1940; Director of Admissions.
- HARPER, JOHN FRANK, JR. (1960); B.S., United States Naval Academy, 1931; M.S., Purdue, 1960; Associate Professor of Mathematics .
- HARRIMAN, EDWIN ALLAN (1965); B.S., Maine, 1959; Extension Agent (Somerset County), Cooperative Extension Service.
- HARRIMAN, LEON C. (1971); B.S., Maine, 1965; Instructor in Physical Education, Assistant Football Coach.
- HARRIS, PAUL CHAPPELL (1959); B.Sc., McGill University, 1952; M.S., University of Maryland, 1956; Ph.D., 1960; Associate Professor of Poultry Science.
- HART, JAMES EMMET (1968); B.S. in Ed., Ohio State University, 1960; M.A. in Ed., Ball State University, 1965; Ed.D., 1968; Assistant Professor of Education.
- HARTGEN, FRANCES C. (1967); A.B., Syracuse University, 1937; M.Ed., Maine, 1953; M.L.S., 1969; Head, Special Collections, Raymond H. Fogler Library.
- HARTGEN, VINCENT ANDREW (1946); B.F.A., University of Pennsylvania, 1941; M.F.A., 1942; John Homer Huddilston Professor of Art and Chairman, Department of Art.
- HARTMAN, MARYANN (1969); B.A., Westminster College, 1949; M.A., Kent State University, 1965; Ph.D., Bowling Green State University, 1969; Assistant Professor of Speech.
- HASBROUCK, SHERMAN ST. CLAIR (1966); B.A., Yale, 1950; M.P.A., The Maxwell School, Syracuse University, 1951; Master of Urban Studies, Yale, 1965; Community Development Specialist, Cooperative Extension Service.
- HASKELL, STUART PHELPS, JR. (1957-65) (1966); B.A., Maine, 1956; Business Manager of Intercollegiate Athletics.
- HATCH, RICHARD WALLACE (1962); B.S., Tufts University, 1950; M.S., Cornell University, 1956; Ph.D., 1959; Associate Professor of Zoology; Leader, Cooperative Fishery Unit.

- HATLEN, BURTON NORVAL (1967); B.A., University of California at Berkeley, 1958; M.A., Columbia, 1959; M.A., Harvard, 1961; Ph.D., University of California, (Davis), 1971; Associate Professor of English.
- HAYES, JAMES ARTHUR (1968); A.B., DePauw University, 1952; M.A., University of Chicago, 1959; Assistant Professor of German.
- HAYES, KENNETH PHILBRICK (1965); B.A., Maine, 1960; M.A., Yale, 1963; Ph.D., University of Massachusetts, 1969; Associate Professor of Political Science.
- HAYNES, JULIAN F. (1969); B.A., Rice University, 1960; Ph.D., Western Reserve University, 1964; Associate Professor of Zoology and Chairman, Department of Zoology.
- HEALD, WALTER R. (1972); B.S., Colorado State, 1947; M.S., Washington State College, 1949; Ph.D., Purdue, 1953; Faculty Associate in Plant and Soil Sciences.
- HELMKE, JOHN (1968); B.S., Maine, 1966; M.A., 1970; Assistant Professor of Political Science.
- HENDERSON, JAMES STEPHEN (1969); B.A., Maine, 1965; M.A., Emory University, 1967; Ph.D., 1968; Assistant Professor of Political Science.
- HEPLER, PAUL RAYMOND (1956); B.S., Michigan State College, 1948; M.S., University of Illinois, 1950; Ph.D., 1956; Associate Professor of Horticulture.
- HERBOLD, ANTHONY E. (1970); B.A., Stanford, 1955; M.A., University of Michigan, 1960; Ph.D., 1963; Associate Professor of English.
- HERLAN, JAMES J. (1966); A.B., Yale, 1957; M.A., Maine, 1967; Coordinator of Foreign Language Laboratory and Lecturer in French.
- HERLIHY, GERALD MCMORROW (1970); B.S., Vermont, 1960; M.S., Long Island University, 1968; Director of ONWARD.
- HESS, CHARLES THOMAS (1969); B.A., Wabash College (Indiana), 1962; Ph.D., Ohio University, 1967; Assistant Professor of Physics.
- HIDU, HERBERT (1970); B.S., Connecticut, 1949; M.S., Pennsylvania State University, 1960; Ph.D., Rutgers, 1967; Associate Professor of Oceanography and Cooperating Associate Professor of Zoology, Ira C. Darling Center.
- HILL, BERYL BARTON (1945-1951) (1958); B.S., Massachusetts State University, 1940; Extension Agent (Androscoggin-Sagadahoc Counties), Cooperative Extension Service.
- HILL, RICHARD CONRAD (1946); B.S., Syracuse, 1941; P.E., (Maine); Professor of Mechanical Engineering; Director, Technology Honors Program; Director, Department of Industrial Cooperation.
- HITCHENS, DONNA J. (1970); B.S., Springfield College, 1969; M.Ed., 1970; Associate Director of Residential Life.
- HJELM, RALPH O. (1969); B.A., Uppsala College, 1944; B.D., Augustana Theological Seminary, 1947; S.T.M., Union Theological Seminary, 1949; Ph.D., Harvard University, 1954; Professor of Philosophy.
- HODGKINS, LAURENCE WHITNEY (1954); B.S., 1950; M.S., Maine, 1969; Extension Agent (Kennebec County), Cooperative Extension Service.
- HOFSTRA, PETER C. (1967); A.B., Calvin College, 1939; M.D., University of Michigan, 1943; Lecturer in Animal Sciences (The Animal Medical Center, New York City).
- HOGAN, JEANNE L. (1965); B.A., Douglass College, Rutgers University, 1944; Head, Interlibrary Loan Division, Raymond H. Fogler Library.
- HOGAN, JOHN MATTHEW (1961); B.Sc., Rutgers, 1941; Ph.D., 1949; Professor and Chairman, Department of Food Science.

UNIVERSITY OF MAINE

- HOLBROOK, FREDERICK RANDALL (1970); B.S., New Hampshire, 1961; M.S., Massachusetts, 1962; Ph.D., 1967; Faculty Associate in Entomology.
- HOLLIN, JOHN T. (1971); B.A., Oxford, 1953; Ph.D., Princeton University, 1972; Associate Professor of Geological Sciences and Quaternary Studies.
- HOLMES, EDWARD MORRIS (1956); A.B., Dartmouth, 1933; M.Ed., Maine, 1954; A.M., Brown, 1956; Ph.D., 1962; Professor of English.
- HOLT, CHARLES FRANCIS (1963); B.S., Maine, 1950; M.S., Cornell, 1961; Field Program Coordinator, Cooperative Extension Service.
- HOLYOKE, VAUGHN H. (1958); B.S., Maine, 1956; M.S., Rutgers, 1961; Associate Professor of Agronomy.
- HOMANS, MARGARET T. (1970); B.S., Maine, 1957; M.Ed., 1970; Instructor in Women's Physical Education (part-time); University of Maine at Bangor.
- HOMOLA, RICHARD L. (1966); B.S., Muhlenberg College, 1956; M.S., University of Vermont, 1962; Ph.D., University of Michigan, 1969; Associate Professor of Botany.
- HOOPER, HENRY O. (1973); B.S., University of Maine, 1956; M.S., Brown University, 1959; Ph.D., 1961; Professor and Chairman, Department of Physics.
- HOOPER, ROGER BRAY (1964); A.B., Tufts University, 1950; M.A.L.S., Wesleyan University, 1960; M.A., Bowdoin, 1963; Associate Professor of Mathematics.
- HOOVER, WILLIAM H. (1962); B.S., Pennsylvania State University, 1956; M.S., 1958; Ph.D., 1961; Professor of Animal Sciences.
- HORAN, JAMES FRANCIS (1965); B.A., University of Connecticut, 1958; Ph.D., 1972; Associate Professor of Political Science.
- HORNE, PETER J. (1973); B.A., University of New Hampshire, 1958; M.Ed., 1966; Extension Agent (York County).
- HOUGH, ELDRED WILSON (1969); B.S., University of Illinois, 1939; M.S., California Institute of Technology, 1941; Ph.D., 1943; P.E., (Maine, Texas, California); Professor of Chemical Engineering, Dean, College of Technology.
- HOUSE, ROBERT G. (1971); B.A., Michigan State University, 1968; M.B.A., Indiana University, 1970; D.B.A., 1972; Assistant Professor of Marketing.
- HOWD, FRANK HAWVER (1959); A.B., University of Rochester, 1951; M.S., 1953; Ph.D., Washington State University, 1956; Associate Professor of Geological Sciences.
- HSU, YU KAO (1971); B.S., National Central University, Nanking, 1948; M.S., University of Maryland, 1953; M.S., University of Illinois, 1962; Ph.D., Rensselaer Polytechnic Institute, 1966; Associate Professor and Coordinator in Mathematics, University of Maine at Bangor.
- HUFF, EDWARD R. (1965); B.S., Maine, 1952; M.S., 1966; Associate Professor of Agricultural Engineering.
- HUNTER, JAMES HERBERT (1957); B.S., Maine, 1953; M.S., 1957; P.E. (Maine); Associate Professor of Agricultural Engineering, Agricultural Experiment Station, Presque Isle, Maine Potato Handling Research Center.
- HUNTING, ROBERT STILWELL (1968); B.S., Boston University, 1938; M.A., 1939; Ph.D., Brown University, 1951; Professor and Chairman, Department of English.
- HUNTLEY, CHARLOTTE L. (1961); B.A., University of Maine, 1970; M.L.S., 1972; Head, Reserve Division, Raymond H. Fogler Library.
- HUQ, ABUL MOAZZAMUL (1969); B.A., Dacca University (East Pakistan), 1949; M.A., Harvard University, 1952; Ph.D., 1954; Professor of Economics.

- HUTCHINSON, FREDERICK E. (1953); B.S., Maine, 1953; M.S., 1958; Ph.D., Pennsylvania State University, 1966; Professor of Soils, Dean, College of Life Sciences and Agriculture, and Director, Maine Agricultural Experiment Station.
- HYATT, ELIZABETH R. (1968); B.S., Maine, 1956; Instructor in Human Development (part-time).
- HYATT, STEPHEN (1962); B.A., Maine, 1957; M.S., Pennsylvania State University, 1961; Associate Professor of Sociology, University of Maine at Bangor.
- IRONS, FRED H. (1967); B.E.E., Ohio State University, 1956; M.S.E.E., Massachusetts Institute of Technology; E.E., 1961; Ph.D., Lehigh University, 1971; Associate Professor of Electrical Engineering.
- ISMAIL, AMR ABDELFAH (1969); B.Sc., University of Cairo (Egypt), 1960; M.S., University of Massachusetts, 1965; Ph.D., Maine, 1969; Assistant Professor of Horticulture and Blueberry Specialist.
- IVES, EDWARD D. (1955); A.B., Hamilton College, 1949; M.A., Columbia University, 1950; Ph.D., Indiana University, 1962; Professor of Folklore and Director of Northeast Archives of Folklore and Oral History.
- JACOBS, RICHARD MORRIS (1963); B.A., Colorado State College, 1956; M.A., 1957; M.F.A., State University of Iowa, 1959; Ph.D., 1964; Associate Professor of Music.
- JACOBS, SALLY C. (1963-1969) (1971); B.A., Colorado State College, 1958; M.S., State University of Iowa, 1963; Instructor in Biochemistry (part-time).
- JAEGER, GILBERT BEYER (1948); B.S., Cornell University, 1942; Area Poultry Specialist, Cooperative Extension Service.
- JEFFREY, WILLIAM HARTLEY (1946); A.B., Drew, 1942; M.A., University of Michigan, 1944; Ph.D., University of Colorado, 1950; Professor and Chairman of History Department.
- JENNEWEIN, JOHN L. (1970); B.S., South Dakota State University, 1966; M.A., Connecticut, 1969; Instructor in Child Development.
- JENSEN, BRUCE L. (1972); B.S., Western Michigan University, 1966; Ph.D., 1970; Assistant Professor of Chemistry.
- JENSEN, ROBERT EUGENE (1968); B.S., University of Denver, 1960; M.B.A., 1961; Ph.D., Stanford University, 1965; Nicolas M. Salgo Professor of Business Administration, College of Business Administration.
- JOHNSON, ARTHUR MENZIES (1968); A.B., Harvard College, 1944; M.A., 1948; Ph.D., Vanderbilt, 1954; A. and A. Bird Professor of History.
- **JOHNSON, EDWARD G., JR. (1967); B.S., Ball State University, 1948; M.A., 1953; Ed.D., University of Toledo, 1967; Associate Professor of Education.
- JOHNSON, JEREMEY E. (1968); B.S., Cornell, 1951; M.S., 1956; Director, Computing and Processing Service; Associate Professor of Mechanical Engineering.
- JOHNSON, RICHARD ANDREW (1963); B.S., Maine, 1954; M.S., 1960; Extension Agent (Piscataquis County), Cooperative Extension Service.
- JOHNSON, RUTH D. (1971); B.S., University of Maine (Orono), 1946; Home Economist (Aroostook County).
- JOHNSON, STANLEY LLOYD (1969); B.S., Cornell University, 1956; Ph.D., 1965; Assistant Professor of Biochemistry.

UNIVERSITY OF MAINE

- JOHNSTON, EDWARD FRANKLIN (1954); B.S., Maine, 1953; M.S., Pennsylvania State University, 1955; Associate Professor of Agricultural and Resource Economics, Agricultural Experiment Station.
- JORDAN, EMERY R. (1971); Assistant Professor of Law Enforcement, University of Maine at Bangor.
- JORDAN, WESLEY DINGLEY (1965); B.S. in Ed., Maine, 1962; M.Ed., 1969; Assistant Professor of Physical Education and Head Athletic Trainer.
- KAKALIK, JOHN SEWALL (1969); B.A., Michigan State University, 1965; Ph.D., 1973; Assistant Professor of Marketing.
- KANDUTSCH, ANDREW AUGUST (1966); B.A., Ripon College, 1950; M.S., University of Wisconsin, 1952; Ph.D., 1954; Lecturer in Zoology (Jackson Laboratory).
- KAPLAN, ARTHUR MARK (1958); B.A., Maine, 1949; M.A., Boston University, 1950; Ph.D., Cornell University, 1956; Professor of Psychology; Vice President for Student Affairs.
- KAPLAN, DORIS F. (1965); B.S., Pratt Institute, 1942; M.A., Teachers College, Columbia University, 1945; M.L.S., Maine, 1967; Reference Librarian (part-time), Raymond H. Fogler Library.
- KARUSH, GERALD E. (1972); B.A., University of Pennsylvania, 1965; M.A., Brown University, 1967; Assistant Professor of Sociology.
- KAY, WILLIAM J. (1972); B.S., Michigan State University, 1961; D.V.M., 1963; Lecturer in Animal and Veterinary Sciences.
- KAZMERSKI, LAWRENCE L. (1971); B.S., University of Notre Dame, 1967; M.S., 1968; Ph.D., 1970; Assistant Professor of Electrical Engineering.
- KEANE, ROBERT E. (1968); B.A., Maine, 1960; Director of Personnel (classified).
- KEARNEY, HAROLD MORTON (1965); A.B., Colby, 1947; M.Ed., Boston University, 1959; Ed.D., 1962; Youth Education Specialist, Cooperative Extension Service.
- KENDA, MARGARET E. (1968-71) (1972); B.A., Northwestern University, 1964; M.A., University of Iowa, 1965; Ph.D., 1971; Assistant Professor of English.
- KENDA, WILLIAM VINCENT (1967); B.S., Northwestern University, 1964; M.F.A., University of Iowa, 1966; Assistant Professor of English.
- KEYO, HOWARD ARTHUR (1946); B.S., Boston University, 1931; Director of Public Information and Central Services.
- KING, F. RICHARD (1967); B.S., University of Massachusetts, 1957; M.S., 1963; Ph.D., University of Connecticut, 1972; Assistant Professor of Agricultural and Resource Economics.
- KITTRIDGE, CHARLES W. (1955); B.S., Maine, 1949; Agricultural Engineer, Cooperative Extension Service.
- KLEINSCHMIDT, GARY D. (1972); B.S., University of Wyoming, 1966; M.S., 1968; Ph.D., University of Illinois; 1972; Area Potato Specialist.
- KLINGE, ALFRED FREDERICK (1965); B.S., Purdue University, 1952; M.S., 1955; Ph.D., University of California, (Los Angeles), 1965; Professor of Agricultural Engineering.
- KLOCKO, DAVID G. (1971); B.S., State University College, Potsdam, 1966; M.A., University of Michigan, 1967; Instructor and Coordinator of Music, Director of Band, University of Maine at Bangor.
- KNIGHT, FRED B. (1972); B.S., Maine, 1949; M.F., Duke University, 1950; D.F., 1956; Dwight B. Demeritt Professor of Forest Resources and Director, School of Forest Resources.

- KONTIO, RAE CLARK (1961); B.S., Maine, 1958; M.S., 1970; Extension Agent (Kennebec County), Cooperative Extension Service.
- KRALL, KENNETH B. (1965); A.B., Gettysburg College, 1959; M.S., Syracuse University, 1960; Instructor in Journalism (part-time).
- KROFTA, RAYMOND NORBET (1966); B.S., University of Wisconsin, 1958; M.S., 1961; Ph.D., 1962; Associate Professor of Agricultural and Resource Economics.
- KRUEGER, GEORGE CORWIN (1950); A.B., Reed, 1945; Ph.D., Brown, 1951; Professor of Physics.
- KULBERG, GORDON ERIC (1966); B.S., Tufts, 1956; M.S., Iowa State University, 1958; Ph.D., Vanderbilt University, 1965; Associate Professor of Psychology.
- KULBERG, JANET MARIE (1967); B.S., Iowa State University, 1955; M.A., Columbia University, 1957; Ph.D., George Peabody College, 1967; Assistant Professor of Psychology.
- KUTSCHA, NORMAN PAUL (1968); B.S., Syracuse, 1959; M.S., Wisconsin, 1961; Ph.D., Syracuse, 1967; Associate Professor of Wood Technology.
- LABER, LARRY JACKSON (1970); B.S., Vermont, 1959; M.S., 1961; Ph.D., University of Chicago, 1967; Assistant Professor of Botany.
- LAFFERTY, HELEN KATHLEEN (1968); B.S., Farmington State College, 1966; M.S., Cornell, 1968; Instructor in Textiles and Clothing.
- LANGFORD, ERIC SIDDON (1969); S.B., Massachusetts Institute of Technology, 1959; M.S., The State University, Rutgers, 1960; Ph.D., 1963; Associate Professor of Mathematics.
- LANGILLE, ALAN RALPH (1967); B.Sc., MacDonald College of McGill University, 1960; M.S., University of Vermont, 1962; Ph.D., Pennsylvania State University, 1967; Associate Professor of Agronomy and Cooperating Associate Professor of Botany.
- LAWRENCE, ROBERT T. (1969); B.S., Husson, 1958; M.S., Maine, 1965; Instructor in Accounting (part-time).
- LEACH, ROGER STANFORD (1963); B.S., Maine, 1952; M.S., Pennsylvania State University, 1954; Ph.D., 1956; Field Program Coordinator, Cooperative Extension Service.
- LEBLANC, LORRAINE M. (1945); Head, Acquisitions Division, Raymond H. Fogler Library.
- LEE, LIN (1966); B.S., National Taiwan University, 1957; M.S., Michigan Technological University, 1961; Sc.D., Washington University (St. Louis), 1967; Associate Professor of Mechanical Engineering.
- LEONARD, DAVID E. (1970); B.S., Connecticut, 1956; M.S., 1958; Ph.D., 1964; Associate Professor of Entomology.
- LEONARD, HERBERT ARTHUR (1939); B.S., Maine, 1939; M.S., Cornell University, 1950; Professor of Animal Sciences and Farm Manager.
- LERNER, JOSEPH (1968); B.S., Rutgers University, 1963; Ph.D., 1967; Associate Professor of Biochemistry.
- *LEWIS, MICHAEL HOWARD (1966); B.S., State University College, New Paltz, New York, 1963; M.A., Michigan State University, 1964; Associate Professor of Art.
- LIBBEY, WALDO MCCLURE (1943); B.S., Maine, 1943; S.M., Massachusetts Institute of Technology, 1951; Ph.D., Worcester Polytechnic Institute, 1969; Professor of Electrical Engineering.

UNIVERSITY OF MAINE

- LIBBY, MERTON EUGENE (1952); B.S., Maine, 1948; M.S., 1960; Extension Agent (Penobscot County), Cooperative Extension Service.
- *LIBBY, WINTHROP CHARLES (1934); B.S., Maine, 1932; M.S., 1933; LL.D., Ricker College, 1968; Professor of Agronomy.
- LINDLOF, JOHN ALAN (1962); B.A., Yale, 1947; M.Ed., Temple University, 1953; M.Ed. in Science, University of New Mexico, 1960; Professor of Education.
- LITTLEFIELD, LYLE (1947-51) (1954); B.S., Maine, 1945; M.S., 1952; Assistant Professor of Ornamental Horticulture and Landscape Specialist.
- LITTLEFIELD, ROBERT HAROLD (1968); B.A., Colby College, 1960; M.A., Tufts University, 1963; Instructor in Physics.
- LOCKE, PHILIP MOSIMAN (1968); B.S., Bluffton College, 1959; M.S., University of New Hampshire, 1964; Ph.D., 1967; Associate Professor of Mathematics.
- LONG, EDITH L. (1972); B.S., University of Maine (Orono), 1971; Extension Agent (York County).
- LÓPEZ-MUÑOZ, JOSÉ LUIS (1969); Licenciado en Medicina, Madrid University, 1956; Ph.D., Lateran University (Rome), 1960; Assistant Professor of Spanish.
- LORING, OLIVER L. (1973); Faculty Associate in Journalism.
- LOTSE, ERIK GUNNAR (1967); Agronomy, College of Agriculture, Uppsala, Sweden, 1953; Agronomie Licentiat, 1964; Associate Professor of Soil Chemistry.
- LOVEITT, BURLEIGH PILLSBURY (1965); B.S., Fitchburg State Teachers College, 1940; M.Ed., Maine, 1957; Extension Agent (Cumberland County), Cooperative Extension Service.
- **LOWELL, ROBERT EDWARD (1966); B.S., Lyndon Teachers College, 1957; M.S., University of Connecticut, 1959; Ph.D., 1969; Associate Professor of Education.
- LUCY, WILLIAM T. (1970); B.A., Michigan State, M.Ed., DePaul University (1963); Ed.D., Maine, 1970; Assistant Dean of Student Activities and Organizations; Cooperating Assistant Professor of Education.
- LUSZCZYNSKI, LAURA BERENICE (1969); B.A., Wayne State University, 1962; M.A., University of Kentucky, 1969; Assistant Professor of Romance Languages.
- LUSZCZYNSKI, WALTER ROBERT (1969); B.A., Wayne State University, 1957; M.A., 1959; Ph.D., 1966; Associate Professor of French.
- LUTZ, MARK A. (1970); B.S., University of California at Berkeley, 1966; M.A., 1967; Ph.D., 1972; Assistant Professor of Economics.
- LYMAN, JOHN R. (1948); B.S., Tufts College, 1947, P.E. (Maine); Professor and Chairman, Department of Mechanical Engineering.
- LYNN, JOHN A. (1973); A.B., University of Illinois, 1964; M.A., University of California (Davis), 1967; Ph.D., University of California (Los Angeles), 1972; Assistant Professor of History.
- MACCAMPBELL, BARBARA B. (1957); B.A., Ohio Wesleyan, 1939; M.A., 1941; M.S.L.S., Western Reserve, 1950; Head, Government Publications Division, Raymond H. Fogler Library.
- MACCAMPBELL, JAMES CURTIS (1957); B.A., Ohio Wesleyan, 1939; M.A., Ohio State University, 1946; Ph.D., 1957; M.S., Simmons College, 1962; University Librarian; Professor and Chairman, Department of Library Service.
- MACCOBY, HERBERT (1970); A.B., Western Reserve, 1943; M.A., Columbia, 1949; Ph.D., 1955; Professor of Sociology.

- MACDONALD, CLYDE W., JR. (1966); B.A., Bates, 1958; M.A., Maine, 1965; Assistant Professor of Modern Society.
- MACKNIGHT, NANCY M. (1972); B.A., Vassar, 1962; M.A.T., Harvard, 1972; M.A., Columbia, 1968; Ph.D., 1972; Assistant Professor of English.
- MCALICE, BERNARD JOHN (1967); B.S., University of Rhode Island, 1962; Ph.D., 1969; Associate Professor of Oceanography, Darling Center; Cooperating Associate Professor of Zoology.
- MCANDREW, WILLIAM J. (1969); B.A., York University (Toronto), 1967; Assistant Professor of History and Director, New England-Atlantic Provinces-Quebec Center.
- MCCARTHY, FRANCIS E. (1971); B.A., St. Bernard College, 1955; M.Ed., Rhode Island College, 1961; Ph.D., University of Connecticut, 1972; Assistant Professor of Education.
- MCCARTHY, PHILIP O. (1968); B.S., Maine, 1962; M.Ed., 1971; Dean of Students, University of Maine at Bangor.
- MCCLEAVE, BARBARA W. (1968); B.S., Montana State University, 1962; Instructor in Zoology (part-time).
- MCCLEAVE, JAMES D. (1968); A.B., Carleton College, 1961; M.S., Montana State University, 1963; Ph.D., 1967; Associate Professor of Zoology.
- †MCCLURE, MELVIN THEODORE (1961-62) (1965); B.A., Maine, 1957; M.S., University of Illinois, 1960; Ph.D., 1968; Associate Professor of Accounting, College of Business Administration.
- MCCORMICK, BEVERLY H. (1969); B.A., Maine, 1967; M.A., 1969; Instructor in English.
- MCCOURT, ANNE A. (1972); B.S., Skidmore, 1950; M.A., Syracuse, 1966; Instructor in Education.
- MCCRUM, RICHARD CASWELL (1957); B.S., University of Arizona, 1951; M.S., Maine, 1953; Ph.D., University of New Hampshire, 1964; Professor of Plant Pathology, Agricultural Experiment Station.
- MCDANIEL, IVAN NOEL (1957); B.S., Eastern Illinois State College, 1951; M.S., 1952; Ph.D., University of Illinois, 1958; Associate Professor of Entomology, Agricultural Experiment Station.
- MCINTIRE, WALTER (1973); B.A., University of New Hampshire, 1961; M.S., University of North Dakota, 1965; Ph.D., 1968; Associate Professor of Human Development.
- MCINTYRE, GARY ALLEN (1963); B.S., Oregon State College, 1960; Ph.D., 1964; Professor of Plant Pathology; Chairman, Department of Botany and Plant Pathology.
- MCNEARY, MATTHEW (1937); B.S., Pennsylvania State University, 1932; M.S., Maine, 1941; P.E. (Maine), Professor and Chairman, Department of General Engineering.
- MCREEL, NANCY D. (1970); B.A., Vassar, 1944; A.M.L.S., University of Michigan, 1947; Head, Reference Division, Raymond H. Fogler Library; Cooperating Instructor in Library Service.
- MADDEN, CARROLL G. (1967); Instructor in Mechanical Engineering Technology (Technical Institute Division).
- MAGARO, PETER ANTHONY (1968); B.S., Pennsylvania State University, 1959; M.A., University of Illinois, 1961; Ph.D., 1965; Associate Professor of Psychology.
- MAGNUSON, DORIS S. (1971); B.S., University of Missouri, 1952; Extension Agent (Cumberland County), Cooperative Extension Service.

UNIVERSITY OF MAINE

- MAGNUSON, GREGG E. (1970); B.M., University of Michigan, 1966; M.M., 1967; Assistant Professor of Music and Conductor of Bands.
- MAIRHUBER, JOHN CARL (1968); B.S. in M.E., University of Rochester, 1942; M.S., 1950; Ph.D., University of Pennsylvania, 1959; Professor of Mathematics, and Chairman, Department of Mathematics and Astronomy.
- MAJOR, CHARLES WALTER (1959); A.B., Dartmouth, 1948; M.S., University of Tennessee, 1954; Ph.D., 1957; Professor of Zoology.
- MAJOR, MARY H. (1965); A.B., North Georgia College, 1947; M.S., Tennessee, 1950; Instructor in Zoology (part-time).
- MALOON, PATRICK R. (1970); B.S., Maine, 1970; Instructor in Physical Education and Assistant Athletic Trainer.
- MANDELL, LEWIS (1973); B.A., City College of New York, 1964; M.A., Northwestern, 1966; Ph.D., University of Texas, 1970; Director of Social Science Research Institute and Associate Professor of Economics.
- MANLOVE, GEORGE KENDALL (1950); A.B., Oberlin, 1936; M.A., 1946; Ph.D., Duke University, 1960; Professor of English.
- MANZER, FRANKLIN EDWARD (1958); B.S., Maine, 1955; Ph.D., Iowa State College, 1958; Professor of Plant Pathology, Agricultural Experiment Station.
- †MARKIDES, KYRIACOS C. (1972); B.S., Youngstown State University, 1964; M.A., Bowling Green State University, 1966; Ph.D., Wayne State University, 1970; Assistant Professor of Sociology.
- MARKS, STEPHEN R. (1972); B.A., Clark, 1964; Ph.D., Boston University, 1971; Assistant Professor of Sociology.
- MARSHALL, KATHERINE K. (1970); B.A., Maine, 1961; Instructor in English, University of Maine at Bangor.
- MARSHALL, STANLEY NICKERSON, JR. (1969); B.S., Maine, 1961; M.S., 1964; Lecturer in Chemical Engineering Technology, Technical Institute Division.
- MARTINDALE, COLIN E. (1970); B.A., University of Colorado, 1964; Ph.D., Harvard, 1970; Associate Professor of Psychology.
- MAWHINNEY, EUGENE ALBERTO (1948-49) (1959); B.S., Maine, 1947; M.A., 1949; Ph.D., University of Illinois, 1955; Professor and Chairman, Department of Political Science.
- MAYER, ANTON F. (1972); B.S., Iowa State University, 1952; M.S., George Washington University, 1967; Professor of Military Science.
- MAZURKIEWICZ, MICHAEL (1967); B.S., Rutgers, 1961; M.S., 1964; Ph.D., University of Connecticut, 1970; Assistant Professor of Oceanography, Darling Center (part-time).
- MENDALL, HOWARD LEWIS (1937); B.A., Maine, 1931; M.A., 1934; Professor of Wildlife Resources; Leader, Cooperative Wildlife Research Unit.
- MERRILL, CARL O. (1972); B.S., University of Maine (Orono), 1966; Lecturer in Physical Education, Freshman Basketball Coach and Assistant Football Coach.
- MERRILL, EDWARD O. (1938); B.S., Maine, 1938; Associate Professor of Chemistry, Agricultural Experiment Station.
- METCALF, HENRY BEMIS (1964); B.S., Maine, 1956; M.S., Northeastern, 1964; Associate Professor of General Engineering.
- METZGER, HOMER B. (1950); B.S., Pennsylvania State College, 1939; M.S., 1948; Ph.D., 1950; Professor of Agricultural and Resource Economics.
- MICHAUD, ROBERT R. (1971); B.A., Maine, 1967; Assistant Professor of Military Science.

- MICKA, EDWARD STEPHEN (1965); B.S., Massachusetts, 1952; M.S., New Hampshire, 1958; Ph.D., Connecticut, 1965; Associate Professor of Agricultural and Resource Economics; Extension Economist (Marketing).
- MILES, E. KENNETH (1933); B.A., Lawrence, 1929; M.A., Northwestern, 1930; Ph.D., University of Pennsylvania, 1933; Professor of German.
- MILLER, ALAN ROBERT (1967); B.S., Boston University, 1952; M.Ed., University of Massachusetts, 1968; Associate Professor and Chairman, Department of Journalism.
- MILLER, D. RICHARD (1972); B.A., California State University (Los Angeles), 1972; Lecturer in Physical Education, Assistant in Recreation and Intramural Supervision and Assistant Coach of Swimming and Diving.
- MILLER, JAMES RANDALL (1968); B.S., Purdue University, 1951; M.A., Bowling Green State University, 1962; Ph.D., Kent State University, 1968; Associate Professor of Education.
- MILLIGAN, ROSALIE E. (1971); B.S., Maine, 1970; M.Ed., 1971; Instructor in Physical Education, Women's Division.
- MONTGOMERY, WILLIAM C. (1971); B.S., University of Idaho, 1962; Assistant Professor of Military Science.
- MONTVILLE, FRANCIS ELI (1961); B.S., University of Rhode Island, 1954; M.S., 1957; Extension Economist (Resource Development), Cooperative Extension Service.
- MORIARTY, H. ROSS (1970); B.S., Michigan State University, 1954; Director of Residential Life.
- MORISON, JOHN R. (1969); B.A., Ohio State University, 1957; M.A., 1966; General Manager, Maine Public Broadcast Network and Lecturer in Journalism.
- MORRISON, JEAN LUTO (1967); B.Mus., University of Pennsylvania, 1948; B.S.L.S., Drexel Institute, 1949; Cataloger, Raymond H. Fogler Library.
- MORROW, RICHARD A. (1970); B.Sc., Queen's University, 1958; M.Sc., University of British Columbia, 1959; Ph.D., Princeton, 1963; Associate Professor of Physics.
- MORSE, CURTIS SPAULDING (1968); B.S., University of New Hampshire, 1963; M.S., 1965; Ph.D., 1971; Assistant Professor of Mathematics.
- MOSHER, PAUL N. (1949); B.S., Maine, 1941; M.S., 1960; Potato Specialist, Cooperative Extension Service.
- MOWER, CAROL P. (1963); B.A., Maine, 1953; M.A., Northwestern University 1957; Instructor in Speech.
- MUIR, FOREST VERN (1968); B.S., Southern Illinois University, 1961; M.S., 1963; Ph.D., Ohio State, 1967; Assistant Professor of Animal and Veterinary Sciences and Extension Poultry Specialist.
- MUMMÉ, ALICE (1968); B. Mus., Lawrence College, 1954; M. Mus., Nebraska, 1956; Instructor in Music (part-time).
- MUMMÉ, KENNETH IRVING (1963); B.S., Lawrence College, 1954; M.S., Maine, 1966; Ph.D., 1970; Associate Professor of Chemical Engineering.
- MUN, ALTON MOON (1961); B.A., University of Southern California, 1949; M.S., University of Illinois, 1951; Ph.D., University of Indiana, 1956; Professor of Zoology.
- MURO, JAMES J. (1965); B.S. in Ed., Lock Haven State College (Pennsylvania), 1956; M.Ed., Rutgers University, 1961; Ed.D., University of Georgia, 1965; Professor of Education and Acting Dean, College of Education.

UNIVERSITY OF MAINE

- MURPHY, ELIZABETH FLORENCE (1930); B.A., Maine, 1930; M.A., 1934; Professor of Horticulture and Food Science, Agricultural Experiment Station.
- MURPHY, GRATTAN P. (1965); B.S., Rockhurst College, 1957; M.S., St. Louis University, 1962; Ph.D., 1966; Associate Professor of Mathematics.
- MURPHY, HUGH JEROME (1950); B.S., Maine, 1948; M.S., 1950; Associate Professor of Agronomy.
- MURPHY, NEIL B. (1971); B.S., Bucknell, 1960; M.S., 1961; Ph.D., University of Illinois, 1968; Maine Bankers Association Professor of Finance.
- MUSGRAVE, KATHERINE O. (1969); B.S., Maryville College, 1941; M.S., Oklahoma State, 1968; Instructor in Foods and Nutrition (part-time).
- MUSGRAVE, STANLEY DEAN (1968); A.S., Blackburn College, 1941; B.S., University of Illinois, 1947; M.S., 1948; Ph.D., Cornell University, 1951; Professor of Animal and Veterinary Sciences.
- MYERS, FRANK WILLIAM (1957); B.A., Maine, 1935; M.Ed., 1947; Associate Professor of Education.
- *NADELHAFT, JEROME J. (1967); B.A., Queens College, New York City, 1959; M.A., University of Wisconsin, 1961; Ph.D., 1965; Associate Professor of History.
- NADELHAFT, RUTH L. (1967-1969) (1970); B.A., Queens College, 1959; M.A., University of Wisconsin, 1960; Ph.D., 1970; Associate Professor of English, University of Maine at Bangor.
- NESBIT, PHILIP (1962-1965) (1967); B.M.Ed., University of Miami, 1957; M.M., New England Conservatory, 1962; Associate Professor of Music.
- NEUBAUER, BENEDICT FRANCIS (1965); B.A., St. John's University, 1960; Ph.D., Iowa State University, 1965; Associate Professor of Botany.
- NICHOLS, DAVID LEIGH (1962); B.A., Maine, 1950; M.A., 1951; Ph.D., Ohio State, 1966; Associate Professor of Education and Associate Dean, College of Education.
- NICHOLS, EMILY B. (1972); B.S., University of Georgia, 1971; Extension Agent (Hancock County).
- NICHOLS, JOHN WILSON (1954); B.A., Western Maryland College 1948; M.A., University of Florida, 1949; Ph.D., 1954; Professor of Psychology.
- NICHOLSON, BRUCE LEE (1969); B.S., University of Maryland, 1965; Ph.D., 1969; Assistant Professor of Microbiology.
- NIGHTINGALE, RICHARD IRVINE (1958); B.S., Maine, 1958; M.S., 1960; Ph.D., University of Arizona, 1970; Associate Professor of Civil Engineering.
- †NOLDE, JOHN JACOB (1950); B.A., Cornell University, 1941; Ph.D., 1950; Professor of History.
- NORTHAM, EDWARD STAFFORD (1964); B.S., University of Michigan, 1947; M.S., 1948; Ph.D., Michigan State University, 1953; Professor of Mathematics.
- NORTON, STEPHEN A. (1968); A.B., Princeton University, 1962; M.A., Harvard University, 1963; Ph.D., 1967; Associate Professor of Geological Sciences.
- O'CALLAGHAN, TERENCE (1973); National University of Ireland, 1960; Lecturer in Biochemistry.
- OLIVER, SHIRLEY DOTEN (1962); B.S. in Ed., Maine, 1949; M.Ed., 1953; Associate Professor of Child Development.
- OLSON, ROBERT EDWARD (1946); B.S., Cornell University, 1938; M.S., 1946; Ph.D., 1954; Professor of Entomology.

PERSONNEL

- O'MEARA, DAVID CHARLES (1954); A.B., Bates, 1952; M.S., Maine, 1954; Associate Professor of Animal Biology, Agricultural Experiment Station.
- O'NEILL, ELMER WESLEY, JR. (1965); A.B., Princeton, 1935; M.A., 1940; Ph.D., 1952; Professor of French.
- OSBERG, PHILIP HENRY (1957); A.B., Dartmouth, 1947; M.A., Harvard, 1949; Ph.D., 1952; Professor of Geological Sciences.
- OSGOOD, EBEN AVERILL, JR. (1963); B.S., Maine, 1951; M.F., Duke University, 1956; Ph.D., University of Minnesota, 1962; Associate Professor of Entomology.
- OTTO, FRED BISHOP (1968); B.S., Maine, 1956; M.A., University of Connecticut, 1960; Ph.D., 1964; Assistant Professor of Electrical Engineering.
- OWEN, RAY BUCKLIN, JR. (1968); A.B., Bowdoin College, 1959; M.S., University of Illinois, 1966; Ph.D., 1968; Associate Professor of Wildlife Resources.
- PALMER, KENNETH TOWNSEND (1969); B.A., Amherst College, 1959; M.A., Pennsylvania State University, 1961; Ph.D., 1964; Associate Professor of Political Science.
- PARSONS, KENNETH LANGMAID (1942-44) (1945); B.S., Maine, 1934; E.E., 1959, P.E. (Maine); Professor of Electrical Engineering.
- PATTERSON, HOWARD HUGH (1968); B.A., Occidental College, 1961; M.S., Massachusetts Institute of Technology, 1965; Ph.D., Brandeis, 1968; Associate Professor of Chemistry.
- PEASE, JANE H. (1969); A.B., Smith College, 1951; M.A., University of Rochester, 1957; Ph.D., 1969; Associate Professor of History.
- PEASE, WILLIAM HENRY (1966); B.A., Williams College, 1947; M.A., Wisconsin, 1948; Ph.D., Rochester, 1955; Professor of History.
- PECHINSKI, JOSEPH M. (1972); B.S., Northeastern, 1965; M.S., University of Illinois, 1966; Ph.D., 1972; Assistant Professor of Education.
- PELSUE, NEIL H., JR. (1970); B.S., University of Vermont, 1963; M.S., University of Massachusetts, 1967; Ph.D., Purdue University, 1971; Assistant Professor of Agricultural and Resource Economics.
- PERKINS, FRED LEMUEL, JR. (1968); B.A., Bates College, 1942; Supervisor of Secondary Education in Journalism.
- PERRY, JOANNE S. (1948-56) (1957); B.A., Maine, 1946; M.A., 1948; Assistant Professor of Mathematics.
- PETTIT, JOHN MELVILLE (1969); B.S., University of Illinois, 1958; M.A., Ohio State University, 1962; Ph.D., Purdue University, 1969; Associate Professor of Speech.
- PHILBRICK, GILBERT EMERY (1966); B.S. in Ed., Maine, 1955; Assistant Professor of Physical Education and Recreation.
- PHILLIPS, WILLIAM J. (1971); B.A., Queens College, CUNY, 1961; M.A., Hunter College, CUNY, 1966; Associate Professor and Coordinator of English, University of Maine at Bangor.
- PIERSON, PATRICIA M. (1969); B.S., Nasson College, 1966; M.A., Michigan State University, 1968; Extension Agent (Waldo County).
- PINCUS, MARTIN S. (1971); B.A., Brooklyn College, 1963; M.A., University of Wisconsin, 1964; Assistant Professor of English, University of Maine at Bangor.

UNIVERSITY OF MAINE

- PINETTE, CLAYTON A. (1970); B.A., Fort Kent State College, 1964; M.Ed., Maine, 1971; Assistant Professor and Coordinator of Development Studies, University of Maine at Bangor.
- PIPER, EDWARD H. (1956); B.S., Maine, 1943; M.S., Cornell, 1948; Administrative Officer, College of Life Sciences and Agriculture and Assistant Director, Agricultural Experiment Station.
- PLATT, DAVID D. (1971); M.S., Columbia University, 1969; Producer-Director, Maine Public Broadcast Network, and Faculty Associate in Journalism.
- PLISGA, STANLEY J., JR. (1969); B.S., Maine, 1967; M.S., 1972; Instructor in General Engineering.
- PLISKOFF, STANLEY STEWART (1969); A.B., Washington Square College of Arts and Sciences, New York University, 1951; M.A., 1953; Ph.D., 1956; Professor and Chairman, Department of Psychology.
- PLOCH, LOUIS ALBERT (1954); B.S., Pennsylvania State University, 1950; M.S., 1951; Ph.D., Cornell University, 1954; Professor of Rural Sociology.
- PLUMMER, HENRY ALMON (1946); B.S., Maine, 1930; M.F., Yale, 1950; Associate Professor of Forest Resources and Forestry Specialist.
- POGORZELSKI, HENRY ANDREW (1969); M.A., Princeton University, 1968; Ph.D., City University of New York, 1969; Professor of Mathematics.
- PORTER, JOSEPH E. (1959); M.D., Boston University, 1934; Lecturer in Medical Technology, Maine Medical Center, Portland.
- POTTS, RONALD SARGENT (1968); A.B., Bowdoin, 1950; M.D., McGill University, 1954; Lecturer in Medical Technology (Central Maine General Hospital).
- POULIN, LAWRENCE EARL (1967); B.S. in Ed., Maine, 1950; M.Ed., 1968; Extension Agent (Hancock County), Cooperative Extension Service.
- POULTON, BRUCE ROBERT (1956); B.S., Rutgers University, 1950; M.S., 1952; Ph.D., 1956; Professor of Animal Sciences; Vice President for Research and Public Services.
- PRATT, DARRELL BRADFORD (1967); B.S., Maine, 1942; M.S., Purdue, 1945; Ph.D., Harvard, 1951; Professor and Chairman, Department of Microbiology; Professor of Zoology.
- PRESCOTT, GEORGE ARTHUR (1961); B.S. in Ed., Boston University, 1941; Ed.M., 1948; Ed.D., 1950; Professor of Education.
- PULLEN, WINSTON EUGENE (1946); B.S., Maine, 1941; M.S., Cornell University, 1942; Ph.D., 1950; Professor of Agricultural and Resource Economics and Associate Dean of the College of Life Sciences and Agriculture.
- PURI, KEWAL K. (1972); B.A., Delhi University, 1953; M.A., 1959; M.S., New York University, 1965; Ph.D., 1967; Associate Professor of Mathematics.
- PYLES, L. REX (1964); B.A., University of Miami, 1959; M.A., University of Michigan, 1963; Assistant Professor of Russian.
- RADKE, FREDERICK HERBERT (1952); B.S., Hamline University, 1947; Ph.D., Iowa State, 1952; Professor and Chairman, Department of Biochemistry.
- RAMSDELL, GORDON ESTEY (1947); B.S., Maine, 1942; M.S., 1951; Associate Professor of Biochemistry, Agricultural Experiment Station.
- RAND, DAVID M. (1960); B.S., Maine, 1958; M.Ed., 1964; Associate Dean of Student Activities and Organizations and Director of the Memorial Union.
- RANDALL, ARTHUR GORDON (1946); B.S., Yale, 1933; M.F., 1934; Associate Professor of Forest Resources.

- RANDEL, WILLIAM PEIRCE (1965); B.S., Columbia University, 1932; A.M., University of Michigan, 1933; Ph.D., Columbia University, 1945; Lloyd H. Elliott Professor of English.
- RASALAH, JAYENDRAN CUMARASWAMY (1969); B.Sc., University of Ceylon, 1957; Ph.D., University of Pittsburgh, 1965; Associate Professor of Chemistry.
- REID, EDWARD ROBERT (1959); A.B., Yale, 1946; M.A., Middlebury College, 1950; Associate Professor of German and Associate Dean of the College of Arts and Sciences.
- REID, WILLIAM MICHAEL (1968); B.A., Central College, 1962; M.A., University of Missouri, 1964; Ph.D., 1969; Assistant Professor of Political Science.
- REIF, EDWARD D. (1971); B.A., Rutgers University, 1966; M.A., Clark University, 1971; Instructor in Psychology, University of Maine at Bangor.
- REYNOLDS, CLARK GILBERT (1968); B.A., University of California, Santa Barbara, 1961; M.A., Duke, 1963; Ph.D., 1964; Associate Professor of History.
- RHOADS, ROBERT BARLOW (1952); B.S., Maine, 1950; M.S., 1951; P.E. (Maine); Professor of Agricultural Engineering, College of Life Sciences and Agriculture; Associate Director, Technical Institute Division, College of Technology.
- RICE, HARRIET E. (1965-67) (1969); B.A., Maine, 1964; M.A., Columbia University, 1965; Ph.D., Purdue University, 1971; Assistant Professor of Speech.
- RICHARDS, CHARLES DAVIS (1952); B.A., Wheaton College, Illinois, 1943; M.A., University of Michigan, 1947; Ph.D., 1952; Professor of Botany.
- RICHENS, VOIT B. (1968); B.S., Washington State University, 1957; M.S., Utah State University, 1961; Ph.D., 1967; Special Assistant Professor of Wildlife Resources.
- RIDEOUT, DWIGHT L. (1965); B.S., Maine, 1962; M.Ed., 1965; Dean of Student Affairs.
- RIDGWAY, GEORGE J. (1966); B.S., University of Washington, 1949; M.S., 1951; Ph.D., 1954; Lecturer in Zoology (Bureau of Commercial Fisheries, Boothbay Harbor, Maine).
- RIDGWAY, RITA KELL (1966); B.S., James Millikin University, 1936; Extension Agent (Androscoggin-Sagadahoc Counties), Cooperative Extension Service.
- RIOUX, ROBERT NORMAND (1959); B.A., University of Connecticut, 1949; M.A., Oklahoma State University, 1950; Doctorat d'université de Paris en Lettres, 1956; Professor of Romance Languages.
- ROBBINS, WALLACE C. (1965); B.S., Maine, 1954; M.S., University of New Brunswick, 1955; Assistant Professor of Forest Technology.
- ROBERTS, DODD EDWARD (1964); B.A., Maine, 1951; M.A., 1955; Ed.D., University of Missouri, 1958; Professor of Education.
- ROBERTS, FRANKLIN LEWIS (1964); B.S., Maine, 1955; M.S., 1957; Ph.D., North Carolina State College, 1964; Professor of Zoology.
- ROBERTSON, CRAIG A. (1969); B.A., University of Kansas, 1961; M.A., 1965; Ph.D., Rutgers University, 1971; Assistant Professor of History.
- ROBERTSON, SUSAN E. (1969); B.S., Marywood College, 1960; M.L.S., Rutgers University, 1967; Reference Librarian, Raymond H. Fogler Library.
- ROBINSON, JAMES ARTHUR (1956); M.S., Maine, 1950; Area Potato Specialist, Cooperative Extension Service.
- RODERICK, THOMAS H. (1965); A.B., University of Michigan, 1952; M.S., 1953; Ph.D., University of California (Berkeley) 1959; Lecturer in Zoology (Jackson Laboratory).

UNIVERSITY OF MAINE

- ROGERS, CARL ADEN (1944); B.S., Vermont, 1935; M.S., Kansas State University, 1964; Extension Agent (Hancock County), Cooperative Extension Service.
- ROGGENBAUER, JOSEF (1961); Diplomkaufmann, University of Vienna, Austria, 1950; M.A., Middlebury, 1965; Doctorate, University of Innsbruck, Austria, 1953; Professor of German and Chairman, Department of Foreign Languages and Classics.
- ROONEY, JAMES A. (1972); A.B., Clark, 1965; M.S., University of Vermont, 1967; Ph.D., 1970; Assistant Professor of Physics.
- ROSS, PAUL (1973); B.S., Juilliard School, 1961; Instructor in Music (part-time).
- ROTHMAN, BONNIE S. (1972); B.A., Duke University, 1967; M.A., Cornell University, 1971; Assistant Professor of Child Development.
- ROURKE, ROBERT VINCENT (1964); B.S., Maine, 1959; M.S., 1964; Assistant Soil Scientist and Soils Specialist, Agricultural Experiment Station.
- ROWE, RICHARD JAY (1959); B.S., Cornell University, 1952; B.S., Iowa State University, 1957; M.S., 1959; Ph.D., Cornell, 1969; P.E. (Maine); Professor of Agricultural Engineering.
- ROY, SUZANNE R. (1972); A.B., Rivier College, 1970; M.A., University of Maine, 1972; Instructor in English.
- RUGGIERI, FRANCESCA J. (1971); B.S., St. Joseph's College, 1956; B.A., 1958; Assistant Documents Librarian, Government Publications Division, Raymond H. Fogler Library.
- †RUSS, CHARLES ROGER (1965); B.S., Marquette University, 1959; M.S., 1961; Ph.D., University of Pennsylvania, 1965; Associate Professor of Chemistry.
- RUSSELL, ELIZABETH SHULL (1969); A.B., University of Michigan, 1933; M.A., Columbia University, 1934; Ph.D., University of Chicago, 1937; Lecturer in Zoology (Jackson Laboratory).
- *RUSSELL, OLGA W. (1966); A.B., Connecticut College, 1934; A.M., University of California (Berkeley), 1939; A.M., Harvard, 1944; Ph.D., 1957; Professor of French.
- RYAN, CHARLES WILLIAM (1966); B.S., Slippery Rock State College, 1959; M.A., Colgate University, 1961; Ph.D., University of Toledo, 1966; Associate Professor of Education.
- RYCKMAN, RICHARD MICHAEL (1967); A.A., City College of San Francisco, 1960; B.A., State University of New York at Buffalo, 1963; Ph.D., 1968; Associate Professor of Psychology.
- SALESI, ROSEMARY A. (1971); B.S., SUNY (Oswego), 1963; M.L.S., Maine, 1970; Instructor in Education and Library Service.
- SANDERS, JOSEPH F. (1966); B.S., Boston University, 1947; M.A., 1948; Ph.D., 1953; Lecturer in Psychology, V.A. Center, Togus.
- SANFORD, ALPHEUS (1958); B.A., Maine, 1947; M.Ed., Boston University, 1954; Ed.D., 1959; Professor of Education.
- SANGER, DAVID (1971); B.A., University of New Brunswick, 1959; M.A., University of British Columbia, 1962; Ph.D., University of Washington, 1967; Associate Professor of Anthropology and Quaternary Studies.
- SAPER, BERNARD (1969); B.A., Brooklyn College, 1946; M.A., Columbia, 1947; Ph.D., University of California (Los Angeles), 1951; Professor of Psychology.

- SASS, BERNARD (1946); B.S., City College of New York, 1934; M.A., Teachers College, Columbia, 1936; Associate Professor of Zoology.
- SAVAGE, DONALD THOMAS (1969); B.B.A., University of Massachusetts, 1960; M.S., University of Wisconsin, 1961; Ph.D., 1967; Associate Professor of Economics.
- SAWIN, PAUL B. (1961); B.S., Cornell University, 1924; M.S., Kansas State University, 1925; M.S., Harvard University, 1930; Sc.D., 1931; Lecturer in Animal and Veterinary Sciences.
- SCHEMNITZ, SANFORD DAVID (1962); B.S., University of Michigan, 1952; M.S., University of Florida, 1953; Ph.D., Oklahoma State University, 1958; Associate Professor of Wildlife Management.
- SCHER, SAUL NATHANIEL (1969); B.A., Queens College, City University of New York, 1954; M.F.A., Columbia University, 1958; Ph.D., New York University, 1965; Associate Professor of Speech.
- SCHMIDT, WILLIAM FREDERICK (1968); B.S., University of Kentucky, 1964; M.S., University of Washington, 1966; Ph.D., 1968; Assistant Professor of Mechanical Engineering.
- SCHNEIDER, WALTER LESLIE (1964); B.M.E., Pratt Institute, 1948; M.M.E., Yale University, 1950; Dr. Eng. Sc., New York University, 1958; Associate Professor of Mechanical Engineering.
- SCHNITKER, DETMAR F. (1969); M.S., North Carolina, 1966; Ph.D., Illinois, 1967; Associate Professor of Oceanography, Ira C. Darling Center, Cooperating Associate Professor of Geological Sciences.
- SCHOENBERGER, WALTER SMITH (1956); A.B., University of Pittsburgh, 1950; M.A., 1953; M.A., The Fletcher School of Law and Diplomacy, 1954; Ph.D., 1963; Professor of Political Science.
- SCHOMAKER, CHARLES EDWARD (1963); B.S., Pennsylvania State University, 1950; M.F., 1954; Ph.D., Michigan State University, 1962; Associate Professor of Forest Resources.
- SCHOMAKER, PEGGY K. (1966); B.S., Pennsylvania State University, 1949; M.S., 1957; Ph.D., Michigan State University, 1961; Associate Professor of Consumer Economics and Management.
- SCHONBERGER, HOWARD B. (1971); B.A., University of Chicago, 1962; Ph.D., University of Wisconsin, 1968; Assistant Professor of History.
- SCHRIVER, EDWARD O. (1968); B.S., Gorham State College, 1954; M.Ed., Maine, 1955; B.D., Andover Newton Theological School, 1960; M.A., Maine, 1961; Ph.D., 1967; Associate Professor of History.
- SCONTRAS, CHARLES A. (1961); B.S., New Hampshire, 1952; M.Ed., Maine, 1957; Ph.D., 1968; Associate Professor of Modern Society.
- SENSENIG, DAVID M. (1969); B.S., Haverford College, 1942; M.D., Harvard Medical School, 1945; Lecturer in Biochemistry.
- SEZAK, WILLIAM (1946-1948) (1949); B.S. in Ed., Boston University, 1938; M.Ed., Maine, 1946; Ed.D., Columbia, 1956; Professor of Education.
- SHEA, KENNETH ROBERT (1968); B.S., Maine, 1965; M.S., 1969; Assistant Professor of Civil Engineering (Technical Institute Division).
- †SHELDEN, RONALD (1971); B.S., CUNY, 1958; M.S.E., Princeton University, 1960; Ph.D., 1964; Associate Professor of Chemical Engineering.
- SHEPPARD, EDMUND MACMILLAN (1962); B.S., University of Miami, 1956; S.M., Massachusetts Institute of Technology, 1958; Ph.D., Purdue, 1962; P.E. (Maine), Professor of Electrical Engineering.

UNIVERSITY OF MAINE

- SHIGO, ALEX L. (1970); B.S., Waynesburg College, 1956; M.S., West Virginia University, 1958; Ph.D., 1959; Faculty Associate in Botany.
- SHIN, ROY W. (1969); B.A., Macalester, 1958; M.A., 1962; Ph.D., Minnesota, 1969; Associate Professor of Political Science.
- SHOTTAER, JAMES EDWARD (1964); B.S., State University of New York, 1954; M.S., State University of New York and Syracuse University, 1956; Ph.D., Michigan State University, 1964; Professor of Wood Technology.
- SHULER, CRAIG EDWARD (1969); B.S., Colorado State University, 1960; M.S., 1966; Ph.D., 1969; Assistant Professor of Forest Resources.
- SIDES, SAMUEL EDWIN (1956); B.S., Maine, 1951; P.E., (Maine); Associate Professor of Agricultural Engineering, Agricultural Experiment Station, Presque Isle, Maine Potato Handling Research Center.
- SIMARD, GERALD LIONEL (1967); B.S., Bates, 1933; Ph.D., Massachusetts Institute of Technology, 1937; Associate Professor of Chemical Engineering.
- SIMPSON, GEDDES WILSON (1931); A.B., Bucknell, 1929; M.A., Cornell University, 1931; Ph.D., 1935; Professor and Chairman, Department of Entomology.
- SINGERMAN, ALAN J. (1968); A.B., Ohio University, 1964; Diplome, University of Paris, 1962; M.A., Indiana University, 1966; Ph.D., 1970; Associate Professor of French.
- SINGERMAN, LUCRETIA V. (1968); B.A., Ohio University, 1964; M.A., Indiana University, 1967; Assistant Professor of German.
- SINNOCK, POMEROY (1971); B.S., North Carolina State University, 1963; M.S., 1965; Ph.D., University of California (Berkeley), 1969; Assistant Professor of Zoology.
- SKAGGS, CHARLES THOMAS (1969); B.S., Western Illinois University, 1964; M.S., 1966; Ph.D., University of Iowa, 1969; Cooperating Assistant Professor of Education; Coordinator of Testing and Research.
- SKORPEN, ERLING RAYMOND (1968); A.B., College of Idaho, 1954; B.A., Oxford University, 1956; M.A., 1958; Ph.D., Yale University, 1960; Professor of Philosophy.
- SLABYJ, BOHDAN M. (1972); B.S., University of Alberta, 1958; M.S., 1960; Ph.D., University of Washington, 1968; Assistant Professor of Food Science.
- SLOANAKER, MARY G. (1973); B.S., Boston University, 1963; M.Ed., University of Vermont, 1973; Cooperating Associate Professor of Dental Health Technology, University of Maine at Bangor.
- SMALL, WILLIAM (1972); B.A., Bowdoin, 1961; M.A., Middlebury, 1966; Ph.D., University of Connecticut, 1972; Assistant Professor of German.
- SMITH, CHARLES WILLIAM, JR. (1968); B.S., Allegheny College, 1962; Ph.D., Ohio University, 1968; Assistant Professor of Physics.
- SMITH, DAVID CLAYTON (1965); B.S. in Ed., Farmington State Teachers College, 1955; M.Ed., Maine, 1956; M.A., 1958; Ph.D., Cornell University, 1965; Associate Professor of History.
- SMITH, DUANE A. (1971); B.S., Maine, 1959; M.S., University of New Hampshire, 1969; Extension Economist—Marketing.
- SMITH, LINDA M. (1970); B.S., Farmington State College, 1970; Extension Agent, Somerset County.
- SMITH, NORMAN (1962); B.Sc., Leeds (England), (1952); M.Sc., Durham (England), 1954; M.S., Maine, 1959; Ph.D., Newcastle, 1970; Professor and Chairman, Department of Agricultural Engineering.

- SMITH, RICHARD K. (1971); B.A., Aurora College, 1957; M.S., Northern Illinois University, 1963; Ed.D., University of Maine (Orono), 1971; Associate Professor of Developmental Studies, University of Maine at Bangor.
- SNIFFEN, CHARLES J. (1970); B.S., Ohio State, 1960; M.S., New Hampshire, 1967; Ph.D., University of Kentucky, 1971; Assistant Professor of Animal Nutrition.
- SOBEL, EUGENE LEE (1970); B.A., Reed College, 1962; Ph.D., Johns Hopkins, 1966; Assistant Professor of Mathematics.
- SOLORZANO, ALEJANDRO J. (1964); Instructor in Physical Education (part-time).
- SOULE, HAYDEN MAYO, JR. (1960); B.S., Maine, 1960; M.S., 1968; Associate Professor of Agricultural Engineering.
- SOULE, WILLIAM LAMSON, JR. (1966); A.B., Harvard College, 1953; M.E.A., The George Washington University, 1963; Associate Professor of Mathematics.
- SPEICHER, BENJAMIN ROBERT (1937); A.B., Denison, 1929; M.S., Pittsburgh, 1933; Ph.D., Professor of Zoology.
- SPRAGUE, RICHARD STANTON (1956); B.A., Maine, 1949; M.A., Yale, 1951; Ph.D., Boston University, 1961; Professor of English.
- SPROUL, OTIS JENNINGS (1955); B.S., Maine, 1952; M.S., 1957; Sc.D., Washington University, 1961; P.E., (Maine); Professor of Civil Engineering.
- STEARNS, WILLIAM FRANKLIN (1960); B.S. in Ed., Maine, 1958; M.A., 1960; Assistant Professor of Mathematics.
- STEVENS, FRANCIS ROBERT (1957); B.S., Maine, 1951; Area Poultry Specialist, Cooperative Extension Service.
- STEVENS, LEROY CARLTON (1967); B.S., Cornell University, 1942; Ph.D., University of Rochester, 1952; Lecturer in Zoology.
- STEVENS, MARGARET F. (1951); B.S., Simmons, 1934; Youth Education Specialist, Cooperative Extension Service.
- STEWART, ALICE ROSE (1947); B.A., Maine, 1937; A.M., Radcliffe, 1938; Ph.D., 1946; Professor of History.
- STILES, DWIGHT G. (1968); B.S., University of New Hampshire, 1942; M.Ed., 1970; Area Potato Specialist, Cooperative Extension Service.
- STILES, WARREN CRYDER (1962); B.S., Rutgers, 1954; M.S., 1955; Ph.D., Pennsylvania State University, 1958; Professor of Pomology; Fruit Specialist, Cooperative Extension Service.
- STONE, WILLIAM FRANK (1966); B.A., Maine, 1956; M.A., University of Florida, 1961; Ph.D., 1963; Associate Professor of Psychology.
- STORCH, RICHARD HARRY (1965); B.A., Carleton College, 1959; M.S., University of Illinois, 1961; Ph.D., 1966; Associate Professor of Entomology.
- STOYELL, PAUL D. (1968); B.S., Ithaca College, 1964; M.Ed., Maine, 1969; Assistant Professor of Physical Education; Head Soccer Coach; Head Gymnastics Coach.
- STRATTON, DONALD P. (1972); M.M., Manhattan School of Music, 1964; Instructor in Music (part-time).
- STRUCHTEMEYER, ROLAND AUGUST (1946); B.S., University of Missouri, 1939; M.A., 1941; Ph.D., Ohio State University, 1951; Professor of Soils.
- STUART, ALDEN E. (1967); B.S., Husson College, 1958; Business Manager and Assistant to the Treasurer.
- STUBBS, DONALD A. (1970); A.B., Washington and Lee, 1962; Ph.D., George Washington, 1967; Associate Professor of Psychology.

UNIVERSITY OF MAINE

- STUCKENRATH, ROBERT, JR. (1967); B.A., Allegheny College, 1952; J.D., University of Pennsylvania, 1955; M.S., 1963; Ph.D., 1969; Lecturer in Geological Sciences.
- STYRNA, EDMUND (1956); B.S., New Hampshire, 1948; Associate Professor of Physical Education, Head Coach of Track and Cross Country.
- SUCEC, JAMES (1964); B.S., University of Connecticut, 1962; M.S., 1963; Associate Professor of Mechanical Engineering.
- SULLIVAN, FRANCIS J. (1948); S.B., Harvard, 1936; M.S., Kansas State College, 1941; P.E. (Maine); Professor of Mechanical Engineering.
- SUMMERS, ROBERT G., JR. (1970); B.S., Notre Dame, 1965; M.S., 1967; Ph.D., Tulane University, 1971; Assistant Professor of Zoology.
- SUPPLE, ROBERT VINCENT (1948); Ed.B., State University of New York, 1943; A.M., New York University, 1945; Ph.D., 1951; Professor of Education.
- SWASEY, JAMES E. (1970); B.S., University of New Hampshire, 1962; M.S., University of Maryland, 1965; Ph.D., 1971; Assistant Professor of Ornamental Horticulture and Landscape Designer.
- SWEETSER, THOMAS CURTIS (1964); B.S., Maine, 1950; Extension Agent (Aroostook County), Cooperative Extension Service.
- SWITZER, ALAN A., JR. (1971); A.B., Harvard College, 1952; Ed.M., Harvard University, 1958; Instructor in Physical Education, Aquatics Coordinator and Coach.
- SYVINSKI, ELIZABETH CHELLIS (1955); B.S., Massachusetts, 1955; Extension Agent (York County), Cooperative Extension Service.
- TARR, CHARLES EDWIN (1968); B.S., University of North Carolina, 1961; Ph.D., 1966; Associate Professor of Physics.
- TASHJIAN, ROBERT J. (1967); A.B., Clark University, 1951; V.M.D., University of Pennsylvania, 1956; Lecturer in Animal Sciences (The Animal Medical Center, New York City).
- TATEM, DAVID (1965); B.A., Randolph-Macon College, 1942; M.A., Columbia University, 1946; Associate Professor of Classics.
- TAYLOR, G. THOMAS (1972); B.A., University of Virginia, 1967; M.A., 1969; Ph.D., University of Colorado, 1963; Assistant Professor of Political Science.
- TERRELL, CARROLL FRANKLIN (1948); B.A., Bowdoin, 1940; M.A., Maine, 1950; Ph.D., New York University, 1956; Professor of English.
- THOMPSON, EDWARD VALENTINE (1966); A.B., Cornell University, 1956; Ph.D., Polytechnic Institute of Brooklyn, 1962; Associate Professor of Chemical Engineering.
- THOMPSON, WALTER ALFRED (1956); B.S., Maine, 1951; Extension Agent (Hancock County), Cooperative Extension Service.
- **THOMSON, ROBERT BRUCE (1947-1950) (1953); A.B., Harvard, 1932; LL.B., 1936; Professor of Political Science; Director of the University's Honors Program.
- THORNBURY, MARGARET ELIZABETH (1961); B.S., Oneonta State Teachers College, 1954; M.S., Ohio State University, 1957; Ph.D., 1961; Professor of Food and Nutrition and Director, School of Human Development.
- TOBEY, DONALD MARVIN (1969); B.S., Cornell University, 1964; M.S., University of Wisconsin, 1967; Ph.D., 1969; Assistant Professor of Agricultural and Resource Economics.

- TOOLE, JOHN WILLIAM (1959); A.B., Harvard, 1946; M.A., Maine, 1948; M.A., University of Illinois, 1955; Associate Professor of Mathematics.
- TRAFFORD, DAVID WHITE (1947); B.A., Maine, 1939; M.A., Indiana University, 1940; Ph.D., 1947; Professor of History.
- TREDWELL, ROBERT FERTIG (1967); A.B., Oberlin College, 1955; Ph.D., Yale, 1960; Professor of Philosophy.
- TRIPP, MARLAND EUGENE (1951-1956) (1957); B.S., Maine, 1950; Extension Agent (Knox-Lincoln Counties), Cooperative Extension Service.
- TRIPP, TERRANCE B. (1971); B.S., Maine, 1959; M.S., 1961; Ph.D., 1967; Lecturer in Chemistry.
- TURNER, WALTER WEEKS (1947); B.S., Massachusetts Institute of Technology, 1947; M.S., 1947; P.E. (Maine); Professor of Electrical Engineering.
- TURNER, PETER B. (1972); B.A., University of Bristol, England, 1967; M.S., University of Minnesota, 1970; Ph.D., 1972; Assistant Professor of Accounting.
- TYLER, DAVID A. (1972); B.S., Maine, 1966; M.S., Cornell University, 1969; Assistant Professor of Civil Engineering.
- URBANSKI, MARIE O. (1971); B.A., Texas University, 1944; M.A., Western Illinois University, 1965; Assistant Professor of English.
- UYAR, KIVILCIM JIM (1970); B.A., Robert College (Istanbul), 1966; M.B.A., University of Illinois, 1969; D.B.A., 1971; Associate Professor of Management.
- VADAS, ROBERT LOUIS (1967); B.S., Utah State University, 1962; Ph.D., University of Washington, 1968; Associate Professor of Botany, Oceanography and Zoology.
- VALLEAU, WILLIAM GRAY (1962); B.S., University of Kentucky, 1955; M.S., Rutgers, University, 1962; Ph.D., 1963; Professor of Zoology.
- VAN LUIK, JAMES MACNAUGHTON (1969); B.S., Hillsdale College, 1951; M.S., (in Library Science) Columbia University, 1955; Associate Professor of Library Service.
- VAN RHEENEN, DWAYNE DALE (1970); B.A., Harding College, 1966; M.A., University of Missouri, 1967; Assistant Professor of Speech.
- VERVILLE, RICHARD R. (1970); B.S., Maine, 1966; M.S., 1970; Extension Agent (Aroostook County).
- VETELINO, JOHN FRANK (1969); B.S., Rhode Island, 1964; M.S., 1966; Ph.D., 1969; Assistant Professor of Electrical Engineering.
- VIETTI, MICHAEL A. (1971); Kansas State College, 1964; M.S., 1966; Ph.D., University of Missouri (Rolla), 1972; Assistant Professor of Physics.
- VIGER, NORMAN JOHN (1966); B.S., Maine, 1966; M.M.E., 1968; Assistant Professor of General Engineering.
- VITRO, FRANK T. (1969); B.S., Notre Dame, 1963; M.A., Boston College, 1966; Ph.D., Iowa, 1969; Associate Professor of Education and Cooperating Associate Professor of Psychology.
- VOSE, PRESCOTT HALE (1950); B.S., Bowdoin, 1929; M.B.A., Harvard, 1931; Controller and Budget Officer.
- VROOMAN, THEODORE H. (1965); B.A., St. Lawrence University, 1942; M.Ed., 1947; Ed.D., Syracuse University, 1970; Associate Professor of Education.

UNIVERSITY OF MAINE

- WADE, EDWARD ALEXANDER (1962); A.B., San Diego State College, 1949; M.A., University of Oregon, 1952; Ph.D., University of Wisconsin, 1955; Professor of Psychology.
- WADSWORTH, RICHARD C. (1954); A.B., Cornell University, 1926; M.D., University of Rochester School of Medicine and Dentistry, 1931; Lecturer in Medical Technology, Eastern Maine Medical Center.
- WAITE, ROBERT G. (1971); B.A., Lehigh University, 1963; M.A., University of Kentucky, 1967; Assistant Professor of English.
- WAKELIN, EDMUND F. (1963); B.A., Dartmouth College, 1939; Community Development Specialist Cooperative Extension Service.
- WAKELIN, EDMUND F., JR. (1971); B.S., Maine, 1970; Extension Agent (York County).
- WALAS, JOHN A. (1967); B.S., Kent State University, 1957; Faculty Associate in Journalism.
- WALKER, CALVIN K. (1970); B.S., University of Vermont, 1965; M.S., Cornell, 1967; Ph.D., 1970; Assistant Professor of Dairy Science and Dairy Specialist.
- WALKUP, MARY JO COLEMAN (1967); B.S., University of Houston, 1955; M.S., Springfield College, 1960; Ph.D., University of Iowa, 1966; Associate Professor of Physical Education, and Head, Women's Division.
- WALLACE, ROBERT L. (1966); B.S., Maine, 1954; M.Ed., 1961; Lecturer in Physical Education and Director of Physical Education and Athletics, University of Maine at Bangor.
- WARNER, MARDIS R. (1950-55) (1956); B.A., Ohio State, 1949; B.A.E., Ohio State, 1949; Agricultural Engineer, Cooperative Extension Service.
- WATKINS, DENNIS A. (1971); B.S., University of Utah, 1962; Ph.D., 1971; Assistant Professor of Community Development.
- WATKINS, JULIA M. (1971); B.S., University of Utah, 1963; M.S.W., 1965; Ph.D., 1970; Assistant Professor of Social Welfare.
- WAVE, HERBERT EDWIN (1967); B.S., Maine, 1952; M.S., Rutgers, 1960; Ph.D., 1961; Associate Professor of Plant and Soil Sciences and Fruit Specialist.
- WAYMOUTH, CHARITY (1964); B.S., University of London, 1936; Ph.D., University of Aberdeen, 1944; Lecturer in Microbiology (Jackson Laboratory).
- WEATHERBEE, RITA ROSEIN (1962); B.S., Simmons College, 1952; M.A., Maine, 1954; Instructor in Zoology (part-time).
- WEAVER, DAVID L. (1971); B.S., Juniata College, 1961; Ph.D., Massachusetts Institute of Technology, 1966; Associate Professor of Chemistry.
- WEAVER, NANCY M. (1972); B.A., Pfeiffer College, 1961; M.L.S., University of Pittsburgh, 1967; M.A., Carnegie-Mellon, 1971; Cataloger and Cooperating Instructor in Library Services.
- WEBBER, SUSAN Y. (1965); B.S., Maine, 1963; M.S., 1972; Certified by American Dietetic Association, 1964; Assistant Professor of Institutional Management, School of Human Development.
- WEBER, STEPHEN LEWIS (1969); B.A., Bowling Green State University, 1964; Ph.D., University of Notre Dame, 1969; Assistant Professor of Philosophy.
- WEBSTER, JAMES HOUGHTON (1969); B.A., Maine, 1959; M.A., Clark University, 1966; Assistant Professor of Finance, College of Business Administration.
- WEBSTER, KARL SMITH (1965); B.S., Vermont, 1949; M.S., Pennsylvania State University, 1958; Associate Professor of Mechanical Engineering.

PERSONNEL

- WEISZ, HANS (1966); M.D., University of Vienna, 1929; Ph.D., 1931; Lecturer in Philosophy.
- WENDZEL, ROBERT L. (1970); B.A., Kalamazoo College, 1960; Ph.D., University of Florida, 1965; Assistant Professor of Political Science.
- WESTERMAN, HAROLD SCOTT (1949); B.A., University of Michigan, 1946; Professor of Physical Education; Director of Physical Education and Athletics.
- WESTFALL, CLAUDE ZEBEDEE (1954); B.S.F., West Virginia University, 1952; M.S., Maine, 1954; Associate Professor of General Engineering.
- WHELDEN, HARRY CROSSMAN, JR. (1955); B.S., University of Connecticut, 1948; Poultry Specialist, Cooperative Extension Service.
- WHITE, JEFFERSON (1972); B.A., Baylor University, 1952; M.A., Yale, 1961; Ph.D., 1964; Professor and Chairman, Department of Philosophy.
- WHITEHILL, ALVIN RICHARD (1961); A.B., Dartmouth, 1937; Ph.D., Cornell University, 1942; Professor of Microbiology.
- WHITING, ROBERT R. (1971); B.S., Maine, 1970; Instructor in Mechanical Engineering Technology.
- WHITMAN, RUSSELL ALLEN (1968); B.A., San Jose State College, 1954; M.A., 1958; M.Ed., Oregon State University, 1964; Counselor, Center for Counseling and Psychological Services; Cooperating Assistant Professor of Education.
- WHITNEY, HARRY F. (1955); B.S., Maine, 1954; M.S., Cornell University, 1955; Extension Agent (Waldo County), Cooperative Extension Service.
- WHITTAKER, JAMES CURTISS (1968); B.S., Purdue University, 1958; M.S., 1960; Ph.D., Ohio State University, 1965; Associate Professor of Forest Resources.
- WICKS, ULRICH (1969); B.A., Northern Illinois University (DeKalb), 1963; Ph.D., University of Iowa, 1970; Assistant Professor of English.
- WIHRY, DAVID FRANCIS (1969); A.B., Merrimack College, 1964; Ph.D., Syracuse 1972; Assistant Professor of Economics.
- WILDES, GLENN K. (1959); B.S., University of Rhode Island, 1954; M.S., 1957; Area Dairy Specialist, Cooperative Extension Service.
- WILHELM, DONALD J. (1971); B.S., Ohio State University, 1958; Ph.D., 1964; Associate Professor of Chemical Engineering.
- WILKINSON, DOROTHY A. (1970); B.A., New York State College for Teachers, 1949; M.A., 1950; M.A., University of Michigan, 1953; Instructor in Speech (part-time).
- WILKINSON, JOSEPH NORMAN (1970); B.A., Michigan, 1964; M.A., 1965; Ph.D., 1970; Assistant Professor of Speech.
- WILSON, DAVID R. (1972); B.S., West Virginia University, 1966; Faculty Associate in Plant and Soil Sciences.
- WILSON, DONALD A. (1968); B.S., Maine, 1965; M.S., University of New Hampshire, 1967; Instructor in Forest Resources and Civil Engineering.
- WILSON, JAMES A. (1968); B.A., Lake Forest College, 1962; Ph.D., Wisconsin, 1971; Associate Professor of Economics.
- WILSON, JOHN M. (1971); B.S., West Chester State College, 1963; M.S., University of Maryland, 1968; Ph.D., 1971; Assistant Professor of Food Science.
- WILSON, JOHN ROBERT (1969); A.B., Bates, 1963; M.A., University of Kansas, 1967; Ph.D., 1969; Assistant Professor of English.
- WILSON, SARA CURTIS (1946); B.S., Farmington State Normal, 1938; Extension Agent (Washington County), Cooperative Extension Service.

UNIVERSITY OF MAINE

- WILSON, TIMOTHY P. (1972); B.S., Slippery Rock, 1962; Lecturer in Physical Education and Freshman Football Coach.
- WILSON, WILLIAM S. (1971); B.S., Maine, 1946; M.D., University of Pennsylvania, 1950; Lecturer in Zoology.
- WING, KENNETH E. (1966); B.S., Cornell University, 1958; M.Ed., 1960; Ph.D., 1966; Associate Professor and Chairman, Department of Agricultural and Resource Economics.
- WINSLOW, JOHN E. (1972); B.S., Notre Dame, 1956; M.S., 1963; Assistant Professor of Military Science.
- WOHLGEMUTH, ANDREW RICHARDS (1969); A.B., University of Pennsylvania, 1959; M.A., Syracuse University, 1966; Ph.D., 1969; Assistant Professor of Mathematics.
- WOLFHAGEN, HELEN JANE (1964); B.S., Willamette University, 1942; Ph.D., University of California (Berkeley), 1949; Lecturer in Chemistry.
- WOLFHAGEN, JAMES LANGDON (1952); A.B., Linfield College, 1946; Ph.D., University of California (Berkeley), 1951; Professor and Chairman, Department of Chemistry.
- WOOD, CLAIR GILBERT (1970); A.B., Ricker College, 1957; M.A.T., Brown University, 1963; Instructor in Chemistry.
- WOODARD, FRANKLIN EARL (1968); B.S., Maine, 1961; M.S., 1963; Ph.D., Purdue University, 1965; Associate Professor of Civil Engineering.
- WOODBURY, HAROLD MACE (1937), B.S., Maine, 1937; M.A., 1948; Professor of Physical Education; Head of Men's Division, Department of Physical Education and Athletics.
- WOODWARD, WALDA ALBION (1962); B.S., Maine, 1958; Extension Agent (Knox-Lincoln Counties), Cooperative Extension Service.
- WOOTTON, ALBERT GEORGE (1956); B.S., Rutgers, 1931; M.A., Columbia, 1951; Professor of Mathematics.
- WORK, GERALD GEOGRE (1967); A.B., Albright College, 1960; M.Ed., Ohio University, 1962; Ph.D., 1967; Associate Professor of Education.
- WYMAN, OSCAR LEWIS II (1965); B.S., Maine, 1949; M.S., University of Massachusetts, 1963; State Program Coordinator, Cooperative Extension Service.
- YAEGER, EARL C. (1970); B.S., North Dakota State University, 1960; Faculty Associate in Agricultural Engineering.
- YOUNG, DAVID BRUCE (1960); B.S., Duke University, 1955; M.S., 1959; Ph.D., Iowa State University, 1972; Associate Professor of Electrical Engineering.
- YOUNG, HAROLD EDLE (1948); B.S., Maine, 1937; M.F., Duke, 1946; Ph.D., 1948; Professor of Forest Resources.
- YOUNG, JON I. (1972); B.S., Brigham Young University, 1969; M.S., 1971; Assistant Professor of Education.
- YVON, BERNARD R. (1970); B.S., Westfield State Teachers College, 1960; M.Ed., Westfield State College, 1963; Ed.D., Wayne State, 1970; Assistant Professor of Education.

PERSONNEL

- ZABEL, LOWELL WALLACE (1967); B.A., Lawrence University, 1935; Louis Calder Professor of Chemical Engineering.
- ZAGATA, MICHAEL D. (1972); B.S., SUNY (Oneonta), 1964; M.S., 1968; Ph.D., Iowa State University, 1972; Assistant Professor of Wildlife.
- ZEICHICK, HERBERT H. (1969); B.S., Boston University, 1958; M.Ed., 1960; Extension Agent, (Penobscot County), Cooperative Extension Service.
- ZICKLIN, GILBERT (1971); B.A., Columbia College, 1963; M.A., University of California (Davis), 1968; Assistant Professor of Sociology.
- **ZIEGENBEIN, DON RALPH (1964); B.S., Babson Institute, 1961; M.B.A., 1962; Assistant Professor of Finance, College of Business Administration.
- ZINGALE, PAUL (1971); B.A., University of Rochester; M.A., University of Minnesota, 1970; Assistant Professor of Management and Industrial Relations.
- ZOLDI, JOHN M. (1971); B.S., Clarkson College, 1965; M.S.E.E., 1969; Assistant Professor of Physical Sciences and Coordinator of Science Programs, University of Maine at Bangor.
- ZOLLITSCH, REINHARD (1964-66) (1969); M.A., Maine, 1964; M.A., University of Massachusetts, 1969; Ph.D., 1971; Assistant Professor of German.
- ZOLLWEG, JOHN ALLMAN (1970); A.B., Oberlin, 1964; Ph.D., Cornell University, 1969; Assistant Professor of Chemistry.

Summary of Student Enrollment

1972-73

	ORONO CAMPUS		
	MEN	WOMEN	TOTAL
Graduates	636	208	844
Fifth Year	15	0	15
Seniors	1127	744	1871
Juniors	1125	906	2031
Sophomores	963	562	1525
Freshmen	1022	689	1711
Two-Year Courses:			
First Year	184	60	244
Second Year	148	38	186
Specials	165	110	275
Three-Year Nurses	0	44	44
Audition	0	2	2
	<hr/>	<hr/>	<hr/>
	5385	3363	8748
	BANGOR CAMPUS		
	MEN	WOMEN	TOTAL
Two-Year Courses:			
First Year	131	83	214
Second Year	94	34	128
Specials	28	9	37
	<hr/>	<hr/>	<hr/>
	253	126	379
	<hr/>	<hr/>	<hr/>
Academic Year Totals	5638	3489	9127
Summer Session	684	607	1291
	<hr/>	<hr/>	<hr/>
Grand Total*	6322	4096	10418

*Omitting duplicates in Summer Session

CLASSIFICATION BY COLLEGES

	ORONO CAMPUS		
	MEN	WOMEN	TOTAL
Graduates	636	208	844
Arts & Sciences	1676	1536	3212
Business Administration	485	44	529
Education	583	770	1353
Life Sciences & Agriculture	1131	772	1903
Onwards	28	12	40
Technology	846	21	867
	<hr/>	<hr/>	<hr/>
	5385	3363	8748

STUDENT ENROLLMENT

BANGOR CAMPUS

General Studies	126	54	180
Law Enforcement	119	20	139
Mental Health Technology	8	52	60
	<hr/>	<hr/>	<hr/>
	253	126	379
	<hr/>	<hr/>	<hr/>
	5638	3489	9127

CANDIDATES FOR DEGREES

ORONO CAMPUS

Graduates	628	196	824
Arts & Sciences	1602	1462	3064
Business Administration	469	41	510
Education	559	755	1314
Life Sciences & Agriculture	1096	753	1849
Onwards	28	12	40
Technology	831	21	852
	<hr/>	<hr/>	<hr/>
	5213	3240	8453

BANGOR CAMPUS

General Studies	111	49	160
Law Enforcement	105	18	123
Mental Health Technology	8	50	58
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	224	117	341
	<hr/>	<hr/>	<hr/>
Grand Total	5437	3357	8794

CLASSIFICATION BY RESIDENCE

CLASSIFICATION BY RESIDENCE, Continued

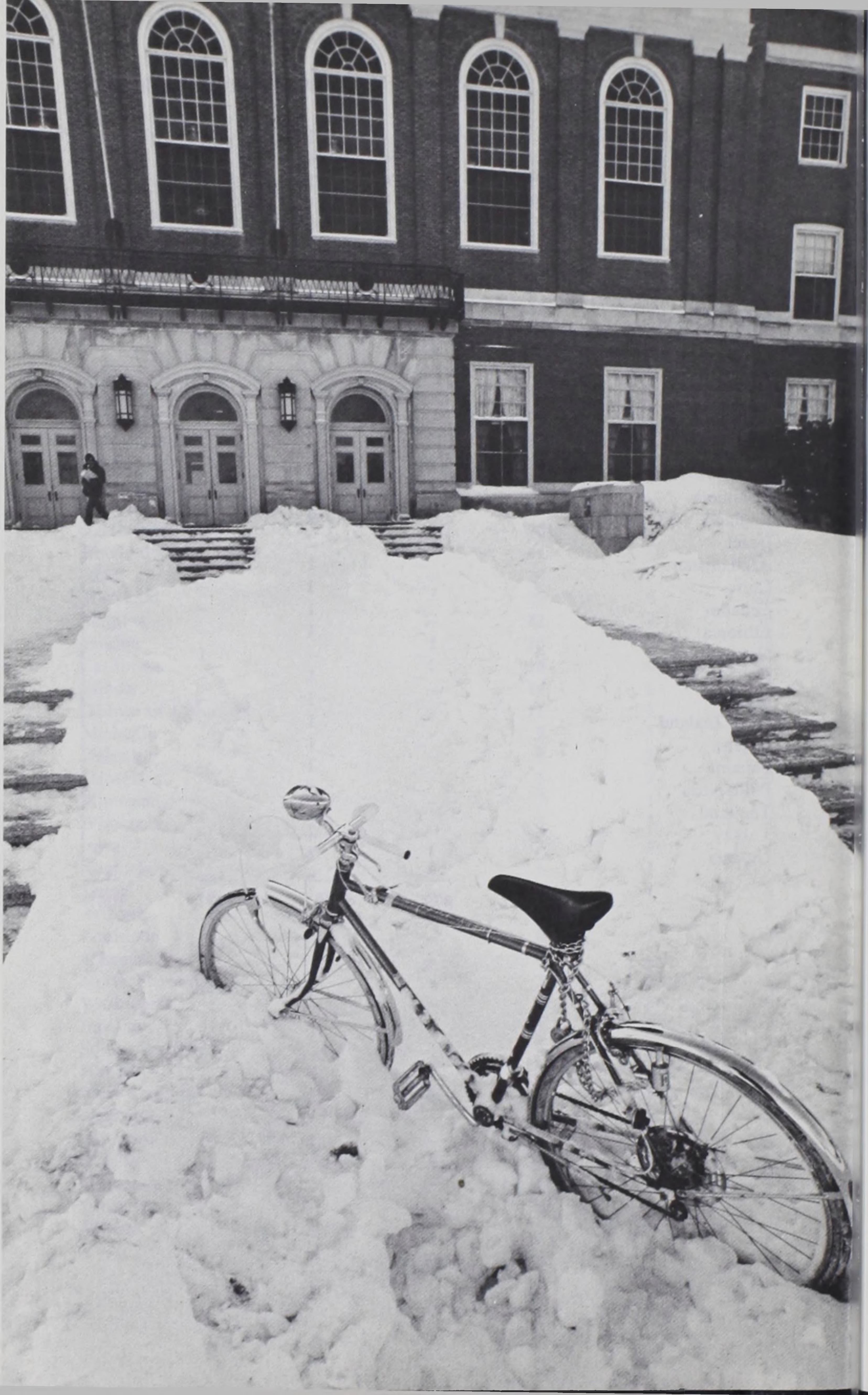
	BANGOR CAMPUS	ORONO CAMPUS	SUMMER SESSION	TOTAL
	REGULAR SESSION			
Androscoggin	10	405	21	436
Aroostook	48	533	69	650
Cumberland	21	812	30	863
Franklin	2	85	12	99
Hancock	25	263	59	347
Kennebec	8	619	14	641
Knox	7	145	69	221
Lincoln	5	107	17	129
Oxford	4	230	19	253
Penobscot	184	2426	475	3085
Piscataquis	12	134	24	170
Sagadahoc	1	108	6	115
Somerset	4	229	41	274

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	BANGOR CAMPUS REGULAR SESSION	ORONO CAMPUS REGULAR SESSION	SUMMER SESSION	TOTAL
Waldo	15	168	38	221
Washington	11	117	23	151
York	9	457	9	475
	<hr/>	<hr/>	<hr/>	<hr/>
	366	6838	926	8130
Maine	366	6838	926	8130
Massachusetts	5	656	45	706
New York	3	279	92	374
New Jersey	2	234	15	251
Connecticut	1	181	18	200
Pennsylvania	—	79	25	104
New Hampshire	—	74	13	87
Vermont	—	46	8	54
Rhode Island	—	41	6	47
Ohio	—	24	13	37
Maryland	—	28	8	36
Virginia	—	32	4	36
Florida	1	25	8	34
California	1	16	4	21
Illinois	—	14	6	20
District of Columbia	—	11	1	12
Michigan	—	9	3	12
Delaware	—	9	2	11
Georgia	—	7	2	9
Minnesota	—	7	1	8
Wisconsin	—	5	3	8
Iowa	—	3	4	7
Kentucky	—	6	1	7
Texas	—	5	1	6
Arizona	—	5	—	5
Louisiana	—	4	1	5
Missouri	—	5	—	5
North Carolina	—	3	2	5
Washington	—	2	3	5
Indiana	—	2	2	4
South Carolina	—	4	—	4
Hawaii	—	3	—	3
West Virginia	—	2	1	3
Alabama	—	2	—	2
Arkansas	—	—	2	2
Oregon	—	2	—	2
Tennessee	—	2	—	2
Wyoming	—	2	—	2
Alaska	—	1	—	1
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STUDENT ENROLLMENT

Colorado	—	1	—	1
Kansas	—	1	—	1
Mississippi	—	1	—	1
Montana	—	1	—	1
Nebraska	—	1	—	1
New Mexico	—	1	—	1
Oklahoma	—	1	—	1
Utah	—	1	—	1
Virgin Islands	—	1	—	1
Canada	—	32	69	101
India	—	7	—	7
Greece	—	3	—	3
Haiti	—	3	—	3
Kenya	—	3	—	3
Taiwan	—	3	—	3
Brazil	—	2	—	2
Colombia	—	2	—	2
England	—	2	—	2
Israel	—	2	—	2
Afghanistan	—	1	—	1
China	—	1	—	1
Ecuador	—	1	—	1
Ethiopia	—	1	—	1
Germany	—	—	1	1
Iran	—	1	—	1
Mexico	—	1	—	1
New Zealand	—	1	—	1
Nigeria	—	1	—	1
Panama	—	1	—	1
Philippines	—	1	—	1
Thailand	—	1	—	1
Turkey	—	1	—	1
Uganda	—	1	—	1
	<hr/>	<hr/>	<hr/>	<hr/>
	379	8748	1291	10418



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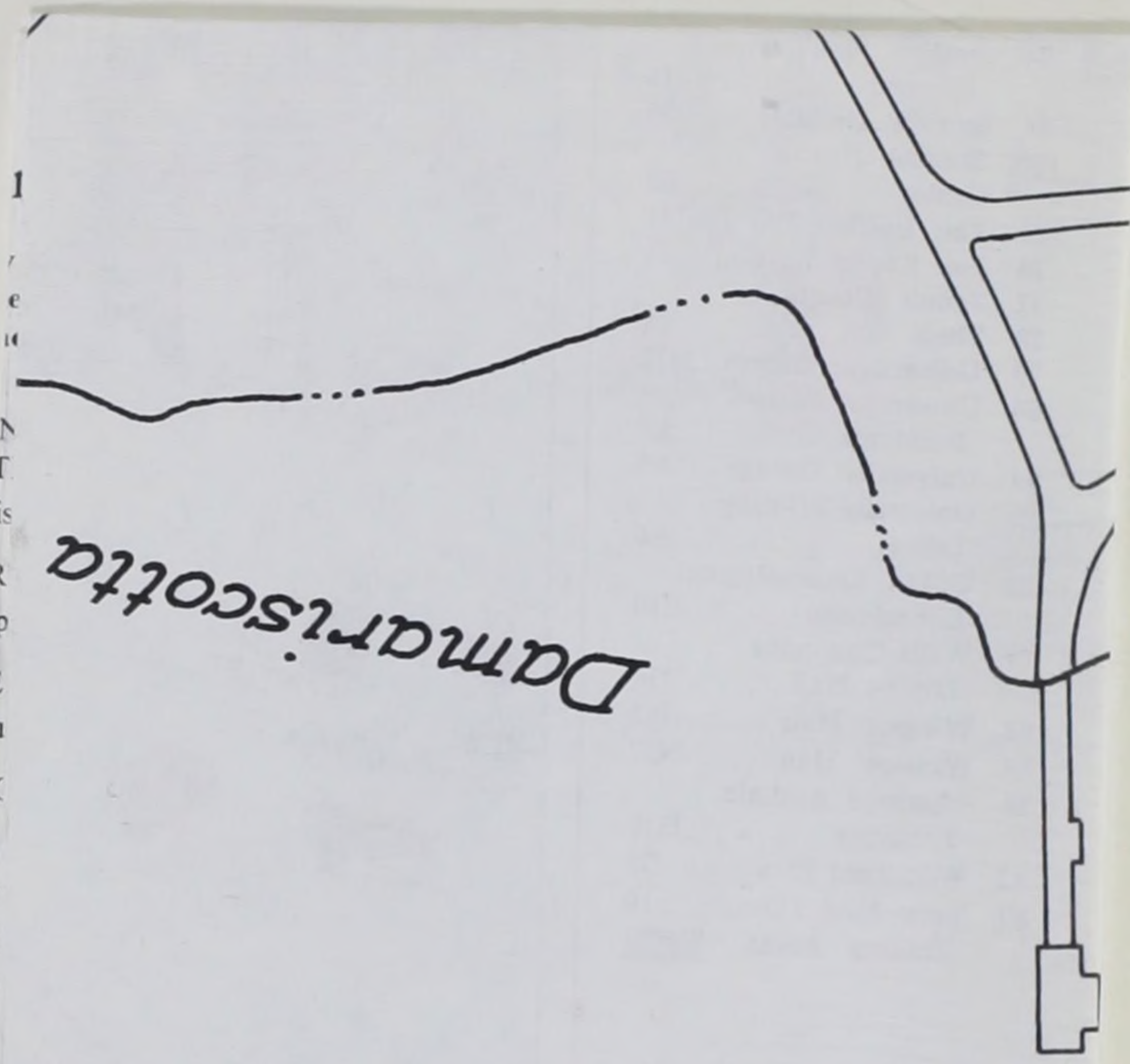
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