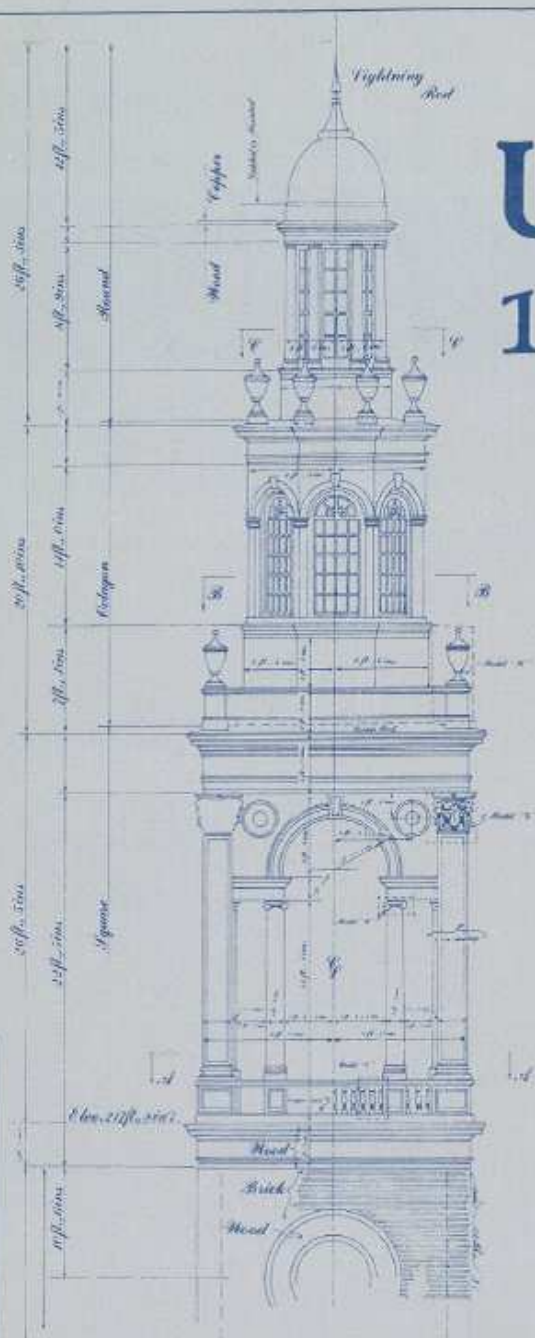


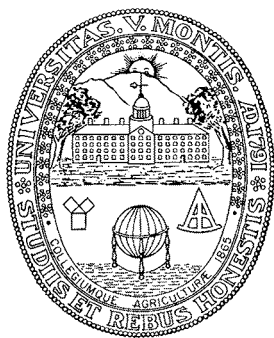
UVM

1981-82



UNIVERSITY OF VERMONT
1981-82 CATALOGUE

1981-82 CATALOGUE



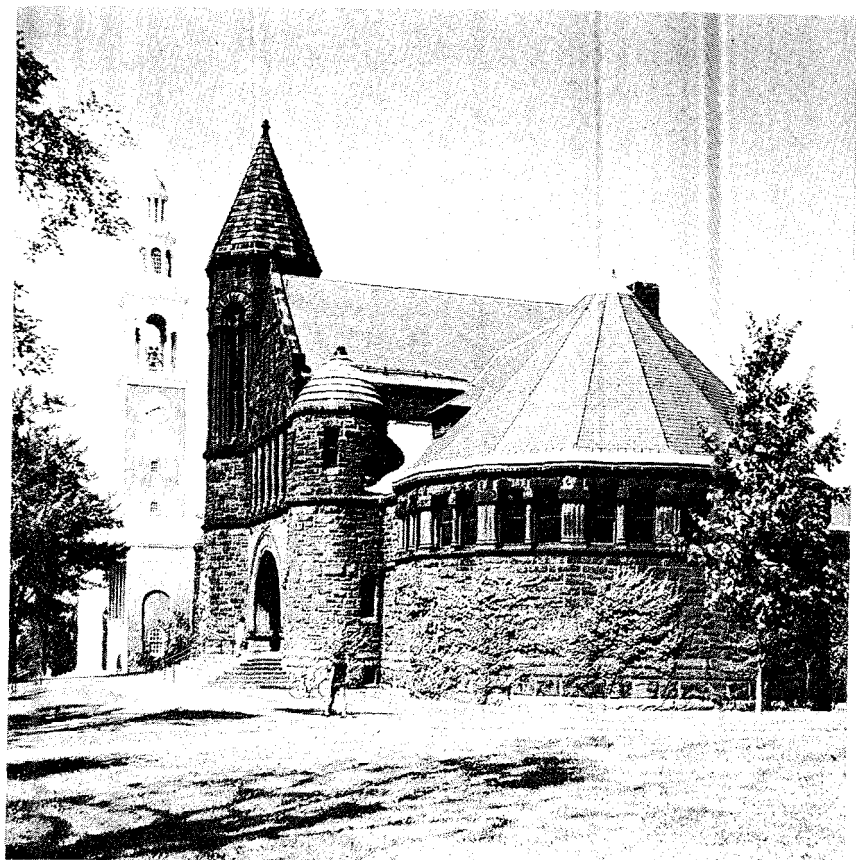
THE UNIVERSITY OF VERMONT

BURLINGTON, VERMONT

Cover:

Tracing from original drawing by McKim, Mead & White, Architects, of Ira Allen Chapel, west elevation, dated September 10, 1924, found in Land Records Office.

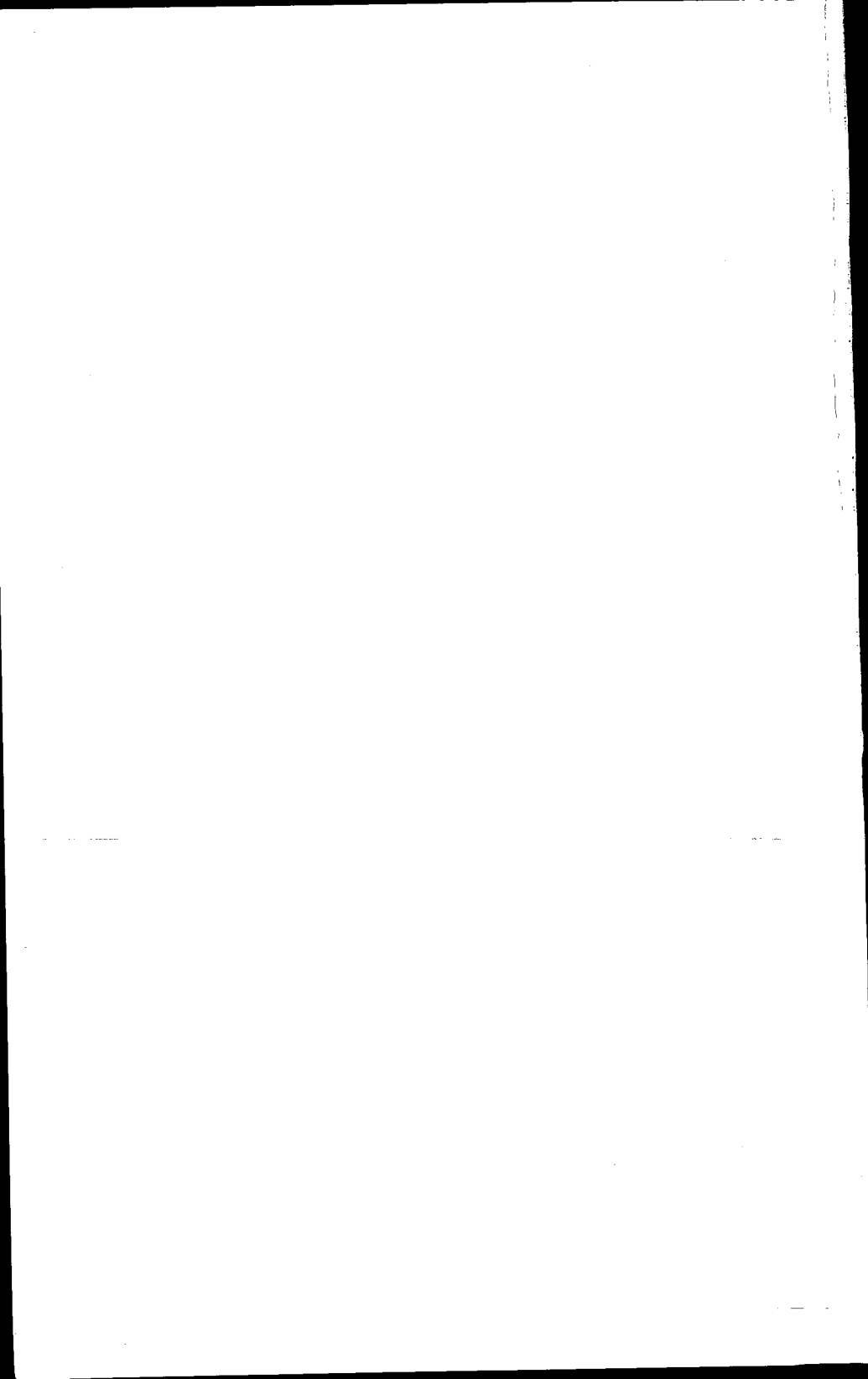
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John Smith/IDC Photo

Although its legal title is The University of Vermont and State Agricultural College, the University is known to its students and alumni as UVM. This popular abbreviation is derived from the Latin Universitas Viridis Montis.

*The colors of the University are green and gold.
The mascot is the catamount.*



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The University of Vermont reserves the right to make changes in the course offerings, degree requirements, charges, regulations, and procedures contained herein as educational and financial considerations require, subject to and consistent with established procedures and authorizations for making such changes.

CORRESPONDENCE

Requests for a catalogue, an application form, or information concerning admissions policies and procedures, room and board, and tuition may be addressed to:

Director of Admissions
University of Vermont
194 South Prospect Street
Burlington, Vermont 05405

Other correspondence may be addressed as follows:

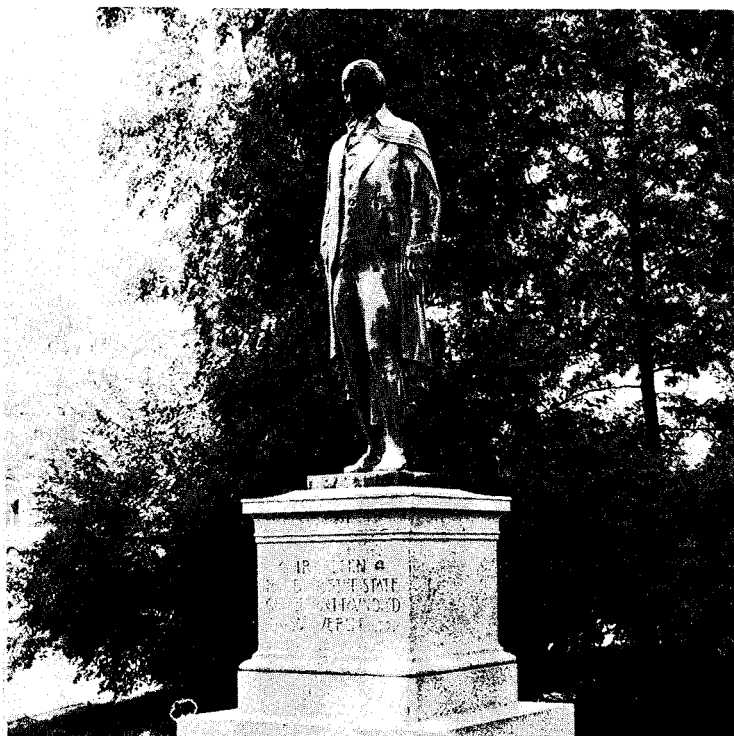
Dean, College of Agriculture
Director, School of Allied Health Sciences
Dean, College of Arts and Sciences
Director, School of Business Administration
Dean, College of Education and Social Services
Dean, College of Engineering and Mathematics
Dean, Graduate College
Dean, College of Medicine
Director, School of Natural Resources
Director, School of Nursing
Director, Environmental Program
Director, Continuing Education (includes Summer Session and Evening Division)

University of Vermont
Burlington, Vermont 05405

It is the policy of the University of Vermont to provide equal opportunity in admissions, programs, and activities in compliance with Title VI of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, and the Age Discrimination Act of 1975. As such, all University sponsored programs and activities, except where limitations or restrictions are legally permissible, shall be open to all students without regard to race, sex, handicap, color, religion, age, or national origin.

Inquiries regarding compliance with the foregoing, or the affirmative action policies of the University, should be directed to: The Assistant to the President for Human Resources.

The University has embarked on a program to remove architectural barriers to make facilities accessible to and usable by the handicapped. Questions should be referred to the Office of Architectural Barrier Control.



John Smith/IDC Photo

In the wording of the original subscription list dated at Colchester September 16, 1789, Ira Allen chose the location of the new college.

Having Honorable views towards the Public and having a desire to make the Place I have chosen for my residence respectable by the Establishment of Liberal Arts and Sciences I therefore name Burlington for that purpose, being situate on the Lake Shore has a most pleasant Prospect together with the advantage of an inland navigation where the waters are clear & Beautiful, the soil dry & good for Building or Gardens, the best of Spring water may be brought in pipes to every part of the Plain.

From *Tradition Looks Forward*, a history of the University of Vermont from 1791-1904 by Julian Ira Lindsay

Introduction

Even before the fledgling Republic of Vermont joined the Union as the fourteenth state, its 1777 constitution called for a university which "ought to be established by direction of the General Assembly." The provision was retained as Vermont moved toward statehood, although it was 1791 before the pioneers of this largely raw and unsettled wilderness territory managed to act on the matter and actually charter a university, to be located in the young town of Burlington on Lake Champlain.

Nine more years passed before, in 1800, the University of Vermont was finally set in motion with a president-professor and a handful of students.

With the adoption, on November 3, 1791, of its charter, the University became the twentieth college in the United States and the fifth in New England, notable in view of the fact that only five of all the citizens in the new state were college-educated. Given the social and religious attitudes of eighteenth century New England, the University was also remarkable in that it was the first in America to have it declared plainly in its charter that the "rules, regulations, and by-laws shall not tend to give preference to any religious sect or denomination whatsoever."

Thus did the founding Legislature of Vermont establish a university which was to develop like no other in the fledgling nation.

While the enabling legislation provided for funding to come from rents, those were often fixed at "\$.25 per acre as long as grass is green and water runs," and in any event were not reliably collectable.

One result is the tradition, born of necessity, which has seen The University of Vermont develop in many of the same ways as the private institutions of the country have developed, with a substantial reliance on alumni and other private philanthropy.

Today, the University's appropriation from the State of Vermont is about 17 percent of the total operating budget of \$96 million. The largest single share (about 31 percent) is obtained from student tuition. Grants and contracts account for about 22 percent of the budget and the remainder comes from alumni and other private philanthropy, endowment, sales, services, and auxiliary enterprises.

The first building was subscribed by citizens of Burlington and when fire destroyed that edifice in 1824, its successor, for which General Lafayette laid the cornerstone, was again made possible by the citizens of Burlington. That building, the Old Mill—still in use today—was only the first in a long line to be made possible by private philanthropy. The list includes all but one of the buildings on University Row: Ira Allen Chapel, Billings, Williams, Old Mill, and The Royall Tyler Theatre. Morrill Hall, the first UVM building to be provided by state funding, did not come until 1907.

Other buildings made possible by private philanthropy include Waterman Memorial, Southwick, Fleming Museum, Converse, Dewey, and Lafayette Halls, Medical Alumni and Given Medical Buildings, Dana Medical Library, the Patrick Gymnasium, Gutterson Field House, and Forbush Pool complex, and, most recently, the Howe addition to the Bailey Library.

Ground will be broken during 1981 for a building to house the programs of the School of Natural Resources to be named the George D. Aiken Center for Natural Resources. The funding for this building will come from a combination of private and state funding.

The University of Vermont was founded in a day when U.S. colleges and universities existed primarily to educate men for the professions, especially for the ministry. Yet, in studying University history, Professor Emeritus Betty Bandel discovered that "this small institution located in a frontier community of New England became a pioneer in the kind of practical education which later became the basis for the establishment of the Land Grant universities—those institutions which made it possible for the sons and daughters of average citizens to aspire to a college education." For example, she noted that the University is believed to be the first non-military institution to have offered engineering courses.

The University pioneered in yet another area of society, that of giving women equal status with men in higher education. In 1871, the University defied custom and admitted two women as students and four years later was the first institution in the country to admit women to full membership in the scholarly society, Phi Beta Kappa.

Tucked in the northwest corner of the Ira Allen Chapel grounds is a memorial to a late nineteenth century graduate of this University, philosopher John Dewey, whose ideas about practical education are still debated with passionate vigor.

During 1980-81, 7,938 students were enrolled in the seven undergraduate colleges and schools—the Colleges of Agriculture, Arts and Sciences, Education and Social Services, and Engineering, Mathematics, and Business Administration, and the Schools of Allied Health Sciences, Natural Resources, and Nursing—and 943 were enrolled in the Graduate College and 358 in the College of Medicine. Beginning with the year 1981-82, the present College of Engineering, Mathematics, and Business Administration will be reorganized into a College of Engineering and Mathematics and a School of Business Administration.

The campus of the University of Vermont is located in Burlington, the state's largest city. Within a greater Burlington area of 100,000 people, the city with its population of 38,000 enjoys magnificent views of Lake Champlain and the Adirondack Mountains to the west and Vermont's Green Mountains to the east.

THE UNIVERSITY'S MISSION

Combining the heritage of a private university with that of a land-grant institution, the University of Vermont and State Agricultural College embraces a broad range of instructional and research programs in the liberal disciplines and in the professions, and, as well, focuses a significant portion of its resources on serving the practical concerns of the citizens of the state. The blend of these characteristics is reflected in the student body, drawn from Vermont and throughout the nation. The University is at once a local and a national resource and, because of its moderate size, is accurately characterized as a comprehensive university with the teaching environment of a college.

The University of Vermont is dedicated to the advancement, transmission, and application of knowledge through teaching, research and scholarly pursuits, and public service. Its faculty and students participate in enhancing the understand-

ing of self and of environment. Exposed to the range of human achievement, stimulated by a spirit of inquiry and intellectual rigor, faculty and students are enabled to develop and extend their knowledge.

The curricula of the undergraduate, graduate, and professional programs provide a balance between response to changing societal needs and the preservation and enhancement of the foundations of liberal education. The University offers a rich environment for research, scholarship, and creative work in many realms of human inquiry, sharing the excitement and fruits of investigation and creation with students and society. Through a variety of research, extension, continuing education, and other programs, the University provides assistance, in its special partnership with the state, in the solution of human, social, technological, environmental, and educational problems of the citizens of Vermont.

Supporting the mission of the University are the services and academic programs described in this catalogue and, in addition, the following:

THE UNIVERSITY LIBRARIES

In the Bailey/Howe Library, the main unit of the University libraries, are located the services and collections relating to the humanities, social sciences, and many of the sciences. This library holds the largest book and map collection in Vermont, and maintains a representative collection of major periodicals, scholarly journals, indexes, and abstracting services. It is a depository for United States and Canadian government publications. The Special Collections Department includes the Wilbur Collection of Vermontiana, rare books, literary and historical manuscripts, and the papers of many individuals associated with the state and the federal government. A separate Physics and Chemistry Library is located in the Cook Physical Science Building. Collections in medicine and the health sciences are located in the Dana Medical Library. The University Archives in the Waterman Building contain the permanent, official records of the University.

VERMONT EDUCATIONAL TELEVISION

Vermont Educational Television is the public television network and owned and operated by the University of Vermont, serving the state.

With studios and offices on the Fort Ethan Allen campus, the network provides an instructional service to schools, college courses for credit, programs for children out-of-school, and a broad spectrum of Eastern Education Network and Public Broadcasting Service programs. Locally produced programs address the concerns and issues of Vermonters.

Programs are broadcast over WETK-TV, channel 33, Burlington; WVTB, channel 20, St. Johnsbury; WVER, channel 28, Rutland; WVTM, channel 41, Windsor; and on channels 74, 76, 79 at Manchester, Wilmington, and Bennington.

UNIVERSITY EXTENSION SERVICE

Extension Service agents in every Vermont county simplify and quickly spread the knowledge of UVM's resources and research directly to Vermonters so latest findings can be put to work.

This "grassroots" approach which reaches nearly all Vermont residents has triggered rapid advances in agriculture, community and natural resources, youth development, and home economics.

MORGAN HORSE FARM

The Morgan Horse Farm in Weybridge, Vermont, has been a shrine for Morgan Horse lovers for more than a century. The Morgan breed dates back to 1789 when the first small but powerful stallion was born to a mare owned by school teacher Justin Morgan.

The Morgan Farm was established in 1878 by Joseph Battell of Middlebury who compiled the first volume of the Morgan Horse Registry and constructed the farm landmark, an ornate Victorian barn with mansard roof. In 1907, Battell deeded the farm to the U.S. Government, which in 1951 turned the farm over to the University of Vermont.

The farm has become a laboratory for UVM students and the focal point for Morgan Horse lovers around the world. The farm continues to host thousands of visitors annually.

A versatile, highly intelligent horse, the Morgan is Vermont's State Animal. The breeding program at the Morgan Farm has produced numerous blue ribbon winners at the National Morgan Horse Show.

ENDOWED CHAIRS

Since the establishment of the Williams Professorship in Mathematics in 1853, the University has been the recipient of a number of generous endowments intended to support teaching and research in various academic fields. Among them are:

The Williams Professorship of Mathematics, 1853, honoring Azarias Williams of Concord, Vermont, merchant and judge, native of Sheffield, England, who in 1839 deeded to the University extensive holdings in land, at that time valued at \$25,000. In return he received a small annuity during the remaining ten years of life.

The Marsh Professorship of Intellectual and Moral Philosophy, established in 1867 to honor James Marsh, distinguished UVM president and philosopher of the 1830's. Many alumni contributed to the fund which established this chair.

The Pomeroy Professorship of Chemistry, established in 1878 by John N. Pomeroy, A.B., 1809, who lectured on chemistry and later, during his career as a lawyer in Burlington, served as trustee of the University. He was awarded the LL.D. in 1861.

The Howard Professorship of Natural History and Zoology, established in 1881 by John Purple Howard, a Burlington resident who was a generous benefactor both of the University and of the City of Burlington.

The Flint Professorship of Mathematics, Natural or Technic Science, frequently awarded in the field of civil engineering, established in 1895 by a bequest from Edwin Flint, A.B., 1836, lawyer and judge in Wisconsin and Iowa until his death in 1891 in Mason City, Iowa.

The Converse Professorship in Commerce and Economics, established in 1899 as a result of an endowment made by John H. Converse, A.B., 1861, LL.D., 1897, Philadelphia railroad financier, who as a trustee of the University proposed the teaching of Latin, modern languages, history, bookkeeping, penmanship, and other subjects necessary to men and women.

The Thayer Professorship of Anatomy, established in 1910 to honor Dr. Samuel White Thayer, Dean of the College of Medicine from 1854-71 and 1880-82, from contributions made by alumni of the College of Medicine.

The McCullough Professorship of Political Science, established in 1926 through grants made by Gov. and Mrs. John G. McCullough of Bennington, Vermont. Gov. McCullough was a lawyer and attorney general in California during the mid-nineteenth century; later a railroad financier and benefactor of many educational and other enterprises during his long residence in Vermont.

The Perkins Professorship of Zoology, established in 1931 to honor George H. Perkins, for sixty-four years as a teacher of science and dean of the College of Arts and Sciences for many years. Grant for this professorship was made by John E. Lynch of Boston, Massachusetts.

The Shipman Professorship of Ophthalmology, established in 1934 by a bequest from Dr. Elliot W. Shipman, M.D., 1885. After beginning his practice in Vergennes, Vermont, and studying ophthalmology in Berlin, Dr. Shipman practiced medicine in Richmond Hill, New York, for thirty-five years.

The Lyman-Roberts Professorship of Classical Languages and Literature, established in 1941 by Mrs. Robert Roberts and Mrs. Edward Lyman to honor Robert Roberts, a well-known lawyer and abolitionist who was mayor of Burlington in the 1890's and served as a University trustee from 1895-1939.

The Corse Professorship of English Language and Literature, established in 1952 by Frederick M. and Fannie C.P. Corse. Mr. Corse, A.B., 1888, and registrar and teacher of mathematics and economics in the University during the 1890's, was general manager for Russia of the New York Life Insurance Company, with offices in Stalingrad (Petrograd) for seventeen years before the Russian Revolution of 1917.

The Lawrence Forensic Professorship of Speech, established in 1965 by Edwin W. Lawrence, lawyer and financier of Rutland, Vermont, A.B., 1901, generous patron of forensic activities at the University.

The Sanders Professorship, established in 1968 as a chair endowed by the alumni, honoring the Rev. Daniel Clarke Sanders, first president of the University.

ACCREDITATIONS

The University of Vermont is accredited by the New England Association of Schools and Colleges. Specific program accreditations are listed below:

AGRICULTURE

Occupational Education—National Council for Accreditation of Teacher Education

ALLIED HEALTH SCIENCES

Dental Hygiene—American Dental Association

Medical Technology—American Medical Association (Committee on Allied Health Education Accreditation) upon recommendation of the National Accrediting Agency for Clinical Laboratory Sciences

Physical Therapy—American Physical Therapy Association

Radiologic Technology

Radiation Therapy Technology—American Medical Association (Committee on Allied Health Education Accreditation) upon recommendation of the Joint Review Committee on Education in Radiologic Technology

Nuclear Medicine Technology—American Medical Association (Committee on Allied Health Education Accreditation) upon recommendation of the Joint Review Committee on Educational Programs in Nuclear Medicine Technology
Radiographic (X-Ray) Technology—American Medical Association (Committee on Allied Health Education Accreditation) upon recommendation of the Joint Review Committee on Education in Radiologic Technology

ARTS AND SCIENCES

Speech-Language Pathology—American Speech-Language-Hearing Association
Music—National Association of Schools of Music
Clinical Psychology—American Psychological Association

EDUCATION

National Council for Accreditation of Teacher Education
Social Work—Council on Social Work Education
Vermont Department of Education—Teacher Education Program Approval

ENGINEERING, MATHEMATICS, AND BUSINESS ADMINISTRATION

Engineering Programs (Mechanical, Electrical, Civil)—Accreditation Board for Engineering and Technology, Inc.

MEDICINE

American Medical Association, Association of American Medical Colleges

NATURAL RESOURCES

Forestry Program—Society of American Foresters

NURSING

Professional Nursing—National League for Nursing
Technical Nursing—National League for Nursing

Admissions to the University

Applications and Deadlines

The University of Vermont welcomes applications from all interested students regardless of race, religion, handicap, nationality, or sex. Prospective freshmen and transfer students interested in applying for admission in either January or September can receive applications by writing to: Office of Admissions, University of Vermont, 194 South Prospect Street, Burlington, 05405. Applications and supporting materials for admission in January should be received in the Admissions Office by December 1, while all materials for admission in September should be on file and complete by February 1. For transfer students, applications should be on file and complete by April 1 except for those applying to Allied Health Sciences or Professional Nursing. These students have a February 1 completion date. Upon filing an application all candidates are required to pay a non-refundable \$25 application fee which is used to meet the cost of processing the application. Fall financial aid information should be submitted by March 1 for freshmen and May 1 for transfers.

Early Notification for Vermont Students

An early notification program is available for prospective freshmen who are Vermont residents (see residency rules, page 44). Vermonters applying under this program will be notified concerning admission during mid-December if the application, high school transcript, official (sent directly from College Board) report of SAT scores, and recommendations have been received by November 1. Students who receive offers of admission under this program will have until May 1 to respond.

Admissions Criteria

Qualification for admission is determined on the basis of the secondary school record, rank in graduating class, recommendations, and College Entrance Examination Board Scholastic Aptitude Test results. College Board Achievement Tests and additional information may also be requested by the Admissions Office. Each application is carefully reviewed by the Admissions Office staff and, in some cases, by the college or school to which the student is applying. The candidate's record is thoroughly examined in order to determine whether the student has adequately prepared for the academic program of his/her choice. All qualified Vermont freshmen applicants will be offered admission. Non-resident applicants are competing for admission and will be selected on the basis of overall academic qualifications, leadership potential, special talents, and ability to add to the diversity of the undergraduate population.

Sons and daughters of alumni of the University of Vermont are encouraged to apply and are given special consideration. Increasing competition means that the University must evaluate the application of each alumni son or daughter in terms of the total number of applications, their relative qualifications, and the limitation which must be placed on the number of applicants who may be offered admission to the various academic programs which are available.

Most prospective freshmen are expected to present at least 16 high school units, including a minimum of four years of English, three years of mathematics, three years of social sciences, two years of a foreign language, and two years of science.

The three years of mathematics should be two years of algebra and one year of geometry. Students who plan to specialize in **engineering, forestry, mathematics, or science** should present both a second year of algebra and a course in trigonometry for a total of four years of mathematics.

Students applying to **business administration** are expected to be enrolled in the college preparatory curriculum at the high school level. These students should present a strong background in mathematics and have a generous exposure to the sciences, social sciences, and humanities. Students planning to major in an **allied health science** must have taken high school courses in biology and chemistry, while physics is highly recommended. Physics is required for students planning to major in **physical therapy**. For students planning to major in **professional nursing**, a high school course in chemistry is required and courses in biology and physics are highly recommended. For students planning to major in **technical nursing**, biology is required; chemistry and physics are recommended. For students planning to major in most programs in the College of Agriculture, courses in biology and chemistry are recommended.

Exceptionally qualified students may in some instances be admitted even though they do not meet the above requirements in full.

Additional courses in mathematics, history, science, the fine arts and music, and a third year in foreign language are strongly recommended as desirable preparation for college. In evaluating the secondary school record, careful attention is given to the course load a student has been carrying and any advanced work is given special consideration. A student planning to major in **music** must arrange for an audition and interview with the chairperson of the department prior to the deadline for completion of the application.

Interviews and Visits

Students are encouraged to visit the campus to form their own first-hand impressions about the University. Prospective students may schedule an appointment with a current UVM student or a staff member on most weekdays during the academic year in order to gain information about the academic and non-academic aspects of undergraduate life.

On most Saturday mornings while the University is in session, information group sessions will be held on campus for interested students and parents. Students should write or call the Admissions Office, (802) 656-3370, for additional information about the group meetings or individual appointments.

New England Regional Student Program

The University of Vermont is currently an active participant with the Universities of Maine, Massachusetts, New Hampshire, and Rhode Island and with Lowell University, Southeastern Massachusetts University, and the public four-year and two-year colleges and technical institutes in a program of regional cooperation aimed at increasing educational opportunities for qualified young men and women of the New England states. Under the program, New England residents are given tuition privileges in certain specialized curricula which are not offered by public institutions in their home state. New England students enrolled in regional student programs at the University of Vermont who are not residents of Vermont are charged 125 percent of the University's in-state tuition. A brochure detailing these specialized curricula has been prepared by the New England Board of Higher Education and is available through the Board, 68 Walnut Road, Wenham, Massachusetts 01984.

Under the New England Regional Student Program, the University of Vermont offers the following undergraduate programs for the 1981-82 academic year:

REGIONAL PROGRAMS OFFERED BY THE UNIVERSITY OF VERMONT TO STUDENTS FROM

<i>Canadian Area Studies</i>	CT, MA, NH, RI
<i>Dairy Technology</i>	ME, MA, NH, RI
<i>Dietetics</i>	NH
<i>Greek</i>	CT, ME, RI
<i>Latin</i>	RI
<i>Recreation Management</i>	CT, MA, RI
<i>Russian</i>	ME, NH
<i>Russian/Eastern European Area Studies</i>	ME, NH, RI

Student Exchange: New England State Universities

The six New England land-grant universities (Universities of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut) participate in an exchange program to enable students at the sub-degree level to take advantage of a course or combination of courses not available at the home institution. In order to participate in the program, a state university student must:

1. Identify a course or combination of courses which is related to his/her area of academic interest and which is not available on the home campus.
2. Receive permission from the appropriate university exchange authorities at both the sending and receiving institutions.
3. Meet minimum eligibility requirements which include the following: In general, a student must be in good standing and have at least a 2.50 grade-point average; must be a degree candidate; and must be at least a first semester sophomore (application may be made as early as the second semester of the freshman year). There is no upper limit in terms of class standing on participation.

Exchanges may not exceed a total period of two academic semesters, but these need not be taken consecutively. Summer sessions are not considered part of the exchange program. Course work approved by the student's host institution and completed satisfactorily is fully transferable to the home institution. Transferability of grades and inclusion in grade-point averages are subject to home institutional policy.

The student will pay normal tuition and required fees to the home institution and room and board (where applicable) to the host institution. Students on financial aid must contact their home institution's financial aid office to determine eligibility for continued scholarship assistance.

Participation in the exchange program will not affect a student's residence status either at the home or host institution, nor does participation improve or prejudice possibilities for transfer.

For information, contact the Office of Academic Affairs, 349 Waterman Building.

Types of Enrollment

DEGREE STUDENTS — Students who have presented appropriate credentials for admission and have been accepted as students in a degree program.

NON-DEGREE STUDENTS — Students who have presented minimum credentials and are permitted to undertake *limited* course work (up to six credit hours per semester) for a purpose *other than* the earning of a degree (see section on Continuing Education).

College Entrance Examinations

The College Entrance Examination Board will administer a series of scholastic aptitude and achievement tests during 1981-82. Complete information may be obtained from the College Entrance Examination Board, P.O. Box 592, Princeton, New Jersey 08540, or College Entrance Examination Board, Box 1025, Berkeley, California 94701.

Transferring to the University

Students interested in transferring to the University may apply for admission to the fall or spring semester. Applications and supporting materials for mid-year admission should be filed by December 1. Applications for fall transfer should be complete by April 1, except for those students applying to the Allied Health Sciences or Professional Nursing. These students have a February 1 completion date. Transfer candidates should see that SAT scores and official transcripts of their high school and college records are sent to the Office of Admissions by the appropriate deadline. A transfer applicant may not disregard the record of any previous education received at another institution.

A student who transfers to the University from another accredited college or university may be given provisional credit for all courses satisfactorily completed, provided that similar courses are counted toward graduation at the University of Vermont. Transfer credit is not allowed for work completed with grade "D" or its equivalent, unless a more advanced course in the same subject has been passed with a higher grade in the institution from which the student transfers. Please note: GRADES do NOT transfer. The quality point average of transfer students is computed on the work taken at the University of Vermont only.

The credit is provisional, pending satisfactory completion of a semester's work at the University. The provisional transfer credits are fully granted if the student is in good standing at the end of the first semester.

The determination of how transferred course(s) listed on the Evaluation of Transfer Credit form fit a specific degree program rests with the academic dean/director of the college/school in which the transfer student subsequently becomes a candidate for a degree.

Advanced Placement Examinations

The University welcomes Advanced Placement Examinations in *all* areas under the College Entrance Examination Board (CEEB). Credit is granted for Grades of 3, 4, and 5 (a Grade of 2 in Mathematics BC).

No college grade is assigned when APP credit is granted. Instead, credit is recorded on the student's permanent academic record for specific University courses. No fee, beyond that charged by CEEB, is assessed for such college credit. Appropriateness and applicability of the Advanced Placement Examination credit is determined by the dean/director of the college/school in which the student is subsequently a candidate for a degree.

Credit by Examination

A degree student who wishes to do so may, under the following conditions, receive credit for a course by taking a special examination and paying the special examination fee charge of \$25 per credit hour. The examination fee must be paid prior to taking the examination.

A request for such an examination must be made in writing at least one month before the date of the examination, and it must be approved by the student's advisor, the chairperson of the department in which the course is given, and the academic dean/director, in that sequence. The student must neither have audited, previously received a grade or mark, or have attempted a prior special examination in this course at the University of Vermont or at any other institution of higher education. The student may not take a special examination in a course whose content is presupposed by other courses the student has already taken. In cases of uncertainty, the department chairperson shall decide whether it is appropriate for the student to take a special examination for credit in a par-

ticular course. Upon passing the special examination, as determined by the examiner and the chairperson of the department in which the course is given, the student receives credit, but not a grade, for the course. Credit by examination forms are available in the Office of the Registrar.

College-Level Examination Program

The University grants a *maximum* of six hours of credit for the following *minimal total* scores on the General Examinations: English Composition (600), Humanities (500), Mathematics (500), and Social Sciences-History (500). Each General Examination yields a total score reported on a scale that ranges from a low of 200 to a high of 800.

Each General Examination, with the *exception* of English Composition, has two subscores, reported on a scale ranging from a low of 20 to a high of 80, which describe achievement on the subdivisions of the test. Three semester hours of credit is granted for a subscore of 50 or higher.

The minimum *creditable* score on CLEP *Subject Examinations* is the average score of students who earned a grade of "B" in a comparable college course. These scores fall between 50 and 57 on a 20 - 80 range of scores. To learn the score required for credit in a specific examination, contact the Office of the Registrar, 360 Waterman Building.

Credit granted for CLEP Examinations may be applied toward distribution requirements and to the total semester hours specified for a particular degree program when approved by the dean/director of the college/school in which the student is subsequently a candidate for a degree. Information about CLEP and application forms are available at the Counseling and Testing Center, 146 South Williams Street.

Credit for Military Service

A veteran who has been accepted into a degree program may, upon presentation of DD Form 214 (Report of Transfer or Discharge), receive military studies credit for this experience in those divisions of the University in which credit for Reserve Officers' Training Corps courses is allowed. Exemption from the physical education requirement is given for service of more than one year.

The University accepts college level credit earned through the Defense Activity for Non-Traditional Education Support (DANTES) formerly the United States Armed Forces Institute (USAFI). DANTES maintains the educational record of the service men and women who have completed Subject Standardized Tests, CLEP examinations, and GED Tests.

The results of courses taken under the auspices of USAFI-disestablished in 1974 - which carry academic credit and which were submitted prior to June 30, 1974, are available at no cost from: DANTES Contractor Representative (transcripts) 2318 South Park Street, Madison, Wisconsin 53713. Results of courses taken

after July 1, 1974, are available at a nominal charge from: DANTES Contractor Representatives (CLEP) Educational Testing Service, P.O. Box 2819, Princeton, New Jersey 08540.

The Guide to the Evaluation of Educational Experience in the Armed Services is the standard reference work for recognizing learning acquired in military life by attending formal military courses. Evidence of satisfactory completion of formal military courses is needed for evaluation.

Orientation and Special Requirements

The College Entrance Examination Board Achievement Tests in mathematics, a modern foreign language, and biology are recommended in all cases where these subjects are to be continued in the student's curriculum. The purpose of recommending these Achievement Tests is for placement only and scores are used in advising students regarding the course of study and the selection of courses. Following acceptance, students must submit by the appropriate deadline dates an acceptance/orientation fee, a statement of medical history, and physical examination record to the University Health Service.

New students are also required to come to the campus for continuing orientation. Schedules and dates of these meetings are mailed prior to enrollment. The Orientation Program takes place in June and September for the fall semester and in January for the spring term. During the two-day program students register for courses, meet informally with faculty and other students, and learn about available student services.

Foreign Students

Foreign Student Services

The University of Vermont welcomes qualified applicants from other countries. A Foreign Student Advisor in the Office of International Students and Overseas Programs is available full-time to provide counseling and assistance to international students and faculty on personal and academic problems, and on matters relating to immigration and social and cultural adjustment. In a one-week orientation prior to the beginning of the fall semester, the Office of International Students provides new foreign students with an introduction to the University and Burlington community. During the orientation, individual assistance is also available. An active campus International Club provides an opportunity for foreign students to contribute to campus life and to make American friends outside the classroom.

Application Procedures

Foreign students interested in applying to the University of Vermont should write to the Admissions Office and request a pre-application form. Upon receipt of this completed form, the Admissions Office will send the student a formal ap-

plication form. Foreign students applying for admission will be required to submit transcripts of all college preparatory education, together with official, certified translations if the transcripts are not in English. In addition to the required SAT (Scholastic Aptitude Test) scores and other supporting documents, students whose native tongue is not English are also required to submit scores from the TOEFL (Test of English as a Foreign Language). Admissions deadlines for foreign applicants are November 1 (for January admission) and February 1 (for September admission). At the present time, no financial aid is available from the University of Vermont to non-U.S. citizens. Therefore, students without adequate financial support from other sources should not submit a request for application forms. All foreign students attending UVM on non-immigrant student visas are charged out-of-state tuition rates.

If a student is admitted to the University of Vermont, an I-20 form (Certificate of Eligibility for an F-1 visa) will be prepared by the Foreign Student Advisor in the Office of International Students. Before the I-20 form is mailed, the student will be required to show proof of financial support in the form of a bank statement or an official letter from a sponsoring institution or organization.

Foreign students interested in graduate studies at the University of Vermont should write directly to the Graduate College Admissions Office, Waterman Building.

Student Expenses

The student expenses outlined in the following paragraphs are anticipated charges only for the academic year 1981-82. Changing costs may require adjustment of these charges before the beginning of the fall semester.

Undergraduate Tuition and Fees

APPLICATION FEE

A non-refundable application fee of \$25 is charged each applicant for admission to a University degree program.

ACCEPTANCE FEE AND ADVANCED TUITION PAYMENT

All new undergraduate applicants who have been accepted by the University are required to pay \$175 in order to reserve a place in the next enrolling class. Freshmen students accepted for the fall semester must pay the deposit by May 1. Most transfer students admitted for the fall and all students admitted for the spring semester must pay the deposit within two weeks of the offer of admission. Of this amount, \$50 is for initial advising, selection of courses, and personal orientation to the campus, a requirement for all incoming undergraduate degree students. The remaining \$125 will be applied to the initial semester's tuition bill.

If a newly admitted student who has paid the required deposit subsequently chooses not to attend the University, the student will receive a \$100 refund if the University is notified in writing prior to the beginning of the semester for which the student was admitted. If the University is notified after the beginning of the semester, the entire deposit is forfeited.

ESTIMATED YEARLY EXPENSES

Listed below are the estimated expenses (excluding transportation, laundry, and spending money), based on the regular tuition for undergraduate students followed by an explanation of these charges.

	<i>Resident</i>	<i>Non-Resident</i>
<i>Tuition</i>	\$1,875	\$5,062
<i>Housing (Double Room)</i>	1,404	1,404
<i>Meals (Minimum Plan)</i>	868	868
<i>Inter-Residence Association Fee</i>	10	10
<i>Library and Athletic Bond Fees</i>	82	82
<i>Student Health Service Fee</i>	92	92
<i>Student Accident & Sickness Insurance (Optional)</i>	68	68
<i>Student Activities Fee</i>	32	32
<i>Books and Supplies (Estimated)</i>	250	250
<i>Total excluding personal and miscellaneous costs</i>	<hr/> \$4,681	<hr/> \$7,868

TUITION

Vermont Residents: \$78 per credit hour through 11.5 hours. From 12-18 credit hours—\$1,875 per semester plus \$78 per credit hour for each hour in excess of 18 hours.

Non-Residents: \$212 per credit hour through 11.5 hours. From 12-18 credit hours—\$5,062 per semester plus \$212 per credit hour for each hour in excess of 18 hours.

Note: Courses taken for audit are also included in determining the number of credit hours for which a student is billed.

HOUSING CHARGES

Room and Board: All housing agreements include both room and board and are legally binding for the nine-month academic year. Each occupant is liable for the yearly rent, one half to be paid each semester. The room charge per person is \$1,124 for triple occupancy, \$1,404 for double occupancy, and \$1,544 for a single room. Depending on vacancies, a limited number of large singles may be available at the rate of \$1,684 a year. For residents in the Hamilton Cooperative the room charge is \$168 less than the cost of the room charge indicated above, depending on the type of occupancy.

The minimum University meal plan is \$868 yearly, one half to be paid each semester. The minimum meal plan is *not* designed to meet all the needs of most students. Rather, the plan allows individual students to purchase whatever additional amount of food service beyond the minimum level they feel is necessary to meet their own nutritional and consumptive needs. The University's food service system includes not only dining halls but also the various campus snack bars, restaurants, and grocery stores. Questions regarding food services should be directed to the SAGA Food Service Office, 40 Colchester Avenue.

A written request is required of any student wishing to cancel a housing agreement. Any student cancelling a housing agreement after June 15 but before the beginning of the fall semester will be assessed a \$100 penalty. Unless specifically authorized by the Office of Residential Life, no room cancellations will be honored after the beginning of the fall semester.

INTER-RESIDENCE ASSOCIATION (IRA) FEE

A \$10 per-year (\$5 per semester) fee is charged to each resident to be used for activities within the residence hall system.

LIBRARY BOND FEE

A library bond fee of \$34 per year (\$17 per semester) is charged to all students enrolled for 12 hours or more. Students enrolled in less than 12 hours but more than three hours will be charged a fee of \$17 per year (\$8.50 per semester). Students enrolled in three hours or less per semester are not subject to the library fee. This fee is assessed by legislative act in accordance with the requirement of the indenture covering the construction of the addition to the Bailey-Howe Library.

ATHLETIC BOND FEE

An athletic bond fee of \$48 per year (\$24 per semester) is charged to all students enrolled for 12 hours or more. This fee is assessed as required by the indenture covering the issuance of bonds and a portion is forwarded to the state government as required by Legislative Act.

STUDENT HEALTH SERVICE FEE

There are two fees associated with the University Health Services: a mandatory per semester fee which all students enrolled for 12 or more hours must pay an annual student health insurance premium. Payment of the mandatory health fee entitles the student access to the general out-patient clinic, certain specialty clinics, and most other support services of the Health Services. Part-time students may pay the health fee at their option.

The optional student health insurance premium provides supplementary coverage for health care problems which either cannot be addressed by Health Services staff or which occur while the student is away from the UVM campus. If a student is not clearly covered by the health insurance policy of a parent, guardian, or spouse, it is strongly advised that the student purchase the supplementary student health insurance. In order to participate in this insurance plan, the Student Health Service Fee must be paid each semester. Married students may purchase insurance coverage for dependents. Further information is available from the University Health Services.

STUDENT ACTIVITIES FEE

Undergraduate degree students enrolled for 12 or more hours are charged a fee of \$32 per year (\$16 per semester). This fee is allocated by the Student Association toward the support of student organizations and student activities.

BOOKS AND SUPPLIES

The estimated yearly cost of books and supplies at \$250 is a *low* average. Some particular curricula may require one-time purchases which will change this amount.

Engineering students, add about \$100 for instruments and calculator.

Dental Hygiene students, add \$500 for first year and \$200 for second year which will be collected during the first week of the fall semester.

Radiologic Technology students, add about \$85 for uniforms and other related expenses.

Technical Nursing students, add about \$160 for uniforms and other related expenses in the beginning of the freshman year. Professional Nursing students, add about \$75 for uniforms and other related expenses in the second semester of the sophomore year and about \$85 in the beginning of the junior year.

Students enrolled in art courses should expect to incur a lab or materials cost roughly equivalent to the cost of books in other courses. In certain courses, instructional materials are purchased in bulk by the department and costs are prorated among students at a far lower rate than if they were purchased individually.

OPTIONAL FEES

Locker-Towel Fee

All students enrolled in physical education activity courses and others who wish to have an assigned locker must pay a \$4 locker-towel fee each year or any portion thereof. This fee provides a locker and a clean towel after each use of the gymnasium facility.

UNIQUE FEES

Credit by Examination

A fee of \$25 per credit hour will be charged for administration of special tests in areas for which academic credit may be received.

Fees for Courses in Music Performance Study

Private lessons are approximately one-half hour in length with 15 sessions being given each semester. \$100 per credit hour will be charged each student for such a course. This is in addition to the tuition charged and will be billed separately during the course of the semester.

Any student enrolled in excess of 18 credit hours will be charged only the \$100 per credit hour for private lessons and not for additional tuition charges for the Music Performance Study course. Any other University course(s) that result in more than 18 credit hours of enrollment will be subject to the additional applicable per credit hour tuition charges.

School of Natural Resources Summer Field Courses

The tuition for the School of Natural Resources Summer Field Courses will be at the Summer Session credit hour rate. In addition, there may be charges for field expenses.

Additional Fees for Special Courses

Occasionally a special fee will be charged in addition to the fee for tuition to cover special equipment, arrangements, or skilled consultants. Students will be notified of this fee through the registration process.

Late Registration Fee

Students who are allowed to register after classes begin will be charged a \$10 late registration fee.

Payment of Obligations

All tuition, fees, room and board charges are payable in full upon notification and not later than the first day of classes unless otherwise announced. Advanced payments are accepted; checks should be made payable to the University of Vermont.

Students who cannot meet their financial obligations because of unusual circumstances should contact the Accounting Office as soon as possible before the due date.

Any student who has not satisfactorily completed financial arrangements by the announced due date will have his/her enrollment terminated.

The University reserves the right to withhold registration material, the degree, and all information regarding the record, including transcript, of any student who is in arrears in the payment of fees or other charges, including student loans and dining and housing charges.

LATE PAYMENT SERVICE CHARGE

Students who are allowed a payment postponement of all or a portion of their financial obligations will be charged a \$50 late payment service charge.

BUDGETED PAYMENT

The University has made arrangements with the Knight Tuition Payment Plan for those who desire to budget annual costs in monthly installments. Information about the various payment programs is sent to each incoming student. For advance information, please write to: Richard C. Knight Insurance Agency, Inc., Knight Tuition Payment Plans, 53 Beacon Street, Boston, Massachusetts 02108.

Financial Aid

Many worthy and deserving students are unable to meet college expenses and for them the University provides, so far as its resources permit, aid in the form of scholarships, loans, and employment.

To be eligible to apply for financial aid, a student must be a U.S. citizen or in the U.S. for other than a temporary purpose and intend to become a permanent resident. A student must also be enrolled at least half-time (six credits) in a degree program. Students who believe they are unable to meet college expenses, are urged to apply to the Office of Financial Aid for assistance in the form of grants, loans, and employment. Entering undergraduate students who wish to apply for aid may do so by: (1) indicating their intention on the Admissions Application Form, and (2) submitting the Family Financial Statement (FFS) directly to the American College Testing Program in Iowa City, Iowa, or the Financial Aid Form (FAF) to the College Scholarship Service in Princeton, New Jersey.

These forms may be obtained from local high schools or by request to the Office of Financial Aid, 330 Waterman Building, University of Vermont, Burlington, VT 05405.

ALL STUDENTS REQUESTING AID SHOULD ALSO APPLY TO THE Pell Grant Program (formerly BEOG) (check appropriate section of the FFS or FAF) and your state agency (for Vermonters: Vermont Student Assistance Corporation (VSAC), 5 Burlington Square, Burlington, VT 05401).

ALL STUDENTS MUST REAPPLY FOR AID EACH YEAR: Continuing students can obtain a University Financial Aid Application from the Office of Financial Aid. They must also submit the Family Financial Statement (FFS) or the Financial Aid Form (FAF). Both forms are available early in the spring semester from the Office of Financial Aid. Preference is given to those students who have complete applications on file by May 1. Applications received after that date will be processed in chronological order according to the date received, subject to the availability of funds.

In addition to University loans and grants the University participates in the federal Supplemental Educational Opportunity Grant Program, the National Direct Student Loan Program, the College Work-Study Program, both the Nursing Health Profession Grant and Nursing Health Profession Loan Program, and the Medical Health Profession Loan Program. On the basis of the Financial Aid Application and the financial information accompanying it, applicants will be considered automatically for all such programs for which they are eligible. Aid is most often awarded in combinations or "packages" of the various types of aid. Almost all awards include some loan or work-study; the application lets the student state a preference.

Financial aid funds are limited. Accordingly, all assistance offered by the Financial Aid Office is based on a calculated determination of financial need which considers the following factors:

1. **STUDENT BUDGET**, comprised of tuition, required fees, room and board, books and supplies, and moderate personal expenses.
2. **EXPECTED PARENTAL SHARE** of educational cost as determined by the financial aid application.
3. **STUDENT SELF-HELP**, usually from earnings or private loans or savings.
4. **ASSISTANCE RECEIVED FROM OTHER SOURCES**, such as private scholarships/grants, state agency awards, etc.

Standard student budgets for the 1981-82 academic year are shown below. Actual costs for subsequent years may be higher if tuition, fees, and/or housing increase.

SINGLE

	In-State	Out-of-State
Tuition	\$1,875	\$5,062
Fees	214	214
Room	1,404	1,404
Board**	1,130	1,130
Personal	550	550
Books/Supplies	<u>250</u>	<u>250</u>
Totals	\$5,423	\$8,610

MARRIED*

	In-State	Out-of-State
Tuition	\$1,875	\$5,062
Fees	214	214
Room	3,150	3,150
Board**	1,800	1,800
Personal	1,504	1,504
Books/Supplies	<u>250</u>	<u>250</u>
Totals	\$8,793	\$11,980

* For dependent children the budget is increased by \$1,000 for the first child, \$800 for the second child, and \$600 for each additional child.

** Average cost reflects additional allowance for meals above minimum plan and is used for both on-and off-campus students.

Undergraduates seeking fellowships for graduate study, such as The Danforth Graduate Fellowship and The Rhodes Scholarship, should make initial inquiries in the Dean's Office of the College of Arts and Sciences or in the Office of the Graduate College.

The University of Vermont awards financial aid without consideration of sex, race, color, national origin, religion, age, or physical/mental handicap.

330 Waterman Building

(802) 656-3156

Tuition Refunds

CANCELLATIONS

Returning students who notify their academic dean/director and the Registrar in writing before the semester begins that they will not be attending the University that semester, will receive a refund. The refund will include all monies paid to the University for that semester.

WITHDRAWAL, MEDICAL WITHDRAWAL, SUSPENSION, DISMISSAL, CHANGES IN CREDIT HOUR LOAD

A student who withdraws for personal or medical reasons, is suspended, is dismissed, or changes enrollment will receive a refund of tuition and fees in accordance with the following schedule:

- If the action occurs prior to the end of the first three weeks of classes, the student will receive an 80 percent refund.
- If the action occurs during the fourth or fifth week of classes, the student will receive a 40 percent refund.
- No refund will be allowed after the fifth week of classes.

All medical withdrawals must be approved by the University Physician.

DEATH

In the case of death of a student, tuition and fees paid for the semester during which the death occurs will be fully refunded.

REFUND OF OTHER CHARGES

Room and board payments will be refunded on a pro-rata basis.

Note: The effective date of any cancellation or withdrawal is the date the dean/director receives such notification in writing.

Only in very extenuating circumstances, the dean/director may recommend to the Registrar an exception be made to this refund policy.

In no case will a refund be made after the first day of classes of the following semester.

STUDENTS RECEIVING FINANCIAL AID

For students receiving financial aid, change in student status or credit hour load may result in revision or loss of that financial aid, depending on the regulations of the particular aid programs involved; and, except when aid program regulations specify otherwise, any such change which reduces the student's University charges will usually result in a matching reduction of the financial aid award, with that reduction prorated among all aid sources making up the award. Such reduction of aid will usually require immediate repayment of the aid so reduced.

Student Life

Division of Student Affairs

A STATEMENT OF MISSION

It should be recognized that students are going through a period of rapid personal growth while on the college campus. In addition to developing new academic skills, they are being challenged to pursue new ideas, evaluate their values systems, change existing attitudes, and investigate new life styles. They are exploring future career options and learning social and interpersonal skills.

Therefore, the broad focus of the Division of Student Affairs at the University of Vermont is to provide support services to students during this time of intense personal development and intellectual growth, in addition to playing a leadership role in developing experiences, policies, and programs to provide learning and leadership opportunities for students in concert with the formal instructional mission of the institution.

To accomplish this mission the student life areas are divided into various functional departments and programs. Each of these provides or coordinates support services and educational experiences to meet student needs.

COUNSELING AND TESTING CENTER

The Counseling and Testing Center provides a service to assist individuals and groups to live more effectively and confidently through a greater understanding of their life situation, the nature of change, and the process of making decisions and choices. A professional staff, augmented by carefully selected and trained interns, offers confidential individual and group counseling and consulting in areas concerning personal, social education, and vocational issues. The Center also offers national group examinations, vocational, and personal testing. Workshops are designed to meet student requests in areas such as life-planning, career development, communications skills, stress management, and confidence building. Services are available on a no fee basis to UVM students carrying six or more credits and on a limited basis to faculty and staff through the Employee Assistance Program.

Office of Specialized Student Services

The Office of Specialized Student Services works closely with disabled students securing solutions to problems encountered in their university experience. This includes providing workers to assist with necessary tasks, e.g. readers, interpreters, mobility aides, notetakers; academic, vocational, and personal counseling to encourage optimal physical independence and eventual employability; and a support system and structure where students can begin to effect changes on campus, community, and personal issues.

Prospective students with disabilities may contact the Coordinator of Specialized Student Services housed in the Counseling and Testing Center for assistance in their decision making and needs assessing regarding future schooling. Incoming students should contact the OSS in planning for housing, classroom, and mobility needs.

146 South Williams Street

(802) 656-3340

TTY (802) 656-3865 (Telecommunications for the deaf)

CENTER FOR CAREER DEVELOPMENT

The Center for Career Development provides all students with comprehensive assistance in exploring and implementing their career objectives. This function consists of two major efforts. The first is to provide direct assistance to students in clarifying career objectives based on their own skills, interests, needs, and abilities. The primary emphasis is through self-awareness, occupational awareness, skill development, and finally entry into the career areas which are complementary to their desired lifestyles. This process is accomplished through one-to-one counseling and/or small group workshops. Along with providing career counseling, the office has developed an active Cooperative Education Program which enables students to fully integrate their academic and career goals. This program is integrated with the academic units in Agriculture, Natural Resources, and Engineering, Mathematics, and Business Administration as well as other offices in Student Affairs. Students will also find the information contained in the Career Resource Library helpful in developing their career goals. The center's library contains literature on various fields, occupational outlooks, salary surveys which are updated four times per year, government opportunities at all levels, as well as a variety of literature describing current career opportunities in both large and small corporations in the private sector. The library contains two complete guides to all graduate programs in the country and a variety of graduate school catalogues from other universities. This information is expanding and being updated continuously.

After helping a student to develop some tentative goals, the office can assist in his/her attempts to implement these goals. The office has a very active on-campus recruiting program which brings local and national employer representatives to campus for employment interviews. All part-time and summer employment opportunities are posted and made available to students attempting to offset a portion of their educational expenses or gain experience in a field of their interest. The staff will provide help in developing an effective resume, conducting employment interviews, developing a credential file, and assist in drafting an overall employment search program.

Students are encouraged to make use of the Center for Career Development early in their educational program.

Veteran Affairs

This office, as part of the Center for Career Development, provides support, coordination of services, and advising to any veteran or dependent eligible for benefits under Federal Law, Chapters 31, 34, or 35. Those persons eligible for

these benefits should contact the office at least one month prior to registration each semester. Those persons wishing to register for benefits should be prepared to present their certificate of eligibility to the Veterans Coordinator.

It is important that all veterans and dependents keep in contact with this office for the latest information with regard to benefits and requirements. Also, those students involved in the Veterans Program should contact this office in the event of any change in credit load, dependency status, address, or major.

Pre-Health Advising

The Pre-Health Advising Office exists to provide assistance and support to all students preparing for entry to medical and dental schools. The office provides general counseling, advising, and referral services to students with academic and non-academic questions and concerns.

Information and advice is provided to students who are in the process of applying to medical, dental, and other health professional schools. The Pre-Health Advisor works in coordination with the Pre-Health Advisory Committee in preparing student letters of evaluation, as required by the majority of medical, dental, and health professional schools as part of the application process.

Materials for registration for the required preprofessional examinations and application services are available. A resource library is also maintained for the use of students, containing medical and dental school catalogues and catalogues for professional schools in related health fields, as well as miscellaneous health careers literature.

322 South Prospect Street
(802) 656-3450

CENTER FOR SERVICE-LEARNING

Field studies, internships, and community involvement resources are offered through the Center for Service-Learning (CSL). International, national, and Vermont internship and volunteer opportunities are available in the CSL library. CSL staff assists students, faculty, and community members in designing field studies and internship options appropriate to personal, academic, or career needs of students. The Center operates the University Year for Action Program, the Service-Learning Internship Program and Volunteer Referral Program. SCIA (Student Community in Action) is a Student Association organization that coordinates student run volunteer projects such as Big Brother/Big Sister, Adopt-a-Grandparent, and H. O. Wheeler Tutoring. Participation in any of the service-learning options provides a structured experiential approach for development of personal and professional competencies which are complementary to academic study in preparation for students to function effectively in their careers and as citizens.

Mansfield House
25 Colchester Avenue
(802) 656-2062

UNIVERSITY HEALTH SERVICES

The University Health Services (UHS) is organized to meet the primary and preventive health care needs of UVM students. Through its out-patient clinics, athletic training program, and health education activities, the Health Services strives to focus on the particular health problems and concerns of college students. Payment of the University health fee entitles the student to unlimited visits to the UHS physicians and nurses, physical therapy services, the gynecology clinic, most laboratory work, and some medications. X-rays are available for a fee. Orthopedic consultation is available at no charge for up to two visits per semester. Referrals are made to medical specialists in the Burlington area, and hospitalization, when indicated, is usually at the Medical Center Hospital of Vermont. Ambulance service is provided free of charge by the UVM Rescue Squad.

Entering students are required to provide the UHS with a complete medical history. In addition, students planning to try out for any of UVM's athletic teams must have a physical examination by a UHS physician.

There is a supplementary health insurance plan available for a separate cost. The insurance plan provides hospitalization and major medical benefits as well as some out-patient benefits. Information is mailed to all in-coming students. If a student is not covered by another health insurance policy, it is strongly advised that the student insurance plan be purchased.

284 East Avenue
(802) 656-3350

SPEECH AND HEARING CENTER

Services of the Speech and Hearing Center, located in Allen House, are free to students in the University who have problems of speech, language, voice, and hearing; for example, problems of articulation, stuttering, voice production, hearing loss, and other communicative disorders.

Allen House
(802) 656-3861

EXTRACURRICULAR ACTIVITIES

Participation in extracurricular activities is a vital part of any student's education at the University. To further this end, the Student Activities Office assists students in developing educational and cultural programs and in managing the operations of their organizations. In addition, the Division of Student Affairs offers an increasingly comprehensive leadership program that encourages not only individual growth, but organizational development.

Student Association, the primary student governing organization, assumes responsibility for voicing student concerns and interests in the political activities of the University community. It also recognizes and funds approximately 80 student organizations. They are a varied set, including the student newspaper, *The Vermont Cynic*; the yearbook, *The Ariel*; WRUV, the student-operated radio station; UVM Rescue Squad; and the Student Legal Service; in addition to a host of political, religious, service, program, honorary, and recreational groups. A

complete listing of student organizations and religious groups can be found in *The Cat's Tale: A Student's Guide to the University of Vermont*.

The Greek system is an integral part of campus life. Fourteen fraternities and six sororities, representing both national and local organizations, maintain active communities at UVM.

Extracurricular life focuses on Billings Student Center, which houses a number of student organizations and provides space for meetings, lectures, films, and other programs.

INTER-RESIDENCE ASSOCIATION (IRA)

The Inter-Residence Association is a government which represents the students living in University residence halls. The government, consisting of an executive board, legislative council, and judicial board, provides leadership for residence hall students, representing their interests to other constituencies within the University community. IRA involves itself in all aspects of residence hall life, constantly seeking new ideas and avenues for the manifestation of these ideas to make the residence halls meet the needs of its residents.

ATHLETICS, CLUB SPORTS, INTRAMURALS, AND RECREATION

The University encourages and supports a variety of sports at a variety of participatory levels. The demands on the recreational facilities are great due to the variety of athletic interests within the University community.

A program of intercollegiate competition for men is maintained in baseball, lacrosse, gymnastics, basketball, cross country, golf, hockey, indoor track, soccer, swimming, tennis, and track. The athletic policies of the University are under the recommendation of the Athletic Council, composed of members of the faculty, the student body, and alumni. Athletic relations are maintained with colleges and universities in New England and the eastern seaboard. The University is a member of the National Collegiate Athletic Association, the New England Intercollegiate Athletic Association, and the Eastern College Athletic Conference.

The Women's Intercollegiate Program offers a variety of team and individual activities which are open to all full-time female students of the University. Intercollegiate competition is on the local and regional level under the auspices of the Eastern Association for Intercollegiate Athletics for Women and the Association for Intercollegiate Athletics for Women. Varsity teams included in the program are as follows: field hockey, soccer, tennis, volleyball, basketball, swimming, gymnastics, skiing, lacrosse, softball, track and field, and cross country.

There are a number of club sports actively participating locally and regionally. These include the Judo, Rugby, Volleyball, Women's Ice Hockey, and Squash Clubs.

The Athletic Department offers a wide variety of intramural sports and activities which provide for voluntary participation by students. The Intramural Office offers competition in 28 different individual, dual, and team sports. Teams may be organized from any dormitory, fraternity, sorority, or independent source.

The facilities of Patrick Gymnasium are also available daily for recreational use to allow students the opportunity to drop in and participate informally in activities that interest them.

THEATRE

The Royall Tyler Theatre is the home for the season of plays presented each year by the Department of Theatre with the University Players, as well as the home for the annual Champlain Shakespeare Festival. The great periods of theatre history are covered during the course of four years in the Major Play Series. Workshop productions of original and experimental theatre forms are also produced as part of the regular course work in theatre as well as by students and faculty outside of the regularly scheduled course offerings. The Departments of Music, Communication, Theatre, and women's physical education collaborate periodically to produce a musical comedy or opera. Participation in theatre activities is open to all members of the University.

DEBATE

The Lawrence Debate and Forensics Union (LFU) provides opportunities for participation in all types of forensic activities — debate, discussion, oratory, and extemporaneous speaking. Members of the LFU appear before service clubs, farm organizations, high schools, and other groups throughout the state. The members of the LFU also participate in more than 300 intercollegiate debates at more than 20 tournaments annually, with the beginners getting as much experience as the varsity members. The LFU travels to various tournaments throughout the United States. Outstanding performers receive recognition by election to Delta Sigma Rho-Tau Kappa Alpha, the national forensic honor society.

MUSICAL ACTIVITIES

Opportunities for participation and appreciation are provided for students with strong musical interests. The University Band, the University Choir and Choral Union, the University Madrigal Singers, the University Brass Ensemble, and the University Orchestra appear in public presentations many times during the year. An opera or musical show is generally presented each year and faculty, senior, and monthly department recitals are scheduled throughout the year.

The University Band appears at athletic events, presents formal concerts, and makes a spring concert tour. The University Choir and the Choral Union give three annual concerts and the Madrigal Singers sing for various groups around the state. The University Orchestra presents two annual concerts, and assists the Choir in a third.

The Music Department is located in a new music building, located behind Redstone and Southwick on the Redstone Campus. The building houses the offices of the department as well as a beautiful recital hall accommodating one of the finest organs in the Northeast. The new facility serves as a showcase for the musical talents of the department and its students, as well as those students seeking musical activity as a part of their extracurricular life on campus.

THE GEORGE BISHOP LANE ARTISTS' SERIES

"...The George Bishop Lane Artists' Series should include musical productions and...other theatrical and artistic productions (and) should be open to the students of the University of Vermont and the public generally...."

—from the will of Mrs. George B. Lane (April 27, 1954)

Since Mrs. Nellie Lane's generous bequest to the University of Vermont, the Lane Series has presented well over 650 concert and stage productions, over 100 film programs, and many events programmed especially for children. More than one million tickets have been purchased for performances that have included the major artists, entertainers, and performances of the time.

Each Lane Series season has presented a carefully balanced program of the best in classical music, dance, opera, the theatre, and jazz, rock, and/or folk music. Performances have included such orchestras at the Chicago Symphony under the direction of Sir Georg Solti, and the London Symphony Orchestra under Herbert Von Karajan; dance has included such events as a full-length SLEEPING BEAUTY with Dame Margot Fonteyn, the Martha Graham Dance Company, Alvin Ailey, and the Joffrey Ballet. Jazz and popular music have been an important part of the Lane Season with appearances by Ella Fitzgerald, Duke Ellington, Simon and Garfunkle, and Joan Baez and Bob Dylan's Rolling Thunder Revue. Soloists have been a prominent feature of the Lane Series with appearances by Arthur Rubinstein, Isaac Stern, Marcel Marceau, Beverly Sills, Julian Bream, Rudolph Serkin, and Lily Tomlin.

Active not only in Burlington, the Lane Series has maintained state-wide activities with series in St. Johnsbury, Brattleboro, and Springfield. In 1973, the Lane Series helped found and manage the Vermont Mozart Festival, and in the summer of 1976 helped found Stowe Performing Arts, a festival of outdoor events in Vermont's ski capital. As a result of all of these activities, the Lane Series has led the way to the establishment of the Green Mountain Consortium for the Performing Arts, the membership of which represents virtually all presenters of the performing arts in Vermont.

THE ROBERT HULL FLEMING MUSEUM

The Fleming Museum houses a distinguished teaching collection of art and ethnography. Originally founded as the Park Gallery in 1873, the collection owes much of its growth to the generosity of alumni and other friends. The O.B. Read American Plains Indian Collection and the David B. Pitman ('32) and Henry Schnakenberg Collections of American art are notable examples. The spacious Marble Court is a center of activity. Along with visiting exhibitions of wide variety, changing exhibitions are organized by faculty and students in museum studies, art history, and studio art, often in collaboration with the Departments of Religion, History, Anthropology, and historic preservation.

Lectures, gallery talks, recitals, and children's tours serve the community at large. Many activities are supported by Museum membership, which is open to all. A center for the study of art history and museology, the Museum houses the Art Department collection of 75,000 slides and photographs, audio-visual class and seminar rooms, as well as a reference library for art research.

HONORARY AND RECOGNITION SOCIETIES

Honorary and recognition societies exist on the University of Vermont campus to recognize student contributions to the University community and student leadership in campus life. There are a few local societies, i.e. Boulder Society, that acknowledge individuals by class.

National Honorary Societies represented on the University of Vermont campus include:

The Phi Beta Kappa Society established the Vermont Alpha Chapter at the University in 1848, and initiates are chosen primarily on the basis of high scholastic standing with emphasis on a broad distribution of liberal studies. A detailed statement of the criteria used is available from the chapter president. The local chapter was the first in Phi Beta Kappa to initiate women into membership.

Mortar Board is a national society for senior women and men. Although membership in Mortar Board comes as a high honor for a University of Vermont student in recognition of outstanding service, scholarship, and leadership, it is also a challenge for continued sound and honest scholarship, and for unselfish service in the best interests of the college campus.

The Society of the Sigma Xi, established at the University in 1945, initiates those who have proven their ability to do research in one of the sciences, including students who have a high scholastic standing.

Other national honorary societies include: Alpha Omega Alpha, medicine; Alpha Zeta, agriculture; Kappa Delta Pi, education; Tau Beta Pi, engineering; Omicron Nu, home economics; Delta Sigma Rho-Tau Kappa Alpha, debating; Sigma Phi Alpha, dental hygiene; National Collegiate Players, dramatics; Alpha Lambda Delta, freshman women's scholastic; Ethan Allen Rifles, outstanding students in the Reserve Officers' Training Corps; Pershing Rifles, a military fraternity.

Housing

Any full-time student may apply to live in University residence halls but priority is given to full-time undergraduate students. All freshmen students, except those living at home and commuting, or those living with their spouses, must live in University housing. Housing is guaranteed for all freshmen who meet appropriate deadlines. Housing is not guaranteed for upper-class students and is determined by a lottery held in the spring of each year. Upper-class students who are actives or pledges of a fraternity or a sorority may register for University residence hall housing or chapter housing.

On-campus housing is seldom available to transfer students entering UVM for the fall semester. The possibility of obtaining housing for the spring term is considerably better though not guaranteed. In recent years most transfer students have been offered housing for the semester beginning in January.

RESIDENCE HALLS

A residence hall is more than a place to sleep, store one's belongings, and study. It is a place where a student can take advantage of the various opportunities and experiences surrounding him or her. A diversity of residence halls and programs are offered. There are freshman halls, upper-class halls, coed halls, single sex halls, an environmental hall, and the Living and Learning Center (additional information on the Living and Learning Center is on page 126). Each residence hall is under the guidance and direction of a Hall Advisor who is assisted by specially selected undergraduate Resident Assistants. These staff members encourage the development of intellectual, social, and cultural programs and assist the residents in their growth toward maturity and responsible self-direction. Each student in the residence halls is a member of his or her residence hall student government which represents student opinion and provides educational and social programs for its constituents.

Contracts for room and board are binding for the college year unless cancelled for due cause with the approval of the Office of Residential Life. In August, each new student will receive notification of a housing assignment and the date of the opening of the residence halls. Rooms may not be occupied until the date specified. Each student is expected to leave the residence halls not later than 24 hours after his or her last examination at the close of each semester. All students living in the residence halls must have board contracts.

Student rooms are equipped for comfortable residence hall living. Each double room has two beds, with mattress pads, two desks and chairs, bureau space for each student, two closets, and blinds or shades on the windows. Bookshelves are provided in some rooms. Students provide their own bed linen, towels, window draperies, pillows, wastebaskets, bureau covers, desk lamps, and reading lamps. Facilities for doing personal laundry are provided in residence areas as well as space for storage of trunks, baggage, bicycles, and skis during the academic year. The Department of Residential Life is located in Mansfield House, 25 Colchester Avenue, (802) 656-3434.

SINGLE STUDENT APARTMENTS

In the fall of 1979, the University initiated an "off-campus" housing option approximately five miles from campus at the former Fort Ethan Allen. There are a total of 31 apartments housing up to 12 students in each unit. Occupancy will be limited to undergraduates (excluding freshmen) or graduate students at the University with priority given to full-time undergraduates.

All the apartment units have a large kitchen (furnished with a stove, refrigerator, and garbage disposal), living room (most with a working fireplace), and one bedroom on the first floor. The other bedrooms and a full bath are on the second floor. Many apartments also have a small bathroom with shower on the first floor. In addition to the kitchen equipment, a coin-operated washer and dryer will be provided in each apartment as well as a single bed for each occupant. All other furnishings are to be provided by the tenant(s).

One building has been set aside as a Community Center. This facility has space for meetings, parties, recreation, and study. Three tennis courts, adjacent to the apartments, are available on a first come, first use basis.

Apartments may be leased for a nine- or a twelve-month period. Rental charges include all utilities (except telephone), use of tennis courts and recreational areas, and use of the shuttle bus. The bus will operate during the academic year, ten hours per day (Monday through Friday) between the apartments and the main campus.

Detailed rental information may be obtained from the Ethan Allen Housing Office, 503 Dalton Drive, Winooski, Vermont 05404.

MARRIED STUDENT HOUSING

There are 131 University-owned apartments designated for married students, located just outside Winooski at Fort Ethan Allen. About five miles from Campus, on Route 15, the apartments are close to a shopping center, hospitals, and educational institutions. These apartments are divided into two complexes.

County Apartments, completed in 1970, consist of 89 unfurnished units; 42 two-bedroom apartments on either the first or second floor, 14 one-bedroom apartments on the first floor and 33 two-bedroom townhouse apartments in 11 two-story buildings. Located in the center of these buildings is a Community Center containing laundry facilities and a large multipurpose room. There are three parking areas within this complex. Each apartment is furnished with an electric stove, refrigerator, water heater, kitchen cabinets, shelves, garbage disposal and wall-to-wall carpeting. The apartments are heated electrically and each room is individually controlled.

The other section, called Ethan Allen Apartments, is former military officers' quarters built between 1895 and 1933. There are 15 buildings with one to five apartments in each. Thirty-one apartments in this complex have two bedrooms, and 11 have three bedrooms. Many have basement or attic storage areas. These apartments have no carpeting, but stoves, refrigerators, and garbage disposals are provided. The cost of the fuel oil heating is included in the rent of about half the apartments. In the others, the tenants are billed directly by the fuel company.

Detailed rental information may be obtained from the Manager of Ethan Allen Housing, 503 Dalton Drive, Fort Ethan Allen, Winooski, Vermont 05404.

OFF-CAMPUS HOUSING

University students eligible to live off campus may utilize the facilities of the Residential Life Office in locating housing in the greater Burlington area. This office provides a free listing service by which community landlords and rental agents are able to make known their housing availability to students at the University.

Students may examine up-to-date listings for available apartments, houses, rooms, and roommate requests on a bulletin board just off the College Street entrance of Waterman Building on the main campus. The University is not responsible for the approval of off-campus housing facilities. It is impractical to send information concerning individual listings by mail. A catalogue of available listings is issued each May, August, and December.

To reserve a catalogue, contact the Office of Residential Life, 25 Colchester Avenue, Burlington, Vermont 05401.

General Information

This section offers a summary of regulations and procedures for registration, change of enrollment, grades, and advisement. It also gives a brief explanation of withdrawal, leave of absence, readmission rules, undergraduate degree requirements, and residency rules. The importance of these regulations and procedures cannot be underestimated.

REGISTRATION

Students in attendance must preregister for the next semester at the designated time. Unless excused in advance by the dean/director of the college/school concerned, students who do not preregister will be considered as dropped and may apply for readmission after one semester. Specific directions are published for each semester.

Written approval of the student's dean/director is required to preregister for more than 18 credit hours.

ACADEMIC ADVISING

Effective academic advising involves an established rapport between student and teacher. Accordingly, each new student is assigned to a faculty advisor upon admission to the University. The student remains under the guidance of this advisor until a major has been selected, usually during the sophomore year at which time a departmental advisor will be assigned. Students with questions about academic planning should consult their advisor throughout the year and especially during the preregistration period. To change academic advisors, students should contact the dean/director of their college/school. Each academic unit within the University maintains its own system for advising students.

ADVISING RESOURCES

In addition to an assigned faculty advisor, there are a variety of other advising resources of-fices available to University undergraduates.

The Academic Advising Center: assists students who are undecided about their academic plans. The Center also helps students with complaints and grievances about course instructions, scheduling, and other academically-related problems.

Pre-Health Advisor: assists undergraduate students with the admissions requirements for dental and medical school. A library of resource materials is maintained which includes literature on alternative health careers, school catalogues, and premedical education journals.

Pre-Law Advising: the UVM Pre-Law Committee assists students by providing meetings and panel discussions regarding career options in law. Advising also includes specific information on applying to law schools. A current collection of law school catalogues is maintained for interested students.

Pre-Veterinary Advising: is available to discuss plans for graduate school and employment in animal science career areas. A selection of catalogues, pamphlets, and other related literature is maintained.

International Students and Scholars Advising: verifies immigration status, interprets immigration laws and immigration forms to foreign students, faculty, and scholars. American students planning to study abroad should also make their plans through this office.

Minority Student Advising: is an effort to meet the needs of students entering the University who demonstrate that additional support services are needed. Incoming freshman minority students may elect to take part in a "Summer Enrichment Program" held on campus for a month (three credits).

Center for Career Development: assists students who are exploring a variety of potential career options early in their academic careers. A library of career information and school catalogues is maintained.

Veterans Affairs Advising: advises students of their G.I. Bill benefits in education. Counseling and referral on academic matters are available to veterans.

ADD/DROP/WITHDRAWAL

1. Courses may be added or dropped only during the first three weeks of classes. After the first week of classes, the instructor may refuse to allow the add if certain material may not be made up (e.g. laboratories) and the loss of this work would seriously affect the quality of educational experience gained by the student in the course. In any case, faculty would not be required to give make-up exams, papers, or quizzes.
2. No drops will be allowed after the third week except in cases where the student is enrolled by administrative error and has not attended the course. The disposition of such cases would be handled entirely by the Registrar's Office.
3. From the end of the third week to the end of the ninth week of classes, a student may withdraw from a course. A student who wishes to withdraw would fill out the course withdrawal form, consult with his/her advisor, and submit the form to the instructor. The instructor would record an evaluation of the student's work. The evaluation options are shown below:

WP: Withdraw passing

WF: Withdraw failing

The instructor will send one copy to the Registrar to be recorded on the transcript. The student will bring a copy to his/her dean for information purposes. The instructor will also record the withdrawal grade (WP or WF) on the final grade sheet which is sent to the Registrar.

4. Between the end of the ninth week and the last day of classes, a student may withdraw from one or more courses only by demonstrating to his/her college or school studies committee, through a written petitionary process, that he/she is unable to continue in the course(s) *due to circumstances beyond his/her control*. Such petition must contain conclusive evidence, properly documented, of the illness or other situation which prevents completion of the course(s). Acceptable reasons would not include dissatisfaction with performance or expected grade, with the course or instructor, or desire to change major or program. If the petition is approved, a grade(s) of "WP" or "WF" will be assigned by the instructor(s) and recorded on the student's permanent record. If the petition is denied, the instructor(s) will assign a final grade ("A"—"F") in accordance with the same criteria applied to all other students in the course(s).
5. No withdrawals are permitted after the last day of classes.
6. The grade of WP will not enter into the GPA. The grade of WF will enter the GPA as an F.
7. The grade of "W" no longer is used so it is deleted from the set of available options.

PASS — NO PASS

PASS — NO PASS course enrollments were approved by the University Senate for implementation in September, 1968. The action was taken in two parts:

FIRST, that any degree program student, not on academic trial, be permitted to take as many as six courses (three courses for two-year students; or as many courses as he/she has semesters remaining for future transfer students) during his/her undergraduate career on a

pass-no pass basis, beginning in his/her sophomore year (second semester of his/her first year for two-year students). These courses may not include any required by the student's major department, either for the major or for the degree. Only *free electives* (without condition) may be taken as pass-no pass. This option may *not* be used for electives within the distribution requirements of a college or department. Students who have enrolled in ineligible distribution elective courses on a pass-no pass basis prior to September 1, 1974, shall not be penalized. The student must complete all work normally required in these courses and he/she will receive full credit toward graduation for passing them. The instructor will NOT be informed of the student's status and the Registrar will record grades of "D" or higher as PASS and grades of "F" as NO PASS. Neither "P" nor "NP" grades will affect the student's grade-point average.

SECOND, that the following addition was approved by the Faculty Senate in January, 1974: Physical education (activity) courses, whether taken to fulfill a requirement or as electives, will be available to students on a pass-no pass basis and shall not be counted as a part of the six standard courses described above.

Procedure:

1. Obtain a PASS — NO PASS Request Form from the Registrar's Office and consult the academic advisor.
2. Obtain the advisor's endorsement that the request conforms to the policy established by the University Senate. Any question about a course or courses being appropriately elected as pass-no pass for a student will be resolved by the student's college/school dean or director.
3. Submit the request to be placed on pass-no pass status at the Registrar's Office during the first week of the semester. Requests to be removed from that status must be filed during the same period.

Note: Non-degree students may not take courses on pass-no pass basis.

AUDITING COURSES

With the approval of the dean/director and the instructor concerned, a regularly enrolled student carrying a normal program may audit a course. Others who do not wish to receive credit, or who have not met admission requirements, may also register as auditors. Auditors have no claim on the time or service of the instructor and no grade credit is given for the work. Tuition is charged at the applicable rate. Under no circumstances will a change be made after the enrollment period to allow credit for courses audited.

The approval of the Director of Continuing Education is necessary for auditing courses in the Evening Division or Summer Session.

GUIDELINES FOR INDEPENDENT STUDIES

1. Independent study is an education experience (taken for credit) which occurs outside the traditional "classroom/laboratory" setting. The project is faculty supervised and tailored to fit the interests of a specific student.
2. Independent study will be under the direct supervision of a faculty member having expertise in the area of investigation and consequently the project will be done in the department which is primarily responsible for the field of study in question.
3. Prior to enrollment in independent study, the student must obtain the approval of his/her advisor, faculty sponsor, and the faculty sponsor's department chairperson.
4. Independent study may be taken for variable credit. The amount of credit to be granted should be mutually agreed upon by the student and the faculty sponsor at the time of enrollment.
5. When a project is to cover more than one term, the XC, rather than incomplete, should be used for the first term of work.
6. All departments in which a student may obtain "service learning" or "field experience" credit should list this option in their description of courses. If a department offers the

opportunity for both "Readings and Research" and "Field Experience (service learning, internships, etc.)," these offerings should have different course numbers, titles, and catalogue descriptions. In the *rare* instance where one cannot differentiate between these two offerings, they may be listed under the same name.

7. All academic units offering independent study courses will be responsible for administering such work. Specific guidelines which define the responsibilities of both faculty and student in terms of administering the independent study project are given in Part 8. Alternative guidelines which incorporate the basic points in Part 8 are acceptable.
8. Procedure:
 - a. The success of an independent study project is often related to the amount of advanced planning expended on the project. Consequently, planning for the project should, whenever possible, be initiated in the semester before the course is taken.
 - b. By the end of the add/drop period, students will be required to submit to their faculty sponsor a specific plan which must include, but not be limited to, the following:
 - i. The project title.
 - ii. A statement of justification, indicating why independent study is being selected and the reason for undertaking the project, its importance, and how it relates to other work done by the student.
 - iii. A clear and complete statement of project objectives.
 - iv. A concise statement of the plans and methods to be used in order to accomplish each objective.
 - c. During the first full week of classes the student and the faculty sponsor will meet and prepare a document which includes the following:
 - i. A schedule of dates when the student and faculty member will meet and discuss progress, including a time plan indicating when various parts of the work are projected for completion.
 - ii. A list of those ways in which documentation of work can be shown.
 - iii. A plan for evaluation, which will include the specific work to be submitted for evaluation on the project, and a statement of criteria to be used for evaluation, will also be included.
 - d. It is the responsibility of the faculty supervisor to ensure that all the provisions in numbers 7 and 8 above have been satisfactorily accomplished. Copies of all documents and schedules mentioned in 8.b and 8.c must be filed with the department chairperson by the end of the add/drop period. Completed projects, along with faculty evaluations, should be retained in the faculty member's files, to be available for review, if necessary, by appropriate school and college committees.

REPEATED COURSES

A student who repeats a course loses any previous credit on record for that course. The previous grade remains on the student's permanent academic record and is included in computing his/her cumulative grade average.

ATTENDANCE

Class Attendance: Every student is expected to attend all regularly scheduled classes. This is a major responsibility of the student toward himself/herself and toward the University. The primary penalty for non-attendance lies in the student's lessened grasp of the subject matter of the course.

It is the responsibility of the student to inform the instructor regarding reason for absence from class.

Absence from Classes: Each department is to inform all students in its classes at the beginning of each semester of its policy for handling absences and the penalties that may be imposed.

Failure to do any work for which a grade is given, if due to unexcused absence, may result in a failing grade for that particular work.

TARDINESS

A student not present at the beginning of an exercise may be marked absent.

RIGHT OF APPEAL

Any student who believes that he/she has been unfairly treated in regard to absences may appeal to his/her academic dean/director.

PRIORITY OF UNIVERSITY EXERCISES

University academic responsibilities have priority over other campus events. Attendance at:

1. regularly scheduled classes have priority over specially scheduled common hour examinations.
2. common hour examinations have priority over attendance at other activities.

FINAL EXAMINATIONS REGULATIONS

1. The examination period at the end of each semester is set by the official University calendar.
2. Semester examinations shall be given only during the regular examination period except by permission of the dean/director of the college/school on request of the chairperson of the department. No examination shall be given during the last week of the semester except lab exams given in courses with specific lab sections.
3. The time and place of each final examination are determined by the Registrar and a schedule is circulated and posted. Any change in the scheduled time or place may be requested by the chairperson of the department concerned when conditions seem to warrant such special arrangement. Decision on such requests rests with the Registrar.
4. In every course in which a final examination is given, every student shall take the examination unless excused by the instructor.
5. A student who is absent from a final examination for any reason must report that fact and the reason, in person or in writing, to his/her instructor within 24 hours. If the absence is due to any situation beyond the reasonable control of the student (e.g. illness or family tragedy), the instructor must provide the student with the opportunity to complete the course requirements. At the instructor's discretion, this may be an examination or some other suitable project. The instructor may require evidence in support of the student's reason for absence.
6. If the absence is not reported as provided above, or is not excused by the instructor, the examination is regarded as failed.

GRADES

Grades are reported and recorded as letter grades. Averages are calculated from quality point equivalents.

A Excellent	4 points per semester hour
B Good	3 points per semester hour

C Fair	2 points per semester hour
D Poor	1 point per semester hour
F Failure	0 points per semester hour

Other grades are:

AU Audit.

Inc. Incomplete. This grade applies to course work which is not completed due to circumstances beyond the student's control, e.g. illness, as documented by the University Health Service; personal tragedy; breakdown of computer or laboratory equipment; or unanticipated delay in receiving information from sources inside or outside the University. Incompletes can be awarded only with the permission of the student's college/school dean/director. The incomplete course requirement will be satisfied at the earliest possible date. In no case shall this time be set longer than the beginning of the corresponding semester of the next academic year. In cases of laboratory assignments, the student must complete all work the first time that the laboratory experience is offered again.

Procedure:

1. The student requests permission for the incomplete grade from the instructor.
2. In consultation with the student, the instructor will fill out and forward to the student's academic dean/director an incomplete card which will describe the reason for the incomplete as well as define the deadline.
3. Along with the incomplete card, the instructor will include his/her recommendation and confirmation of eligibility for the incomplete on academic grounds (e.g. breakdown of equipment or computer or unanticipated delay in receiving information from sources inside or outside the University).
4. Confirmation of eligibility for medical incompletes and personal tragedy will be provided by the dean/director's office.
5. It is the student's responsibility to learn from the dean/director whether the incomplete request has been approved, the date by which the work is to be completed, and from the instructor the nature of all outstanding requirements.
6. It will be the responsibility of each dean/director's office to determine through the Registrar whether any incompletes have been awarded without prior approval.

XC Extended Course. This grade is awarded at the end of the semester to a student who is enrolled in an identified course, the nature of which makes it unreasonable or impossible for the student to complete the required work within the regular semester.

NP Not Passed, not used in grade-point average computation.

P Passed, not used in grade-point average computation.

WP Withdrawn, without penalty, not used in grade-point average computation.

WF Withdrawn, failing. This grade is weighted as an "F" in the computation of the grade-point average.

M Missing. Grade not turned in by the instructor.

In cases in which a student requests reconsideration of a grade for a course already taken, the grade change, if any, must be made by the instructor and approved by the student's dean/director by the end of the first month of the following semester unless an extension is granted by the student's dean/director.

CLASS STANDING

The designation of a student's class shall be determined by the number of credits completed. The divisions are as follows:

Freshman	0-29.9 credit hours
Sophomore	30.0-59.9 credit hours
Junior	60.0-89.9 credit hours
Senior	90.0 and over credit hours

TRANSCRIPTS

An official transcript is the reproduction of a complete, unabridged academic record validated with the University seal, facsimile signature of the Registrar, and date of issue. A key to transcript is included which contains a full statement of pertinent definitions. A rank-in-class entry is made upon graduation.

Currently enrolled, as well as former undergraduate and graduate students, may obtain an official transcript of their permanent academic record by writing or telephoning the Office of the Registrar, 363 Waterman Building, (802) 656-2045. The charge is \$2 for each transcript. Please allow a minimum of one week for normal processing and three weeks following the end of a semester.

ACCESS TO RECORDS

Students have the right to review any of their educational records maintained by the University. Students also have the right to have all educational records maintained in a confidential manner. In appropriate situations, students may choose to waive some or all of these protections, but such waivers must be clearly stated in writing. If a student feels an educational record to be misleading, or containing information which is inaccurate, a hearing may be scheduled to seek appropriate modification. Requests for review of records should be made to the Registrar.

HONORS

The Bachelor's and Associate's degrees may be conferred with honors, by vote of the Senate, in recognition of general high standing in scholarship. Three grades are distinguished and indicated by inscribing on the diploma the words *cum laude*, *magna cum laude*, or *summa cum laude*.

Honors are determined in the following manner: Within the graduating class of each college or school, students in the top one percent will receive *summa cum laude*; the following three percent will receive *magna cum laude*; the next six percent will receive *cum laude*. The total number of honors awarded will not exceed ten percent of the graduating class of each school or college.

Honors will be calculated on all grades received at this University. In order to be eligible for consideration, a student must have taken at least 60 hours (30 hours for two-year programs) at this university in which a letter grade of A, B, C, D, or F has been awarded.

DEAN'S LIST

The deans/directors of the undergraduate colleges/schools publish at the beginning of each semester the names of those full-time students who stood in the top 20 percent of each class of their college/school during the preceding semester. Full-time enrollment in this case shall be a minimum of 12 credit hours in courses in which grades of A,B,C,D, or F have been given.

STUDENT LEAVE OF ABSENCE POLICY

A leave of absence means that a student who is eligible for continued enrollment ceases to be enrolled while in good standing and is guaranteed readmission. This policy benefits both the student and the University in that it enables a student to plan for readmission to the University and allows the University, by having records on the expected date of return of its students, to refine further the planning of the size of the student body. The following statements further define a leave of absence:

- a. Upon application to his/her academic dean/director a student may be granted a leave of absence by that dean/director when that application merits the commitment of the University to insure the student's readmission.
- b. A leave must be granted for a finite period of time.
- c. A leave normally may not exceed four semesters.
- d. A leave normally may not be granted for the current semester after the day on which courses can be dropped without penalty.
- e. A leave may not be granted to students currently on academic trial or disciplinary probation.
- f. A leave is distinct from withdrawing for medical reasons and is not granted for medical reasons.
- g. A leave does not guarantee housing upon the student's return.
- h. A leave guarantees readmission to the student's college/school in the University if the student confirms his/her intent to return by the closing date for a normal readmission application (October 31 and March 31 preceding the appropriate semester).
- i. While on a leave, an individual's student status is temporarily terminated. A leave of absence guarantees an individual's readmission only if he/she takes the appropriate action.
- j. Financial aid awarded but not used prior to a leave will not be carried over. Reapplication for aid for the readmission period must be made according to normal Office of Financial Aid policies and procedures applicable to that period.
- k. A leave should be confirmed by the appropriate form signed by both the student and the dean/director of the college/school involved.

WITHDRAWAL

A student who wishes to withdraw from the University must first notify his/her academic dean/director in person or in writing.

READMISSION

Any degree student who has left the University for one semester or more must write to his/her dean's/director's office to request readmission. Students must apply for readmission by October 31 or March 31 preceding the appropriate semester of return.

LOW SCHOLARSHIP

The information below describes the general University regulations for low scholarship standing. The Studies Committee of each college/school may determine additional or supplementary requirements. Students with questions regarding their academic standing should consult with their college/school dean/director.

1. "On Trial":
 - a. "On trial" is an intermediate status between good standing and dismissal. The student remains enrolled according to stated academic conditions of his/her college/school.
 - b. A student is placed "on trial" by the dean/director or the designated committee of the college/school concerned. Special academic conditions may be set in each case. Normally the period of "trial" status is one semester.
 - c. The circumstances under which a student is placed "on trial" are as follows:
 - (1) Any student who is readmitted to the University after having been dismissed for low scholarship re-enters "on trial."
 - (2) Generally a student is placed "on trial" if in any semester he/she has failed half or more of the hours of his/her enrollment but has been permitted to continue in college/school.

- (3) A student whose record has been consistently below the graduating average or generally unsatisfactory in any semester may be placed "on trial" or continued "on trial" even though he/she does not come within the provisions of Section (2).
 - d. A student who has earned fewer than 30 semester hours of credit and is "on trial" is barred from participation in all athletic and other student activities.
2. Separation:
- a. A student is dismissed from the University if he/she receives grades below passing in one-half or more of the semester hours of his/her enrollment in any semester unless he/she is allowed to continue by action of the designated committee.
 - b. A student who fails to meet the condition of his/her trial or whose record has been unsatisfactory and consistently below the graduation average may be dismissed for low scholarship even though he/she does not come within the provision above.
 - c. A student dismissed for low scholarship must address his/her application for readmission to the college/school taking the action.
 - d. Any student dismissed for academic or disciplinary reasons must receive written approval from his/her previous academic dean/director (or the Dean of Students for disciplinary cases) before enrolling in any University course.

INTERCOLLEGE TRANSFERS

A student who is or has been a member of any college/school of this University may transfer to another college/school of the University only with the consent of the deans/directors of the two colleges/schools concerned. In the case of veterans receiving educational benefits through the Veterans Administration, the change must also be approved by the advisor to veterans in the Center for Career Development.

UNDERGRADUATE DEGREE REQUIREMENTS

Degrees are conferred on the recommendation of the colleges/schools and specific requirements will be found in the sections devoted to the respective colleges/schools.

In addition to the course requirements of the curricula, students must also fulfill the general requirements in physical education.

To be eligible for graduation, a student must have attained a cumulative average sufficient to meet the minimum requirements for the college/school in which the student is officially enrolled. Grades in courses accepted for transfer credit are excluded in computing this average.

Every candidate for a degree is required to have taken 30 of the last 45 semester hours of credit (15 of the last 30 for two-year students) in residence at the University except that those who have completed three years of premedical study in the University are awarded their degrees after successful completion of one year of study in any approved college of medicine. Other exceptions to this rule may be made only upon decision of the dean/director or the appropriate faculty committee of the college or school in which the student is enrolled. To qualify for a second Bachelor's degree, the candidate must have fulfilled all the requirements for the degree and must have taken a full year of work, usually 30 hours, in addition to that taken to qualify for the first degree.

PHYSICAL EDUCATION

One year of physical education, normally completed during the freshman or sophomore year, is required of all undergraduate students in four-year programs. The two credits earn-

ed in activities classes will be included in the total number of hours required for graduation. Students may opt to take activities classes on a pass-no pass basis. (For further details see the pass-no pass heading under General Information.) Medical examinations are required of all new students. Those with serious defects may be given restricted work or may be excused by the Director of University Health Services. The physical education requirement for students pursuing two-year degree programs shall be one credit of course work earned in activities instruction.

Students 25 years of age or older are exempt from physical education requirements.

UNIVERSITY RESPONSIBILITY

Many courses involve instruction in and the use of various types of power equipment, laboratory apparatus, and specialized facilities. 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 precaution. 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 University Health Service.

USE OF ENGLISH

Correct English usage is demanded by all departments of the University. Written work of any kind which is unsatisfactory in manuscript form, grammar, punctuation, spelling, or effectiveness of expression may be penalized, regardless of content. Students whose written work falls below the standard of correct usage may be referred to the English Department for additional instruction, even though the freshman course in English has been passed.

Before they may be admitted to the University, foreign students must offer evidence that they are capable of reading and writing English on the college level.

ACADEMIC DISCIPLINE

The University expects each student to maintain high standards of personal conduct and social responsibility at all times both on and off campus. All students, as responsible citizens, are required to observe and to share in the support of University regulations. Any student who fails to uphold these standards is subject to disciplinary action by the University.

The disciplinary authority of the University is vested in the President. In such cases as he/she considers proper, this authority may be delegated to the several deans/directors and to appropriate judicial bodies. The continuance of each student at the University, the receipt of academic credits, graduation, and the conferring of any degree or the granting of any certificate are strictly subject to the disciplinary powers of the University. The University is free to cancel a student's registration at any time on any grounds if it considers such action to be for the welfare of the institution.

University policy on the above matters is explained in detail in "The Cat's Tale: A Student's Guide to the University of Vermont." Each student is held responsible for knowledge and observance of these rules and regulations, including those concerned with academic honesty.

UNIVERSITY RESIDENCY REGULATIONS

The Vermont Legislature has established a lower rate of tuition for students who are Vermont residents. Such a policy has as its objective the attempt to more evenly distribute the cost of operating and supporting the University of Vermont between Vermont residents

whose taxes have previously supported the University and non-residents who have not done so.

The Legislature has stated that enrollment at an institution for higher learning or presence within the state for purposes of attending an institution of higher learning shall not constitute residence for tuition purposes.

IN-STATE STATUS REGULATIONS

(Adopted by the Board of Trustees, December 14, 1974; amended June 15, 1979)

The following requirements must be met by a student prior to being granted resident status for the purpose of admission, tuition, and other University charges:

1. The applicant shall be domiciled in Vermont, said domicile to be continuous for one year prior to the commencement of the semester next following the date of application. Changes in residency status shall become effective for the semester following the date of application. There shall be one date designated each year for the commencement of each semester and the summer term. A semester shall commence on the day classes *begin* for that semester. The summer term shall commence on the day classes *begin* for the summer term.
2. Domicile shall mean a person's true, fixed, and permanent home, to which he/she intends to return when absent. A residence established for the purpose of attending an educational institution or qualifying for resident status for tuition purposes shall not of itself constitute domicile. Domicile shall not be determined by the applicant's marital status.
3. The applicant must demonstrate such attachment to the community as would be typical of a permanent resident of his/her age and education.
4. Receipt of financial support from the applicant's family will create a rebuttable presumption that the applicant's domicile is with his/her family.
5. An applicant becoming a student at an institution of higher learning in Vermont within one year of first moving to the state shall have created a rebuttable presumption of residence in Vermont for the purpose of attending an educational institution.
6. Eligibility to enroll as a resident student in another state shall create a rebuttable presumption against eligibility to be enrolled at the University of Vermont as a "Vermont Resident."
7. A student enrolling at the University of Vermont shall be classified by the appropriate officer (designated by the President), as a resident or non-resident for admission and tuition purposes. The decision by the officer shall be based upon information furnished by the student and other relevant information. The Officer is authorized to require such written documents, affidavits, verifications, or other evidence as he/she deems necessary.
8. The burden of proof in all cases rests upon the student claiming to be a Vermont resident and shall be met upon a showing of clear and convincing evidence.
9. The decision of the Officer on the classification of a student as a resident or non-resident may be appealed in writing to the Committee on Residence, whose decision shall be final.

Note: These regulations were under review at the time of publication of the catalogue. Questions should be addressed to the Office of the Dean of Students.

The College of Agriculture

The Bachelor of Science degree is awarded for the programs listed below. Please refer to the departmental listings in this section for more information and specific requirements.

Department of Agricultural and Resource Economics

- Food Production Economics
- Food Marketing and Agribusiness
- International Agriculture

Department of Animal Sciences

- Animal Science
- Animal Industry
- Dairy Production
- General
- Preprofessional/Science
- Dairy Technology
- Business-Management-Quality Assurance
- Dairy Science
- General

Department of Botany

- Botany

Department of Human Nutrition and Foods

- Dietetics
- Human Nutrition and Foods

Department of Microbiology and Biochemistry

- Biochemical Science

Department of Plant and Science

- Plant and Soil Science

Department of Textiles, Merchandising and Consumer Studies

- Clothing
- Fashion Merchandising and Management
- Textiles
- Textile Design

Department of Vocational Education and Technology

- Occupational and Extension Education
- Agricultural and Natural Resource Education
- Extension Education
- Health Occupations Education
- Home Economics Education
- Industrial Education
- Agricultural Technology

Inter-Departmental

- Biological Sciences
- General Studies

The College of Agriculture performs four public functions: it teaches resident students, investigates problems, brings information to the people, and performs related services. These four areas of work are performed by the resident instruction division, the research division (Vermont Agricultural Experiment Station), the extension division (Vermont Cooperative Extension Service), and the Related Services Division.

The curricula of the resident instruction division prepare students for professional careers. Upon receiving the Bachelor of Science degree, students usually enter management, specialized services, sales, education, government service, or research.

The evolution of society necessitates continual progress and change. Thus the challenge of preparing students to excel now, yet adjust to future changes, is being met through programs designed to give a foundation both in the social sciences and the humanities plus a fundamental technical education.

In each area of study certain courses are prescribed, with allowance made for the election of additional courses, to provide a well-balanced and integrated educational program and to insure reasonable concentration. Faculty advisors counsel students in the selection of elective courses and educational problems. The normal semester program includes 15 to 18 credit hours of courses.

Programs of Study

The programs in the College are broad and flexible, with sufficient areas of concentration and electives to meet the specific needs and desires of the student. Therefore, responsible departmental advising is important in the development of each student's program. Every candidate for a degree, in consultation with his/her advisor, must choose one of the above programs upon entering the College. The candidate must then fulfill the requirements stated below.

Degree Requirements

All programs in the College of Agriculture leading to the Bachelor of Science degree require:

- A. The successful completion of a minimum of 120 credit hours of course work plus two credit hours in physical education.
- B. A minimum cumulative grade-point average of 2.00.
- C. The successful completion of at least two courses in each of the following areas:
 1. Writing, communication, and public address
 2. Science, mathematics, and statistics
 3. Fine arts, philosophy, language, and literature
 4. Social sciences
- D. Courses as specified in individual programs.

Applicability of courses to specific areas will rest with the advisor and, if necessary, with the concurrence of the dean of the College. It is further recommended that courses chosen to fulfill these requirements be taken outside the department in which the student's program of study is located. Students desiring to complete teacher education programs and teacher certification must apply for admission to Teacher Certification through the Vocational Education and Technology Department prior to their junior year and enroll in appropriate courses in the College of Education and Social Services (see College of Education and Social Services).

Preprofessional Preparation

Students who are striving for admission to professional colleges, such as dentistry, medicine, and veterinary medicine, can meet the undergraduate requirements for these programs through enrollment in the College of Agriculture. Those interested in human medical sciences usually enroll in biological sciences while individuals interested in veterinary medicine usually enroll in either animal sciences or biological sciences. Any student indicating a specific professional interest will be assigned a faculty advisor knowledgeable in that area.

Competition for places in professional schools is very keen and a superior academic record throughout an undergraduate program is necessary to receive consideration for admission. Due to this intense competition, all potential candidates are encouraged to also complete the requirements in an area of secondary interest.

Students applying to the College of Agriculture, and expressing an interest in medicine or preveterinary medicine, should present evidence of high performance in high school level science and math courses, plus additional supporting documentation such as high SAT scores and strong letters of recommendation.

Biological Sciences Core

Students initially interested in the broad area of biological sciences may enroll in this core curriculum for the freshman and sophomore years. The curriculum is designed to permit students to continue in basic biology or to transfer to one of the applied biology programs. In addition to the general college requirements listed, students should complete during the first two years the following courses or their equivalents: Biology 1, 2 or Zoology 9 and Botany 4; Math, 19, 20 or Math 21; Chemistry 3, 42 or Chemistry 1, 2 and 141, 142; Microbiology and Biochemistry 55 (Microbiology). Course descriptions are listed under the appropriate departments.

Programs available upon completion of the core curriculum are listed below. Students may wish to select offerings from these programs during the freshman and sophomore years in addition to the required courses state above.

Freshman and Sophomore Years:

Junior and Senior Years:

Take Biological Science Core

Continue in Biological Science or transfer to Animal Sciences, Biochemical Science (see Microbiology and Biochemistry), Botany, or Plant and Social Science

An alphabetical listing and description of programs and concentrations follows.

Agricultural and Resource Economics

The Department of Agricultural and Resource Economics offers two major programs of study: Agricultural Economics in the College of Agriculture and Resource Economics in the School of Natural Resources.

AGRICULTURAL ECONOMICS Options in the agricultural economics program provide students with basic work in agricultural economics, together with an exposure to courses in the liberal arts and the sciences. Students in this program acquire quantitative skills and analytical concepts that can be applied to the problems of U.S. or world agriculture. Students elect one of three options:

1. **Food Production Economics:** Prepares the student to manage a farm business or to work in the many service or educational fields related to agricultural production and finance.
 2. **Food Marketing and Agribusiness:** Prepares the student for managerial, sales, or market analysis positions with businesses, especially those that supply agricultural inputs or market agricultural products. Students might also work in government statistical or market analysis programs.
 3. **International Agriculture:** An option for students who are interested in a course of study that will prepare them to work in agricultural development in third world countries, or to work for agencies or private companies with international programs.
- I. General Education Requirements:
- A. Communication Skills. For all options:

English 1	Written Expression
Communication 11	Effective Speaking
 - B. Quantitative Skills. For all options:

Math. 18 OR	Mathematics for Business, OR
Math. 19	Fundamentals of Calculus I
Statistics 111 OR	Elements of Statistics, OR
Statistics 141	Basic Statistical Methods
 - C. Science. For Food Production Economics and Food Marketing and Agribusiness options:
A minimum of nine hours, comprised of one laboratory science course, one course in animal science, and one course in plant science.

For the International Agriculture option:
Chemistry 3, Outline of General Chemistry, plus one semester of another laboratory science.
 - D. Arts and Humanities. For all options:

Philosophy 3	Introduction to Logic
One unspecified course	
 - E. Social Science. For all options:

One course in political science	
One course in another social science, excluding economics	
- II. Option Requirements:
- A. Food Production Economics

Economics 11, 12	Principles of Economics
Agr. and Res. Econ. 2	World Food and Population
Agr. and Res. Econ. 161	Agricultural Finance
Agr. and Res. Econ. 166	Small Business Management
Agr. and Res. Econ. 201	Farm Business Management
Agr. and Res. Econ. 207	Markets, Food, and Consumers
Agr. and Res. Econ. 208	Agricultural and Food Policy
Agr. and Res. Econ. 210	Marketing Institutions
Agr. and Res. Econ. 254	Production Economics

 A minimum of an additional 15 hours from a list of restricted electives.
 - B. Food Marketing and Agribusiness

Economics 11, 12	Principles of Economics
Economics 186	Microeconomic Theory
Economics 190	Macroeconomic Theory
Agr. and Res. Econ. 166	Small Business Management
Agr. and Res. Econ. 207	Markets, Food, and Consumers
Agr. and Res. Econ. 208	Agricultural and Food Policy
Agr. and Res. Econ. 210	Marketing Institutions
Agr. and Res. Econ. 264	Agricultural Price Analysis and Forecasting

 A minimum of an additional 15 hours from a list of restricted electives.

C. International Agriculture

Animal Sciences 1
 Plant and Soil Science 11
 Agr. and Res. Econ. 2
 Voc. Ed. and Tech. 5
 Voc. Ed. and Tech. 112

Introductory Animal Science
 Principles of Plant Science
 World Food and Population
 Introductory Agricultural Engineering
 Extension and Community Education

Each student must take at least 15 additional hours within a department of the College of Agriculture, 12 hours of which must be at or above the 100 level.

Each student will elect to concentrate on either Latin America or Africa and will take the courses listed below. (With special permission, a student may elect to specialize in the language and culture of the Soviet Union or Southeast Asia. An approved internship in a third world country may substitute for nine hours credit as required above.)

Latin America Area

Spanish 1-2

Elementary AND/OR
 two semesters of an intermediate course

Anthropology 21
 Anthropology 161
 Geography 56
 History 33

Human Cultures
 Cultures of South America
 Latin America
 Introduction to the Modern History of
 Latin America

African Area

French 1-2

Elementary AND/OR
 two semesters of an intermediate course

Anthropology 21
 Anthropology 162
 Geography 51
 History 37

Human Cultures
 Cultures of Africa
 Africa
 Introduction to African History

RESOURCE ECONOMICS For a description of the program in Resource Economics, refer to the School of Natural Resources.

Animal Sciences

Two programs, Animal Sciences and Dairy Technology, are offered in the Department of Animal Sciences, with several specialized options under each program. A strong advisor-advisee relationship exists to help students meet their professional goals.

Specific programs are planned by the student and his/her advisor; however, each student must successfully complete a minimum of eight courses in the Department of Animal Sciences, including at least five of advanced standing.

ANIMAL SCIENCES This program deals with a wide range of activities. The major agricultural enterprise in Vermont is related to dairy cattle farming. Consequently, our primary production option relates to the feeding, breeding, and management of dairy cattle. Supporting courses are also offered in the production of livestock, pleasure horses, and poultry. Graduates from the dairy option are successful dairy farmers, farm managers, and sought by employers in related agribusiness as well. High quality preprofessional science

graduates are competitive for admission to schools of veterinary medicine and are sought for graduate study in nutrition, physiology, and genetics by universities across the country. In addition, graduates in all options are successful in many related agribusiness jobs including feed and equipment sales, banking, management, etc.

Options under the Animal Sciences Program are:

1. **Dairy Production:** Provides formal training in the theories and practices of dairy cattle production. Major emphasis is placed on breeding, feeding, and farm management. This option prepares the student for employment as a farm owner or manager or for field work with breed associations, farm organizations, or commercial companies closely allied with dairy cattle production. A variation of this option is livestock production which includes similar courses but with more emphasis on other types of livestock. A possible four-year curriculum for the Dairy Production Option is shown below.
2. **Animal Industry:** Primarily for those students who are interested in business. It prepares them for supervisory and management positions in industries related to animal sciences, such as those involved with the processing and sales of dairy, meat, and poultry products; feed and fertilizer companies; farm equipment and supply agencies; advertising and public relations; and other areas of public service. A possible four-year curriculum for the Animal Industry option would be similar to the Dairy Production option below except that students in this option would take fewer science courses and a heavier concentration of courses in economics, accounting, and agricultural economics including small business management, agricultural finance, agricultural policy, marketing institutions, advanced agricultural economics, and agricultural price analysis and forecasting.
3. **Preprofessional/Science:** For those students interested in careers in veterinary and human medicine, research, or university positions. Students in this program will be provided with the strong science background that is necessary for advanced study in such areas as medicine, physiology, nutrition, genetics, and related biological fields. In comparison with the curriculum for dairy production, students in this option would take fewer courses in business and production sciences and more courses in the basic sciences. A possible four-year preprofessional/science curriculum is shown below.
4. **General:** For those students with interest in the animal sciences but without specific career goals. Students in this option are required to take at least eight Animal Sciences courses and are encouraged to select one of the other options by their junior year.

Possible Dairy Production Option

Freshman Year	Credits	Sophomore Year	Credits
Introductory Animal Sciences	4	Organic Chemistry	4
Zoology	4	Dairy Cattle Selection	3
Inorganic Chemistry	4	Genetics	4
Principles of Plant Science	3	Physiology	3
Fundamentals of Nutrition	3	Animal Feeding	4
Principles of Agr. and Res. Econ.	3	Animal Health	3
Electives*	9	Electives*	9
Junior Year	Credits	Senior Year	Credits
Livestock Production	4	Physiology of Reproduction	4
Markets, Food, and Consumers	3	Dairy Cattle Management	3
Introductory Soil Science	4	Forage Crops	3
Animal Breeding	3	Introductory Dairy Technology	3
Electives*	16	Farm Business Management	3
		Electives*	14

Possible Preprofessional/Science Option

Freshman Year	Credits	Sophomore Year	Credits
Biology	8	Organic Chemistry	8
Inorganic Chemistry	8	Math. through Calculus	6
English Writing	3	Public Speaking	3
Introductory Animal Sciences	4	Genetics	4
Fundamentals of Nutrition	3	Animal Feeding	4
Electives*	3-6	Anatomy	3
		Electives*	3-6
Junior Year	Credits	Senior Year	Credits
Physics	8	Physiology of Reproduction	3
English Composition	3	Endocrinology	4
Microbiology	4	Animal Production	3
Physiology	3	Statistics	3
Biochemistry	4	Electives*	15-20
Animal Production	3		
Electives*	3-6		

*Includes courses for college requirements in communications, social sciences, fine arts, and humanities. Also includes advanced courses in nutrition, genetics, and physiology for the science option and other courses in animal science, plant and soil science, vocational education and technology, and agricultural economics for the production option.

DAIRY TECHNOLOGY This program deals with all aspects of handling, processing, quality assurance, and marketing of fluid milk and manufactured dairy products. Options under the Dairy Technology Program are (1) **General**, (2) **Business-Management/Quality Assurance**, and (3) **Dairy Science**. Core courses in the department that a student should take for all three of the options are: Introductory Animal Sciences, Introductory Dairy Technology, Fundamentals of Nutrition, Dairy Testing and Quality Control, Food Microbiology, Manufactured Dairy Products, Sensory Evaluation of Foods, Milk Processing, Ice Cream and Frozen Dairy Products, Dairy Plant Management, and Senior Seminar. Sequence of courses for each option of a four-year curriculum will be prepared by the student in consultation with his/her advisor. A suggested four-year curriculum in the Dairy Science Option is given below:

Dairy Science Option

Freshman Year	Credits	Sophomore Year	Credits
Introductory Animal Sciences	4	Introductory Dairy Technology	3
Inorganic Chemistry	8	Fundamentals of Nutrition	3
Math. (through Calculus)	3	Microbiology	4
Electives*	15	Statistics	3
		Computer Applications	3
		Organic Chemistry	8
		Electives*	3
Junior Year	Credits	Senior Year	Credits
Food Microbiology	3	Sensory Evaluation of Foods	3
Dairy Testing and Quality Control	3	Milk Processing	3
Manufactured Dairy Products	3	Dairy Plant Management	3
Ice Cream and Frozen Dairy Products	3	General Biochemistry	4
Small Business Management	3	Physical Chemistry	3
Physics	8	Quantitative Analysis	4
Electives*	8	Senior Seminar	1
		Electives*	8

*Includes courses for college requirements such as communications, social sciences, and fine arts and humanities.

Vermont has the only Dairy Technology Program in the Northeast. Consequently, our graduating seniors have many job opportunities in areas such as the manufacture of fluid milk products, cheese varieties, ice cream, and butter and powder operations, quality control and assurance programs, sales and services, sanitarians, public relations, etc. Also, our graduating seniors are eagerly sought for graduate-study programs at universities throughout the United States.

Biological Science

This program is designed to provide flexibility in developing a background in biological sciences. Students may fulfill their course requirements by selecting basic and applied courses from the several biologically-oriented departments (Animal Sciences, Botany, Microbiology and Biochemistry, Plant and Soil Science, Zoology, and others).

Graduates of the program may continue their education in graduate school or professional schools or they may obtain employment in a variety of areas. Possible job opportunities would include basic and applied research in educational institutions and governmental agencies, technical writing, employment with environmental consultants, etc.

The following courses are required of all students in the Biological Science program following completion of the core requirements: genetics (one semester), biochemistry (one semester), physics (two semester sequence), and statistics (one semester). In addition, all students must take six additional courses in basic or applied biology. These courses should be selected to include at least one course in botany or applied plant science, one course in zoology or applied animal science, one course in the area of evolution and diversity of life, one course in ecology, and two courses in physiology or biochemistry. Of these, at least one or more courses at the 200 level should be included. These courses are selected in consultation with the advisor from the diverse offerings of the various colleges and departments.

Botany

Students in the Colleges of Agriculture or Arts and Sciences may major in Botany. Each undergraduate plans a program in consultation with a personal department advisor. The emphasis on flexibility permits a choice of electives when planning for each individual's career. Cross-disciplinary study is encouraged as botany, a fundamental science, is the base upon which education, research, and careers in both applied and basic plant science is built. Many students aim specifically for careers that do not require formal education beyond the Bachelor's degree, e.g. preparation for numerous positions in: agriculture, business, education, administration, government, industry, medicine, research, or their own businesses. Many other students prepare themselves for graduate education and professional careers requiring advanced degrees, e.g. careers in botany, biology, medicine, dentistry, agriculture, biochemistry, or environmental sciences. In either case, close attention is given to increasing the student's choices after college. Students are also encouraged in their senior year to enrich their botanical experience through individualized, original research and study with faculty members. Areas of interest include: anatomy, cell botany, cytology, ecology, phycology, physiology, plant development, plant pathology, and taxonomy.

Required courses: Math. 22; or Math. 21 and Statistics; or Math. 19, 20 and Statistics, Physics 11, 12 or preferably 15, 16; Chemistry 42 or preferably 141, 142; Biology 1, 2; Botany 101, 104, 107, 108, and 109 or 160; two additional semester courses in Botany, at least one at the 200 level. Botany 4 and Zoology 9 may be substituted for Biology 1,2.

Six hours of modern foreign language are strongly recommended. Students may petition the department to substitute other courses for certain requirements in the planning of individual programs.

Environmental Studies

The College of Agriculture participates in the interdisciplinary University Environmental Program as described on page 121. Most students select the Coordinate Major Program and fulfill the requirements in one of the major programs available in the College.

General Studies

This program is designed for students seeking a general rather than a specialized knowledge in the field of agriculture and related subjects. Through the proper selection of electives, a student may choose an area of concentration within the College and also select courses that contribute to a liberal education.

Required: In addition to the basic College requirements, each student must satisfactorily complete 40 credit hours in the College of Agriculture, 20 of which must be at the 100 level or above. All additional courses must be selected in consultation with and have the approval of the student's advisor.

Human Nutrition and Foods

The Department of Human Nutrition and Foods prepares professionals to enter the rapidly growing field of nutrition and/or foods. Such preparation requires a strong foundation in basic science including chemistry, physiology, microbiology, and biochemistry. The Department also recognizes the importance of general education and majors are required to complete courses in psychology, sociology, economics, English composition, speech, and the humanities. Courses in statistics and language are strongly encouraged.

The majority of course credits are earned in Human Nutrition and Foods providing background in normal, cellular, and therapeutic nutrition as well as nutrient requirements for growth, development, and health at various stages of the life cycle. Because nutrients are supplied in food, other courses focus upon physical, chemical, and nutritional properties of food, and consumer aspects of food as related to socioeconomic status, lifestyle, cultural beliefs, and state of health. Although a series of courses providing information in these areas are required of all majors, each student has some choice of electives to be selected from Human Nutrition and Foods courses. Students may concentrate in Dietetics (approved by the American Dietetic Association, Generalist Plan IV) or Human Nutrition and Foods with an emphasis in foods, food service administration, human nutrition, or nutrition education.

Dietetics: This concentration is designed to meet all academic requirements for membership in the American Dietetic Association under the Generalist, Plan IV. Graduates must, however, also complete a dietetic internship or three years of approved work experience to qualify for membership. This course plan provides a solid background in basic science, normal and therapeutic nutrition, foods, and quantity food management. Career opportunities include hospital dietetics as well as community nutrition programs, quantity food management, or graduate school.

Human Nutrition and Foods: This concentration is designed to provide a strong background in basic science, normal nutrition, and foods with the opportunity to develop an emphasis in one of four areas: foods, food service management, human nutrition, or nutrition education. Each student also develops a supporting area (9-12 credits) in the biological sciences, social sciences, behavioral sciences, education, communications, language, business, or social work. Graduates may find career opportunities with food companies, food management companies, community nutrition programs, government agencies and the Agricultural Extension Service, or go on to graduate school.

Microbiology and Biochemistry

BIOCHEMICAL SCIENCE Contemporary biology increasingly demands knowledge of events at the molecular level. Students who plan a career of research or teaching in biology are well advised to concentrate on the principles and methods of biochemistry during their undergraduate years. To this end, the program in Biochemical Science provides a coordinated sequence of study in chemistry, biology, and biochemistry. Depending on the student's future plans and capability, three areas of concentration are possible: (1) **Cellular Biochemistry** which emphasizes the physiological and metabolic reactions of organisms; (2) **Molecular Biology** which focuses on the chemical and physical structures of subcellular particles; and (3) **Nutritional Biochemistry** which emphasizes the synthesis and utilization of nutrients. Specialization in one of these concentrations normally commences in the junior year after completion of the Biological Sciences Core (p. 48). Students are required to complete a minimum of three hours of physical chemistry (or eight hours for the Molecular Biology option), 12 hours of biochemistry and three advanced biology courses, two of which would be in their specialty (e.g. nutrition, physiology, genetics, etc.).

Plant and Soil Science

The Plant and Soil Science program is designed for students interested in horticultural crops, agronomic crops, soils, and insect pest management as they relate to the science of food, feed, and fiber production or to recreation and the environment. The program is flexible and allows students to place their primary emphasis in either science or agribusiness. Suggested groupings of courses have been developed by the Department to be used as guides for students interested in general plant and soil science, soil science, plant science, ornamental horticulture and landscape design, horticultural therapy, and insect pest management. Specific courses, in addition to the core courses, are worked out between the student and the advisor.

All students majoring in Plant and Soil Science must take Principles of Plant Science, Introductory Soil Science, Plant and Soil Career Orientation, Soil Fertility and Management, one semester of Seminar, two semesters of chemistry (one semester of inorganic and one semester of organic), one semester of mathematics or statistics, plant pathology, and insect pest management. A minimum of six additional courses in Plant and Soil Science at the 100 level or above are required, to be selected in the student's area of interest and approved by his or her advisor. Courses in related areas may be substituted for one or two of these six courses with the consent of the student's advisor.

Core Courses		Hours
Plant and Soil Science 11	Principles of Plant Science	3
Plant and Soil Science 82	Plant and Soil Science Career Orientation	1
Plant and Soil Science 106	Insect Pest Management	4
Plant and Soil Science 161	Introductory Soil Science	4
Plant and Soil Science 162	Soil Fertility and Management	3
Plant and Soil Science 281	Seminar	1
Botany 104	Plant Physiology	4
Botany 117	Plant Pathology	4
Mathematics or Statistics		3-4
Chemistry 3		4
Chemistry 42		4
Six additional Plant and Soil Science courses at or above the 100 level		18-20

Two courses in Fine Arts and/or Humanities	6
Two courses in English and/or Communications	6
Two courses in Social Sciences	6

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Textiles, Merchandising, and Consumer Studies

This Department offers two major programs: (1) Textiles and Related Art, and (2) Merchandising and Consumer Studies. Each of these programs provides the student with the opportunity to select from two professional concentrations, leading to careers in business or industry as well as to graduate studies.

TEXTILES AND RELATED ART The two areas of professional concentration in this program are: (a) **Textile Science**, and (b) **Related Art**. The Textile Science concentration is appropriate for students wishing to prepare for positions in research, product development, quality control, and technical sales in the textile industry. The concentration encompasses the scientific, technological, and economic aspects of the textile industry. The Related Art concentration prepares students for positions as designers or stylists in the textile or apparel industries and for the production of textile crafts. The application of design and aesthetic principles is emphasized.

MERCHANDISING AND CONSUMER STUDIES The two areas of professional concentration in this program are: (a) **Fashion Merchandising**, and (b) **Consumer Studies**. The concentration in Fashion Merchandising is appropriate for students seeking careers in the retailing, marketing, buying, and promotion of consumer goods, particularly in the apparel or textile areas. A core of courses in textiles, apparel, and design is combined with business management courses. The Consumer Studies concentration prepares students for consumer-related careers in business, government, financial institutions, and public utilities. This concentration provides a broad base with courses in management and in specific consumer areas. Programs can be structured to emphasize consumer economics or consumer education.

Vocational Education and Technology

The VOTEC department offers two major programs, (1) Occupational and Extension Education and (2) Agricultural Technology, which provide an opportunity to choose from seven areas of professional concentration. The programs are flexible. Certain concentrations may be completed either as (1) a major in this department, (2) a dual major when combined with other programs in the University, and/or (3) without having to attend the University campus on a full-time basis. Courses of general interest are available to students majoring in other programs in the University.

OCCUPATIONAL AND EXTENSION EDUCATION Five areas of concentration prepare students for teaching certification. One concentration prepares students for adult education responsibilities in governmental agencies, private organizations, business, or industry. Prior to the beginning of their junior year, students desiring teacher certification must apply for admission to teacher education, and students desiring to complete the Extension Education concentration must declare their intent. Contact the Department office, 108 Agricultural Engineering Building.

Teacher certification concentrations are offered in cooperation with the College of Education and Social Services. Selected programs have been approved under the Vermont State Department of Education's Program Approval Plan and have reciprocity certification in

selected states. Selected courses in the College of Education and Social Services will be included in teacher certification concentrations.

1. Agricultural and Natural Resources Education: Preparation to teach grades 7-12 agricultural or renewable natural resource subject areas. Field experiences are provided in secondary school settings. There are two options for teacher certification: (1) Agricultural and Natural Resources Education Major, and (2) dual major specialist in the College of Agriculture or the School of Natural Resources.

	Typical Curriculum**				
	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Voc. Ed. & Tech. 52**	3	-	Voc. Ed. & Tech. 131, 132	3	-
Animal Sci. 1 or Plant and Soil Sci. 11	3-4	-	Plant and Soil Sci. 11 or Animal Sci. 1	3-4	-
English 1	3	-	Psychology 1	3	-
Math. 9	3	-	Electives*	6	-
Elective*	3	-	Phys. Ed.	1	-
Voc. Ed. & Tech. 6	-	2	Voc. Ed. & Tech. 156**	-	2-3
Communication 11**	-	3	Educ./Gen'l 2**	-	3
Ag. Res. and Econ. 61	-	3	Educ./Lrng. Stds. 45 or 46**	-	3
Chemistry 3	-	4	Philosophy 1	-	3
Elective*	-	3	Elective*	-	3
Phys. Ed.	-	1			
	<hr/> 15-16	<hr/> 16		<hr/> 16-17	<hr/> 14-15

JUNIOR AND SENIOR YEARS

Voc. Ed. & Tech.-Voc. Ed.-151, 152, 155, 270, 292**
 Educ./Elem. 122 or 134, Educ./Sec. 137, 138 or 223**
 Electives*

*Electives to meet College and program requirements, including specific state and national requirements for certification, to be selected with the approval of advisor.

**The Dual Major specialist in the College of Agriculture or the School of Natural Resources will complete the requirements for their primary major plus courses selected to meet specific state and national certification requirements.

2. Home Economics Education: Preparation to teach in the Consumer and Homemaking or Occupational Home Economics fields. Consumer and Homemaking field — preparation to teach Home Economics subjects commonly found in middle schools, junior high schools and high schools. Occupational Home Economics field — preparation to teach specialized vocational subjects in grades 11-12. Acceptable experience in business, industry, or the military is required before the degree can be awarded in the Occupational field.

The Adult and Extension Education option provides an alternative for students not seeking teacher certification.

	Typical Curriculum				
	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Voc. Ed. & Tech. 52	3	-	Economics 11 or		
Psychology 1	-	3	Ag. and Res. Ec. 61	-	3
Sociology 10	3	-	Communication 11	-	3
English 1	3	-	Humanities Elective	3	-
Math. 9	-	3	Science Elective	4	-
Humanities Elective	-	3	Human Nutr. & Fds. 43 or 46	3	-
			Text. Mdsng. & Cons.		
			Stds. 56	-	3

(cont'd)	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Chemistry 3	4	-	Text. Mdsng. & Cons. Stds. 20	-	3
Chemistry 4	-	4	Text. Mdsng. & Cons. Stds. 58	3	-
Text. Mdsng. & Cons. Stds. 15	-	3	Text. Mdsng. & Cons. Stds. 54	-	3
Human Nutr. & Fds. 37	3	-	Educ./Gen'l 2	3	-
Phys. Ed.	1	-	Phys. Ed.	1	-
	<hr/> 17	<hr/> 16		<hr/> 17	<hr/> 15

JUNIOR AND SENIOR YEARS

Voc. Ed. & Tech. 151, 152, 155, 270, 292

Educ./Sec. 137, 138, Educ./Lrng. Stds. 45

Additional home economics courses and electives to meet College and concentration requirements including specific state and national requirements for certification, to be selected with the approval of advisor.

3. **Industrial Education:** Industrial Arts and Vocational fields are included in this concentration. Industrial Arts Field — prepare to teach six I.A. subject areas commonly found in grades 7-12. Vocational Field — prepare to teach a specialized trade or industrial subject in grades 11-12. At least two years of acceptable experience in business, industry, or the military is required before the degree can be awarded in the vocational field.¹

	Typical Curriculum				
	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Voc. Ed. & Tech. 20	3	-	Voc. Ed. & Tech. 131, 132	3	-
Voc. Ed. & Tech. 52	3	-	Physics 3	4	-
English 1	3	-	Psychology 1	3	-
Math. 9	3	-	Electives*	6	-
Mech. Engineering 1	3	-	Voc. Ed. & Tech. 105	-	3
Phys. Ed.	1	-	Ag. and Res. Ec. 61	-	3
Voc. Ed. & Tech. 6	-	2	Educ./Gen'l 2	-	3
Voc. Ed. & Tech. 30	-	3	Educ./Lrng. Stds. 45 or 46	-	3
Communication 11	-	3	Elective*	-	3
Math. 2	-	3			
Chemistry 3	-	4			
Phys. Ed.	-	1			
	<hr/> 16	<hr/> 16		<hr/> 16	<hr/> 15

¹Several paths lead either to a degree, teacher certification, or both. A degree may be earned on a full-time basis, or on a part-time basis while employed in industry or teaching. Persons entering teaching directly from industry may earn teacher certification through the Transition Into Education (T.I.E.). Qualified individuals may start as non-degree students and seek admission to a degree program after satisfactorily completing specified courses.

Persons having two or more years of appropriate work or military experience may qualify for up to 30 credits by successfully completing National Occupational Competency Institute Examinations. Students with less than two years experience may qualify for the off-campus technical internship.

Qualified non-degree students seeking teacher certification will complete professional Vocational Education and Technology courses plus selected courses in the College of Education and Social Services.

JUNIOR AND SENIOR YEARS

Voc. Ed. & Tech. - Voc. Ed. - 151, 152, 155, 270, 292

Voc. Ed. & Tech. - 100, 110, 140, 141, 145, 162, 165

Educ./Elem. 122 or 134, Educ./Sec. 137, 138, or 223

Electives*

*Electives to meet College and program requirements, including specific state and national requirements for certification, to be selected with the approval of advisor. Minimum requirement for graduation is 122 semester hours, including physical education.

4. Health Occupations Education: Preparation to teach occupationally-oriented subjects in grades 10-14. Available only to students who have completed a recognized training program in a health occupation and are licensed. A minimum of two years of experience in a health occupation is required before a degree is awarded.¹

Typical Curriculum

General Education	Hours
Two courses in writing, communication, and public address (e.g. English 1, Communication 11)	6
Two courses in science, mathematics, and statistics (e.g. Math. 9, Chemistry 3)	6
Two courses in social sciences (e.g. Psychology 1, Political Science 3)	6
Two courses in fine arts and humanities (e.g. Theatre 5, Philosophy 3)	6
Professional Education	
Voc. Ed. and Tech. 52, 151, 152, 155, 270, 292	23-28
Educ./Gen'l 2, and Educ./Lrng. Stds. 45 or 46, Educ./Elem. 122 or 134, Educ./Sec. 137, 138, or 223	12

Technical Education

Completed prior to acceptance into baccalaureate degree program.

5. Extension Education: Preparation for educational responsibilities in government agencies, private organizations, business, or industry by majoring in another program in the University and completing this concentration concurrently. Field practicum experiences are provided. Professional courses include Vocational Education and Technology 82, 182, 183, 184, 283.

AGRICULTURAL TECHNOLOGY This program offers students a choice of two concentrations, one leading to a Bachelor of Science degree and one which provides the first two years of a Bachelor of Science in Agricultural Engineering degree.

1. Agricultural Technology: This concentration combines applied technical courses in the areas of energy and power, structures, utilities, machinery, soil and water; and complementary offerings from other departments to provide a program of study containing both depth and breadth. Agricultural Technology graduates find employment in a agribusiness, public service, or vocational education.

Typical Curriculum

	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
English 1	3	-	Physics 3	4	-
Math. 9 or 10	3	-	Civil Engineering 12	4	-
Mech. Engineering 1	3	-	Voc. Ed. & Tech. 131, 132	3	-
Voc. Ed. & Tech. 20	3	-	Voc. Ed. & Tech. 145	2	-
Elective*	3	-	Elective*	3	-
Phys. Ed.	1	-	Ag. and Res. Ec. 61	-	3
Communication 11	-	3	Chemistry 4 or 16	-	4
Math. 18 or 21	-	4	Statistics 111	-	3
Chemistry 3 or 5	-	4	Voc. Ed. & Tech. 30	-	3

(cont'd)				
FRESHMAN YEAR	1st	2nd	SOPHOMORE YEAR	1st 2nd
	SEMESTER	SEMESTER		SEMESTER
Voc. Ed. & Tech. 6	-	2	Elective*	- 3
Elective*	-	3		
Phys. Ed.	-	1		
	<hr/>	<hr/>		<hr/>
	15	17		16 16

JUNIOR AND SENIOR YEARS

Voc. Ed. & Tech. - 100, 121, 122, 140, 162, 165, 197 or 199, 292, and Voc. Ed. & Tech. 150, technical internship.

Ag. Res. and Ec. 161, 166.

Electives*

*To include four general electives to meet College requirements plus one biological science elective and five technical electives to be selected with approval of advisor. Minimum requirement for graduation - 122 credit hours including Physical Education.

2. Professional Agricultural Engineering — B.S.A.E.: The first two years of a professional engineering curriculum. The last two years of the professional program must be completed at an institution offering a Bachelor of Science in Agricultural Engineering degree. Vermont resident students in good standing may complete their studies at the University of Maine, under a special arrangement which allows them to pay the same tuition rate as Maine residents.

Preparation for professional engineering work in soil and water control, agricultural machinery and equipment, agricultural structures, the application of electricity and refrigeration to agriculture, and rural water supply and sanitation. The graduate is also prepared for research and graduate study in agricultural engineering. (Freshman admission at the Maine-resident tuition rate to this curriculum at the University of Maine will be allowed for Vermont-resident students wishing to take all four years at one institution.)

The College of Arts and Sciences

Anthropology	Bachelor of Arts
Area Studies	Bachelor of Arts
Art History	Bachelor of Arts
Art — Studio	Bachelor of Arts
Biology	Bachelor of Arts
Botany — Arts and Sciences	Bachelor of Arts
Chemistry	Bachelor of Arts or Bachelor of Science
Classical Civilization	Bachelor of Arts
Communication Science and Disorders	Bachelor of Arts
Communication Studies	Bachelor of Arts
Economics	Bachelor of Arts
English	Bachelor of Arts
French	Bachelor of Arts
Geography	Bachelor of Arts
Geology	Bachelor of Arts or Bachelor of Science
German	Bachelor of Arts
Greek	Bachelor of Arts
History	Bachelor of Arts
Latin	Bachelor of Arts
Mass Communication	Bachelor of Arts
Mathematics — Arts and Sciences	Bachelor of Arts
Music	Bachelor of Arts or Bachelor of Music
Philosophy	Bachelor of Arts
Physics	Bachelor of Arts or Bachelor of Science
Political Science	Bachelor of Arts
Psychology	Bachelor of Arts
Religion	Bachelor of Arts
Russian	Bachelor of Arts
Sociology	Bachelor of Arts
Spanish	Bachelor of Arts
Theatre	Bachelor of Arts
Zoology	Bachelor of Arts
Individually Designed Major — Arts and Sciences	Bachelor of Arts
Undecided — Arts and Sciences	No Degree

Throughout its history, the College of Arts and Sciences has held that its central purpose is to provide students with a sound liberal education. Congruent with this central purpose, we seek to instill in students at all levels the spirit of reasoned inquiry and habits of intellectual discipline which are required for the critical thinking expected of free men and women. We further seek to acquaint students with their intellectual, cultural, and aesthetic heritage, and to provide them with the skills necessary to cope with the complex human, societal, and technological problems of modern society. Finally, we seek to prepare students for direct entry into rewarding careers in a variety of fields and for advanced study that may be prerequisite to other opportunities. These objectives of a liberal education are achieved through the courses of instruction which comprise the undergraduate curricula of the College. These curricula, through satisfaction of the major requirement, allow the student to attain baccalaureate

level mastery of a specific discipline or an approved interdisciplinary program. As well, through satisfaction of the distribution requirement, students acquaint themselves with the diversity of approaches whereby people have come to understand themselves and their environment.

Degree Requirements and Academic Regulations

- I. All candidates for degrees awarded by the College of Arts and Sciences must present a total of 122 semester hours of credit, including two semester hours of credit in physical education. Of the minimum 122 credits, at least 96 must be taken in courses offered by the College of Arts and Sciences; and for the Bachelor of Arts, no more than 45 credits may be in the major discipline, while for the Bachelor of Science, no more than 50 may be in the major discipline.

In order to receive a degree from the College of Arts and Sciences, students must have a minimum cumulative average of 2.00. Students must also complete 30 of the last 45 hours of credit in residence at the University of Vermont and as matriculated students in the College of Arts and Sciences.

Every candidate for a degree must complete the appropriate distribution requirements and a major program.

II. DISTRIBUTION REQUIREMENTS

A. Language and Literature

NO STUDENT MAY FULFILL THIS CATEGORY WITHOUT OFFERING A FOREIGN LANGUAGE AT THE LEVEL OF 10 OR HIGHER.

English	Hebrew	General Literature
French	Latin	Classics 42
German	Russian	Classics 22
Greek	Spanish	Linguistics 101, 102

B. Fine Arts and Philosophy

Art	Music	Classics 42
Communications	Philosophy	Linguistics 101, 102
	Religion	Theatre

C. Social Sciences

Anthropology	Economics	Psychology
Communication	Geography	Sociology
Science and	History	Linguistics
Disorders	Political Science	

D. Sciences and Mathematics

Biology/Botany/Zoology*	Mathematics/Statistics*
Chemistry	Physics
Geology	

*count as one discipline for the purpose of distribution.

Only courses offered in the disciplines listed above may be used to satisfy distribution requirements. All courses must be valued at three or more credit hours and may not be taken on a pass/no pass basis. Courses taken to fulfill distribution requirements may also be applied to the major. The specific requirements are as follows:

BACHELOR OF ARTS: Each student must present nine semester courses by choosing three courses from three of the categories A, B, C, and D above. In any given category, no more than two courses may be chosen from one discipline.

BACHELOR OF SCIENCE: Each student must present six semester courses selected from at least two of the categories A, B, and C above.

BACHELOR OF MUSIC: same as Bachelor of Arts

III. MAJOR REQUIREMENTS

All students in the College of Arts and Sciences must complete a major program. At least one-half of the major requirements must be taken at the University of Vermont, and only with the approval of the department chairperson will courses taken at another institution be applied toward completion of the major. All students must maintain an average in the major field of 2.0 or better and may not apply the pass/no pass option to any course required for completion of the major or the related field.

Of the minimum 122 credits, Bachelor of Arts candidates may take no more than 45 credits in the major, and Bachelor of Science candidates may take no more than 50 in the major.

Students may elect more than one major by consulting the Dean's Office and the departments involved. By the date of graduation, the student must complete the major requirements of each department, although courses taken to satisfy the related field requirement may overlap when deemed appropriate.

INDIVIDUAL DESIGN MAJOR is a non-departmental major for those students in the College of Arts and Sciences whose needs and interests are not met by the major programs currently offered in the College. Such special major programs should be coherent and lead to an in-depth understanding of some area of human knowledge which is not presently defined by one departmental discipline. Students wishing to pursue this option should contact the Dean's Office and secure approval from the Committee on Honors and Individual Studies.

For specific major requirements, see the following pages.

IV. ELECTIVES

Students will select elective courses in consideration of the following limitations. Courses offered by other colleges or schools at the University may be taken by Arts and Sciences students, but only 24 hours of such credit may be applied to the minimum 122 required. Courses offered by other colleges or schools at the University by departments which offer majors in the College of Arts and Sciences are excepted from the 24 credit limitation. (At present, these include courses in Botany, Mathematics, the Environmental Program, and Statistics.)

MILITARY STUDIES courses may be taken by students in the College of Arts and Sciences, but only eight such credits may be applied to the minimum 122 required. Military Studies credits will be counted as outside of the College of Arts and Sciences. In general, the College does not grant credit for military service.

PHYSICAL EDUCATION courses, beyond the two required of all students, may be taken as elective degree credit, and will be counted as outside of the College of Arts and Sciences.

READINGS AND RESEARCH or independent study credits may be elected in any field including the major discipline. There is no limit on the number of Readings and Research credits which may be earned, but if a student elects nine or more such credits during any given term, the student must secure approval from the Committee on Honors and Individual Studies. Students will be required to adhere to the independent study guidelines, as described on page 37 of the current catalogue.

V. TRANSFER

Students wishing to transfer to the College of Arts and Sciences from another college or school at the University must have a cumulative grade-point average of 2.50 or better. Applications may be filed in the Dean's Office and will be acted upon at the end of each term. All students receiving a degree from the College of Arts and Sciences must earn 30 of the last 45 credits in the College; therefore, students wishing to transfer should make application by no later than the end of the junior year.

Transfer students from other institutions should note that 30 of the last 45 credits and one-half of the major credits must be earned at the University of Vermont and as a student in the College of Arts and Sciences. Although the physical education requirement may be waived for transfer students, the minimum required number of credits remains 122. Transfer credit will be initially evaluated by the Registrar, although judgment as to the applicability of credit toward satisfaction of degree requirements rests with the Dean's Office and the chairperson of the major department. Transfer credit from other institutions is not used in the calculation of the University of Vermont grade-point average.

VI. SPECIAL PROVISIONS CONCERNING CREDIT

Credit will not be given for the following combinations:

- Biology 1, 2 and Biology 3
- Biology 1, 2 and Botany 4
- Chemistry 1, 2 and Chemistry 11, 12
- Chemistry 1, 2 and Chemistry 3, 4
- Chemistry 141, 142 and Chemistry 140
- Mathematics 2 and Mathematics 10
- Mathematics 9 and Mathematics 10
- Mathematics 19 and Mathematics 21
- Mathematics 20 and Mathematics 21
- Music 1 and Music 15
- Music 2 and Music 12
- Philosophy 1, 2, and 3
- Physics 11, 12 and Physics 15, 16
- Zoology 5, 6 and Zoology 104
- Zoology 9 and Zoology 5, 6 or Biology 1, 2
- Zoology 104 and Anatomy 9 and/or Physiology 10

VII. ACADEMIC STANDARDS

The following criteria for academic trial and dismissal, while making allowances for the student in the freshman year, are designed to encourage academic work of quality equal to or greater than the minimum average required for graduation. Any student experiencing academic difficulty is encouraged to meet with a member of the Dean's Office.

DISMISSAL: Students who earn a semester average of 1.00 or less, or who fail (F, NP, WF) half or more of their credit hours (excluding physical education and military studies), are dismissed for low scholarship. Students who are dismissed may not enroll in any University courses during the term of dismissal.

TRIAL: Students who earn a semester average higher than that which merits dismissal, but below 2.00 (1.70 for first-semester freshmen), are placed on trial. During the following term, students on trial must earn a 2.00, have no more than one failure, enroll in no courses on a pass/no pass basis, and maintain a program of 12 or more credit hours. Failure to satisfy any of the conditions of trial is grounds for dismissal.

It is the prerogative of the Committee on Academic Standing to modify the above regulations in light of extraordinary or extenuating circumstances.

VIII. COMMITTEE ON ACADEMIC STANDING

The Committee on Academic Standing reviews all requests for special consideration with regard to College regulations, changes in enrollment, curriculum standards, and graduation requirements. Students may petition to this Committee through the Dean's Office.

IX. MAJORS: DEPARTMENTAL REQUIREMENTS

For the Bachelor of Arts degree, the major field must include a minimum of 36 semester hours, at least 18 of which must be in the major discipline. Concentration requirements, including courses and necessary prerequisites may not exceed 60 semester hours. For the Bachelor of Science degree, the major field must include a minimum of 36 hours, at least 18 of which must be in the major discipline. No more than 94 semester hours of the total program, including distribution requirements and major field, may be in specifically designated courses.

ANTHROPOLOGY Thirty hours in Anthropology including 21, 24, 26, and 28 (these provide an introduction to the discipline's four major fields); 225 and 228 (recommended for the junior year) and four additional advanced (100- or 200-level) courses of which only one may be an independent study and at least one must be at the 200 level.

AREA AND INTERNATIONAL STUDIES Entering students are invited to consider the option of concentrating in Area and International Studies. Courses in several academic disciplines can be combined so as to focus on a particular area of the world, thus providing an opportunity to test generalizations against the particular reality of a geographical area and its people.

Undergraduates who major in Area Studies usually accumulate sufficient credit to enable them also to fulfill department requirements in one of the social sciences, humanities, or foreign languages.

The four areas presently available for concentration are: CANADA, LATIN AMERICA, RUSSIA/EAST EUROPE, EUROPE (Western, Northern, Mediterranean).

The approach to undergraduate education combines exposure to the traditional disciplines with integrative knowledge and appreciation of a foreign culture and thus combines the broad liberal arts education with a more specific area competence.

During their freshman and sophomore years, students who plan to major in Area Studies should take the required foreign language courses as well as beginning courses in the humanities and social sciences which are prerequisites of subsequent required courses and also meet the general distribution requirements.

Students interested in concentrating in Area Studies are urged to contact the Director, Area and International Studies, Extension 4062.

Specific requirements of the individual programs (with the exception of ASIAN) are as follows:

ASIAN STUDIES

Currently available as a major field only for those students who can fulfill the language requirement in their special field. Asian language offerings are limited at the University of Vermont.

WEST ASIA

Anthropology 166
 Anthropology 170
 History 35
 History 36
 History 105
 Political Science 178
 Religion 114
 Religion 116
 Religion 145

Peoples of the Middle East
 Pastoral Nomads
 The Rise of Islam
 Modern Middle East
 History of the Ancient Near East
 The Israeli Political System
 Hebrew Scriptures
 Judaism
 Primitive Christianity

SOUTH AND SOUTHEAST ASIA

Anthropology 163
 Anthropology 165
 Religion 21

Religion 131
 Religion 132
 Religion 168
 Religion 196

South Pacific Cultures
 Peoples of South Asia
 Introduction to the Study of
 Religion: Asian Traditions
 Hindu Tradition
 Buddhist Tradition
 Contemporary Spiritual Life
 Man and Nature in East and West

EAST ASIA

Geography 58
 History 31
 History 32
 History 131
 History 132
 Philosophy 3
 Philosophy 121
 Philosophy 122
 Philosophy 221
 Political Science 175
 Political Science 176

Religion 21

Religion 132
 Religion 141
 Religion 145
 Religion 166

China and Japan
 Traditional Chinese Civilization
 History of Japan
 Modern China (1800-1949)
 Peoples Republic of China (1949-present)
 Comparative East-West Philosophy
 Chinese Philosophy I
 Chinese Philosophy II
 Topics in Chinese Philosophy
 Asian Political Systems (China, Japan)
 Asian Political Systems (South and
 Southeast Asia)
 Introduction to Study of Religion:
 Asian Traditions
 Buddhist Tradition
 Religion in Japan
 Religion in China
 Buddhist Tradition

CANADIAN STUDIES

- I. Eighteen hours representing at least four different disciplines selected from the following courses:

Anthropology 167
 Anthropology 196
 Anthropology 267
 Area and Int'l Studies 91
 Communication 293
 English 135, 136
 French 287, 288
 Geography 52
 Geography 210

Cultures of Canada
 Bilingualism and Biculturalism
 The Franco-Americans
 Introduction to Canadian Studies
 Canadian Mass Media
 Canadian Literature
 Literature of the French of North America
 Geography of Canada
 Special Topics in Regional
 Geography-Canada

History 75, 76
 History 195
 History 284
 History 285
 Political Science 173
 Sociology 167

History of Canada
 Canadian-American Relations
 Seminar in Canadian History
 Seminar in French Canada
 Canadian Politics
 Social Structure of Canada

- II. French language through the intermediate level.
 - III. An additional six hours from the above list and/or courses recommended by the Program.
 - IV. An additional 12 hours from related courses chosen in consultation with advisor.
- Canadian Studies cosponsors a Summer Program in Quebec and encourages its students to enroll. Courses taken in this program are applicable to the appropriate category, I, II, III, or IV, as listed above.

LATIN AMERICAN STUDIES

- I. Nine hours as follows:

Anthropology 161	History 33
Geography 56	

Two additional semester courses selected from Area and International Studies, 193, 194; 195, 196, 197, 198; or 297, 298; Economics 216; History 133, 134; or from courses recommended by the Program of Latin American Studies.

- II. Plus six hours of advanced Spanish (Spanish 185, 186; 285, 286; or 293).
- III. An additional 12 hours from related courses chosen in consultation with advisor.

RUSSIAN/EAST EUROPEAN STUDIES*

A minimum of 40 semester hours, to include:

Economics 290 (11, 12 prerequisites)	History 154, and
Geography 53	Political Science 172

Six semester hours of other courses recommended by the Program of Russian and East European Studies; and two years of a Slavic language (usually Russian 1-2 and 11, 12). At least 18 hours must be taken from 100-level courses and above.

Recommended Courses

Area and Int'l Studies 91	Introduction to Russia and East Europe
Economics 185	Comparative Economic Systems
Economics 258	Problems of Communism
History 54	History of Russia and Eastern Europe
Political Science 212	History of Political Thought
Political Science/History 278	Foreign Policy of the U.S.S.R.
Gen'l Literature 181	Russian Literature in Translation
Gen'l Literature 182	Soviet Literature in Translation

Courses in Area and International Studies as well as in advanced Russian, while recommended, are not included within the 40 hours minimum requirements.

NOTE: The Program offers also an interdisciplinary individual-design major in Russian and East European Studies *and* Economics, requiring normally four courses in Russian, or

another Slavic language, four courses in economics, two area courses in disciplines other than economics, two courses in business administration, and two approved electives at the 100-level or above.

*A graduate certificate in Russian and East European Studies is offered in conjunction with a Master's degree program in a particular discipline.

EUROPEAN STUDIES (Northern, Western, Mediterranean)

- I. At least 18 hours of upper-level courses in one European Area or topic (e.g. Medieval and Renaissance Studies or Irish Studies) determined through consultation with an advisor and approval of the European Studies subcommittee of the Area and International Studies Program.
- II. Fifteen hours of additional upper-level courses related to Europe.
The total of I and II shall include nine hours of advanced courses in European Literature and Fine Arts and nine hours of advanced courses in Social Science relating to Europe.
- III. Six hours of a European foreign language related to the area or topic of I and at the 200 level. Those who have concentrated on a foreign language in I shall offer six hours of a second foreign language at the 100 level or above in addition to the requirements of II.

Variants in the language requirement may be made by the advisor, depending upon the area of interest (e.g. Ancient/Medieval History or Archaeology, where an ancient and a modern language would be required).

ART Students may major in one of the following:

Studio Art Twenty-four hours in studio, including 2, 3, 4, with three different instructors; four courses at the 100 level with two different instructors in both of the following areas: Group A includes two-dimensional disciplines: printmaking, drawing, painting, and photography; Group B includes three-dimensional disciplines: sculpture, ceramics, visual environment, and fine metals; and 283; nine hours in Art History, including 179 preceded by 5 and 6; and six hours of related advanced critical, social, or creative studies.

Art History Twenty-seven hours in Art History, including 5, 6; four courses at the 100 level, one in each of the following periods: Medieval (153, 154), Renaissance (158, 161, 164), Baroque (167, 168, 171), Modern/American (172, 175, 176, 179, 181, 184); two seminars at the 201 level or above, one of the latter in the senior year; six hours of Studio Art — three hours chosen from 2, 3, 4, and three hours at the 100 level; nine hours of related historical and/or critical studies outside the discipline at the 100 level or above; intermediate level French or German (or other foreign language by advisor's permission if related to the area of emphasis).

Note: A Studio Art major may take not more than one Evening Division course per semester in Studio Art.

BIOLOGY Students may select either of two degree programs:

Bachelor of Arts: Chemistry 1, 2 or 11, 12, 13, 14, to be taken the freshman year if possible; Physics 11, 12 with laboratory or preferably 15, 16; Math. 19, 20, or Math. 21, or Statistics 111, or 141 or 211. Thirty-six hours including Biology 1, 2, 101, 102, 103, Zoology 104, Botany 108; and three advanced courses, not all in the same department, selected in consultation with the advisor from among the offerings of the several biologically-oriented departments.

Bachelor of Science: Chemistry 1, 2 or 11, 12, 13, 14, to be taken the freshman year if possible; Chemistry 141, 142; Physics 15, 16; Mathematics 19, 20 or 21, 22; Statistics 141 or 211. Forty-six hours including Biology 1, 2, 101, 102, 103, Botany 108, and Zoology 104.

The remaining credits should be chosen from more than one department and selected in consultation with the advisor from among the 100- and 200-level biology and zoology courses, Botany 104, 107, 109, and the 200-level botany courses, and approved advanced offerings of the several other biologically-oriented departments. Three hours of undergraduate research or honors may be counted toward the total of the 46 required credits.

BOTANY Math. 21, 22; or Math. 21 and Statistics 111; or Math. 19, 20 and Statistics 111; Physics 11, 12 or preferably 15, 16; Chemistry 42 or preferably 141, 142; Biology 1, 2; Botany 101, 104, 107, 108, and 109 or 160, and two additional semester courses in botany, at least one at the 200 level. Six credits of modern foreign language are strongly recommended. Students may petition the department to substitute other courses for certain requirements in the planning of individual programs.

CHEMISTRY Students may select either of two degree programs:

Bachelor of Arts: Chemistry 11, 12, 13, 14 (or 1, 2, 121 or 1, 12, 14), 143, 144, 145, 146, 162, 163, 201, 202, and 231; Math. 21, 22, 121 (or equivalent); Physics 24, 25 (or 15, 16).

Bachelor of Science: Chemistry 11, 12, 13, 14 (or 1, 2, 121 or 1, 12, 14), 143, 144, 145, 146, 162, 163, 201, 202, 231, 232, 282; nine hours of advanced chemistry or biochemistry electives, which may include Chemistry 291; Physics 24, 25 (or 15, 16); Math. 21, 22, 121, 271 (or equivalent); proficiency in German equivalent to the completion of German 1, 2 or 21, 22.

CLASSICS Students may major in:

Latin: Twenty-seven hours in courses numbered above 100 among which 111, 112 are required, one course in literature in translation numbered above 100 and one course in Greek above 100 are applicable; History 107, Roman History; a second foreign language (either six hours of Greek at least through 12 or six hours of a modern European language of which at least three hours are at the 100 level or above).

Greek: Twenty-seven hours in courses numbered above 100 among which 111, 112 are required, one course in literature in translation numbered above 100 and one course in Latin above 100 are applicable; History 106, Greek History; a second foreign language (either six hours of Latin at least through the intermediate level or six hours of a modern European language of which at least hours are at the 100 level or above).

Classical Civilization: Forty-two hours consisting of 30 in the major discipline and 12 hours at the 100 level or above in related courses. *Major Discipline:* Courses in Latin, Greek, classics, ancient history, and ancient art are applicable, among which three hours in Ancient History (9, 105, 106, 107) and the following language study are required: six hours of Latin or Greek at the 200 level OR six hours of Latin at the 100 level and six hours of Greek at the intermediate level (11, 12) OR three hours of Latin or Greek at the 200 level and three hours of a modern foreign language at the 100 level. (The three hours of the modern foreign language are not to be counted as part of the major discipline but as a related course.) Strongly recommended as part of the major discipline are Classics 42 (Mythology), Art 51 (Greek Art), Classics 153, 154, 155, 156 (Greek and Latin Literature in Translation). Classics 22 (Etymology) is applicable, but not together with Classics 42. Also recommended are History 106 and 107. *Related Courses:* Students should consult with the Classics Department in choosing related courses. Courses at the 100 level or above in one or more of the following are applicable: anthropology, art, English, economics, geography, history, modern foreign languages, music, philosophy, political science, religion, sociology, and theatre. Strongly recommended are courses in literature, medieval history, ancient philosophy, medieval, renaissance, and baroque art.

COMMUNICATION No new majors will be admitted for the 1981-82 academic year.

Communication Studies: 11; seven advanced-level courses in Communication Studies, at least three of which must be at the 200 level; two additional courses in the department; plus nine hours of related courses.

Mass Communication: 63; eight advanced-level courses in Mass Communication, at least five of which must be at the 200 level; plus nine hours of related courses.

COMMUNICATION SCIENCE AND DISORDERS: 74, 101, 270; two from 278, 281, 282; English 101 and nine additional hours in Communication Science and Disorders plus nine hours in approved related courses.

ECONOMICS Thirty-three hours in Economics including 11, 12, 186, 167, 190, three courses at the 100 level and three courses at or above the 200 level. In addition, students must select nine hours from the other social sciences.

ENGLISH Twenty-seven hours to be distributed as follows: 81, 82 and 21 hours at the intermediate or advanced levels. At least six of these hours must be at the advanced level (200 level). Nine of these hours must be in courses in English literature before 1900, or in literary criticism, or in study of the language (101-129; 201-229). Satisfaction of the Group A College requirement; 12 hours (six in courses numbered 100 or above) in a related field.

ENVIRONMENTAL STUDIES Twenty-four hours of advanced courses approved by the Director of the Environmental Program and Environmental Studies 1, 2, 51, 100, 201-2-3, 204. Consult the appropriate section of this catalogue for requirements of major and coordinate major programs. See p. 122.

GEOGRAPHY Thirty hours in Geography including 81, an 18-hour concentration, and three additional hours at the 200 level; the concentration must include at least three hours at the 100-level and three hours at the 200-level and will be designed to meet individual student interests with the advice and consent of a member of the department faculty; 12 hours of courses in related disciplines.

GEOLOGY Students may select either of two degree programs:

Bachelor of Arts: Twenty-seven hours of Geology, including 105, 111, and six additional hours at the 100 level, and nine hours at 200 level. Twelve hours in physical science, biological science, mathematics (calculus or above), or engineering. Field experience (238, or equivalent) strongly recommended.

Bachelor of Science: Students who elect this curriculum are encouraged to combine geology with one or more related disciplines in order to develop strong scientific backgrounds. Examples of such interdisciplinary fields include geochemistry, geophysics, oceanography, geology engineering, geomathematics, environmental studies, and geobiology.

Typical Curriculum

	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Math. 21, 22	4	4	Geology 105	4	-
Chemistry 11 and 13 or 1	5-4	-	Computer Sci. 11 or		
Chemistry 12 and 14 or 2	-	5-4	Statistics 11	3	-
Geology 1	4	-	Physics 15, 16	4	4
Geology Elective	-	3	Geology 111	-	4
Electives	3	3	Geology 145 a,b	-	2
Physical Ed.	-	1	Elective (Chemistry 123*)	3	-
			Electives	-	6
	16-15	16-15		14	16

	1st SEMESTER	2nd SEMESTER		1st SEMESTER	2nd SEMESTER
JUNIOR YEAR			SENIOR YEAR		
Geology 155	4	-	Geology 238**	4	-
Geology 156	-	4	Geology 197***	3	-
Biology 1 or Zoology 9	4	-	Geology 198***	-	4
Computer Sci. 11 or Statistics 111	3	-	Geology 270	-	3
Physical Ed.	1	-	Geology Electives	3	3
Geology 166	-	4	Electives	6	6
Geology 277	-	3			
Biology 2 or Botany 4	-	4			
Elective	3	-			
	<hr/> 15	<hr/> 15		<hr/> 16	<hr/> 16

*Chemistry 123 if Chemistry 1, 2 was taken.

**Or equivalent summer courses.

***Or 200-level Geology, or approved ancillary science/engineering courses.

GERMAN Ten semester courses of advanced level including 101, 102; 281, 282; four semester courses of English or general literature; two semester courses of European history to be selected from 16, 5, 6, 52, 125, 152; an advanced related course to be selected in consultation with the department.

HISTORY Thirty hours in History including at least three courses at the advanced intermediate (100) level, and one course at the seminar (200) level. Within the major, students must select an 18-hour area concentration, including at least one advanced intermediate course and a seminar. Concentration areas designated by the department include: Traditional Societies; Modern Europe; The Third World; The Western Hemisphere; and Historiography, Methodology, and History of Ideas. Students may design other concentrations, to meet individual interests, with the advice and consent of their advisors and the department. The balance of the departmental major requirement (12 hours) should be fulfilled through courses *outside* the concentration area. Other requirements: a foreign language pursued to the level of reading knowledge (usually a minimum of one semester at the university intermediate level or demonstration of competence by taking an examination), or a year's work in statistics and quantitative methods (usually Statistics 111 or Sociology 100 and History 121). Twelve hours of work in another discipline, or in Area Studies, of which six must be at the 100 level or above.

MATHEMATICS Thirty-six semester hours of courses numbered 21 or higher, including 124 and at least 15 semester hours in mathematics or statistics courses numbered 200 or above. Students interested in specializing in statistics should contact the Statistics Program.

MUSIC Students may select either of two degree programs:

Bachelor of Arts: 15, 16, 21, 22, 115, 116, 121, 122, and six hours of performance study plus senior recital; piano until functional piano facility is achieved (see p. 222) six hours in another discipline as approved by the department. Students who wish to meet accreditation requirements of the National Association of School of Music will also complete one of the following combinations:

- 203, 205, and four advanced courses in music literature.
- 203, 205, 208, 215, and two advanced courses in music literature.
- 208, advanced course in music literature, and 12 additional hours of performance study.

One foreign language through the intermediate level is required of students on combinations (a) or (b).

Bachelor of Music: This degree, with a concentration in performance or theory, is the initial preprofessional collegiate music degree, designed for students who wish to pursue a career in music as performers, scholars, or private teachers. Such students must develop the

skills, concepts, and sensitivity essential to the professional life of a musician. To earn the degree they must demonstrate not only technical competence but also a broad knowledge of music and musical literature, sensitivity to musical style, and an insight into the role of music in society. Candidates should possess a high degree of talent, well-developed musicianship, artistic sensibilities, and a strong sense of commitment. Graduates will ordinarily continue their studies through postgraduate work before they are fully qualified as professionals. Admission to the performance major requires an audition with the Music Department. Admission to the theory major requires evidence of a particular aptitude for, and potential in, musical theory, and will normally occur after the freshman year.

PERFORMANCE MAJOR

	1st SEMESTER	2nd SEMESTER		1st SEMESTER	2nd SEMESTER
FRESHMAN YEAR			SOPHOMORE YEAR		
Performance Study	2	3	Performance Study	3	3
Ensemble	1	1	Ensemble	2	2
Keyboard*	1	1	Keyboard	1	1
Music History I	3	3	Theory II	4	4
Theory I	4	4	Music History II	3	3
Non-music Electives	3	6	Non-music Electives	3	3
	<hr/> 14	<hr/> 18		<hr/> 16	<hr/> 16

	1st SEMESTER	2nd SEMESTER		1st SEMESTER	2nd SEMESTER
JUNIOR YEAR			SENIOR YEAR		
Performance Study	4	4	Performance Study	4	5**
Ensemble	1	1+2	Ensemble	1+1	1+1
Form and Analysis	-	3	Conducting	-	3
Counterpoint	3	-	Music Electives	3	-
Orchestration	3	-	Non-music Electives	6	3
Non-music Electives	6	6		<hr/> 15	<hr/> 13
	<hr/> 17	<hr/> 16			

REQUIRED FOR GRADUATION:
plus physical education

125
2

127

*Until functional piano facility achieved (see page 222).

**Recital.

THEORY MAJOR

	1st SEMESTER	2nd SEMESTER		1st SEMESTER	2nd SEMESTER
FRESHMAN YEAR			SOPHOMORE YEAR		
Theory I	4	4	Ensemble	1	1
Music History I	3	3	Theory II	4	4
Performance Study*	2	2	Period or Genre	3	3
Non-music Electives	6	6	String Class	1	-
			Woodwind Class	-	1
			Performance Study	2	2
			Music History II	3	3
			Non-music Electives	3	3
	<hr/> 15	<hr/> 15		<hr/> 17	<hr/> 17

	1st	2nd		1st	2nd
JUNIOR YEAR	SEMESTER		SENIOR YEAR	SEMESTER	
Ensemble	1	1	Composition	3	-
Orchestration	3	3	Form and Analysis II	3	-
Form and Analysis I	-	3	Performance Study	2	2
Counterpoint I & II	6	-	Independent Study	3	3
Brass Class	1	-	Non-music Electives	3	9
Percussion Class	-	1			
Performance Study*	2	2			
Conducting	-	3			
Non-music Electives	3	3			
	<hr/>	<hr/>		<hr/>	<hr/>
	16	16		14	14

REQUIRED FOR GRADUATION:
plus physical education

124
2

126

*Including piano until functional piano facility is achieved (see page 222).

PHILOSOPHY Twenty-seven hours including (a) 13 or 113 or 213, (b) 101 and 102, (c) 201 or 202, (d) at least one of 4, 140, 142, 144, 152, or 240, and (e) a total of at least three 200-level courses in Philosophy. An additional nine hours in a related discipline or disciplines is required. Students considering graduate work are urged to study a foreign language.

PHYSICS Students may select either of two degree programs:

Bachelor of Arts: Twenty-five hours in Physics, including 15, 16, or 24, 25; 128, 201, or 202, 211 and 213; mathematics through 121. An additional laboratory science and a reading knowledge of French, German, or Russian are strongly recommended.

Bachelor of Science: Physics 24, 25 (or 15, 16), 128, 201, 202, 211, 213, 214, 265 (or equivalent), 273, nine hours of approved physics electives, and three hours of advanced laboratory credits in Physics or a related science; Math. 21, 22, 121 and six hours of approved mathematics electives; eight hours of chemistry, exclusive of Chemistry 3, 4 or 7; by midway in the junior year, a student must demonstrate proficiency in computer programming equivalent to completion of Computer Science 11.

POLITICAL SCIENCE Twenty-seven hours including nine hours selected from the "core" courses (13, 21, 51, 71, 81) and 15 hours at the level of 100 or above, of which at least nine hours must be at the 200 level; nine hours in a related discipline, of which six must be in courses numbered 100 or above.

PSYCHOLOGY Requirements for the major in Psychology are 1, 109, 110, 119, and a minimum of 18 additional credit hours in Psychology, with a minimum of 12 credit hours at the 200 level or above. At least three credit hours must be taken from each of the categories A, B, and C as follows:

Category A = Psych. 205, 206, 207, 210, 220, 221, 222, 264

Category B = Psych. 230, 233, 234, 261, 262, 263

Category C = Psych. 250, 251, 253

A minimum of nine credit hours in the social and/or natural sciences at the 100-level or above are also required. Courses to fulfill this requirement will be determined by consultation with the major advisor.

RELIGION Twenty-seven hours in Religion, including 71; two courses chosen from among 101, 104, 108; one course from the 110-129 range (Western traditions); one course from the 130-149 range (Asian traditions); 201; plus nine hours in a related discipline.

ROMANCE LANGUAGES Thirty hours of advanced level courses in French or Spanish, of which at least 12 must be in literature and at least 12 must be in courses numbered above 200. Related area: a minimum of 12 hours of courses from another department or departments chosen in consultation with departmental major advisors and specifically approved by them.

RUSSIAN Nine semester courses at the advanced level to be chosen in consultation with a faculty member teaching in the Russian language curriculum; four semester courses of another language which may consist of combinations of two semester courses in English or comparative literature and two semester courses of a foreign language at the 11, 12 level, plus three semester courses from the Russian and East European Area Studies program (chosen in consultation with major advisor).

SOCIOLOGY 10, 100, normally taken by the end of the sophomore year; 278, normally taken by the end of the junior year; and 24 additional credit hours in sociology, of which a minimum of 18 credit hours must be at the 200 level. At least one course must be taken from each of the categories A and B as follows:

Category A = 209, 225, 232, 237

Category B = 241, 249, 274, 275, 279

At least three credit hours must be taken from each of three of the following categories:

Category C = 202, 204, 205, 206

Category D = 214, 216, 217, 255, 258

Category E = 211, 219, 229, 240, 254

Category F = 207, 228, 285, 286, 288, 289

And a minimum of six hours in the related fields of anthropology, communication, economics, geography, history, political science, or psychology.

THEATRE Thirty-three hours of Theatre courses, including 1, 5, 10, 15, 40, 115 or 140; 125 or 126; two courses selected from 127, 128, 129, and 130; 250; plus nine hours of related courses, six of which are numbered 100 and above. A summer's participation in the Champlain Shakespeare Festival or comparable company strongly recommended.

ZOOLOGY Students may select either of two degree programs:

Bachelor of Arts: One semester of calculus; Physics 11, 12 with laboratory or preferably 15, 16; Chemistry 1, 2 or 11, 12, 13, 14 to be taken the freshman year if possible. Thirty hours of biology and zoology including Biology 1, 2, 101, 102, 102, Zoology 104, plus seven hours chosen from Biology 105 and/or 200-level zoology courses.

Bachelor of Science: Chemistry 1, 2 or 11, 12, 13, 14 to be taken the freshman year if possible; Chemistry 141, 142; Physics 15, 16; Mathematics 19, 20 or 21, 22; Statistics 141 or 211. Forty-three hours of biology and zoology courses including Biology 1, 2, 101, 102, 103, and Zoology 104. The remaining credits may be chosen from 100- and 200-level biology and zoology courses. Three hours of undergraduate research or honors may be counted toward the total of the 43 required credits.

X. MINORS

Proposals for minor programs must be submitted by department chairpersons to the College of Arts and Sciences Curriculum Committee. They must consist of 15 to 18 hours work, including at least nine hours at the intermediate level and three hours at the advanced level. Students may complete more than one minor, but may not minor in the field of the major, nor may two minors be taken in the same department. Minor programs do not satisfy the related field requirement as specified by the major department, except with permission of the department chairperson. Other than with permission of the Committee on Academic Standing, students are ineligible to minor in an interdisciplinary minor program if the student's major or minor is in any of the parent departments.

SPECIFIC MINOR REQUIREMENTS ARE AS FOLLOWS:

HISTORY AND PHILOSOPHY OF SCIENCE History 21, 22; Philosophy 112; three hours chosen from History 128, 129; three hours chosen from Philosophy 113 or 212; three hours chosen from History 128, 129, Philosophy 113, 144, 212, 215, Math. 261, Sociology 248 or Special Topics. *Prerequisites:* 12 credits of natural science, including three credits at the 100 level or above.

PHILOSOPHY Philosophy 101 and 102; or 102 and 112; or 101 and 140. At least one course from Philosophy 201, 202, 240, and six additional hours at the intermediate level or above. (Except with departmental permission, courses numbered 180-199 and 280-299 will not count toward fulfillment of the minor.)

PHYSICS Eighteen hours including Physics 24, 25 (or Physics 15, 16); 128; three additional hours in Physics courses numbered 100 or above excluding Physics 193-198; and three hours numbered above 200. No more than three hours in Physics 201 or 202 will count. Mathematics through 121 is needed for Physics 128.

Preprofessional Preparation

Students who plan to enter professional colleges requiring previous collegiate preparation will find the variety of courses offered in the College of Arts and Sciences and the freedom of election in that College is such that all the requirements for any professional school may be met. Many students will desire so to direct their four-year undergraduate courses as to provide, in addition to a sound general education, appropriate preprofessional training for later work in the medical sciences, law, or theology.

Special advising is available in the College for students preparing for careers in education, journalism, law, and medical sciences.

BIOLOGY A major in Biology is offered to students enrolled in the College of Arts and Sciences. It has been designed for the student who wishes to concentrate in Biology while pursuing a liberal arts education. It will also serve as a basis for programs leading to graduate study in biological fields and as an appropriate major for students in premedical and pre dental programs.

The concentration consists of a year of elementary biology and single-semester courses in genetics, ecology, cellular biology, animal structure and function, and plant structure and development. This core is followed by three elective courses selected from a wide range of offerings in biologically-oriented departments at the University. A year of chemistry, a year of physics, and mathematics (calculus or statistics) are also required.

JOURNALISM Admission to schools of journalism is generally open to academically qualified students who hold the Bachelor of Arts degree with concentration in any discipline. Interested students should take a broad program in the liberal arts, including work in the social sciences, in mass communication, and in English.

LAW American law schools, as a rule, require graduation from a four-year college with a Bachelor's degree prior to admission. There is no prescribed curriculum for admission to law school, and candidates pursue their undergraduate studies in a wide range of majors. A Pre-Law Advisory Committee aids students in planning their academic programs and in making application to law schools. Members of the committee include: Professors Hoffman and Holland, Department of Political Science; Professor McGovern, Department of History; Professor Stánfield, Department of Sociology; Professor Tashman, Department of Business Administration; Larry Simmons, Center for Career Development; Susan Perkins, College of Arts and Sciences.

THEOLOGY Graduation from a four-year college is prerequisite for admission to most theological seminaries. Although no prescribed curriculum is demanded as preparation for

such professional schools, the student is advised to elect substantially from the departments of languages (particularly classics), history, philosophy, religion, psychology, and social studies.

OPTOMETRY The requirements for admission to schools of optometry vary, but typically they include courses in English, mathematics, physics, chemistry, and zoology with a minimum of two years of college work.

PHARMACY Under the Regional Plan (page 12) Vermont residents may prepare for pharmacy school at Connecticut or Rhode Island. This is a five-year program with years of preprofessional work which includes English, mathematics, botany, chemistry, zoology, physics, social science, a course in fine arts, and orientation to pharmacy.

MEDICINE AND DENTISTRY The prevailing requirements for admission to an accredited medical college include a minimum of three years of undergraduate work but most institutions recommend four years. It is strongly urged that a student desiring to enter medical college should during his/her sophomore year consult catalogues of colleges to which he/she expects to apply, and arrange to include in his/her program courses required by those schools.

Each student, in consultation with his/her advisor, plans a four-year program of courses which will fulfill the requirements for a Bachelor's degree. To meet the *minimum* requirements of most medical colleges, the program should include the following:

Mathematics, one of the following options:

- a) Math. 21, 22 (recommended for able students)
- b) Math. 19, 20 (recommended)
- c) Math. 21 (adequate)
- d) Math. 9, 19 (adequate)
- e) Math. 9, 2; 21 or 19, 20 (suggested for students not immediately prepared to enter calculus)
- f) Math. 7, 8 (not acceptable)

Chemistry, two years minimum, *with laboratory*

Chemistry 1, 2, or 11, 12, 13, 14 (recommended for potential Chemistry majors)

Chemistry 141, 142 (required)

Physics, one year minimum, *with laboratory*

- a) Physics 15, 16 (recommended for students with calculus background)
- b) Physics 24, 25 (recommended for students concentrating in the physical sciences or engineering)
- c) Physics 11, 12 (acceptable for students without calculus background, or taking calculus concurrently)

Biology, one year minimum, *with laboratory*

Biology 1, 2

Students who enter an accredited medical college after three years (90 hours) of undergraduate work may, on application and after completing one year of medical study, qualify as candidates for a Bachelor of Science degree.

The requirements for admission to colleges of dentistry vary, but in all cases include at least three years of college work. (The majority of applicants will have completed four years.) In general, the minimum requirements given above should be used in planning a program leading to entrance into a dental school. A student should consult catalogues of the dental colleges to which he/she expects to apply in order to make certain all requirements are met.

In general, students should avoid taking courses at the undergraduate level in those areas taught at the professional level: i.e. human anatomy, human physiology, microbiology. Many medical colleges now strongly recommend or require that students enroll in courses in the humanities and social sciences.

SECONDARY TEACHING Students in the College of Arts and Sciences may, upon application to the Dean of Education and Social Services, be accepted into the teacher training program for secondary education. Application should be made before the end of the sophomore year. The prescribed courses in education, up to 24 credit hours, can count as electives towards the Bachelor of Arts. Students completing this program are eligible for Secondary Teacher's Certification.

College Honors

The honors program at both the junior and senior level is designed for the superior student with unusual initiative and intellectual curiosity, and provides an opportunity to pursue a special project without the restrictions of classroom routine. Such a student enters a program of reading, research, or creation under the direction of the department of his/her choice. A student may take honors in either or both years.

A student in the College of Arts and Sciences who, at the end of his/her junior year, has an average of 3.00 or above for the work of the sophomore and junior years may become an applicant for college honors in a particular subject. His/her program for the senior year must be approved not later than the end of the junior year by the department in which honors are sought and by the Committee on Honors, and he/she must present a satisfactory written report and pass an oral examination on the field of special study.

A program called junior honors, which may be considered introductory to but distinct from college honors, is available to juniors who have a sophomore average of 3.00 or above and who have the permission of their department chairperson. The program for each junior honors candidate will be determined by the department chairperson concerned.

Departmental Honors

A senior whose overall average is 2.50 or above, or who has been specially recommended by the department in which he/she is concentrating, is eligible to take a comprehensive examination. Upon successfully completing the examination he/she will be granted his/her degree "with Departmental Honors." Some departments have instituted seminars or other programs designed to help the student gain the requisite breadth and depth of knowledge.

The Center for Area Studies

The Center for Area and International Studies is an inter-department activity, with a director and five programs, each of which has its own director. The purposes of the Center are to encourage and coordinate interdisciplinary and comparative study and research for selected foreign areas. The Center also sponsors interdisciplinary seminars and guest lectures. The Center for Area Studies administers the program of concentration in Area Studies and offers the B.A. degree in the College of Arts and Sciences, based on the successful completion of courses in several academic disciplines with concentration in one of five foreign areas: Canada, Latin America, Russia, and Eastern Europe and Western Europe. Requirements for concentration include the general distribution requirements in the College of Arts and Sciences, the foreign language of the selected area usually through the intermediate level; several options of courses in the social sciences and humanities related to the selected area; and specialized area courses, reading and research, college honors, and area seminars based on team teaching and supervised research. Special courses offered for Area Studies include: "Introduction to the Area (91)," "College Honors," "Special Topics," "Readings and Research," and "Seminar."

The Government Research Center Social Science Data Laboratory

The Government Research Center provides research facilities for members of the University community and others. The Social Science Data Laboratory is operated by the Political Science Department and the Academic Computing Center as data archives, a research facility, and a teaching resource. The Center is the depository of data sets made available to the University of Vermont by the Inter-University Consortium for Political and Social Research, and also holds several data sets from other sources (including UVM researchers). The Center's archives are available to any student or faculty member. Computer analysis may be done at the Research Center which contains four terminals. Advanced students provide assistance for faculty and student projects. The director of the Center will aid researchers in statistical analysis. Many students enrolled in social science courses learn data analysis and use of the computer at the Research Center. Anyone who feels that the Research Center's resources might be of use is urged to drop by or to contact the director.

The College of Education and Social Services

Social Work	Bachelor of Science
Art Education	Bachelor of Science in Art Education
Early Childhood Development	Bachelor of Science
Early Childhood Education — Kindergarten and Primary	Bachelor of Science in Education
Elementary Education — General	Bachelor of Science in Education
Reading Concentration	Bachelor of Science in Education
Special Education	Bachelor of Science
Human Development	Bachelor of Science
Human Development Education	Bachelor of Science
Music Education	Bachelor of Science in Music Education
Physical Education	Bachelor of Science in Education
Secondary Education — English	Bachelor of Science in Education
Communication and Theatre	Bachelor of Science in Education
General	Bachelor of Science in Education
Language	Bachelor of Science in Education
Mathematics	Bachelor of Science in Education
Science	Bachelor of Science in Education
Social Sciences	Bachelor of Science in Education
Individually Designed Major — Education	Bachelor of Science in Education
Interdisciplinary — Social Services and Education	Bachelor of Science in Education
Undecided — Education	No Degree

The College of Education and Social Services offers four-year curricula leading to the degrees listed above.

Undergraduate programs are offered in:

Art Education — Grades K-12	Physical Education — Grades K-12
Elementary Education — Grades K-6	Secondary Education — Grades 7-12
Music Education — Grades K-12	Social Work
Early Childhood	Human Development

These curricula are designed to prepare teachers for the kindergarten-elementary level, junior high schools, and assignments calling for subject specialties in elementary, secondary, and twelve-grade situations. Programs are composed of general education, professional education, and professional laboratory experiences.

The College of Education and Social Services has developed course clusters in the area of reading-language arts, early childhood, and special education. The American Primary Experimental Program (A.P.E.X.) is a program that prepares teachers for grades kindergarten through third (K-3). The Responsive Teacher Program is designed to prepare elementary and secondary regular classroom teachers with special competencies for enhancing the social, personal, and

academic growth of handicapped learners. Any student who desires early childhood or responsive teacher education certification endorsement must be enrolled in the College of Education and Social Services.

The Early Childhood Development curriculum prepares professionals for Day Care and Pre-School, from birth to school age. The Human Development major prepares students to work in a variety of settings with individuals and families across the life-span.

The Social Work Program is designed to prepare students for beginning professional practice in social work. Students learn how to examine social issues, social problems, the development of social policy, the impact of social policy on social service delivery systems, and how to relate this to the values of Social Work.

The faculty-student advising process individualizes the program to the student's specific interests and career goals. Upon completion of the sophomore year, students may apply for acceptance in one of these specialized programs for the last two years of their undergraduate career. Programs are also available for individually-designed majors and for careers in interdisciplinary social services and education.

The required graduation cumulative average is 2.0. It is required that students achieve a cumulative average of 2.50 in the major field as a prerequisite to approval for either student teaching or Social Work field experience.

Candidates for a degree at the University of Vermont who desire initial Vermont Teacher Certification should plan to include formal study of the teaching of reading in their programs. The Regulations Governing the Certification of Educational Personnel prescribe the completion of six semester hours in reading for all secondary school teachers (7-12) and nine semester hours for all elementary school teachers (K-6).

The College of Agriculture offers, in cooperation with the College of Education and Social Services, programs in Home Economics Education, Occupational and Extension Education, and Applied Technology. For further information, refer to sections in this catalogue describing the College of Agriculture.

General Education Requirements

ADMISSION AND ACCREDITATION

The College of Education and Social Services has the responsibility for maintenance of standards approved by the National Council for the Accreditation of Teacher Education (N.C.A.T.E.). Initial admission of students is to the University of Vermont College of Education and Social Services — admission to the teacher education program occurs after special tests in communication skills and other screening measures are administered. Students must also meet personal, academic, and professional criteria established for teacher education candidates. This admission procedure is in accordance with the College's standards as approved by the N.C.A.T.E.

All teacher education candidates are expected to complete admission procedures before the beginning of the junior year in order to fulfill degree requirements.

The programs to be described are the programs through which the UVM College of Education and Social Services achieves accreditation by the N.C.A.T.E. and the Vermont State Department of Education Program Approval Plan. Students completing an N.C.A.T.E. accredited program are qualified to receive certification in most states. Those completing a program evaluated through the Vermont State Department of Education's Program Ap-

proval Plan will have reciprocity certification in neighboring states. Further information may be obtained from the Office for Student and Field Services, Waterman Building.

The College of Education and Social Services has the responsibility for maintenance of standards approved by the Council on Social Work Education. Admission to the Social Work program occurs after students have completed the introductory courses and made application to become program majors.

EDUCATION AND SOCIAL WORK Candidates for the Bachelor of Science in Education and the Bachelor of Science, Social Work major, are required to select a minimum of 60 credit hours from the following five general areas, with the restriction that at least one course must be selected from each area. General Education courses required for certification, such as English and social science or the University requirement of two semesters of physical education activities, may be used to satisfy the general education requirement in that area. Students may also apply required courses in their major and minor, broad field, or area of concentration to meet requirements in general education.

- | | |
|---|---|
| <p>I. Arts and Letters</p> <ul style="list-style-type: none"> a. Art b. Classics c. Communication and Theatre d. English e. Music <p>II. Science and Mathematics</p> <ul style="list-style-type: none"> a. Biology b. Botany c. Chemistry d. Computer Science e. Geology f. Environmental Studies g. Mathematics h. Physics i. Statistics j. Zoology | <p>III. Social Sciences</p> <ul style="list-style-type: none"> a. Anthropology b. Economics c. Geography d. History e. Political Science f. Psychology g. Sociology <p>IV. Humanities</p> <ul style="list-style-type: none"> a. Foreign Language b. Philosophy c. Religion <p>V. Health and Physical Education</p> <ul style="list-style-type: none"> a. Health Education b. P.E. Methods c. Selected Activities |
|---|---|

EARLY CHILDHOOD AND HUMAN DEVELOPMENT Students enrolled in the Bachelor of Science, Early Childhood and Human Development majors, are required to complete 120 semester hours of course work including:

General requirements	
Behavioral and social sciences	6 credits
Communications skills	6 credits
Humanities	6 credits
Physical and biological sciences	6 credits
Home Economics	
Integrated courses	9 credits
Physical Education	
Physical education activities	2 credits
Professional concentration requirements electives	82 credits

ELEMENTARY EDUCATION (Kindergarten through Six) The elementary education program is designed to prepare teachers for assignments in grades kindergarten through six. The Bachelor of Science in Education is awarded upon satisfactory completion of our approved program which includes a planned sequence of professional courses and laboratory experience. Upon completion, graduates are eligible for Vermont teaching certification.

Elementary teacher certification for prospective teachers in grades K-3 may be obtained by enrolling in the Early Childhood Education Program (A.P.E.X) in the College of Education and Social Services. Early Childhood certification (ages 0-8) may be obtained by enrolling in the Early Childhood Development major in the Early Childhood and Human Development Program.

The elementary education curriculum includes a general component of 60 credits selected from the following academic areas: arts and letters, science and mathematics, social sciences, humanities, and health and physical education (two semesters of physical education activities are required). Electives may be used to build an area of concentration of 24 to 33 credits. Specific information about academic majors or general education requirements may be obtained from advisors or from the Office for Student and Field Services, Waterman Building.

The professional programs begin by introducing the student to education as a field of study. The student is made aware of the social foundations and relationships of education as well as the resources available concerning the field. Emphasis is placed on the need for examining educational literature and research as part of the process of making critical judgments. Continuous field experiences are available throughout the four years. The program also includes special content courses for elementary teaching. Information concerning field experiences (deadlines, requirements, etc.) may be obtained from the Office for Student and Field Services, Waterman Building.

In addition to the academic and professional requirements, certain courses are recommended to meet specific state and national requirements in elementary education. These are specified in the typical program.

	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Educ./Gen'l 2	3	or 3	Educ./Elem. 3 or 4	1	or 1
Comm. 11, Theatre 5	3	or 3	*Math. 15, 16	3	3
*English	3	or 3	*History 7 or 8	3	or 3
General Electives and/or			Educ./Lrng. Stds. 45, 46	3	or 3
Approved Electives and/or					
Area of Concentration	-	or -			
JUNIOR YEAR	1st	2nd	SENIOR YEAR	1st	2nd
	SEMESTER			SEMESTER	
Art 2, 3, or 4	3	or 3	Educ./Elem. 160	3	-
*Music Methods	3	-	Phys. Educ. 100, 116	2	3
Educ./Elem. 134	3	or 3	Educ./Gen'l 190	3	or 3
Educ./Lrng. Stds. 44	3	or 3	Educ./Elem. 181	8-12	or 8-12
Educ./Elem. 121	3	or 3	General Educ. Electives		
*Political Science 21	3	or 3	Concentration Electives		
General Educ. Electives			Reading		
and/or Approved Electives					
in Area of Concentration					

*Recommended to meet specific state and national certificate requirements.

A minimum of 127 approved semester hours is required for the degree. Includes nine semester hours minimum in teaching reading courses for teacher certification.

SECONDARY EDUCATION (Seven through Twelve) The secondary education program is intended to prepare teachers for junior and senior high schools in Vermont and other states. The Bachelor of Science degree is awarded upon satisfactory completion of an approved program. Upon completion, graduates are eligible for Vermont teaching certification.

The secondary education curriculum includes a general component of a minimum of 60 credits selected from the following five academic areas: arts and letters, science and mathematics, social sciences, humanities, and health and physical education (two semesters of physical education activities are required). The student may use electives during the four years to build major and minor fields of study or a broad field major. Academic majors or general education requirements may be obtained from advisors or from the Office for Student and Field Services, Waterman Building. The program includes a planned sequence of professional courses and laboratory experiences.

TEACHING FIELDS

All teacher education candidates must have, prior to their student teaching, at least 30 credit hours in a teaching major and 18 hours in a teaching minor or at least 48-50 hours in a broad field major. The following are current approved majors, minors, and broad field majors (detailed outlines developed in cooperation with the respective departments are available at the Office for Student and Field Services, Waterman Building):

MAJORS Biological science, chemistry, communication studies, earth science, English, French, geography, German, history, Latin, mathematics, physical science, physics, Spanish. (No new communication majors will be admitted for the 1981-82 academic year.)

MINORS Anthropology, biology, chemistry, coaching, communication studies, earth science, economics, English, French, geography, German, health education, history, Latin, mathematics, physics, political science, psychology, religion, Russian, sociology, Spanish.

BROAD FIELD MAJORS Natural science, social studies, environmental studies.

Students should select majors and minors which are logically related and which commonly occur as teaching combinations in secondary schools. The major-minor or Broad Field program must include credits in advanced courses.

EXPERIENCES IN PUBLIC SCHOOLS Students in secondary education usually have direct experiences in public schools throughout the four-year curriculum. Students observe and participate as teacher assistants in local junior and senior high schools. During the senior year students devote 16 continuous weeks to full-time teaching in public secondary schools. In many cases, students must arrange to live off-campus during the student teaching assignment.

Applications for all field experiences must be made one semester in advance of assignments, and the student must assume responsibility for meeting deadlines. Information about application and assignment procedures may be obtained from the Office for Student and Field Services, Waterman Building.

A typical program is as follows:

	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
*English	3	or 3	English Lit. Elective	3	or 3
Comm. 11, Theatre 5	3	or 3	Psychology 1	3	or 3
Educ./Gen'l 2	3	or 3	Educ./Lrng. Stds. 45, 46	3	or 3
*Social Science (Recommended: three credits of U.S. History and three credits of Political Science 21)	3	3	General Educ. Electives or Approved Electives in Major and Minor or Broad Field		
One Elective from Science and Math. Area	3	or 3			
One Elective from Humanities Area	3	or 3			
Physical Educ.	1	or 1			
General Educ. Electives or Approved Electives in Major and Minor or Broad Field					

	1st	2nd		1st	2nd
JUNIOR YEAR	SEMESTER		SENIOR YEAR	SEMESTER	
*Educ./Sec. 15	2	or 2	Educ./Gen'l 190	3	or 3
Educ./Sec. 178	-	3	Educ./Elem. 181	8-12 or 8-12	
Educ./Sec. 179			General Educ. Electives		
(Educ./Sec. 182 for			or Approved Electives in		
English Majors; and			Major and Minor or Broad		
Educ./Sec. 294 for			Field	-	-
Communication Majors)	-	3			

*Recommended to meet specific state and national certification requirements.

A minimum of 124 approved semester hours is required for the degree. Include six semester hours in teaching reading courses for teacher certification.

Students are responsible for obtaining information regarding teacher certification and degree requirements from the appropriate College of Education and Social Services offices.

ART EDUCATION (Kindergarten through Twelve) The program in Art Education qualifies candidates to teach art in grades K through 12. Students fulfill general education requirements and complete 42 hours in professional art education and required education courses, 45 hours minimum in studio art, art history, and related subjects. Graduates satisfy College of Education and Social Services requirements for teacher certification, and College of Arts and Sciences requirements for an art major. The program allows sufficient additional advanced courses as recommended by the Art Department for admittance to graduate school.

Students must be enrolled in the College of Education and Social Services. Those admitted as freshmen or sophomores to the Art Education Program are considered *Candidates* in the Program. Admission as *Majors* is made at the beginning of the junior year following formal review procedures during second semester of the sophomore year.

A typical program is as follows:

	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
English	3	or 3	English Lit. Elective	3	or 3
Comm. 11, Theatre 5	3	or 3	Psychology 1	3	or 3
Educ./Gen'l 2	3	or 3	Educ./Lrng. Stds. 45, 46	3	3
Social Science	3	3	Studio Electives	6	6
One Elective from Science			Related Electives	-	-
and Math. Area	3	or 3			
One elective from					
Humanities area	3	or 3			
Physical Educ.	1	1			
Art 2,3 or 4	3	3			
Art 5, 6	3	3			

	1st	2nd		1st	2nd
JUNIOR YEAR	SEMESTER		SENIOR YEAR	SEMESTER	
Educ./Art 177	4	-	Educ./Art 141	4	or 4
Educ./Art 154	1-6	or 1-6	Educ./Art 183	-	3
Art History	3	or 3	Art 281 or 197	3	or 3
Educ./Sec. 1	2	or 2	Educ./Art 292	2-6	or 2-6
Studio Electives	-	-	Educ./Sec. 181	8-12 or 8-12	
Related Electives	-	-	Studio Electives	-	-
Teaching Reading	3	3	Related Electives	-	-
			Educ./Gen'l 190	3	or 3

A minimum of 124 approved semester hours is required for the degree. Include six semester hours teaching reading courses for teacher certification.

Students are responsible for obtaining information regarding teacher certification and degree requirements from the appropriate College of Education and Social Services offices.

MUSIC EDUCATION (Kindergarten through Twelve) The curriculum in music education, leading to the degree of Bachelor of Science in Music Education, is recommended to students who have sufficient training and natural musical ability to justify a career in music. Graduates are qualified for positions as instructors and supervisors of music in the public schools.

The Department of Music is a member of the National Association of Schools of Music, and all its degree programs are accredited by the N.A.S.M.

The program includes a general component of 60 credits selected from the following five academic areas: arts and letters, science and mathematics, social sciences, humanities, and health and physical education (two semesters of physical education activities are required). Students may apply required courses in music to meet the general education requirements.

A typical program is as follows:

	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Theory I	4	4	Theory II	3	4
Performance (Major, Piano, String Class)	3	3	Music History II	3	3
Major Ensemble	1	1	Performance (Major, Piano, Woodwind Class, Voice Class)	5	5
Electives	3	to 6	Major and Minor Ensembles (or Second Major)	2	2
Physical Educ.	1	1	Learning and Human Development	3	or 3
Music History 1	3	3	Electives	3	or 3
Comm. 11 or Theatre 5	3	or 3			
	<hr/>	<hr/>		<hr/>	<hr/>
	18	18		17	17
JUNIOR YEAR	1st	2nd	SENIOR YEAR	1st	2nd
	SEMESTER			SEMESTER	
Orchestration	3	-	Student Teaching	12	-
Conducting	-	3	Form and Analysis	-	3
Elem. Music Methods	3	-	Counterpoint	-	3
Sec. Music Methods	-	3	Ensembles	-	2
Performance (Major, Brass Class, Guitar)	4	3	Performance (Recital, Percussion Class, Repair Class	-	4
Ensembles	2	2	Music Elective	-	3
Participation	1	1	Senior Seminar	3	-
Teaching Reading	3	3			
Elective	-	3			
	<hr/>	<hr/>		<hr/>	<hr/>
	16	18		15	15

A minimum of 128 approved semester hours is required for the degree. Include six semester hours teaching reading courses for teaching certification. Students should pass the piano facility examination prior to student teaching. Students are responsible for obtaining information regarding teacher certification and degree requirements from the appropriate College of Education and Social Services offices.

EARLY CHILDHOOD AND HUMAN DEVELOPMENT

Concentrations: Early Childhood Development, Human Development, and Human Development Education (offered jointly with the Home Economics Education Program).

The Early Childhood and Human Development Program focuses on individual development across the life span and on the person's relationship to his or her physical, social, and psychological environments. Emphasis is given to development within various family structures and to strategies for facilitating normal development. Students learn basic and applied concepts of human development and develop skills in working with normal people of different ages and in a variety of settings. Field experience is required of all students.

Students major in one of three areas:

Early Childhood Development provides the student with academic and teaching experiences concentrating on the developmental needs of young children and their families. This is a state-approved teacher education program; graduates are recommended for teacher certification in Early Childhood (ages 0-8).

Human Development is an interdisciplinary study of people and their relationships across the span of life. The approach is ontogenetic and ecological. Field work and small seminars permit the Human Development major to concentrate on a particular stage within the life cycle.

Human Development Education is designed to provide the student with a broad background in human development and family relationships along with professional teaching experience. Graduates are eligible for teacher certification in Home Economics with specialization in human development, family living, child care, and sex education.

THE RESPONSIVE TEACHER PROGRAM The Responsive Teacher Program is a two-year concentration for students majoring in elementary, secondary, or physical education. This program trains regular classroom teachers with special education skills. The responsive teacher is trained to educate all children through individual teaching/learning procedures. Using a data-based individual model of instruction the responsive teacher learns to set goals for *all* students and assures that these goals are met by use of individualized instruction and the application of behavior analysis theory.

Candidates for the Responsive Teacher Program are chosen at the end of their sophomore year and must meet specified entrance requirements. The competency based program begins in the fall of the junior year with a consecutive two-year schedule, in addition to the regular elementary or secondary program. Responsive Teachers-in-Training attain competencies in specifying minimum objectives in the basic skill areas, measurement systems, individualized instruction, and learning theory. A *full-time* commitment is expected of each Responsive Teacher-in-Training during the spring semester. Working with a partner, they spend each morning in a classroom where at least one child has been designated as eligible for special education services. Each afternoon students engage in course work and seminars designed to increase the rate of learning for Vermont's eligible children. During their senior year Responsive Teachers-in-Training will spend a full semester student teaching in a Vermont classroom that contains at least one child eligible for special educational services.

Students who successfully complete this program will be recommended for certification as regular elementary or secondary teachers, with an endorsement for Teacher of the Handicapped.

Questions concerning the Responsive Teacher Program should be directed to Coordinator of Responsive Teacher Program, Special Education Area.

The program must contain these courses:

	1st	2nd		1st	2nd
JUNIOR YEAR	SEMESTER		SENIOR YEAR	SEMESTER	
Educ./Spec. 151	6	-	Educ./Spec. 181	12	-
Educ./Spec. 152	-	6	Educ./Spec. 201	3	-
Educ./Spec. 160	-	6	Educ./Spec. 165	-	1

A minimum of 127 approved semester hours is required for the degree. Include six to nine semester hours teaching reading courses for teacher certification. Students are responsible for completing all certification requirements at the elementary or secondary level.

SOCIAL WORK PROGRAM Provides education for social work practice based on a liberal education in the social sciences and humanities. Career opportunities in the field of social work are explored. The student, in consultation with his/her advisor, selects elective courses which will provide the opportunity to develop individual interests. A minimum of 122 credit hours of prescribed and elective courses is required for graduation.

Usual sequence of courses:

FRESHMAN YEAR			SOPHOMORE YEAR		
SEMESTER			SEMESTER		
Professional Courses:			Professional Courses:		
Educ./Soc. Work 2	3	or 3	Educ./Soc. Work 14 (optional)		
Prerequisites for Educ./Social Work 165, 166	-	-	Educ./Soc. Work 165	3	-
Political Science 21	3	or 3	Educ./Soc. Work 166	-	3
Psychology 1	3	or 3	Educ./Soc. Work 167	3	or 3
Sociology 10	3	or 3	Economics 11	3	or 3
Educ./Soc. Work 51 (optional)	-	-	Psychology 152 (or in junior year)	3	3
			Educ./Soc. Work 47	3	-
			Educ./Soc. Work 48	-	3
JUNIOR YEAR			SENIOR YEAR		
SEMESTER			SEMESTER		
Professional Courses:			Professional Courses:		
Educ./Soc. Work 168	3	or 3	Educ./Soc. Work 170	15	or 15
Educ./Soc. Work 169	3	or 3	Educ./Soc. Work 291	3	-
Educ./Soc. Work 194	3	-	Educ./Soc. Work 292	-	3
Educ./Soc. Work 195 (optional)	-	3	Recommended Electives		
Psychology 152	3	or 3	Additional Courses in:		
			Psychology		
			Sociology		
			Education		
			Human Development		

The B.S. degree in Social Work requires a minimum of 122 approved credit hours (including two credits for physical education activities) with grades of 2.5 or better in professional courses and prerequisites and a cumulative average of 2.0.

A student must make formal application for admission to the professional Social Work Program and must meet specified entrance requirements.

HEALTH EDUCATION (Kindergarten Through Twelve) The Health Education program is designed to prepare candidates for teaching assignments in health in grades kindergarten through twelve. Graduates are awarded a degree of Bachelor of Science in Education upon completion of the 124 semester-hour program. There is a 41-credit hour general education component which includes 13 hours of science, first aid, and personal health. The 30-hour major is interdisciplinary in nature, drawing upon courses from across the University, to cover the broad spectrum of required health content areas. An 18-credit hour teaching minor is required along with this major to be eligible for Vermont teaching certification.

A typical program is as follows:

	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Educ./Gen'l 2	3	-	Anatomy and Physiology ⁴	4	3
English 1	3	-	Sociology 157	-	3
English Lit. Elective	-	3	Educ./Lrng. Stds. 45, 46	3	3
Participation	X	-	Human Nutr. & Fds. 43 or 46	3	-
Educ./Hlth. 46	3	-	Early Chldhd. &		
Comm. 11 or Theatre 5	-	3	Human Dev. 65	-	3
Humanities ¹	-	3	Psychology 1	3	-
Science Elective ²	3	3	Teaching Reading	3	3
Social Science ³	3	3	Educ./Phys. Ed. 23	-	2
Activities	1	1			
	<hr/> 16	<hr/> 16		<hr/> 16	<hr/> 17
	1st	2nd		1st	2nd
JUNIOR YEAR	SEMESTER		SENIOR YEAR ⁵	SEMESTER	
Educ. Organ. & Human Dev.			Educ./Gen'l 190	3	-
220 or Psychology 150	-	3	Educ./Hlth. Electives	6	-
Educ./Hlth. 208	3	-	Electives	6	-
Educ./Hlth. 182	-	3	Educ./Gen'l 181	-	12
Educ./Hlth. (Community)	3	-			
Sociology 254	-	3			
Courses in Minor	9	9			
	<hr/> 15	<hr/> 18		<hr/> 15	<hr/> 12

¹Humanities (any philosophy, religion, or foreign language courses)

²Science (select from biology, botany, zoology, chemistry, or physics.)

³Social Science (six credits from History 7,8, Political Science 11, 21)

⁴Anatomy and Physiology (Zoology 5 and 6, Anatomy 9 and Physiology 10, or 100 and 101)

⁵Fourth-year fall and spring semesters interchangeable.

PHYSICAL EDUCATION (Kindergarten through Twelve) The physical education curriculum, open to men and women, includes a selection of courses from within the broad areas of general education, general professional education, specific professional education (including the physical education major and minor, if selected), and unstructured electives. Graduates are awarded a degree of Bachelor of Science in Education upon the completion of a 130 semester hour program.

The major program in physical education qualifies candidates to teach physical education in grades K-6, 7-12, K-12 depending upon the major option selected. Candidates may opt for a 30-credit specialty for teaching physical education in elementary schools, or a secondary school specialty. In either instance, the candidate also selects an 18-credit area of concentration (minor). A third option provides for a 40-credit broad field major which prepares students for teaching in grades K-12 and includes introductory courses in health and recreation. There is no minor requirement with the broad field major. Candidates in all three major options will earn a minimum of eight credits in activity skill courses where they will demonstrate competency in a variety of sports from intermediate to advanced levels. A fourth option in leisure studies provides a 30-credit specialty for those seeking employment other than in a school setting. A minor is required with this option.

A typical K-12 program is as follows:

	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Educ./Gen'l 2	3	-	Social Science ³	3	3
English 1	3	-	Educ./Lrng. Stds. 45, 46	3	3
English Lit. Elective	-	3	Anatomy and Physiology ⁴	4	3
Educ./Phys. Ed. 21	3	-	Educ./Phys. Ed. 157	2	-
Educ./Hlth. 46	-	3	Educ./Phys. Ed. 192	-	3
Psychology 1	-	3	Educ./Phys. Ed. Elective	3	3
Humanities ¹	-	3	Activities	2	2
Science Elective ²	3	3			
Comm. 11 or Theatre 5	3	-			
Activities	2	2			
Participation	-	X			
	<hr/>	<hr/>		<hr/>	<hr/>
	17	17		17	17
JUNIOR YEAR	1st	2nd	SENIOR YEAR ⁵	1st	2nd
	SEMESTER			SEMESTER	
Educ./Phys. Ed. 166	3	-	Educ./Gen'l 190	3	-
Educ./Phys. Ed. 167	-	3	Educ./Phys. Ed. 260	3	-
Educ./Phys. Ed. 155	3	-	Educ./Phys. Ed. Electives	9	-
Educ./Phys. Ed. 104	5	-	Elective	3	-
Educ./Phys. Ed. 105	-	5	Educ./Gen'l 181	-	12
Coaching Elective	2	2			
Educ./Phys. Ed. Elective	-	3			
Teaching Reading	3	3			
	<hr/>	<hr/>		<hr/>	<hr/>
	16	16		18	12

¹Humanities (any philosophy, religion, or foreign language course)

²Science (select from biology, botany, zoology, chemistry, physics, psychology, sociology, or math.)

³Social Science (six credits from History 7, 8, Political Science 11, 21)

⁴Anatomy and Physiology (Zoology 5 and 6, Anatomy 9 and Physiology 10, or 100 and 101)

⁵Fourth-year fall and spring semesters interchangeable

Note: No more than 50 credits in major theory courses included in the 130-credit graduation requirement.

Physical Education majors will present a minimum of 130 approved semester hours for the degree. Include six to nine semester hours teaching reading courses for Teacher Certification.

Students are responsible for obtaining specific information regarding degree requirements and teacher certification from the appropriate College of Education and Social Services office.

FIFTH-YEAR CERTIFICATE IN EDUCATION A special fifth-year program culminating in a certificate of advanced study is offered for students who wish to work beyond the Bachelor's degree but who need or desire more flexibility than is possible in any of the standard programs for Master's degrees.

The certificate program is especially designed to meet the needs of teachers who are developing new teaching fields, for advanced students who are meeting requirements for state certification, and for experienced teachers who desire flexibility in choice of courses at both graduate and undergraduate levels.

Each certificate program is individualized to fit the qualifications and the professional objectives of the candidate. Undergraduate courses may be approved for the program when such courses appropriately support the candidate's professional objectives.

The program for the *Fifth-Year Certificate* is governed by the following regulations:

1. Candidates must hold a Bachelor's degree.
2. Candidates must make written application on forms obtained from the Office of the Dean of the College of Education and Social Services.
3. Candidates are admitted to the program by action of a faculty committee.
4. A maximum of 12 credits may be applied to the program at the time of admission.
5. A maximum of nine credits may be transferred from other institutions.
6. Credits for the program may be earned in the regular academic year, the Summer Session, and the Evening Division.
7. The program for each candidate must include a minimum of 30 credits approved by a faculty advisor.
8. A minimum mark of C must be made in any course which is to be included in the program.
9. No comprehensive examination or formal thesis is required for completion of the program, but the candidate will submit a culminating paper under the direction of his/her faculty advisor.
10. The program must be completed within seven years after the time of admission.

Requests for further information about fifth-year programs should be directed to the Office for Student and Field Services, Waterman Building.

CERTIFICATE OF ADVANCED STUDY A certificate of Advanced Study (C.A.S. — sixth-year certificate), a 30-36 graduate credit hour program beyond the Master's degree, is offered by the College of Education and Social Services in the field of Administration and Planning, Counseling and Integrated Studies. The C.A.S. has become a professional requirement in the hiring and advancement of administrative, supervisory, and other personnel in many school districts throughout the United States. The program requires a nine credit on-campus residency unit. Residency may be fulfilled during any academic semester or summer and is part of the total 30-36 program credits. Further information may be obtained from the Office for Student and Field Services, Waterman Building.

The Division of Engineering, Mathematics, and Business Administration

The Division of Engineering, Mathematics, and Business Administration became effective July 1, 1981. It includes the College of Engineering and Mathematics and the School of Business Administration. The College and School offer degrees in:

Business Administration
Civil Engineering
Electrical Engineering
Mechanical Engineering
Mathematics
Statistics
Computer Science

Bachelor of Science in Business Administration
Bachelor of Science in Civil Engineering
Bachelor of Science in Electrical Engineering
Bachelor of Science in Mechanical Engineering
Bachelor of Science in Mathematics
Bachelor of Science in Mathematics
Bachelor of Science in Computer Science

The Division of Engineering, Mathematics, and Business Administration offers professional undergraduate programs which provide the basis for professional practice or further study.

Graduates of professional schools are expected to fulfill unique and significant roles in planning and directing the work of the world and in effecting and managing change. The primary objective of professional education is, therefore, to develop skill in the "problem-solving art." This includes not only intellectual knowledge of complex and high order, but also the intelligent and intuitive application of that knowledge to the situations of life.

Professional graduates must have the ability, the confidence, and the self-discipline to identify and define a problem, break it down into operable components, marshal the necessary resources from the natural and social sciences, mathematics, and the humanities, and to employ these resources in a systematic, effective, and efficient fashion to derive a useful solution. To enhance and promote these qualities in students, the Division's curricula all emphasize the balanced development of conceptual understanding and specific skills.

The professional graduate is also often required to act on the basis of incomplete knowledge and with limited time and resources. The Division therefore requires that its students exhibit certain personal qualities in addition to the intellectual achievement expected of all university graduates. Foremost among these are integrity, acceptance of responsibility, and reliability in independent work.

The Division is also committed to the idea that learning is a life-long endeavor. Our undergraduate programs therefore provide a base upon which students may build as the demands of their professional careers increase and their personal interests broaden.

Academic Information

GENERAL The instructional programs of the Division are made up of a lower level (normally freshman/sophomore years) and a variety of upper level curricula (majors). Each curriculum is administered by one of the Division's schools, departments, or programs.

Admission to the Division as a freshman does not guarantee admission to an upper level program. In order to enter one of these programs, students must:

- A. be in good academic standing in the lower level of their chosen major or in another college/school of the University.
- B. meet specific requirements established by the school, department, or program responsible for the upper level curriculum to which they seek admission. These requirements include (1) the completion of specific prerequisite courses, and (2) a minimum grade-point average in these prerequisite courses.

In any year, places in the several upper level programs may be limited by available resources (faculty, laboratory facilities, etc.). In such cases, only the most qualified students will be accepted, and some students who have satisfied the minimum requirements (above) may not be admitted.

ACADEMIC STANDARDS Students who receive a cumulative or semester grade-point average of less than 2.0 will be placed on trial. Students who have failed half their course credits for any semester, or who have had two successive semester averages below 2.0, or two successive semesters in which their cumulative grade-point average falls below 2.0, are eligible for dismissal.

COOPERATIVE PROGRAMS The Division of Engineering, Mathematics, and Business Administration offers cooperative work-study programs for majors. At least one year of practical work experience related to the student's major field is required. Academic credit is not ordinarily awarded for co-op work but may be possible to arrange for faculty-supervised independent study projects as part of the co-op experience.

Students interested in a cooperative program arrangement should consult the Dean's Office or the unit in which they intend to enroll before the end of the sophomore year.

Although the Division will attempt to place all qualified students in co-op positions, it cannot guarantee the availability of these positions in advance.

CORE COURSES A group of fundamental, or "core," courses is identified in each of the three primary areas: business administration, engineering, and mathematics. These courses provide the foundations needed, both for advanced work and for specialization, within the respective fields. Some core courses deal with essential concepts and skills and must be completed during the first and second years. Others treat material which, though more advanced, is common to all branches of the field. These courses are found primarily in the second and third years. If exempt from a core course, a student must replace it with a higher level course recommended by a faculty advisor.

HONORS THESIS PROGRAM The Division Undergraduate Thesis Program is designed for the superior student with unusual initiative and intellectual curiosity, and provides an opportunity to pursue a special program without the restrictions of classroom routine. Such a student enters a program of reading, research, design, or creation under the direction of a school, department, or program of the student's choice. Such a unit need not be in the Division — e.g. a Computer Science major could do a special project in Physics.

The student matriculated in the Division who, at the time of application, has an average of 3.00 or above for sophomore and junior year work may apply to the school, department, or program of his/her major and simultaneously to the unit in which he/she intends to do the project. These participating programs can establish whatever mechanism they choose to provide the necessary approvals outlined hereafter. The student proposal for a thesis must normally be approved not later than the end of the junior year by the participating school, department, or program. A written report of the completed project must be approved by the participating school, department, or program and the student may be asked to pass an oral examination on the field of special study. At the time of graduation, the student's

transcript and the graduation program will be appropriately denoted with "Honors Thesis" and the title of the thesis.

HUMANITIES AND SOCIAL STUDIES The objective of the Humanities and Social Studies requirements for all programs is to broaden the student's understanding of mankind and relationships in human society. The Division has a minimum requirement of 18 Humanities and Social Studies credit hours for the B.S. degree but specific programs may require more than this minimum.

English 1 is required of all students except Mathematics and Statistics majors, unless exempt by recommendation of the English Department. Students whom the English Department exempts from English 1 are required to take another course in English. Engineering students may not include English 1 as a Humanities and Social Studies elective even though it is required.

No credit is given for a "dash course" (a two-semester sequence listed with a dash between the course numbers) unless the second semester is completed. Credit for elementary language courses is granted for degrees in the mathematical sciences and Business Administration only if the intermediate level course is also satisfactorily completed. No credit toward Engineering degrees is granted for elementary language courses.

Engineering students must select their Humanities and Social Studies courses from lists held by their advisors. These courses shall be from the categories of language and literature, fine arts and philosophy, and social sciences. A minimum of nine credits must be in one category and a minimum of six must be in one departmental area.

INDIVIDUALLY DESIGNED MAJORS Occasionally, students whose interests fall within the overall curricular domain of the Division are nevertheless unable to find a program or option which addresses their specific educational objectives. In such cases, the student may propose an "individually designed major." Any such proposal must contain an appropriate college core program, must contain a breadth and depth of courses consistent with regular professional programs or options, must be sponsored by a faculty member who is willing to act as the student's advisor, and must be approved by the Studies Committee. Proposals for individually designed majors must be presented to the Dean's Office and approved before the student can be admitted to the upper level of the Division.

Each student must select one of the options available, or have an approved individually designed major, when applying for the upper division.

CREDIT FOR MILITARY SERVICE The Division of Engineering, Mathematics, and Business Administration does not, in general, grant credit for military service. Credit for specific courses or other academic experience acquired during military service may be available through petition to the Studies Committee.

CREDIT FOR MILITARY STUDIES COURSES

Army ROTC at the University of Vermont The Division grants eight credits for Military Studies 1, 2, 3, and 4 in the category of humanistic social studies for all programs in the Division. Normally, other Military Studies courses may be utilized as free electives only. See advisor.

Air Force ROTC at St. Michael's College No academic credit is granted for the first two years of AFROTC courses at St. Michael's College. At the junior and senior level the following St. Michael's courses are approved:

Military Studies 301-303 — A total of six credits (three each semester) will be granted under the UVM elective category of "Political Science."

Military Studies 401-403 — Six credits will be granted under the UVM elective category of "Business Administration." Credit will not be given for both the UVM course Business Administration 170 and Military Studies 401 at St. Michael's.

Credits from these courses will be treated as transfer credits, and they may be used as electives only, not as substitutes for required UVM courses.

PHYSICAL EDUCATION In addition to the course requirements listed for each curriculum, all students must satisfactorily complete two credits in physical education.

RESEARCH AND SPECIAL PROJECTS Opportunities for undergraduate research and work on special projects are offered by the several departments and programs of the Division. Credit may be arranged, with a maximum of four hours per semester. No more than 12 hours of courses in these categories may be used to satisfy the requirements for the B.S. degree. It is understood that credit for such courses is contingent upon submission of a final report or other acceptable evidence of project completion.

TRANSFER CREDIT Transfer credits from other institutions are not used in the calculation of the University of Vermont grade-point average. Students who wish transfer credit must obtain approval from their departments.

The School of Business Administration

The School of Business Administration offers a program leading to a Bachelor of Science degree in Business Administration. The curriculum is designed to provide the student with a broad background in the fields of knowledge useful for managerial decision making and, additionally, considerable exposure to the humanities and the social, physical, and mathematical sciences. The core program required of all students provides:

- A. A background of the concepts, processes, and institutions in marketing and distribution, production, and financing functions of business enterprise.
- B. A background of the economic and legal environment of business enterprise along with consideration of the social and political influences on business.
- C. A basic understanding of the concepts and methods of accounting, quantitative methods, and information systems.
- D. A study of organization theory, interpersonal relationships, control and motivation systems, and communications.
- E. A study of administrative processes under conditions of uncertainty including integrating analysis and policy-determination at the overall management level.

Beyond this core, study in a specialty option allows the student to pursue in more depth a functional area of interest. The areas available are Accounting, Finance and Banking, Marketing Management and Sales Promotion, and Management.

The School of Business Administration cooperates in the offering of courses in the Management Engineering curriculum administered by the Department of Mechanical Engineering which is described in the section on engineering curricula.

The Accounting option is registered with the University of the State of New York, The State Education Department, Albany, N.Y. Students completing the requirements of the accounting option will be eligible for admission to the New York State licensing examination in Certified Public Accountancy.

A minimum of 122 approved semester hours is required for the Bachelor of Science in Business Administration degree, including required courses in physical education.

DISTRIBUTION REQUIREMENTS

1. Each student shall present nine semester courses (three credits, or more, each) by choosing three courses from each of any three of the following four categories labeled a,b,c, and d below). No courses required in the Business Administration program may be used to fulfill distribution requirements.

a. Language and Literature:

English	*Italian
*French	*Latin
*German	Literature in Translation
*Greek	*Russian
*Hebrew	*Spanish

* No distribution credit is allowed for courses taken in a foreign language unless at least one course in that language, at the intermediate level or above, is taken and passed.

b. Fine Arts and Philosophy:

Art	Philosophy
Communication	Religion
Music	Theatre

c. Social Sciences:

Anthropology	Political Science
Economics	Psychology
Geography	Sociology

History

d. Sciences and Mathematics:

Biology	Physics
Botany	Zoology
Chemistry	Mathematics
Engineering and Technology	Statistics
Geology	Computer Science

2. Majors in Business Administration are required to complete a minimum of 48 hours (including the 27 hours of distribution requirements) in nonbusiness courses. English 1 is normally required and may be included in the 27 hours of distribution requirements. Nonbusiness courses required in the business program may not be used to satisfy this requirement.

Majors in Business Administration will normally take the following courses before enrolling in Junior-Senior Core courses:

Freshman-Sophomore Core

FRESHMAN YEAR	1st SEMESTER	2nd SEMESTER	SOPHOMORE YEAR	1st SEMESTER	2nd SEMESTER
Math. 18	-	4	Economics 11, 12	3	3
English 1	-	3	Bus. Ad. 60, 61	4	4
Electives*	15	9	Computer Science 11	3	-
			Statistics 111	-	3
			Electives*	3	6
	<hr/> 15	<hr/> 16		<hr/> 13	<hr/> 16

*Three hours in psychology or sociology (prerequisite for Bus. Ad. 170) should be included.

The following courses must be completed by all majors in Business Administration:

Junior-Senior Core

		Hours
Bus. Ad. 132	Legal and Political Environment of Business*	3
Bus. Ad. 154	Foundations of Marketing	3
Bus. Ad. 170	Organizational Behavior	3
Bus. Ad. 173	Operations Analysis I	3
Bus. Ad. 180	Managerial Finance I	3

*Accounting majors may substitute Bus. Ad. 17, 18.

The following course is required of all business majors and must be completed the last semester on campus.

Bus. Ad. 191	Business Policy	3
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SPECIALTY OPTIONS In addition to the courses listed above, a student must take a minimum of four courses (12 hours) in one of the areas of concentration listed below.

Finance and Banking

Required:		Hours
Bus. Ad. 184	Financial Institutions and Markets	3

Electives (nine-credit minimum):

Bus. Ad. 168	Cost Accounting	3
Bus. Ad. 181	Issues in Financial Management	3
Bus. Ad. 182	Security Valuation and Portfolio Selection	3
Bus. Ad. 185	Commercial Bank Management	3
Bus. Ad. 281	Municipal Finance	3
Bus. Ad. 283	Financial Management of International Operations	3

Management

Students with a specialty in Management have the option of concentrating in Human Resources Management or in Operations Management.

Human Resources Management

Required:		Hours
Bus. Ad. 171	Personnel Management	3
Bus. Ad. 175	Designs for Organizational Systems	3

Electives (six-credit minimum):

Bus. Ad. 176	Current Issues in Management and Organization Theory	(1-12)
Economics 242	Labor Management Relations	3

Any other 100-level or above course justified as relevant to the student's program and approved by the Undergraduate Studies Committee, or any course from the Operations Management Option electives.

Operations Management

Required:		Hours
Bus. Ad. 175	Designs for Organizational Systems	3
Bus. Ad. 174	Operations Analysis II	3

Electives (six-credit minimum):

Bus. Ad. 140	Decision Making Under Uncertainty	3
Bus. Ad. 242	Management Information System	3
Bus. Ad. 243	Quality Assurance	3
Bus. Ad. 244/ Statistics 225	Applied Regression Analysis	3
Bus. Ad. 245	Introduction to Operations Research	3
Bus. Ad. 272/ Civil Engr. 227	Discrete Simulation	3
Bus. Ad. 274/ Mech. Engr. 201	Safety Engineering	2
Bus. Ad. 275/ Mech. Engr. 275	Human Factors	3
Bus. Ad. 276/ Mech. Engr. 276	Plant Planning and Design	4

Marketing Management and Sales Promotion

Bus. Ad. 153	Personal Selling and Sales Management	3
Bus. Ad. 156	The Marketing Operations of Small Retail and Service Establishments	3
Bus. Ad. 157	Marketing Research	3
Bus. Ad. 158	Fundamentals of Advertising	3
Bus. Ad. 257	Consumer Behavior	3
Bus. Ad. 258	Current Marketing Developments	3
Bus. Ad. 259	Marketing Management	3

Accounting

Accounting majors are required to take all of the following courses.

Bus. Ad. 17, 18	Business Law	6
Bus. Ad. 161, 162	Intermediate Accounting	6
Bus. Ad. 164	Introduction to Federal Taxation	3
Bus. Ad. 168	Cost Accounting	3
Bus. Ad. 184	Financial Institutions and Markets	3
Bus. Ad. 266	Advanced Accounting	3
Bus. Ad. 267	Auditing	3

Engineering Programs

The Division of Engineering and Mathematics offers accredited, professional programs in Civil, Electrical, and Mechanical Engineering. These engineering curricula are accredited by the Accreditation Board for Engineering and Technology (ABET). Other interdisciplinary engineering programs offered by the College include: Bioengineering, Engineering Management, Engineering Physics, and Environmental Engineering.

Engineering education at UVM combines the study of mathematics and the physical and engineering sciences with courses illustrating their application to the analysis and design of equipment, processes, and complete systems. In addition, students are encouraged to avail themselves generously of the life science, social science, and humanities courses available throughout the University. The breadth and flexibility of the engineering programs provide a sound background for engineering practice in private or public domains, for graduate study in engineering or science, and for further professional study in such fields as business, law, or medicine.

Students enrolled in the civil, electrical, and mechanical engineering curricula may become affiliated with their respective national professional engineering societies, the American Society of Civil Engineers, the Institute of Electrical and Electronics Engineers, and the American Society of Mechanical Engineers, as each organization has authorized a student chapter at the University of Vermont. Engineering students demonstrating high scholarship attainment combined with exemplary character are recognized by membership in the Vermont Alpha Chapter of Tau Beta Pi, the national engineering honor society. These student organizations' meetings present opportunities for students to conduct activities similar to those of the national societies.

Core Curriculum for Engineering Students

	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Chemistry 5*	4	-	Physics 25	4	-
Physics 24	-	4	Math. 121	4	-
Math. 21,** 22	4	4	Math. elective	-	3
Engineering 2	-	2	Other courses according		
Computer Science 11	-	3	to major selected		
English 1	3	-			
Humanities/Social Studies	3	3			
Science Elective***	4	-			
	<hr/>	<hr/>		<hr/>	<hr/>
	14-18	16		16-18	16-18

*Bioengineering, Engineering Physics, and Environmental Engineering students should take Chemistry 1 and 2 in place of Chemistry 5.

**See footnote under course offerings of the Department of Mathematics.

***Required for Civil Engineering.

CIVIL ENGINEERING The curriculum in Civil Engineering, leading to the degree of Bachelor of Science in Civil Engineering, offers instruction in environmental engineering, hydraulics and hydrology, planning, soil mechanics, structural engineering, and transportation engineering, as well as in the engineering sciences, mathematical sciences, natural sciences, humanities, and the social sciences. Every candidate for this degree must earn a minimum of 132 semester hours of credit including the required courses in physical education.

	1st	2nd
SOPHOMORE YEAR	SEMESTER	
Humanities/Social Studies	3	3
Math. 121	4	-
Math. 124 or 271	-	3
Thermodyn., ME 41	-	4
Mechanics, CE 1, 2	3	3
Surveying, CE 10, 11	4	3
Physics 25	4	-
	<hr/>	<hr/>
	18	16

	1st	2nd		1st	2nd
JUNIOR YEAR	SEMESTER		SENIOR YEAR	SEMESTER	
Humanities/Social Studies	3	3	Free Elective	-	3
Elec. Engr. 100	4	-	CE 125, Engr. Economy	3	-
Statistics 141	-	3	CE 171, Struc. Anal. II	3	-
CE 100, Mech. of Materials	3	-	CE 172, 173, Struc. Design	3	3
CE 101, Materials Testing	-	2	CE 180, 181, Soils		
CE 160, Hydraulics	4	-	and Foundations	4	4
CE 140 Transportation	-	3	CE 130, Engr. Planning	-	2
CE 150, 151, Environ Engr.	3	3	Professional Elective	3	3
CE 170, Struct. Anal. I	-	4			
	<hr/>	<hr/>		<hr/>	<hr/>
	17	18		16	15

The following departmental requirements have been established for admission to the upper level in Civil Engineering (see General Requirements).

A student must have completed the following eight courses: Engineering 2, Civil Engineering 1, Chemistry 5, Physics 24 and 25, and Math. 21, 22, and 121; and must have maintained a 2.0 average in these courses and have an overall cumulative average of 2.0 No Civil Engineering courses numbered 100 or above may be taken until a student is admitted to the Upper Division.

ELECTRICAL ENGINEERING The general accredited degree curriculum for Electrical Engineering students is outlined below. In addition, a Computer Engineering option is available (see p. 100). This option permits a concentration of courses in the computer design field.

The Department of Electrical Engineering offers a cooperative work experience. This arrangement comprises a five-year program, with the fourth year devoted to full-time engineering work at a local industry.

The Department also offers one of the several pre-medical options available in the College. The curricular modifications associated with this option are detailed on page 100.

SOPHOMORE YEAR		1st	2nd
		SEMESTER	
Humanities/Social Studies		3	3
Math. 121		4	-
Math. 271 or 124 or			
Statistics 151		-	3
Physics 25, 128		4	4
EE 81, 82, Laboratory		2	2
EE 3, Engr. Analysis I		3	-
EE 4, Engr. Analysis II		-	3
EE 140, Elec. Field Theory		-	3
		<hr/> 16	<hr/> 18
JUNIOR YEAR		1st	2nd
		SEMESTER	
EE 163, Solid State Phys.			
Electronics I	3	-	
EE 171, Signals and Systems	3	-	
Engr. Sci. Elective	-	3	
Humanities/Social Studies	3	-	
EE 141, Elec. Field Theory	3	-	
EE 183, Junior Lab.	2	-	
EE 164, Solid State Phys.			
Electronics II	-	3	
EE 172, Discrete-time Signals			
and Systems	-	3	
EE 133, Fund. of Mini/Micro-			
computer Based Systems	3	-	
EE 110, Control Systems	-	3	
EE 120, Electronics I	-	3	
EE 184, Junior Lab.	-	2	
	<hr/> 17	<hr/> 17	
SENIOR YEAR		1st	2nd
		SEMESTER	
Tech. Elective			
(Design Oriented)		6	3
EE 113, Elec. Energy Gen.			
and Distribution	3	-	
Humanities/Social Studies	3	-	
EE 121, Electronics II	3	-	
EE 185, 186, Senior Lab.	1	1	
Elective	-	3	
EE 146, Wave and Diffusion			
Analogies	-	3	
EE 114, Elec. Energy Conv.	-	3	
EE 174, Info. Trans. Syst.	-	3	
	<hr/> 16	<hr/> 16	

The above comprises what is termed the general option curriculum, for which a minimum of 132 approved semester hours is required, including required courses in physical education. Two other options are offered as follows:

Computer Engineering Option

		1st	2nd		
SOPHOMORE YEAR		SEMESTER			
Humanities/Social Studies		3	3		
EE 140, Elec. Field Theory		-	3		
Math. 121		4	-		
Physics 25, 128		4	4		
EE 81, 82, Laboratory		2	2		
EE 3, Engr. Analysis I		3	-		
EE 4, Engr. Analysis II		-	3		
Math. 271 or 124 or					
Statistics 151		-	3		
		16	18		
				1st	2nd
JUNIOR YEAR		SEMESTER		SEMESTER	
EE 163, Solid State Phys.					
Electronics I	3	-	Tech. Elective (Design	3	-
EE 171, Signal and Systems	3	-	Oriented)		
Humanities/Social Studies or			Comp. Sci. 101, Intro. to	3	-
EE 133, Fund. of Mini/Micro-			Computer Sci.		
computer Based Systems	3	-	Humanities/Social Studies:		
EE 131, Fund. of Digital			or EE 133, Fund. of Mini/		
Computer Design	3	-	Microcomputer-Based		
EE 141, Elec. Field Theory	3	-	Systems	3	-
EE 183, 184, Junior Lab.	2	2	EE 121, Electronics II	3	-
EE 164, Solid State Phys.			EE 185, 186, Senior Lab.	1	1
Electronics II	-	3	EE 187, Senior Project*	3	-
EE 172, Discrete-time Signals			Tech. Elective	-	3
and Systems	-	3	EE 110, Control Systems or		
EE 132, Fund. of Digital			Humanities/Social Studies	-	3
Computer Design	-	3	Approved Math. or		
EE 120, Electronics I	-	3	Computer Sci. course	-	3
EE 110, Control Systems or			Comp. Sci. 102, Software	-	3
Humanities/Social Studies	-	3	EE 174, Info. Trans. Syst.	-	3
		17		16	16

*Credit can be split between first and second semester.

The above comprises the computer engineering option, for which a minimum of 132 approved semester hours is required, including required courses in physical education.

Pre-Medical Option

Requires a minimum of 136 approved semester hours, including required courses in physical education. The changes from the general option curriculum are:

One design-oriented technical elective in the first semester of the senior year, technical and free electives in the second semester of the senior year, and three courses, selected with departmental approval, among EE 174, 163, 164, 113, 114, and the Engineering Science elective are replaced by Chemistry 141, 142, 160, and Biology 1, 2.

MECHANICAL ENGINEERING The Curriculum in Mechanical Engineering, leading to a degree of Bachelor of Science in Mechanical Engineering, offers instruction in design, solid

and fluid mechanics, materials, manufacturing processes and systems, thermodynamics and energy systems, as well as in engineering and physical sciences, humanities, and social sciences including aspects of professional engineering such as law, safety, and economics.

The degree requires a minimum of 129 semester hours of credit including the required courses in physical education. In the senior year each student selects one of the following areas of concentration: (a) Mechanics and Materials; (b) Manufacturing; or (c) Energy. A minimum of 18 credit hours is required in the humanities and social sciences. See page 93 for distribution.

	1st	2nd
SOPHOMORE YEAR	SEMESTER	
Math. 121, Calculus III	4	-
Physics 25, Fundamentals	4	-
ME 41, Thermo. and Heat Tran.	4	-
ME 53, Mat'ls Processing I	2	-
Humanities/Social Sciences	3	-
Math 271, Applied	-	3
Phys. 128, Modern	-	4
ME 50, Mechanics	-	4
ME 42, Engr. Thermo.	-	3
ME 46, Analysis and Comp.	-	2
	<hr/> 17	<hr/> 16

	1st	2nd		1st	2nd
JUNIOR YEAR	SEMESTER		SENIOR YEAR	SEMESTER	
ME 133, Engr. Vibr.	3	-	ME 135 (or 137), Design	4	-
ME 143, Fluid Mech.	3	-	ME 185, ME Lab	3	-
EE 100, Principles	4	-	Concentration Elective	3	-
ME 100, Mech. Struct.	3	-	Concentration Elective	3	-
ME 123, Junior Lab.	1	-	Humanities/Social Sciences	3	-
Humanities/Social Sciences	3	-	ME 150, Engr. Profession	-	2
ME 101, Engr. Mat'ls	-	3	ME 152, Safety Engr.	-	2
ME 144, Heat and Mass Trans.	-	4	Concentration Electives	-	3
EE 101, Elect. Circ. and Instr.	-	4	Concentration Electives	-	3
ME 134, Systems Control	-	3	Humanities/Social Sciences	-	3
ME 124, Junior Lab.	-	1	Free Elective	-	3
Industrial Visits					
	<hr/> 17	<hr/> 15		<hr/> 16	<hr/> 16

*Concentration Electives (*required electives):*

Mechanics & Materials	Manufacturing	Energy
*ME 233, Mech. Metal.	*ME 233, Mech. Metal.	*ME 243, Adv. Fluids
*ME 211, Adv. Mech. Str. I	*ME 231, Mat'ls Processing II	*ME 261, Energy
ME 252, Engr. Des. II	*ME 211, Adv. Mech. Struc. I	ME 262, Thermal Systems
ME 222, Adv. Mech. Struc. II	Statistics 211, Stat. Meth. I	ME 264, Thermal Envir. Engr.
ME 206, Appl. of Computers	ME 275, Human Factors	ME 206, Appl. of Computers
ME 202, Dynamics	ME 276, Plant Plan. & Design	ME 246, Aerodynamics
ME 231, Mat'ls Processing II	ME 206, Appl. of Computers	ME 297, Nuclear Engr.
ME 191, 192, Thesis	ME 191, 192, Thesis	ME 191, 192, Thesis
ME 295, 296, Special Topics	ME 295, 296, Special Topics	ME 295, 296, Special Topics
	ME 173, Oper. Anal. I	

INTERDISCIPLINARY ENGINEERING The College also offers interdisciplinary programs in Bioengineering, Environmental Engineering, and Engineering Management leading to the degree of Bachelor of Science in Engineering as well as a program in Engineering Physics leading to the degree of Bachelor of Science. Detailed statements of the requirements of each of these programs is available in the Dean's Office.

All candidates for the Bachelor of Science in Engineering degree must complete the engineering core curriculum (page 98). Students who wish to follow the Bioengineering or Environmental options should take Chemistry 1-2 (or Chemistry 11-12) in place of Chemistry 5.

In addition, candidates for this degree must complete the following courses:

Math. 271 — Applied Mathematics	3
Mech. Engr. 50 — Mechanics	4
Mech. Engr. 41 — Thermodynamics and Heat Transfer	4
Mech. Engr. 101 — Engineering Materials	3
Elec. Engr. 100 — Electrical Engineering Concepts	4
Elec. Engr. 101 — Electronic Circuits and Instruments	4
Senior project or engineering design course (three hours minimum)	

A minimum of 130 semester hours, including required courses in physical education, are required for this degree.

Mathematical Sciences Programs

The College of Engineering and Mathematics offers programs in several areas of the mathematical sciences and their applications. Curricula leading to the Bachelor of Science degree are available in Mathematics, Computer Science, and Statistics.

Core Curriculum for Mathematical Sciences

Math. 21, 22, 121, 124.

Computer Science 11.

MATHEMATICS The curriculum in Mathematics is designed to provide sound basic training in mathematics, to prepare the student for a position in an area in which persons with mathematical skills and insights are sought, and to qualify students for advanced study in graduate school. Students in the College of Arts and Sciences may concentrate in mathematics and receive the Bachelor of Arts degree. An advisor from the Department will assist students in the determination of programs best suited to their individual needs and plans.

In addition to the core curriculum (above), candidates for the B.S. degree in Mathematics must complete the following requirements:

1. *Major Courses.* Thirty additional hours in Mathematics, Statistics, or Computer Science courses numbered 100 or above. Of these 30 hours, at least 21 hours must be numbered 200 or above and not more than 12 hours may be chosen from Computer Science.
2. *Allied Field Courses.* Twenty-four hours selected from:

(a) Physical Sciences	(e) Agricultural Sciences
(b) Biological Sciences	(f) Business Administration
(c) Medical Sciences	(g) Psychology
(d) Engineering	(h) Economics

 Of these 24 hours, at least six hours must be in courses numbered 100 or above and at least six must be taken in the fields (a)-(d).
3. *Humanities and Social Studies.* Twenty-four hours selected from categories A, B, C on page 62. These must be distributed over at least two categories, and at least six hours must be taken in each of the two categories chosen.

Note: Courses used to satisfy the requirements in 2 may not be used to satisfy requirements in 3.

4. A minimum of 122 semester hours is required, including required physical education courses.

Students major in Mathematics with a variety of goals and career objectives. Each student works out with a faculty advisor a program of courses consistent with his/her aims; but to indicate the variety of possibilities, the following is a list of options available within the requirements set forth above:

The first two options are in the area of Applied Mathematics. They combine mathematical techniques with applications in order to equip the student to treat a variety of physical problems. Emphasis is on the mathematics involved in the solutions of problems and on developing methods for addressing a large spectrum of "real world" problems.

- Option 1 Mathematics of Computation.** This option emphasizes problem-solving via computers. The program of study should expose the student to several areas in which the mathematics of computation has significant applications. Recommended Mathematical Sciences courses include Math. 104, 207, 218, 230, 237, 238, 240, 274, Statistics 211, 221, Computer Science 12, 242.
- Option 2 Industrial and Applied Mathematics.** This option stresses Applied Mathematics and its uses in the scientific method of decision-making. Included in this program are such areas as operations research and modeling and their applications to education government, and industry. Students in the ROTC program will find courses in this option especially valuable in the military. Recommended Mathematical Sciences courses include Math. 207, 221, 222, 230, 236, 237, 238, 240, 241, 264, 274, 276, Statistics 151. Recommended Allied Field Courses include Physics 24, 25, and at least one advanced course in physics and engineering.
- Option 3 Pre-Graduate Training.** This option is designed for students for students who plan to do graduate work in Mathematics. The program of study will prepare students for advanced work at the graduate level. Recommended Mathematical Sciences courses include Math. 104, 207, 230, 240, 241, 242, 251, 252.
- Option 4 Secondary Education.** This option provides mathematical training for students seeking careers as teachers in secondary schools. Recommended Mathematical Sciences courses include Math. 4, 104, 251, 252, 255, 257, 260, 261. Statistics 151, 211. The student should consult the College of Education and Social Services concerning non-mathematical courses needed for certification.
- Option 5 General.** This option is intended for students whose career goals require exposure to a broad range of mathematical topics. It is recommended for premedical students and for students who are interested in the quantitative aspects of allied electives such as economics, business, biology, etc. Students in this option are advised to take several courses in Applied Mathematics, Statistics, and Computer Science as well as several courses in a chosen allied elective area.

Students electing any of the above options must meet the requirements for a B.S. in Mathematics as stated above.

STATISTICS Students receiving the B.S. degree in Mathematics may elect Statistics as their major. In addition, students receiving a B.A. degree in Arts and Sciences may specialize in Statistics as a part of their Mathematics major. Statistics is a mathematical science extensively used in a wide variety of fields. Indeed, every discipline which gathers and interprets data uses statistical concepts and procedures to understand the information

implicit in their data base. Statisticians become involved in efforts to solve real world problems by developing and investigating stochastic models, designing surveys and experimental plans, constructing and interpreting descriptive statistics, and developing and applying statistical inference procedures. To investigate new statistical procedures requires a knowledge of mathematics and computing as well as statistical theory. To apply concepts and procedures effectively also calls for an understanding of the field of application.

The program is designed for students who plan to enter business, industry, or government as statisticians, plan to become professional actuaries, or to continue to graduate school in statistics or a related quantitative field (biostatistics, operations research, demography, biomathematics, etc.). The courses and curricula are administered through the Statistics Program Steering Committee which includes faculty from Mathematics, College of Medicine Biometry Facility, Physiology and Biophysics, Business Administration Psychology, Forestry, the Agricultural Experiment Station, and the Academic Computing Center. This broad representation of disciplines affords students excellent opportunities for gaining direct experience in the application of statistics. Cooperative work programs afford an opportunity for intensive experience in industry or business during a semester away from the University.

Students specializing in statistics are required to complete the requirements given above for the B.S. in Mathematics with the following specific requirements:

- a. Mathematical Science courses must include 21 semester hours of Statistics including 141, or 211, 151 or 251, 241, or 262, 221 or 227 or 229, and 281.
- b. Allied field courses must include a laboratory science course (eight credits). The student in consultation with his/her Statistics Program advisor must plan a sequence of allied field courses consistent with his/her professional and career goals. Students interested in pursuing intensive studies in an area not specifically listed are encouraged to plan a program with their advisor and submit it to the Studies Committee for review and approval.
- c. Humanities and Social Studies must include English 1 and Communication 11 or 14.

Further details on the Statistics curriculum may be obtained at the Statistics Program Office.

COMPUTER SCIENCE Computer Science is one of the mathematical sciences, although there are strong ties to electrical engineering. It is the study of the theoretical basis, design, and application of electronic computing machines.

A student interested in majoring in Computer Science will have a faculty member from the Computer Science Program assigned as advisor. The program offers the B.S. and M.S. degrees in Computer Science.

The Computer Science curriculum provides a broad basic training in Computer Science with required courses in the theory of computing, hardware design, and software techniques. A minor specialization in an allied field is required so that the student develops an appreciation for the applicability of his/her knowledge of computer science.

Requirements for the degree of Bachelor of Science in Computer Science are, in addition to the Mathematical Sciences core (page 102):

Computer Science: 12, 101, 102, 103, 104, 201, 222, 241, 242

Other Mathematical Science: Math. 104, 124; Statistics 141, 151

Electrical Engineering: 131

Physics: 24, 25

Other: English 1, Communications 11.

Minor Field: Six semester courses for a minimum of 18 credits in an allied area. Suggested areas are: business administration, social science, physical science, biological science, or engineering. Students who wish to minor in Mathematics or Statistics may do so and are required to take only four courses numbered 200 or above the area of their choice.

In order to assure that the courses chosen to constitute the minor specialization form a cohesive unit, all minor programs must be approved by the Computer Science Studies Committee.

Distribution Requirements: A student must complete at least two semester courses for a minimum of six credits in each of the two areas:

A. Social Science to include:

Anthropology	Political Science
Economics	Psychology
Geography	Sociology
History	

B. Humanities, Fine Arts, and Philosophy to include:

Language	Music
Literature	Speech
Art	Philosophy
Drama	Religion

Courses used to fill the other requirements may not be used to fill the distribution requirement.

A typical program in Computer Science is as follows:

	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Computer Sci. 11, 12	3	3	Computer Sci. 101, 102	3	3
Math. 21, 22	4	4	Math. 121, 124	4	3
English 1	3	-	Math. 104	-	3
Communication 11	-	3	Physics 25	4	-
Physics 24	-	4	Statistics 141, 151	3	3
Electives	6	3	Electives	3	3
	<hr/>	<hr/>		<hr/>	<hr/>
	16	17		17	15
JUNIOR YEAR	1st	2nd	SENIOR YEAR	1st	2nd
	SEMESTER			SEMESTER	
Computer Sci. 103, 104	3	3	Computer Sci. 201	3	-
Elec. Engineering 131	3	-	Computer Sci. 241, 242	3	3
Computer Sci. 222	-	3	Electives	9	12
Electives	9	9			
	<hr/>	<hr/>		<hr/>	<hr/>
	15	15		15	15

A minimum of 125 semester hours is required, including required courses in physical education.

The Division of Health Sciences

The Division of Health Sciences brings together several related programs in this important field. It includes the College of Medicine, the School of Allied Health Sciences, and the School of Nursing.

The Division reserves the right to require the withdrawal of any student from any curriculum whose health, academic record, or performance and behavior in the professional careers in judged unsatisfactory.

The College of Medicine

Refer to the College of Medicine Bulletin for information on admission and curriculum. The Bulletin is available from the Dean's Office, College of Medicine, Given Medical Building.

The School of Allied Health Sciences

Dental Hygiene
Medical Technology
Medical Laboratory Technology
Physical Therapy
Radiologic Technology
Nuclear Medicine Technology
Radiation Therapy
Radiographic Technology

Associate in Science
Bachelor of Science
Associate in Science
Bachelor of Science
Associate in Science

The School of Allied Health Sciences offers a variety of programs in response to the social and health care needs of our community. It encourages interaction among its students and faculty in meeting this need. All programs offer clinical education experiences in a variety of appropriately approved hospitals and health facilities in Vermont and the eastern part of the country. The academic programs are accredited by the responsible professional agencies. Criteria for academic standards will be given to students at registration time and also will be available upon request from the Director's and departmental offices.

THE PROGRAM IN DENTAL HYGIENE

The Department of Dental Hygiene offers a two-year curriculum leading to an Associate in Science degree and a Certificate in Dental Hygiene.

The program is accredited by the Commission on Dental Accreditation of the American Dental Association. Graduates are eligible to write the National Board Examination in Dental Hygiene and meet requirements for licensure determined by most individual states.

Dental hygienists are health professionals who, in cooperation with the dental profession, strive to provide services which promote optimum oral health for the public. Dental hygiene services are primarily educational and preventive in nature and they are provided through a variety of health care settings including general and specialty dental practices, community health agencies, and public schools.

Requirements for admission to the Dental Hygiene program are identical with general University requirements, with the additional recommendation that applicants write the Dental Hygiene Aptitude Test. Information and application forms for this test are available from the American Dental Hygienist's Association, Testing Division, 666 N. Lake Shore Drive, Suite 1136, Chicago, Ill. 60611. Applicants are welcome to visit the department and to discuss dental hygiene with faculty and students.

As this program of study is scientifically orientated, high school courses in algebra, chemistry, and biology are important prerequisites. Personal attributes essential to success include good health, emotional stability, task orientation, high moral standards, and an ability to relate well with patients of all ages.

The courses of study are designed to give the student a well-rounded foundation in basic sciences, specific knowledge in dental sciences and an understanding of the humanities. Clinical experience is obtained in the Department's dental hygiene clinic where patients of all ages and with varieties of problems receive service. Dental hygiene students also have an opportunity to increase their communication skills through oral health education presentations in schools in the area.

FIRST YEAR	1st SEMESTER	2nd SEMESTER	SECOND YEAR	1st SEMESTER	2nd SEMESTER
Dental Hygiene Core 3-4	7	5	Dental Hygiene 145-146	5	3
Human Nutrition & Foods 46	3	-	Dental Hygiene 71	1	-
Anatomy 9	4	-	Dental Hygiene 181-182	4	4
English 1 (or higher level)	3	-	Microbiology 55	4	-
Dental Hygiene 61	-	2	Communication 11	3	-
Chemistry 3	-	4	Dental Hygiene 62	-	2
Physiology 10	-	3	Dental Hygiene 91	-	2
Psychology 1	-	3	Sociology or Anthropology	-	3
Physical Education	1	-	Elective	-	3
	<hr/> 18	<hr/> 17		<hr/> 17	<hr/> 17

A minimum of 69 approved semester hours and a grade-point average of 2.0 is required for the Associate degree in this curriculum. A grade of "C" or better is required for all professional courses.

PROGRAMS IN MEDICAL TECHNOLOGY

The Department of Medical Technology offers an integrated Associate degree and Baccalaureate degree curriculum. Both of these programs are accredited by the American Medical Association through the National Accrediting Agency for Clinical Laboratory Sciences.

Requirements for admission to study in these programs are identical with general University requirements, with the additional requirement that applicants have taken high school biology and chemistry; physics is highly recommended.

The Associate degree program is designed to prepare individuals for technical practice and to promote personal development as responsible members of society, by providing a reasonable balance between general education content and specific medical laboratory knowledge and practice. Graduates of the Associate degree program are eligible for national certification as laboratory technicians. The process of certification is a written examination covering the material included in professional courses. As there are many certifying agencies, students will be advised of options for certification during the second year.

The Baccalaureate degree program is designed to extend the knowledge and judgment acquired at the Associate degree level preparing the individual to assume a leadership role in his/her professional practice. Students are admitted into the following curriculum options: Clinical Chemistry, Hematology, Clinical Microbiology, and Generalist. On completion of the Baccalaureate degree, the student is eligible for certification at the Baccalaureate level. There are many agencies through which the student may be certified. Details of the certification process will be explained during the final year.

The Program offers clinical laboratory experience in the laboratories of the University and Medical Center Hospital of Vermont.

Due to space limitations imposed by physical facilities, the number of students admitted to the Baccalaureate degree program is limited. Students desiring admission to this B.S. degree program make application to the School of Allied Health Sciences in the spring of the second year. The applicant must show evidence of technical proficiency, good academic achievement, and adherence to high standards of professionalism.

Associate Degree Curriculum

FIRST YEAR	1st SEMESTER	2nd SEMESTER	SECOND YEAR	1st SEMESTER	2nd SEMESTER
English	3	-	Chemistry 16	4	-
Math. (by placement)	3-4	-	*Medical Technology 20	-	6
Chemistry 3	4	-	*Medical Technology 40	-	5
Anatomy 9	4	-	*Medical Technology 30	5	-
Medical Technology 3	1	-	*Medical Technology 50	5	-
Biochemistry 102	-	4	Medical Technology 2	-	2
Physiology 10	-	3	Electives	3	3
Microbiology 55	-	4			
Physical Education	1	1			
Electives	-	3-6			
	<hr/> 16-17	<hr/> 15-18		<hr/> 17	<hr/> 16

*Sequence of professional courses may be either fall or spring.

A minimum of 61 approved semester hours including University requirements for physical education activity of one credit hour and a grade-point average of 2.0 are required for the Associate degree in this curriculum. A minimum grade-point average of 2.0 in professional courses is necessary for recommendation to certification agencies for examination.

Baccalaureate Degree Curriculum

THIRD YEAR	1st SEMESTER	2nd SEMESTER	FOURTH YEAR	1st SEMESTER	2nd SEMESTER
Biochemistry 211-212	4	4	Medical Technology 141	3	-
Physics 11-12	4	4	Medical Technology 195	3	-
Pathology 101	3	-	Medical Technology 196	-	2
Statistics 111	-	3	Specialty Courses*	8-12	5-13
Specialty Courses*	4	3-4	and/or		
Electives	3	3-6	Electives	3	6-12
	<hr/> 17-18	<hr/> 17-18		<hr/> 17-18	<hr/> 16-18

*The specific distribution of required specialty and elective courses for the four curricular options: Generalist, Chemistry, Hematology, and Microbiology, is available from the department on request.

A minimum of 128 semester hours including physical education activity requirement of two credit hours and a grade-point average of 2.0 are required for the Bachelor of Science degree.

THE PROGRAM IN PHYSICAL THERAPY

The Department of Physical Therapy offers a four-year curriculum leading to a Bachelor of Science degree. In the freshman and sophomore years, students will concentrate on the necessary prerequisite courses. These prerequisites are in the humanities, sciences, and social studies. In the sophomore year, the student will begin the basic sciences of anatomy and physiology and introductory courses in Physical Therapy. The junior and senior years are devoted to the professional program with time to further explore the humanities and

social sciences required for a liberal education. During the professional program, clinical education experiences will provide the student with concurrent opportunities to apply the acquired knowledge and skills. The program of study is:

	1st	2nd		1st	2nd
FIRST YEAR	SEMESTER		SECOND YEAR	SEMESTER	
Psychology 1	3	-	+ Mech. Engineering 93	4	-
Biology 1 & 2	4	4	+ Elec. Engineering 94	-	4
Chemistry	4	4	Anatomy 201	5	-
Math. (by placement)	3	-	Physiology 101	-	5
English (by placement)	-	3	Physical Therapy 21, 22	3	3
Psych. Elective	-	3	Physical Therapy 110	-	3
*Elective	-	3	+ Statistics	3	-
Physical Education	1	1	*Electives	3	3
	<hr/> 15	<hr/> 18		<hr/> 18	<hr/> 18

*Optional/Advisor

+ or other approved course

*Optional/Advisor

	1st	2nd		1st	2nd
THIRD YEAR	SEMESTER		FOURTH YEAR	SEMESTER	
Anatomy 202	3	-	Physical Therapy 151-152	5	3
Physiology 102	5	-	Psychology 295	3	-
Pathology 101	3	-	Physical Therapy 133	1	-
Physical Therapy 121-122	3	4	Pharmacology 190	-	2
Physical Therapy 124	-	4	Physical Therapy 158	-	6
Physical Therapy 131-132	1	2	Physical Therapy 173-174	3	2
Physical Therapy 144	-	2	Physical Therapy 176	-	2
*Physical Therapy 142	-	2	*Electives	6	-
*Electives	3	4			
	<hr/> 18	<hr/> 18		<hr/> 18	<hr/> 15

*Optional/Advisor

*Optional/Advisor

SUMMER PROGRAM

Physical Therapy 128 3

A minimum of 124 credits are required for graduation, to include six credits in the humanities.

A minimum grade-point average of 2.0 is required for the baccalaureate degree in this curriculum. At the end of each semester and prior to each Clinical Education assignment, the faculty review the development of professional attitudes and behaviors of the majors in this program as well as the quality of their academic record.

The full-time Clinical Education Program (P.T. 128, P.T. 158) is an integral part of the curriculum offering the student opportunities to apply academic knowledge in the clinical setting. The program is widely affiliated throughout the Northeastern United States. Students affiliating will be responsible for the cost of transportation and living expenses (including room and board) during the six-week period of the junior summer and the 12-week period of the senior spring semester. Students should plan their finances to include these expenses.

The affiliations will be scheduled as indicated unless inconvenient for the clinical facilities. Students may be required to affiliate during an alternate time period if sufficient clinical facilities are not available.

THE PROGRAMS IN RADIOLOGIC TECHNOLOGY

The Department of Radiologic Technology offers three 24-month programs leading to the Associate in Science degree.

1. The **Radiography Program** prepares persons for a career in operating X-ray equipment to obtain diagnostic information on patients.
2. The **Nuclear Medicine Technology Program** prepares persons for a career in working with radioactive drugs and complex equipment for diagnosing patient problems.
3. The **Radiation Therapy Technology Program** prepares persons for a career in operating high energy radiation machines for treating cancer patients.

During the semester, students obtain direct experience with patients at the Medical Center Hospital of Vermont (MCHV). Summertime clinical experiences are obtained at the MCHV and other hospitals throughout the region. The summer clinical experiences will require additional room, meal, transportation, and tuition expenses.

A limited number of eligible graduates of these programs may transfer to the College of Education and Social Services to complete a B.S. degree program for a teaching career in Radiologic Technology.

Registered technologists from hospital-based programs are encouraged to apply. Equivalency examinations are available in all Radiologic Technology courses and will be administered after a person matriculates.

All three programs are accredited by the American Medical Association and graduates are eligible to write the national registry examination.

Interested persons should write directly to the Department in the Rowell Building for additional information, interview, and tour of clinical facilities.

NUCLEAR MEDICINE TECHNOLOGY PROGRAM

FIRST YEAR	1st SEMESTER	2nd SEMESTER	SECOND YEAR	1st SEMESTER	2nd SEMESTER
Anatomy 9	4	-	Chemistry 3	4	-
Math. (by placement)	3	-	Distribution	-	3
Physical Education	1	-	Radiologic Tech. 131, 132	5	3
Radiologic Tech. 1	2	-	Radiologic Tech. 133, 134	3	3
Radiologic Tech. 31, 32	1	3	Communications 11 or 14	3	-
Radiologic Tech. 33, 34	1	1	Radiologic Tech. 138	-	2
English	3	-	Elective	-	6
Radiologic Tech. 4	-	3			
Physiology 10	-	3			
Computer Science 3	-	3			
Distribution	-	3			
	<hr/> 15	<hr/> 16		<hr/> 15	<hr/> 17

SUMMER SESSION

Radiologic Tech. 187

3

SUMMER SESSION

Radiologic Tech. 188

3

RADIOGRAPHY PROGRAM

FIRST YEAR	1st SEMESTER	2nd SEMESTER	SECOND YEAR	1st SEMESTER	2nd SEMESTER
Anatomy 9	4	-	Distribution	6	-
Math. (by placement)	3	-	Radiologic Tech. 111, 112	3	3
Physical Education	1	-	Radiologic Tech. 113, 114	3	3
Radiologic Tech. 1	2	-	Radiologic Tech. 115	4	-
Radiologic Tech. 11, 12	2	3	Radiologic Tech. 110	-	3
English	3	-	Electives	-	6
	<hr/> 16	<hr/> 16		<hr/> 16	<hr/> 15

(cont'd)

	1st	2nd
FIRST YEAR	SEMESTER	
Radiologic Tech. 4	-	3
Radiologic Tech. 14	-	3
Physiology 10	-	3
Communication 11 or 14	-	3
	<hr/> 15	<hr/> 15

SUMMER SESSION

Radiologic Tech. 185

3

SUMMER SESSION

Radiologic Tech. 186

3

RADIATION THERAPY TECHNOLOGY PROGRAM

FIRST YEAR	1st	2nd	SECOND YEAR	1st	2nd
	SEMESTER			SEMESTER	
Anatomy 9	4	-	Communication 11 or 14	3	-
Math. (by placement)	3	-	Radiologic Tech. 121, 122	3	4
Physical Education	1	-	Radiologic Tech. 123, 124	3	3
Radiologic Tech. 1	2	-	Radiologic Tech. 125, 126	2	2
Radiologic Tech. 21, 22	1	2	Elective	3	3
Radiologic Tech. 23, 24	1	1	Radiologic Tech. 110	-	3
English	3	-	Computer Science 3	3	-
Radiologic Tech. 4	-	3			
Physiology 10	-	3			
Distribution	-	3			
	<hr/> 15	<hr/> 15		<hr/> 17	<hr/> 15

SUMMER SESSION

Radiologic Tech. 189

3

SUMMER SESSION

Radiologic Tech. 190

3

DISTRIBUTION (at least one three-credit course from two of the three categories).

- A. Anthropology, human development, philosophy, psychology, religion, sociology.
- B. Economics, environmental studies, geology, military studies, political science, geography, history, natural resources, art history, agricultural economics, business administration, forestry, music history, and literature.
- C. Theatre, music theory and composition, studio art, classics, German, Hebrew, French, Spanish, and Russian.

A minimum of 61 approved semester hours with a cumulative grade-point average of 2.0 and a grade-point average of 2.0 in Radiologic Technology courses are required for the Associate degree in this curriculum.

COORDINATORS IN CLINICAL AFFILIATIONS

NUCLEAR MEDICINE TECHNOLOGY

Bohannon, Jean, R. T.; Medical Center Hospital of Vermont, Burlington, VT.
 Coppinger, Denise, R. T.; Maine Medical Center, Portland, ME
 Kieran, James, R. T.; Winchester Memorial Hospital, Winchester, MA
 Lawrenson, Sue; Albany Medical Center, Albany, NY
 O'Brien, Patrick, R. T.; Mary Hitchcock Medical Center, Hanover, NH
 Rich, Dayton, R. T.; Hartford Hospital, Hartford, CT
 Rubel, Ted., R. T.; Memorial Hospital, New York, NY

RADIOGRAPHY

Canalas, Richard, R.T.; Central Vermont Medical, Berlin, VT
 Cunningham, Dan, R.T.; Medical Center Hospital of Vermont, Burlington, VT
 Horton, James, R.T.; Osteopathic Hospital of Maine, Portland, ME

Jones, Karl, R.T.; Putnam Memorial Hospital, Bennington, VT
 Kibbee, Gary, R.T.; North Country Hospital, Newport, VT
 Lacasse, Iris, R.T.; Medical Center Hospital of Vermont, Burlington, VT
 Quintana, Mary, R.T.; Mary Hitchcock Medical Center, Hanover, NH
 Revoire, Brenda; Fanny allen Hospital, Winooski, VT
 Suprenant, Dorothy, R.T.; Fairlawn Hospital, Worcester, MA
 Tidd, Joel, R.T.; Brattleboro Memorial Hospital, Brattleboro, VT
 Winn, Donna, R.T.; Northwestern Medical Center, St. Albans, VT

RADIATION THERAPY TECHNOLOGY

Jones, Gisela, T.T.; Mary Hitchcock Medical Center, Hanover, NH
 Morley, Patricia, R.T.; Medical Center Hospital of Vermont, Burlington, VT
 Powel-Smith, Carol; R.T.; Eliot Hospital, Manchester, NH
 Sawyer, Gale, R.T.; Maine Medical Center, Portland, ME
 Trembley, Kathy, R.T.; Massachusetts General Hospital, Boston, MA

The School of Nursing

Technical Nursing—(two years)

Associate in Science

Professional Nursing—(four years)

Bachelor of Science

The School of Nursing offers two distinct educational programs to prepare qualified individuals for the practice of nursing. The Professional Nursing program is four years in length and leads to the Bachelor of Science degree. The Technical Nursing program is two years in length and leads to the Associate in Science degree. Both programs are approved by the Vermont State Board of Nursing and accredited by the National League for Nursing, Inc.

Transfer between the two programs is possible in accord with University policy and with consent of the departments concerned.

Applicants must satisfy the general admissions requirements for the University. For the baccalaureate program, a high school course in chemistry is required and courses in biology and physics are highly recommended. For the Associate degree program, courses in biology, chemistry, and physics are recommended.

A minimum 2.0 grade-point average is required for graduation. Grades in nursing courses are based on achievement in theory and in laboratory practice, both of which must be satisfactory to receive a passing grade. Refer to departmental sections for specific policies. The School of Nursing reserves the right to require the withdrawal from nursing of any student whose health, academic record, or performance and behavior in nursing is judged unsatisfactory.

All students in the School of Nursing are required to carry professional liability insurance when enrolled in clinical nursing courses and are responsible for transportation to and from the agencies which are used for clinical experiences. These include the Medical Center Hospital of Vermont; Birchwood Terrace Health Care; the Burlington Visiting Nurses' Association, Inc.; and other selected agencies in the Burlington, Middlebury, and St. Albans areas. For seniors in the baccalaureate program, it is required that a car be available for use in community experiences in the senior year.

Financial aid is available in the form of scholarships, loans, prizes, and employment (see section on Financial Aid). Of special interest to students in nursing is the Nursing Student Loan Program. Anyone interested should make application for financial aid by February 1.

PROFESSIONAL NURSING PROGRAM

The Department of Professional Nursing offers a curriculum leading to the Bachelor of Science degree. This curriculum is designed to provide the opportunity for qualified individuals to prepare for professional practice in beginning positions in various settings, to acquire a foundation for continued formal study in nursing, and to enhance growth toward maturity as individuals, professional persons, and citizens. The graduates of this program are eligible to apply for licensure as registered nurses. They may advance without further formal education to positions which require beginning administrative skills.

The curriculum, conducted in four academic years, provides an approximate balance in general and professional education. Courses in the sciences — biological, physical, and social — serve as a foundation for the professional nursing courses.

A minimum of 125 approved semester hours is required for the Bachelor of Science degree. A grade of "C" or better is required in Chemistry 4, Zoology 5-6, Microbiology and Biochemistry 55, Professional Nursing 26, 125-126, 225, 226, and 252.

A typical program of studies follows:

FRESHMAN YEAR		1st	2nd	SOPHOMORE YEAR		1st	2nd
		SEMESTER				SEMESTER	
English		3	3	Early Childhood & Human Development 80-81		3	3
Psychology 1		-	3	Micro. and Biochem. 55		4	-
Chemistry 3-4		4	4	Zoology 5-6		3	3
Sociology 10 or 11		3	-	Prof. Nursing 25		-	3
Communication 11		3	-	Prof. Nursing 26		-	3
Electives		3	6	Human Nutr. & Foods 141		-	3
Physical Education		1	1	Electives		6	-
		17	17			16	15
JUNIOR YEAR		1st	2nd	SENIOR YEAR		1st	2nd
		SEMESTER				SEMESTER	
Prof. Nursing 125		9	-	Prof. Nursing 225		9	-
Prof. Nursing 126		-	9	Prof. Nursing 226		-	9
Electives		6	6	Prof. Nursing 251		3	-
				Prof. Nursing 252		-	6
				Elective		3	-
		15	15			15	15

In addition to the general educational courses found in the curriculum outline, specific courses in general education are required and additional courses are elected in accordance with individual need and interest and in consultation with the faculty advisor. These are:

Social Sciences — 15 credits, including:

Psychology 1 and Sociology 10 or 11

Humanities and Languages — 15 credits, including:

English — six credits

Philosophy or Religion — three credits

Communication 11 — three credits

General Electives — 15 credits

General electives may be chosen in an area of the student's choice. Students desiring to elect a sequence of courses in a given area, such as foreign languages or mathematics, should begin the sequence during the freshman year.

TECHNICAL NURSING PROGRAM

The Department of Technical Nursing offers a curriculum leading to the Associate in Science degree. The curriculum is designed to prepare qualified individuals to give direct nursing care to patients of all age groups and to promote development of the individual as a responsible member of society. The graduates of this program are eligible to apply for licensure as registered nurses and are prepared for nursing practice in hospitals, nursing homes, and other health agencies.

The curriculum is two academic years in length. General education courses and courses related to nursing account for approximately one-half of the total required credits, and nursing courses for the remaining one-half. Nursing courses are taught concurrently with general education courses throughout the two years and include classroom instruction and guided clinical experiences in selected agencies.

A minimum of 63 approved semester hours is required for the Associate in Science degree. A grade of "C" or better is required in Anatomy 9, Physiology 10, Technical Nursing 15-16 and 123-124.

A typical program of studies follows:

	1st SEMESTER	2nd SEMESTER		1st SEMESTER	2nd SEMESTER
FIRST YEAR			SECOND YEAR		
English 1 or English Elective	-	3	Sociology 10	3	-
Early Childhood & Human Development 80-81	3	3	Approved Elective**	-	3
Anatomy 9	4	-	Free Elective	-	3
Physiology 10	-	3	Tech. Nursing 123-124	10	10
Human Nutr. & Foods 46	3	-	Tech. Nursing 130	2	-
Tech. Nursing 15-16	6	6			
Physical Education*	-	1			
	<hr/> 16	<hr/> 16		<hr/> 15	<hr/> 16

*Physical Education: One credit during the two years.

**Anthropology, English, history, philosophy, political science, and/or religion.

ADVANCED STANDING

The School of Nursing provides an opportunity for individuals who have had prior experience in the health field to receive advanced standing in the program to which admission is sought. Admission to the program is essentially the same as for other applicants to the University. In accord with University policy, the student may apply for credit by examination in general education and selected nursing courses.

Individuals planning to seek admission with advanced standing are urged to write to the School of Nursing for more detailed information and to arrange for a personal interview prior to applying for admission or taking courses for college credit at this or another institution.

OPPORTUNITIES FOR REGISTERED NURSES

The advanced standing policies outlined above are applicable to registered nurse students seeking a baccalaureate degree in nursing. Students may enroll in the regular full-time program or the Alternate Track for Vermont registered nurses. The alternate track allows the registered nurse student the opportunity to complete all but one semester (spring-senior year) of the program on a part-time basis.

CONTINUING EDUCATION

The School of Nursing sponsors continuing education programs which are offered in different locations within the state to meet the needs of registered nurses. The School cooperates with health-related agencies, institutions, and professional organizations in sponsoring additional programs. A tentative schedule for each year can be obtained from the School of Nursing or Regional Coordinators.

The School of Natural Resources

Forestry	Bachelor of Science
Recreation Management	Bachelor of Science
Resource Economics	Bachelor of Science
Wildlife and Fisheries Biology	Bachelor of Science
Environmental Studies-Natural Resources	Bachelor of Science
Undecided-Natural Resources	No Degree

The major goal of the School of Natural Resources is to encourage and stimulate the development of leaders for the stewardship of renewable natural resources. Academic programs provide the philosophical and scientific bases for addressing critical issues facing society in the allocation, management, and utilization of resources. The programs require a foundation in communication skills, the humanities and social sciences, the physical and biological sciences, and the quantitative areas of mathematics and statistics. The technical and applied education of the natural resource programs builds from that knowledge base to prepare individuals for careers in forestry, wildlife and fisheries biology, outdoor recreation, resource economics, and environmental studies.

The School emphasizes scholastic excellence and the development of professional responsibility. Faculty members are conscientious in their roles as academic advisors. The relationship of the student and his or her advisor is of central importance to the supportive atmosphere of the School. Students should communicate frequently with their advisors to obtain assistance in clarifying and meeting their educational and professional goals. Students also are urged to become active in selected student and professional natural resource organizations.

The minimum cumulative grade-point requirement for the Bachelor of Science degree in the School of Natural Resources is 2.00. Additionally, a student must successfully complete the following:

- a. 120 credit hours;
- b. a minimum of three courses and at least nine credit hours in each of the following five areas: biological and earth sciences, quantitative sciences, communications, social sciences, and arts and humanities; and
- c. further requirements as specified by the individual's academic program.

FORESTRY

The program in Forestry provides a liberal education in the humanities and sciences and a professional education in forestry. The professional core emphasizes the science and techniques of coordinating the management of forest and wild lands for forest products, water, wildlife, and recreation. The program is designed to prepare individuals for positions in forestry or for graduate study in the forest sciences. A non-professional minor option in forestry is available on a limited basis. For details consult the department.

A minimum of 130 credit hours of prescribed and elective courses is required for graduation.

	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Math. 19, Calculus I ¹	3	-	Statistics 141, Basic Meth.	3	-
Zoology 9, Gen'l Zool.	4	-	Civil Engr. 12, Plane Surv.	4	-
Botany 4, Intro. Plant Biol.	-	4	For. 5, Dendrology	4	-
For. 1, Intro. to Forestry	3	-	Plant and Soil Sci. 161,		
English ⁵	3	-	Intro. Soil Sci.	4	-
Chemistry 3, Gen'l Chem.	-	4	For. 120, Forest Ecology	-	3
Physical Educ.	1	1	For. 140, For. Biometry I	-	4
Other Courses ^{4, 5}	0-3		Computer Science 11		
			Prgmng. I	-	3
			Other Courses ^{4, 5}	-	5-6

SUMMER FIELD PROGRAM

For. 122, Forest Ecosystems Analysis	4
For 142, Forest Biometry II	4

	1st	2nd		1st	2nd
JUNIOR YEAR	SEMESTER		SENIOR YEAR	SEMESTER	
For. 123, Silviculture	4	-	For. 163, Timber Harvest.	3	-
For. 151, For. Econ.	3	-	For. 251, For. Policy and		
For. 161, Wood Tech.	3	-	Administration	3	-
Other Courses ^{2, 3, 4, 5}	5-6	15	For. 272, Forestry Mgmt.	-	3
			Other Courses ^{3, 4, 5}	9	12

Total Program Requirements, Semester Hours

130

- ¹ Students not qualified to enter Math. 19 will take Math. 10 during the first semester followed by Math. 19 during the second semester.
- ² Two courses in forest protection (Forestry 132, 133, 134) must be taken during the junior year.
- ³ Two courses from the following (Forestry 276, Recreation Mgmt. 235, Wildlife Biology 74 or 174, or an approved water-related course) must be taken during the junior and senior years.
- ⁴ All students must complete the following requirements in the arts, humanities, and social sciences:
 - a. one course in economics prior to Forestry 151;
 - b. two courses in social sciences from anthropology, economics, geography, history, political science, psychology, or sociology; and
 - c. three courses in the arts and humanities from art, classics, English, foreign language, literature, history, music, philosophy, religion, or theatre.
- ⁵ All students must complete the following requirements in English and communication:
 - a. one course from English 1, 50 or 53;
 - b. Communication 11, Effective Speaking; and
 - c. one communication elective course from an approved list.

WILDLIFE AND FISHERIES BIOLOGY

This program prepares individuals for professional careers requiring expertise in wildlife and fisheries biology and ecology. All majors must complete a core of courses which meets the minimum recommendations of The Wildlife Society for professional training, and which satisfies educational requirements of the U.S. Office of Personnel Management as well as most state agencies for entrance grades in wildlife positions. Program flexibility allows each student, in consultation with an advisor, to expand the core with coursework appropriate to personal educational and career goals.

Course sequences can be developed in preparation for traditional positions in wildlife management, graduate study in wildlife or fisheries science, or other positions in wildlife or fisheries resources.

Completion of 127 semester hours of credit in core and elective courses is required for the Bachelor of Science degree.

FRESHMAN YEAR	1st SEMESTER	2nd SEMESTER	SOPHOMORE YEAR	1st SEMESTER	2nd SEMESTER
Biol. 1,2 or Botany 4, Zool. 9, Intro. Biol.	4	4	Botany 109 or Forestry 5, Plant Taxonomy	4	-
Chemistry 3 and 4, or 42, Intro. Chemistry	4	4	One course from Biol. 102, Botany 160, Forestry	-	3-4
Math. 19, Calculus I ¹	3	-	120, Ecology	-	3-4
English 1 or 50, Comm. ²	-	3	Wildlife Biol. 174, Princ. of Wildlife Mgmt.	-	3
Physical Educ.	1	1	Plant and Soil Sci. 161, Intro. Soils	4	-
Electives ³	3	3	Statistics 141, Basic Meth.	3	-
			Computer Sci. 11, Programming I	3	-
			Forestry 140, For. Biometry	-	4
			Communication ²	3	3-6
SUMMER PROGRAM					
			Wildlife Biol. 130, Ornithology	4	
			Wildlife Biology 151, Biometry	2	

JUNIOR YEAR	1st SEMESTER	2nd SEMESTER	SENIOR YEAR	1st SEMESTER	2nd SEMESTER
Animal Sci. 171, or Biol. 103 & Biol. 101, or Zool. 104 or Zool. 219, Struct./Funct.	3-4	4	Wildlife Biol. 271 & 272, Wildlife Ecology/Mgmt.	4	4
Wildlife Biol. 161, Fisheries Biol.	4	-	Natural Res. Law, Plan- ning, Policy (two courses)	0-3	3-6
One course from Natural Res. 278, Zool. 204, 236, 237, Aquatic Ecol./Mgmt.	0-4	0-4	Electives ³	6-10	6-9
Zoology 217, Mammology Communication ²	4	-			
Electives ³	-	3			
	0-3	3-6			

Total Program Requirements, Semester Hours

127

¹ Qualified students may substitute higher math; those not qualified for Math. 19 will take Math. 10 in the fall semester followed by Math. 19 in the spring semester.

² Communication requirements for all students: English 1 or 50, Communication 11 plus two additional courses from an approved list.

³ All students must complete the following requirements in arts, humanities, and social sciences:

- a. one course in economics (Agricultural and Resource Economics 61 or Economics 11);
- b. two additional courses from anthropology, geography, political science, psychology, sociology; and
- c. three courses from at least two of the areas: art, classics, music, foreign languages, history, philosophy, religion.

RECREATION MANAGEMENT

All majors in Recreation Management are required to successfully complete a series of core courses during the freshman and sophomore years. Upon completion of the sophomore year, the students elect to concentrate in one of two areas: Public Outdoor Recreation or Private Outdoor Recreation and Tourism.

These concentrations are designed to prepare students for professional careers in the management of outdoor recreation resources. The public recreation resources include

parks, forests, wilderness, and recreation areas at the local, regional, state, and federal governmental levels. Private resources include ski areas, campgrounds, hunting preserves, resorts, and other specialized recreation facilities.

PUBLIC OUTDOOR RECREATION The Recreation Management Program's concentration in public land management prepares the student for a professional career in the planning and management of natural resources for outdoor recreation use. It combines course work from natural resource disciplines with social sciences, communications, and public administration and management.

PRIVATE OUTDOOR RECREATION AND TOURISM This concentration is designed to prepare students for careers in private outdoor recreation and tourism enterprises. Special emphasis is given to the management of private ski areas, but the program permits specialization in several types of private recreation businesses. Course work is concentrated in natural resource management and business administration.

A minimum of 127 semester hours of required and elective courses is required for the Bachelor of Science degree.

	1st	2nd		1st	2nd
FRESHMAN YEAR	SEMESTER		SOPHOMORE YEAR	SEMESTER	
Communication Electives ¹	3	3	Communication Electives ¹	3	3
Quantitative Sciences Electives ²	3	3	Quantitative Sciences Electives ²	3	-
Natural Sciences Electives ³	-	4	Natural Sciences Electives ³	3	4
Social Sciences Electives ⁴	6	-	Social Sciences Electives ⁴	3	6
Arts and Humanities Electives ⁵	3	3	Civil Engr. 112, Plane Surv.	4	-
Rec. Mgmt. 8, Rec. and Resources	-	3	Geography 81, Intro. Cartography	-	3
Physical Educ. Electives	1	1			

SUMMER FIELD TRAINING
Recreation Mgmt. 150, Rec. Mgmt.⁶ 4

	1st	2nd		1st	2nd
JUNIOR YEAR	SEMESTER		SENIOR YEAR	SEMESTER	
Rec. Mgmt. 138, Park Design	3	-	Rec. Mgmt. 153, Rec. Admin. and Operations	3	-
Rec. Mgmt. 225, Econ. of Outdoor Rec. & Tourism	-	3	Rec. Mgmt. 155, Environ. Interpretation	3	-
Rec. Mgmt. 235, Outdoor Rec. Planning	3	-	Rec. Mgmt. 157, Ski Area Mgmt.	-	3
Electives ⁷	9	12	Rec. Mgmt. 159, Part. in Rec. Mgmt.	3	-
			Rec. Mgmt. 182, Senior Rec. Seminar	-	2
			Rec. Mgmt. 240, Wilderness & Wilderness Mgmt.	-	3
			Electives ⁷	6	5

Total Program Requirements, Semester Hours

127

- ¹ All students must complete the following: Communication 11, Effective Speaking; English 50, Expository Writing; and two other courses in English.
- ² All students must complete the following: two courses in mathematics and/or computer science and one course in statistics.
- ³ All students must complete the following:
 - a. Botany 4, Introduction to Plant Biology;
 - b. Geology 1, Introduction to Geology or Plant and Soil Science 161, Introduction to Soil Science; and
 - c. Forestry 3, North American Trees or Forestry 5, Dendrology, or Plant and Soil Science 126, Ornamental Horticulture.
- ⁴ All students must complete the following: one course in sociology; one course in psychology; one course in political science; two courses in economics.
- ⁵ All students must complete at least two courses in the arts and humanities selected in consultation with their advisor.
- ⁶ An intensive four-week field-oriented course immediately following the spring semester.
- ⁷ Students take additional specified course work in *either* the Public Outdoor Recreation concentration or in the Private Outdoor Recreation and Tourism concentration. Students selecting the Public concentration must complete:
 - a. Rec. Mgmt. 154, Recreation Policy Formulation; and a course in water or wildlife management.

Students selecting the Private concentration must complete:

- a. Rec. Mgmt. 151, Food and Lodging Business Management;
- b. Business Admin. 17, Business Law;
- c. Business Admin. 154, Foundations of Marketing;
- d. Business Admin. 170, Organizational Behavior; and two elective courses in business administration.

RESOURCE ECONOMICS

This program deals with the application of economic theory to natural resource allocation problems. It prepares an individual to effectively use economics and conservation in achieving an efficient and equitable use of natural resources. Graduates will be prepared for positions in natural resource management and administration.

FRESHMAN YEAR	1st SEMESTER	2nd SEMESTER	SOPHOMORE YEAR	1st SEMESTER	2nd SEMESTER
Geography 3, Intro. to Economic Geog.	3	-	Economics 11, Principles	3	-
Math. 19, Calculus I	3	-	Economics 12, Principles	-	3
Math. 20, Calculus II	-	3	Statistics	3	-
Electives ¹	9	12	Res. Econ. 121, Res. Econ.	-	3
			Electives ¹	9	9
JUNIOR YEAR	1st SEMESTER	2nd SEMESTER	SENIOR YEAR	1st SEMESTER	2nd SEMESTER
Res. Econ. 222, Nat. Res. Evaluation	-	3	Rec. Mgmt. 225, Econ. of Outdoor Recreation	-	3
Geography 287, Spatial Analysis	3	-	Forestry 151, For. Econ.	3	-
Econ. 186, Microecon. Theory	3	-	Nat. Res. 235, Legal Aspects of Planning and Zoning	3	-
Econ. 190, Macroecon. Theory	-	3	Economics 217, Urban and Regional Economics; or Forestry 252, Forest Valuation	-	3
Ag. & Res. Ec. 162, Land Use Issues	-	3	Forestry 251, Forest Policy & Administration	3	-
Electives ¹	9	6	Electives ¹	6	9

Total Program Requirements, Semester Hours 120

¹ All students must complete School of Natural Resources general educational requirements and University physical education requirements.

ENVIRONMENTAL STUDIES — N.R. Two options are available to students interested in an Environmental Studies program with emphasis in natural resources. The Coordinate Major option requires completion of an approved program of studies including the requirements of another major program within the School. The major in Environmental Studies is an individually-designed interdisciplinary program available to qualified students upon approval of a petition to the Director of the Environmental Program. The detailed requirements of these two options are described in the Environmental Program section of this catalogue.

UNDECIDED - N.R. Some high school seniors who do not wish to decide among the various programs of the School are admitted as "undecideds." These students and their advisor develop a one- or two-year curriculum which enables them to explore several fields of natural resources. With careful planning and gradual refinement of their interests, undecided students who maintain acceptable academic records can be admitted to one of the School's degree programs and graduate within the usual time required.

The Environmental Program

Environmental Studies — Agriculture	Bachelor of Science
Environmental Studies — Arts and Sciences	Bachelor of Arts
Environmental Studies — Education and Social Services	Bachelor of Science
Environmental Studies — Engineering, Mathematics, and Business Administration	Bachelor of Science
Environmental Studies — Natural Resources	Bachelor of Science

The Environmental Program is a University-wide program of undergraduate education, research, and community service dedicated to the study of the cultural and biophysical environments essential to the quality of life on earth. It seeks to serve the needs of students for sound education and career preparation *and* the needs of society — two goals that strengthen one another in practice.

The Environmental Program is an interdisciplinary academic program involving students and faculty from throughout the University, as well as community professionals, recognizing that study of the environment involves all disciplines and professional fields. Thus, the Program is not a unit of any single college or school of the University, but works cooperatively with other academic programs and action organizations on campus and in the community.

While the Environmental Program attempts to serve a wide range of environmental interests, its primary focus is the individual student. A Director and interdisciplinary faculty assist students in planning an individualized program of studies which combines a broad, comprehensive understanding of the environment *and* depth in a specific discipline or profession leading to a future career. Program offices are located in The Bittersweet where students are invited to visit with the staff regarding their academic plans, to gain assistance with research or action projects, and to seek information about community internships and future employment.

The Environmental Studies Curriculum

The curriculum in Environmental Studies offers students several alternatives leading to an individualized program of studies: The *Coordinate Major in Environmental Studies* combines study of the environment with a traditional disciplinary major or professional field. The *Major in Environmental Studies* provides a unique opportunity for the student seeking an individually-designed interdisciplinary major.

Students entering the University may apply for admission to Environmental Studies through several of the undergraduate colleges and professional schools. Choice of the appropriate college or school will depend on the individual's interests and educational objectives or, in the case of the Coordinate Major program, on the major or professional field to be coordinated with Environmental Studies. It is recommended that incoming students consult with the Environmental Program before making application to the University.

DEGREE REQUIREMENTS

Students must complete the distribution requirements and minimum credit-hour requirements of their college or school, and one of the following major programs. Incoming students will be assigned an advisor in the Environmental Program who will assist in selecting a major program, usually during the sophomore year.

COORDINATE MAJOR IN ENVIRONMENTAL STUDIES For the majority of students this program offers the best combination of career opportunities and environmental interests. In addition to the Environmental Studies Core Program, the student completes the departmental requirements of a related disciplinary or professional major in his or her college or school, *and* an individualized program of studies and independent work which strengthens the environmental aspects of the major.

Environmental Studies Core Program

Required Courses:	Credit Hours
Introduction to Environmental Studies, ENVS 1	4
Introduction to Environmental Studies, ENVS 2	4
Environmental Theory, ENVS 100	3
Seminar in Environmental Studies, ENVS 204	3

Departmental Major Program

Consult other sections of the Catalogue for major requirements and actual credit hours.

Coordinate Option

At least three intermediate or advanced environmentally-related courses selected by the student in consultation with an advisor in the Environmental Program. These courses may be in the student's major field, a closely-allied discipline, or from several supporting fields.

Education students seeking certification in Environmental Studies in elementary or secondary education: see page 83 of Catalogue.

Electives — and College or School Distribution Requirements

Total Credits

120+

MAJOR IN ENVIRONMENTAL STUDIES This interdisciplinary major offers students the opportunity to combine studies in a variety of disciplines and professional fields. Each student's program is individually designed, rather than shaped around an existing departmental major, and provides the opportunity to direct study toward newly-developing environmental careers and graduate study programs. It is especially suited to the student seeking a broad liberal education with an environmental thrust.

This individually-designed major is a highly-selective program for qualified students with well-conceived academic goals. Admission to the major requires submission of a special petition to the Environmental Program, approval of the Director of the Environmental Program, and successful completion of Environmental Studies 51. In addition to course requirements, the major includes a required senior research thesis, internship, or practicum.

Environmental Studies Core Program

Required Courses:	Credit Hours
Introduction to Environmental Studies, ENVS 1	4
Introduction to Environmental Studies, ENVS 2	4
Environmental Theory, ENVS 100	3
Seminar in Environmental Studies, ENVS 204	3

Major Program

Major Seminar, ENVS 51	3
Individually-designed Program	24+
(Planning and selection of courses accomplished as a course project in Environmental Studies 51, including at least 24 hours of intermediate or advanced environmentally-related courses)	
Research Seminar, ENVS 201	3
Senior Project and Thesis, ENVS 202	6-15+
Senior Thesis (a research or action project, or internship) planned and designed in Environmental Studies 201. Actual credit arranged in consultation with senior project and thesis advisor.	
Electives — and College or School Distribution Requirements	60+
Total Credits	120+*

*Consult appropriate college or school for exact credit requirements.

Reserve Officers' Training Corps

ARMY

GENERAL Army ROTC offers programs for men and women leading to a commission as an officer in the United States Army. The University's Department of Military Studies offers courses in world military affairs and other related areas. Additionally, special courses offer basic education and technical training in military subjects with emphasis on leadership and management.

PROGRAMS Military Studies at UVM consists of several programs: (1) A four-year program comprised of a Basic Course open to all freshmen and sophomores and an Advanced Course for qualifying juniors and senior. This generally requires one military studies course per term during the four years of undergraduate study. Attendance at a summer camp of six weeks' duration is required between the junior and senior year. (2) A two-year program for sophomores who have not taken any prior ROTC courses. The program requires a six-week summer camp, or attendance at a six-week on-campus military studies institute, between the sophomore and junior year; one course per term during the junior and senior year, and attendance at a six-week summer camp between the junior and senior year. (3) The Simultaneous Membership Program allows students to be active members of local National Guard units or Reserve units drawing approximately \$100 per month pay, in addition to being members of the Advanced Course (regardless of academic year). (4) The Early Commissioning Program allows students who have fulfilled the military prerequisites for commissioning to receive a Reserve Officer's Commission while still completing their undergraduate studies. (5) The Veterans Program recognizes previous military service and provides commissioning opportunities for enlisted veterans.

SCHOLARSHIPS Scholarships, available for four, three, two years, and one year, provide tuition, books, and all associated fees plus \$100 a month during the school year.

Application for the four-year scholarships is made during the senior year in high school. The three, two and one-year scholarship applications are made through the Department of Military Studies.

SUBSISTENCE ALLOWANCE All junior and senior cadets receive \$100 a month. Students also receive travel allowances to and from summer camp, plus approximately \$600 while at camp.

EXTRACURRICULAR ACTIVITIES Champlain Sabers and the Ethan Allen Rifles offer membership to participating students. The Champlain Sabers is a military fraternity fostering a spirit of friendship and cooperation among ROTC students. Ethan Allen Rifles is an honorary society for the promotion of military and academic excellence.

POSTGRADUATE Upon graduation, ROTC students are normally commissioned as officers in the U.S. Army. The active duty service obligation will vary from three months with a Reserve Commission (six years' active reserve) to four years with a Regular Army Commission, dependent upon Army needs and per-

sonal desires. Active duty may be deferred for as many as four years for those who wish to pursue an advanced degree while studying as a full-time graduate student.

AIR FORCE

The Department of Aerospace Studies provides preprofessional preparation for future Air Force Officers. The curriculum is designed to develop career-oriented men and women who can apply their university education and AFROTC experience to their initial active duty assignments as Air Force Commissioned Officers. *AFROTC is open to all college majors.* In addition to the formal courses of study, pilot candidates participate in a 25-hour Flight Instruction Program during their senior year.

SCHOLARSHIPS Air Force ROTC College Scholarships provide payment of tuition, laboratory fees, textbooks, and \$100 per month for each ten months of the school year on scholarship status.

SUBSISTENCE PAY All students in their last two years of AFROTC receive tax-free subsistence pay of \$100 per month.

UNIFORMS Uniforms are furnished at no cost.

AFROTC FIELD TRAINING Field training is offered during the summer between the sophomore and junior years at selected Air Force bases throughout the United States. Students in the four-year program participate in four weeks of field training during the summer between their sophomore and junior years. Students applying for entry into the two-year program must successfully complete six weeks of field training prior to enrollment in AFROTC.

For additional information contact the AFROTC, Saint Michael's College.

The Living/Learning Center

The goal of the Living/Learning Center is to integrate academic and cultural activities with residential living in ways that enrich the personal and intellectual lives of its participants. It is both an academic support unit and a residence, housing 588 students and eight faculty families, as well as faculty and administrative offices.

The Center is organized into programs, which are year-long plans of coursework seminars and/or special activities related to academic or avocational interests. These programs are created and directed by either students or faculty members. Living/Learning Center programs sometimes supplement an existing course of study but often define a totally new educational direction, providing exciting and unusual opportunities for the students who want to explore a curricular or personal interest in innovative ways. All of the programs have a specific theme and plan, outlining what skills, knowledge, creative talents, judgment, and abilities the program member will seek to develop.

The freshman, sophomore, junior, senior, and graduate students who reside in the Center live with fellow program members in five-, six-, or seven-person suites adjoining a common living room and bathroom facilities. This fosters close friendships and communication among the program members. The suites are located in each of the five buildings (A, B, C, D, and E) as are classrooms, laundry rooms, common living rooms and kitchens, as well as apartments for eight resident faculty and their families. The Center has a reading room/reference library, computer terminal room, grocery store, music practice rooms, dining hall, a pre-school, an audio/visual room, U.S. post office, administrative and faculty office space, a main Center lounge with a fireplace, and an art gallery. In addition, through the efforts and expertise of three accomplished staff artists, the Center has pottery, graphics, and photography studios that provide direct program support for the L/LC community. The University community is invited to become "co-op" members of the pottery and photography studios, providing members with informal instruction and use of the facilities and equipment. The building is accessible and equipped for the handicapped.

Every program, faculty and student directed, sponsors educational activities to which the entire UVM community is invited, making Living/Learning a center of cultural and intellectual activity. An evening's involvement might include a sign language workshop, conversational Russian, dialogue with UVM faculty, artistic performances and gallery exhibits, and various other program events.

Attracting townspeople with exciting opportunities for involvement and learning, the Living/Learning Center and its residents benefit from the expert advice of interested Burlingtonians who participate as L/LC Student Program Advisors, workshop leaders, loyal audiences (theatrical and musical performances), L/LC art gallery devotees, and as guest artists who exhibit or perform their art for the L/LC students and University community.

Above all, the Living/Learning Center is an opportunity to be part of a community of people — students, faculty, and administrative staff — who share the goal, work, and excitement of together improving the scope and quality of their University experience.

The Graduate College

The mission of the Graduate College is to serve the needs of college graduates who desire a broader and more thorough knowledge of scholarship and research in their chosen fields. The College offers 66 programs leading to the Master's degree, and 14 programs leading to the degree of Doctor of Philosophy. For detailed information regarding graduate programs, degree requirements, and Graduate College regulations and procedures, refer to the Graduate College Catalogue, available from the Graduate Admissions Office, 332 Waterman Building.

Persons applying to and enrolled in graduate programs are expected to be familiar with the general regulations of the Graduate College and with the specific degree requirements in their chosen fields of study. Questions pertaining to matters other than admission to graduate programs may be directed to the Graduate College Dean's Office, 335 Waterman.

UNDERGRADUATE ENROLLMENT FOR GRADUATE CREDIT

UVM senior undergraduates may enroll for graduate credit at UVM under the following circumstances: the course must be available for graduate credit; total enrollment including the graduate course must not exceed 12 credit hours in the semester in which the course is taken; the course must not be computed as part of the Bachelor's degree; permission to seek such graduate credit must be requested of the Graduate Dean in writing by the dean or director of the undergraduate college or school prior to enrollment. Such graduate credit is limited to six hours and is not available for transfer to another institution as graduate credit. It can be used only at UVM if the course is judged appropriate by the student's advisor for the particular graduate program.

Continuing Education

Through Continuing Education the University provides opportunities for formal and informal study to persons who have and have not attended college, who require additional training in their work, or who wish to pursue previously unexplored areas of study.

The Summer Session

Summer Session offers courses in many subjects at both the graduate and undergraduate level.

The offerings are diversified to meet the needs of students who desire courses leading to an undergraduate or graduate degree. Offerings are scheduled to enable students to accelerate their programs or explore new areas of interest. Special courses are developed for school personnel, both administrators and teachers, who desire fundamental or specialized courses or who wish to broaden their knowledge of special subjects. All courses are open to persons interested in study for self-improvement.

It is recommended that any regularly matriculated student at the University of Vermont obtain prior approval from his/her academic dean/director for any courses to be taken in the Summer Session. The purpose of this recommendation is to insure such courses are appropriate to the degree for which the student is working.

The Master's degree in several (but not all) areas may be earned through work in the Summer Session. Enrollment in courses for graduate credit does not imply admission to the Graduate College. Details about available courses and programs will be sent on request by the Director of Continuing Education.

Evening Division

The University's Evening Division program extends educational opportunities for adults beyond the daytime schedule. Members of the faculty at the University, and others working under temporary appointment, offer evening or extension courses in many disciplines both at the Burlington campus and throughout Vermont.

To establish Evening Division courses, interested persons should contact the Evening Division in Grasse Mount, (802) 656-2085.

It is recommended that any regularly matriculated student at the University of Vermont obtain prior approval from his/her academic dean/director of any courses to be taken in the Evening Division to insure such courses are appropriate to the degree for which the student is working. All persons desiring graduate credit must secure the approval of the Dean of the Graduate College at the time of registration.

Non-Degree Student Enrollment

Non-degree students are persons who have presented minimum credentials and are permitted to undertake evening courses and limited course work in the day program for purposes other than that of earning a degree. Credits earned by non-degree students who later apply and gain admission to a degree program will be evaluated and, if appropriate, will be accepted toward completion of their degree. Non-degree students may enroll for a maximum of six credits (or two courses) per semester in the day program. Special permission is necessary for a student to exceed the six-credit maximum. Before completing 30 credits of course work through Continuing Education, degree-bound students should consult with an advisor at Continuing Education, submit an application for formal admission to UVM, and then should consult with the appropriate dean/director to structure further courses into a degree program. Graduate students are limited to a total accumulation of nine semester hours.

Graduate non-degree students anticipating admission to a graduate degree program should seek advice in the Graduate College, Waterman Building.

Selection of courses for those having long-range plans of earning a degree should be made on the basis of information given in this catalogue. Students interested in making a formal application for admission to the University should contact the Office of Admissions, Clement House.

Students presently enrolled and in good standing at another institution may take courses at the University of Vermont to transfer to their institutions. Visiting students are considered non-degree students and should contact Continuing Education for information and registration material.

All non-degree students who would like assistance in planning educational programs and selecting courses should contact Continuing Education in Grasse Mount, (802) 656-2085.

Conferences and Institutes

Conference activity is a rapidly increasing part of University life. Throughout the regular college year and during the summer, many conference groups make use of University classroom and residence halls as well as University auditoria and dining services. Faculty, staff, and external groups interested in arranging for meetings or conferences at the University must contact the Conferences and Institutes Office, Grasse Mount. This office will also plan and coordinate conferences, seminars, short courses, and meetings to be held at off-campus locations.

Church Street Center for Community Education

The Center, located in the restored Ethan Allen Firehouse on Burlington's Church Street, offers over 100 non-credit mini-courses and workshops each session and operates a program of lectures, films, readings, and exhibits. The Center also serves as a clearinghouse for information on University and community educational activities. It draws upon the combined talents and resources of the University and the larger community.

Study Abroad

The Office of Overseas Programs at B178 Living/Learning Center maintains information about overseas study programs and helps students make arrangements for foreign study. The Office also assists in the evaluation of credits from study abroad. Students intending to study overseas and receive credit from UVM must contact the Office of Overseas Programs and complete the Study Abroad Approval Form prior to departure. This applies even to students intending to pursue independent study overseas under University of Vermont auspices.

In addition to the opportunities for students to participate in hundreds of non-UVM overseas study programs, the University has direct involvement in the following programs:

— *The Vermont Overseas Study Program (VOSP) at the University of Nice in France* provides a year of study abroad for a selected group of undergraduates from the University of Vermont and from other colleges and universities.

Intended primarily for students concentrating in French, the program is also open to qualified students from other fields, such as the fine arts or the social sciences. Student selection will be based on the following criteria:

1. Junior or senior class standing with a minimum grade-point average of 2.5 (C+).
2. A good working knowledge of French.
3. An interest in and potential for capitalizing on a year of study abroad.
4. A sound educational program.
5. Creditable personal qualifications.

Upon the successful completion of his/her work, the student receives appropriate credit (usually 30 hours) toward his/her degree. For further information about the Vermont Overseas Study Program, an interested student should contact the VOSP Office, Department of Romance Languages.

— *Intercollegiate Center for Classical Studies in Rome*: Properly qualified students may attend one or two semesters at the Center and receive full credit. For further information, consult with the chairperson of the Department of Classics.

— *Medieval Studies in Italy*: The University of Vermont has developed a summer program of interdisciplinary Medieval/Renaissance studies. Centered in Rome and Assisi, the program features travel to many historical sites. All instruction in English. Not offered every year. For further information, contact Prof. William Stephany, Department of English.

— *School of Biological Sciences, University of Bath, Bath, England*: Plant and Soil Science majors have the opportunity to participate in this exchange program and become involved in either a summer work experience or attend school during the academic year. Contact Department of Plant and Soil Science.

The University of Vermont is also a participating institution in the following programs:

— *Institute for European Studies*: This non-profit organization sponsors programs in Madrid, Spain; Vienna, Austria; Freiburg, Germany; Paris and Nantes, France; and London and Durham, England. Semester, year, and summer options are available. Contact Office of Overseas Programs.

— *International Student Exchange Program (ISEP)*: Developed and administered by Georgetown University, ISEP facilitates the exchange of students between academic institutions throughout the world on a one-for-one basis for a single academic year. U.S. participants pay tuition, fees, room, and board to their home institution and exchange places with students from Europe, Asia, Australia, Canada, Africa, and Latin America who have similarly covered the cost of their tuition, fees, room, and board. Contact the campus coordinator, David Shiman, Office of Overseas Programs.

— *Semester at Sea*: UVM is a member of the Institute for Shipboard Education, which administers a unique global semester under the auspices of the University of Pittsburgh. A wide variety of courses is offered, and port calls range from Egypt to Hong Kong. Contact the Office of Overseas Programs.

— *Junior-Year-in-Salzburg Program*: Administered by the University of New Hampshire, this program in Salzburg, Austria, is open to qualified University of Vermont undergraduates in all major fields. Basic requirements are: completion of sophomore year; two years of college-level German with an average of B; and good academic standing (a cumulative average of 2.5). For further information contact Prof. Veronica Richel, Department of German and Russian.

Courses of Instruction

The University reserves the right to change these course offerings at any time.

The departments and areas of instruction are arranged alphabetically, and the college/school in which each is located is indicated.

A student who lacks the stated prerequisites for a course may be permitted to enroll by the instructor. Such students must inform the instructor that they lack the prerequisites, and the instructor will make appropriate efforts to ascertain that they are properly qualified.

Courses are divided into three levels: introductory, intermediate, and advanced. Where appropriate, a department may limit enrollment in a particular course. Such limitations, other than class size, must be explicitly stated.

Courses numbered from 1-99 are introductory courses. Introductory courses emphasize basic concepts of the discipline. In general, they presuppose no previous college work in the subject. The only exceptions to this rule are those cases in which there is a two-semester introductory sequence. In such cases, the second semester course may have the first semester course as a prerequisite.

Courses numbered from 100-199 are intermediate courses. An intermediate course covers more advanced material than that treated in introductory courses. Students will be expected to be familiar with the basic concepts of the subject and the course will present more difficult ideas. Intermediate courses will generally be more specialized than introductory courses. An intermediate course will always have a minimum prerequisite of three hours prior study in the discipline or in another specified discipline.

Courses numbered from 200-299 are advanced courses. An advanced course presents concepts, results, or arguments which are only accessible to students who have taken courses in the discipline (or, occasionally, in a related discipline) at the introductory and intermediate levels. Prior acquaintance with the basic concepts of the subject and with some special areas of the subject will be assumed. An advanced course will always have a minimum prerequisite of three hours prior study at the intermediate level in the discipline, or in a related discipline, or some specified equivalent preparation.

Some departments make further subdivisions of courses at some levels. Where this applies, an explanation can be found at the beginning of the department's list of courses.

Two numerals separated by a comma (as in 17, 18) indicate that the separate semester courses may be taken independently for credit. Two numerals separated by a hyphen (as in 17-18) indicate that the semester courses may not be taken independently for credit, and, unless otherwise stated, they must be taken in the sequence indicated. In cases where two numerals are separated *either* by a comma *or* by a hyphen, the odd-numbered course will be taught in the fall and the even-numbered course in the spring.

The number of credit hours per semester is stated in each course description. For some courses, the course title is followed by a pair of numerals connected by a hyphen and enclosed in parentheses (as in (2-3)); this form indicates the number of class hours respectively of lecture and laboratory.

Agricultural and Resource Economics

COLLEGE OF AGRICULTURE

Professors Sargent, Sinclair, Tremblay, Webster (Chairperson); Associate Professors Fife, Gilbert, Pelsue; Assistant Professor Schmidt; Extension Professors Bevins, Eddy, Houghaboom; Extension Associate Professor Bigalow.

PROGRAM IN AGRICULTURAL ECONOMICS

2 World Food and Population Agricultural development with emphasis on natural and economic phenomena and the effect of food supplies on population trends and policies. Three hours. Tremblay.

61 Principles of Agricultural and Resource Economics Introduction to principles of economics through the analysis of problems of agricultural production and resource development. Three hours. Sargent.

151 Food and Lodging Business Management Economic decisionmaking for food and lodging business management. Emphasis on analysis of business investment and profitability over the firm life. Credit cannot be granted for both 151 and 166. Three hours. Bevins.

161 Agricultural Finance Capital requirements of agriculture, financial problems of farmers, types and sources of credit, policies and practices of lending institutions. *Prerequisite:* 61 or Economics 12. Three hours.

162 Land Use Issues Analysis of economic, political, social, and legal institutions determining land use and development. Case studies in regional and state land use problems. *Prerequisite:* 61 or equivalent. Three hours. Sargent.

166 Small Business Management Theoretical and practical considerations in organizing and operating small business. Emphasis on financing, accounting, budgeting, investment analysis, and tax management. *Prerequisite:* Sophomore standing. Three hours. Fife.

191, 192 Practicum in Agricultural and Resource Economics Planned, supervised, off-campus education during academic year or summer. A student may earn up to 12 hours of credit. *Prerequisites:* Junior standing, departmental permission. Credit variable.

195,196 Special Topics in Agricultural Economics Readings and discussion of selected topics in agricultural economics at an undergraduate level. *Prerequisite:* Departmental permission. Credit as arranged.

197, 198 Undergraduate Research Work on a research problem under the direction of a staff member. Findings submitted in written form as prescribed by the department. *Prerequisite:* Senior standing. Three hours.

201 Farm Business Management Organization and operation of successful farm businesses with emphasis on resource allocation, production efficiency, and marginal analysis. Field trips required. *Prerequisites:* 61 or Economics 12; junior standing. College of Agriculture major. Three hours. Tremblay.

205 Rural Communities in Modern Society (See Sociology 205.)

207 Markets, Food, and Consumers Market structure, prices, and economic forces involved in the movement of farm products from producers to consumers. *Prerequisite:* 61 or Economics 12. Three hours, Webster.

208 Agricultural and Food Policy History and institutional development of agricultural policy. Price and income problems of American agriculture and alternative solutions. *Prerequisite:* 61 or Economics 12. Three hours.

210 Marketing Institutions Agricultural marketing institutions servicing northeastern U.S. Reading, lectures, and extended field trip. *Prerequisites:* Six hours in agricultural economics, permission of instructor. Three hours. Webster, Tremblay.

218 Community Organization and Development (See Sociology 207.)

254 Production Economics Principles and application of the economics of production in agriculture; emphasis on factor use, enterprise selection and combination, and decisionmaking. *Prerequisites:* 61 or Economics 12, Math. 18 or 19, or permission of instructor. Three hours. Pelsue.

255, 256 Special Topics in Agricultural and Resource Economics Readings and discussion of selected topics in economics at an advanced level. *Prerequisite:* Departmental permission. Credit as arranged.

264 Agricultural Price Analysis and Forecasting Analysis and measurement of factors affecting supply, demand, and elasticity; their relation to the level and changes of market prices; and use of quantitative techniques in forecasting. *Prerequisites:* 61 or Economics 12, Math. 18 or 19, or by permission of instructor; Statistics 111 helpful. Three hours. Pelsue.

266 Economics of Managerial Decisions Applying economic concepts to problems of capital budgeting, tax planning, pricing, demand analysis, and discounting cash flows. Cases. *Prerequisite:* Economics 12 or equivalent. Three hours. Fife.

271 Agriculture in Economic Development The role of agriculture in development of less-developed countries. Discussion of alternative economic development models. Review of various development programs, including Mexico, China, France, Yugoslavia. *Prerequisite:* 61 or Economics 12. Three hours. Sargent.

272 Seminar on World Food Problems and Policies Review of recent books and periodical literature; discussion and written or oral reports on topics of contemporary interest. *Prerequisite:* 271 or permission. Three hours. Tremblay.

PROGRAM IN RESOURCE ECONOMICS

(For descriptions of the following courses, refer to Recreation Management, page 244, and Resource Economics, page 248.)

- 121 Resource Economics
- 157 Ski Area Management
- 222 Natural Resources Evaluation
- 225 Economics of Outdoor Recreation and Tourism
- 233 Rural Planning
- 234 Practicum in Rural Planning
- 243 Spatial Analysis (See Geography 287.)

Anatomy and Neurobiology

COLLEGE OF MEDICINE

Professors Parsons (Chairperson), Young; Associate Professors Freedman, Kriebel, Krupp, Wells; Assistant Professors Ariano, Boushey, Schwaber; Lecturer Fonda.

9 Introductory Human Anatomy (3-3) Laboratory emphasizes human topographic anatomy, presenting cadaver prosections, radiographs, microscope slides, etc., for study of regional relationships. Histo-physiological correlations

of body systems discussed in lectures. *Prerequisite:* Departmental permission. Four hours.

197, 198 Undergraduate Research Individual laboratory research under the guidance of a faculty member. *Prerequisite:* Departmental permission. Three or six hours.

201 Human Gross Anatomy (3-6) Lectures and detailed regional dissections emphasize functional anatomy of major systems (e.g. musculoskeletal, cardiovascular, nervous). Required for Physical Therapy students; others upon departmental permission. Five hours. Kriebel.

202 Human Neuroanatomy (2-3) Structural basis of nervous system function, including spinal reflex organization, detailed analysis of sensory and motor systems, clinical examples, human brain dissection, microscopic slides. Required for Physical Therapy students; others upon departmental permission. Three hours. Schwaber.

Animal Pathology

COLLEGE OF AGRICULTURE

Professor Bolton (Chairperson); Associate Professor Murray; Extension Professor Wadsworth; Associate Animal Pathologist Kunkel.

105 Animal Anatomy Gross and microscopic structure of the organ systems of the mammalian body with emphasis on farm animals. Three hours. Murray.

106 Animal Diseases Fundamentals of disease recognition and prevention in domestic animals. Special disease problems in cattle and horses with emphasis on control measures. *Prerequisite:* 105 recommended. Three hours. Murray.

110 Wildlife Diseases Common diseases and parasitic problems of large game animals, small fur-bearing animals, waterfowl, and game birds. Autopsy techniques and diagnostic laboratory procedures. *Prerequisites:* Two courses in biology or zoology. Three hours. Bolton. Alternate years, 1982-83.

195, 196 Special Topics Departmental permission required. One to three credit hours.

197, 198 Senior Research Work on a research problem under the direction of a qualified staff member. Findings submitted in written form as prescribed by department. *Prerequisite:* Senior standing. Three hours.

Animal Sciences

COLLEGE OF AGRICULTURE

Professors Atherton, Balch, Bull (Chairperson), Carew, Duthie, Foss, Nilson, Smith, Welch; Associate Professor Simmons; Assistant Professor Gilmore; Extension Assistant Professor Wildman; Extension Professor Gibson.

1 Introductory Animal Science (3-3) Fundamental principles of dairy technology, anatomy, physiology, nutrition, breeding, and management of animal species important in our agricultural economy. Four hours. Welch.

33 Introductory Dairy Technology (2-3) Basic information on milk and milk products and application of this information in laboratory exercises. Three hours. Duthie.

43 Fundamentals of Nutrition I, II A comprehensive study of specific

nutrients in terms of their availability, function, utilization, and requirements in mammalian species. Three hours. Carew.

44 Dairy Cattle Selection (2-3) Fundamental principles of dairy cattle selection and breeding. Three hours. Gibson.

104 Dairy Testing and Quality Control (2-3) Composition and properties of milk products. Standard methods of bacteriological and chemical analysis and their significance in product quality. Three hours. Atherton.

109 Food Microbiology (2-3) Desirable and undesirable activities of microorganisms in foods. Laboratory methods in quality control. Microbial contamination, food spoilage, and food-borne disease. Three hours. Atherton.

114 Manufactured Dairy Products (2-3) Methods and technical problems in manufacturing milk products such as cheese, butter, evaporated and dry milks. *Prerequisites:* 33, junior standing. Three hours. Nilson. Alternate years, 1981-82.

120 Sensory Evaluation of Foods (1-4) Taste and odor as basic components of flavor, sensory tests for consumer acceptance studies, and practical training in flavor identification. Three hours. Duthie.

131 Qualitative Genetics of Domestic Animals and Cultivated Plants (3-2) An introductory course in qualitative genetics. Examples from familiar species are used to demonstrate the principles of inheritance. *Prerequisite:* Botany 4 or Zoology 9 or equivalent. Four hours. Gilmore.

140 Principles of Animal Feeding (3-3) Principles of meeting the nutrient requirements of animals, especially as they relate to the practical problems of formulation and production systems. *Prerequisite:* 43. Four hours. Welch.

153 Milk Processing (2-3) Technical aspects of processing fluid milk and fluid milk products. *Prerequisite:* Departmental permission. Three hours. Nilson. Alternate years, 1982-83.

171 General Physiology An intermediate course, especially designed for the biology student to increase knowledge of animal functions at the organ system level in mammals. *Prerequisite:* Anatomy, chemistry, and biology. Three hours. Foss.

177 Livestock Production (2-3) Organization and operation of livestock enterprises. Theory and application of feeding, breeding, and management programs and principles. *Prerequisite:* 140. Three hours. Welch.

187, 188 Light Horse Production and Management (2-3) The problems of light horse production. Application of the principles of selection, management, and horsemanship. *Prerequisites:* 187 for 188; junior standing. Three hours. Balch.

190 Poultry Production (2-3) Organization and operation of poultry enterprises. Theory and application of feeding, breeding, and management programs and principles. *Prerequisite:* 140. Three hours.

197, 198 Undergraduate Research Research activity under direction of qualified staff member. Findings submitted in written form as prescribed by department. *Prerequisites:* Junior standing, departmental permission. Three hours.

211 Ice Cream and Frozen Dairy Products (2-3) Fundamentals of ice cream manufacturing, the physico-chemical and biological factors involved; calculation of formulas; sherbets and specialties; merchandising; sanitary control. *Prerequisites:* 33 or 153 and 104. Three hours. Nilson. Alternate years, 1981-82.

232 Quantitative Genetics in Animal and Plant Improvement Principles of quantitative and statistical genetics are studied in relation to animal and plant breeding. Methods of selection and schemes of mating discussed. *Prerequisites:*

Introductory course in genetics, Statistics 111 or permission of instructor. Three hours. Gilmore.

242 Advanced Nutrition (See Human Nutrition and Foods 242.) Three hours. Tyzbir.

245 Nutritional Biochemistry (See Human Nutrition and Foods 245.) Three hours. Tyzbir.

249 Nutrition Seminar (See Human Nutrition and Foods 249.) Two hours. Tyzbir.

250 Dairy Cattle Management (2-3) Organization and operation of dairy enterprises. Theories and methods of application of feeding, breeding, and management programs and principles. *Prerequisites:* 140; minimum of junior standing. Three hours. Wildman.

256 Dairy Plant Management (2-3) Organization and operation of milk processing and manufactured milk products plants. *Prerequisites:* 153, Agricultural and Resource Economics 61; junior standing. Three hours. Nilson. Alternate years, 1982-83.

270 Endocrinology (3-3) Anatomy, physiology, glandular interrelationships, and assay methods of the endocrine glands and their hormones. *Prerequisite:* Departmental permission. Four hours. Simmons.

275 Physiology of Reproduction and Lactation (2-3) Fundamental principles of the physiology of reproduction and lactation with the primary emphasis on farm animals. Three hours. Simmons.

281 Animal Sciences Senior Seminar Reports and discussions of problems and special investigations in selected fields. One hour.

282 Animal Sciences Graduate Seminar Reports and discussions of problems and special investigations in selected fields. One to three hours.

291 Special Problems in Animal Sciences Reading, discussion, and special laboratory investigation in the field of animal and dairy science. *Prerequisite:* Departmental permission. May enroll more than once for maximum of six hours.

294 History of Nutrition (See Human Nutrition and Foods 294.) One hour. Smith.

Anthropology

COLLEGE OF ARTS AND SCIENCES

Professors Haviland, Mitchell (Chairperson); Associate Professors C. Pastner, S. Pastner, Power, Woolfson; Assistant Professor Gordon; Research Assistant Professor Thomas.

21 Human Cultures Introduction to cultural anthropology focusing on the life ways of non-Western societies and how anthropologists study them. Three hours.

24 Prehistoric Archaeology Examination of the origins and development of culture from the earliest human fossils through the appearance of civilization; the nature of archaeological data and interpretations. Three hours. Power.

26 Physical Anthropology Introduction to the study of the evolution and racial differentiation of humanity. Three hours. Haviland.

28 Language in Culture Introduction to the anthropological study of language with special focus on language and communication as they pertain to how we became human, and what makes us human. Three hours. Woolfson.

60 Vermont Indians Vermont's native peoples from their earliest ap-

pearance in the region until today. Archaeological and ethnographic data reviewed in the broader perspective of aboriginal northeastern culture history. Three hours. Haviland, Power. Alternate years.

160 North American Indians Ethnographic survey of major native American cultures of Mesoamerica and the United States against the background of aboriginal culture history, and problems of contact with European cultures. *Prerequisite:* 21. Three hours. Haviland. Alternate years.

161 Cultures of South America Ethnographic survey of major native American cultures south of Mesoamerica against the background of aboriginal culture history, and their relation to the present day culture spheres. *Prerequisite:* 21. Three hours. Haviland.

162 Cultures of Africa Ethnographic survey of representative native societies of sub-Saharan Africa and major colonial/immigrant minorities with emphasis on changes resulting from colonialism, independence, and modernization. *Prerequisite:* 21. Three hours. Gordon. Alternate years.

163 South Pacific Cultures A survey of the major cultural areas of the South Pacific including problems of prehistory, contact with Western colonialism, and contemporary life. *Prerequisite:* 21. Three hours. Mitchell. Alternate years.

165 Peoples of South Asia The culture and social organization of the peoples of Pakistan, India, Bangladesh, and Sri-Lanka. Theoretical issues in the anthropological analysis of these societies will be discussed. *Prerequisite:* 21. Three hours. S. Pastner.

166 Peoples of the Middle East The culture and social organization of the peoples living in the lands from Morocco to Afghanistan, including a consideration of Islam. *Prerequisite:* 21. Three hours. C. Pastner.

167 Peoples of Canada An exploration of the native and immigrant cultures of Canada's minorities and the cultural conflicts engendered in the Canadian experience. *Prerequisite:* 21, or Geography 52, or History 75 or 76. Three hours. Woolfson. Alternate years.

168 The Franco-Americans The cultural patterns of the French peoples in New England, with particular reference to Vermont and problems of persistence and change. *Prerequisite:* 21. Three hours. Woolfson. Alternate years.

170 Pastoral Nomads Examination of the social and economic organization of migratory herding peoples against a backdrop of environmental pressures and participation in larger social systems. *Prerequisite:* 21. Three hours. S. Pastner. Alternate years.

172 Women, Society, and Culture A cross-cultural treatment of women which emphasizes the interrelationships between female status, social organization, and ideological systems. *Prerequisite:* 21. Three hours. C. Pastner.

175 Ethnography of Art Analysis of the art of tribal and non-western peoples of Africa, Oceania, and North American Indians, emphasizing the relation of art to social and ideological systems. *Prerequisite:* 21. Three hours. C. Pastner. Alternate years.

177 Crisis Cults and Movements Examination of prophetic, millenarian, and revolutionary sects and movements with emphasis on non-western, non-industrial societies. Specific movements viewed in their cultural context. *Prerequisites:* 21. Three hours. S. Pastner.

178 Sociolinguistics The exploration of language and nonverbal interactions as cultural activities. Focus on the rules and patterns people display appropriate to communication and social interaction. *Prerequisite:* 28 or Linguistics 101. Three hours. Woolfson.

179 Cultural Ecology Interrelationships of social groups and their natural

environments and resource bases, with primary emphasis on non-industrial cultures examined from the perspectives of anthropology and geography. *Prerequisite*: 21 or Geography 1 or 16. Three hours. Gade, S. Pastner (team taught). Alternate years.

180 Psychological Anthropology A cross-cultural study of the individual in a sociocultural context examining cognition and culture, symbols, alternative states of consciousness, human sexuality, deviance and madness, and ethnotherapy. *Prerequisite*: 21. Three hours. Mitchell.

185 Urban Anthropology The study of urbanization and urban life in non-western countries including such topics as urban-rural ties, peasant migrations, and sociocultural adjustment to urban living. *Prerequisite*: 21. Three hours. Gordon.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

200 Field Work in Archaeology Methods and techniques of archaeological investigation in field situations and the laboratory analysis of data. *Prerequisites*: 24, one 100-level course in anthropology or history, permission of instructor. Three to six hours. Summers only. Haviland, Power.

210 Archaeological Theory Development of archaeology from the 19th century to the present including concepts of form, space and time, intellectual attitudes, current systems theory, and research strategies. *Prerequisites*: 24, one 100-level anthropology course; or Historic Preservation 201; or graduate standing in Historic Preservation Program, or History 105, 106, or 107. Three hours. Power.

225 Anthropological Theory Schools of anthropological thought examined in relation to data on non-western societies and the historical and social context in which the anthropologist works. *Prerequisites*: 21, one 100-level course. Three hours. C. Pastner.

228 Social Organization Examination of the basic anthropological concepts and theories used in the cross-cultural analysis of kinship and marriage. *Prerequisites*: 21, one 100-level course. Three hours. Mitchell.

283 Culture Change Study of sociocultural transformations in non-western countries with emphasis on industrialization, urbanization, and modernization and their impact on the lives of previously traditional peoples. *Prerequisites*: 21, one 100-level course, or 21, six hours in the social sciences. Three hours. Gordon. Alternate years.

290 Methods of Ethnographic Field Work Examination of the theoretical and ethical premises of field work methodology with practical experience in participant observation, interviewing, the genealogical method, and the recording of data. *Prerequisite*: Twelve hours of anthropology. Three hours. Mitchell.

295, 296 Advanced Special Topics *Prerequisites*: 21, one 100-level course.

Area and International Studies

COLLEGE OF ARTS AND SCIENCES

Executive Committee: Professors Gade, Geno (Director), Mabry, Miles, Seybolt, Stephany, Thompson; Mr. Pilachowski.

Asian Studies: Professors Alnasrawi, Andrews, Bresendine, Davision, Engroff, Gordon, Gussner, Hansen, Little, McKnight, Mitchell, C. Pastner, S. Pastner, Schmidt, Seybolt (Director), Sugarman, Vandermeer, Yadav; Messrs. Dunlop, Pilachowski.

Candian Studies: Professors Berkowitz, Coghlan, Geno, Hunt, Kenny, Lipke, Mahler, Metcalfe, Miles (Director), Senecal, Shiman, Stanfield, Thompson, Woolfson, Yadav, Ms. Cleghorn, Miss Crane.

European Studies (Western, Northern, Mediterranean): Professors J. Ambrose, Andrea, Barnum, Bradley, Bryan, Chapman, Davison, A.I. Dickerson, Felt, Fengler, Finney, Howe, Hutton, Kinnard, Lewis, Mabry, Mahoney, Martin, Metcalfe, Moneta, Pacy, Paden, Poger, Richel, Roland, Sandler, Scrase, Spinner, Stephany (Director), Sweterlitsch, Ugalde, Wesseling, Whitebook; Mr. Buechler.

Latin American Studies: Professors Gade (Director), Haviland, Murad, Simon, True, Ugalde, Vogelmann, Weiger, Zarate.

Russian and East European Studies: Professors Cook, Daniels, Mabry (Director), Meeks, Nalibow, Pacy, Paganuzzi, Pomar, Staron, Thurston.

Associated Faculty: Professors Fritz, Gordon, Hilberg, Julow, Schmokel, Shiman, Tremblay.

91 Introduction to Area (A) Introduction to Canada: A team-taught introduction to Canada through interdisciplinary perspective. (B) Introduction to Russia and East Europe: A team-taught introduction to Russian and East European societies through an interdisciplinary perspective.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

297, 298 Seminar Conducted by a team of area specialists and covering selected topics through interdisciplinary and comparative approaches. *Prerequisite*: Permission by the executive committee of Area Studies. Other area courses are offered by individual academic departments. For specific requirements for each area, consult the director of appropriate program.

Art

COLLEGE OF ARTS AND SCIENCES

Professors Janson, Zucker (Chairperson); Associate Professors Davison, Hewitt, Lipke, Owre; Assistant Professors Blasdel, Fengler, Higgins, McIntyre, Okino, Roland; Instructor Spivak; Lecturer Aschenbach.

STUDIO ART

2 Basic Drawing Structure and reconstruction of visual experience through drawing, and transformation of three-dimensional experiences onto a two-dimensional surface. Assignments and media vary with instructor. Three hours.

3 Two-Dimensional Studies Primary concern with surfaces and imagery utilizing various aspects, depending on instructor, of painting, drawing, graphics, and photography. Three hours.

4 Three-Dimensional Studies Exploration of manipulative materials and structural form, utilizing various aspects, depending on instructor, of sculpture and construction. Three hours.

Note: Art 2, 3, or 4 may, in certain cases, be taken more than once if with a different instructor and with permission of chairperson.

11 Introduction to Fine Metals Emphasizes design in the third dimension. Basic metal fabrication techniques, soldering, forming, forging, fusing, and casting. Drawing is required. Three hours. Spivak.

13 Introduction to Ceramics Basic design and practice in ceramics. Hand-built and thrown forms, firing and glazing. Three hours. Okino.

111 Fine Metals A continuation of third-dimensional fabrication with work in chasing, repousse, casting, stone setting, and more complex methods of construction. Design and drawing are required. *Prerequisite:* 11. Three hours. Spivak.

112 Fine Metals A more personally designed program with the student planning the major direction of the semester study. A personal approach to design and drawing emphasized. *Prerequisites:* 11, 111. Three hours. Spivak.

113 Ceramics Intermediate techniques in throwing and handbuilding. Intensity of investigation varies with individual student. *Prerequisites:* 4, 13. Three hours. Okino.

114 Clay and Glaze Technology Kiln theory and construction. *Prerequisites:* 4, 13 (113 is not a prerequisite for 114). Three hours. Okino.

115 Intermediate Drawing An intense investigation of drawing and elements that relate to the discipline. The figure used to introduce drawing exercises dealing with contour, gesture, color, and compositional geometry. *Prerequisite:* 2. Three hours. Owre.

121, 122 Painting Painting as a discipline to further increase understanding and awareness of color, space, and visual perception. May be taken in either order (121 is not a prerequisite for 122). *Prerequisites:* 2, 3. Three hours.

131 Printmaking: Etching Basic procedures in zinc plate printing stressing design and technical control of aquatint, etching, drypoint, engraving, and embossment. Offered alternate semesters. *Prerequisites:* 2, 3. Four hours. Davison.

132 Printmaking: Silkscreen Basic procedures in stencil printing stressing design and technical control of stencil cutting, glue and tusche resist, and photo-silkscreening. Offered alternate semesters. *Prerequisites:* 2, 3. Four hours. Davison.

133, 134 Printmaking: Lithography Basic procedures in planographic printing from stone, stressing design and technical competence. Intensity of investigation varies with individual student. May be taken in either order (133 is not a prerequisite for 134). *Prerequisites:* 2, 3. Four hours. Davison.

137, 138 Photography Photographic processes as methods of seeing, with emphasis on visual discovery through informed manipulation of materials. *Prerequisite:* 3. Three hours. Higgins.

141, 142 Sculpture Advanced explorations of manipulative materials. *Prerequisites:* 2, 4. Three hours. Aschenbach or Zucker.

147 Visual Environment An exploration of public spaces, structures, architectural detail, landscaping, roadways, lighting, etc. Field trips; meetings with planners and architects; projects. *Prerequisites:* 2, 3, or 4. Three hours. Owre.

193 College Honors

195 Special Topics in Studio Art Offered in the day schedule only. *Note:* A Studio Art major may use no more than one Art 195 course to fulfill the minimum Studio Art major requirements of 100-level courses. Three hours.

197 Readings and Research: Tutorial in Studio Art Independent/individual research in studio art. *Prerequisites:* Junior standing, six hours of studio art courses at 100 level, departmental permission (a contract must be obtained from and returned to the Art Department during preregistration). Three hours.

215 Advanced Drawing An intense investigation of drawing and elements that relate to that discipline. Emphasis on conceptual method, contemporary techniques, and both objective and non-objective source material. *Prerequisite:* 115. Three hours. Owre.

281 Advanced Studies in Studio Art Work in close consultation with facul-

ty sponsor on a specific and advanced project. *Prerequisites:* Senior standing, major in studio art, departmental permission (a contract must be obtained from and returned to the Art Department during preregistration), six hours of 100-level courses in the topic of the contract. Three hours.

283 Advanced Seminar in Studio Art Advanced seminar for senior studio art majors covering a range of topics. *Prerequisites:* Senior standing, major in studio art, instructor's permission. Three hours. (Not offered for graduate credit.)

ART HISTORY

5, 6 Art History Painting, sculpture, and architecture in the western world. First semester: Egyptian through Gothic. Second semester: Renaissance to the present. *Prerequisite:* 5 before 6. Three hours. Fengler, Roland.

7 Architecture An introduction to architecture, its changing form, structure, and purpose from antiquity to the present. Three hours. Janson. Alternate years.

51 Greek Art History of art in Greek lands in ancient times. Emphasis on sculpture, architecture, and vase painting. *Prerequisite:* Sophomore standing. Three hours. Schlunk.

52 Roman Art Development of Roman art styles out of Greek forms. *Prerequisite:* Sophomore standing. Three hours.

150 Christian Iconography. Introduction to subject matter and symbolism of Christian Art. Emphasis on major episodes from the lives of Mary, of Christ, and of the saints most frequently depicted in art. Examples drawn from Early Christian through Baroque periods. *Prerequisite:* 6. Three hours. Fengler. Alternate years, 1982-83.

153 Medieval Art to the Year 1000 Painting, sculpture, and architecture from the Early Christian through the Ottonian periods, with emphasis on Byzantine and Carolingian art. *Prerequisite:* 5. Three hours. Roland. Alternate years, 1982-82.

154 Medieval Art from the Year 1000 Painting, sculpture, and architecture of the Byzantine, Romanesque, and Gothic periods. *Prerequisite:* 5. Three hours. Roland. Alternate years, 1982-83.

158 Northern European Art 1400-1600 Netherlandish and German art of the period. Special attention to Jan van Eyck, Rogier van der Weyden, Hugo van der Goes, Durer, Bosch, and Bruegel. *Prerequisite:* 6. Three hours. Fengler.

161 Italian Renaissance Painting Painting in Italy from Gothic innovations of Giotto and Duccio through establishment of 15th century Renaissance style to the High Renaissance works of Leonardo da Vinci, Raphael, and Michelangelo. The development of Venetian painting. *Prerequisite:* 6. Three hours. Fengler.

164 Italian Renaissance Sculpture Sculpture in Italy from its Gothic sources through the Renaissance period. Special attention to Ghiberti, Donatello, and Michelangelo. *Prerequisite:* 6. Three hours. Fengler. Alternate years, 1981-82.

167 Baroque Art in Southern Europe The art of Italy, France, and Spain in 17th century, with emphasis on sculpture of Bernini, architecture of Versailles, and paintings of Carracci, Carabaggio, LaTour, Poussin, Zurbaran, and Velazquez. *Prerequisite:* 6. Three hours. Roland.

168 Baroque Art in Northern Europe The art of the Netherlands, Flanders, and England in 17th century, with emphasis on paintings of Rembrandt, Vermeer, Rubens, and Van Dyck. *Prerequisite:* 6. Three hours. Roland.

171 Rococo and Romantic Art European architecture, sculpture, and painting, circa 1700-1850, and the origins of the modern movement. *Prerequisite:* 6. Three hours. Roland.

172 Modern European Art A studio of the principal European (including British) painters and sculptors from 1855 to 1970. *Prerequisite:* 6. Three hours. Lipke.

175 19th Century Architecture Building and design from the late 18th century to the end of the 19th, as shaped by architects, engineers, and entrepreneurs. *Prerequisite:* 6. Three hours. Janson.

176 20th Century Architecture Building and design since 1900. Visits with architects and to modern buildings in the area. *Prerequisite:* 6. Three hours. Janson.

179 Art Since 1945: Issues in Contemporary Art The study of the development of modernism and post-modernism in contemporary art in all media. Coordinated with department's visiting artist and critics lecture series. Emphasis varies with instructor. *Prerequisite:* 6. Three hours.

181 American Painting A survey of the major developments in American painting and sculpture between 1680 and 1970. *Prerequisite:* 6. Three hours. Lipke.

184 American Architecture The Colonial Period to Frank Lloyd Wright. Research on buildings of historical interest in the area. *Prerequisite:* 6. Three hours. Janson.

194 College Honors

196 Special Topics

198 Readings and Research *Prerequisite:* Departmental permission. Three hours.

201 Architecture and the Environment (See Historic Preservation 201.) *Prerequisites:* Six hours advanced studies in art and architecture, permission. Three hours. Liebs.

207 Studies in American Art or Architecture Selected topics in American art and/or architecture, individual research and reports. *Prerequisite:* By permission to students of Art History, American History, or Literature. Three hours. Janson.

282 Seminar in Art History Individual or group study in a special area. *Prerequisites:* Six hours advanced, three in the chosen area, permission. Three hours.

Biochemistry

COLLEGE OF MEDICINE

Professors Bresnick (Chairperson), Lamden, Meyer, J. Thanassi, Woodworth; Associate Professors Chiu, Cidrowski, Cutroneo, Hart; Research Assistant Professors Eastman, N. Thanassi, Tierney.

102 Biochemical Analysis (2-4) Lectures, conferences, and laboratory exercises concerned with theory and techniques of importance in quantitative analysis of biological materials. Primarily for students of Medical Technology; others with permission of department chairman. *Prerequisite:* Chemistry 3. Four hours. Lamden.

191, 192 Undergraduate Research Participation in a research program currently being pursued by a faculty member of the department. Written report due at end of each semester. *Prerequisites:* Chemistry 1, 2 or 11, 12. Some programs may require additional courses in chemistry. Credit as arranged, up to four hours per semester.

211-212 Biochemistry for Health Sciences (2-4) Primarily for Medical Technology students. Lectures provide a comprehensive study of mammalian biochemistry particularly as it relates to man. Medically-oriented experiments utilizing modern clinical chemistry techniques performed in laboratory. Case studies of MCHV used to correlate lecture and laboratory material. *Prerequisites:* 102 or quantitative chemistry; organic chemistry. Physiology strongly recommended. Four hours per semester. Hart.

Botany

COLLEGE OF AGRICULTURE

Professors Etherton, Hyde, Klein, Vogelmann (Chairperson); Associate Professors Cook, Ullrich, Worley; Assistant Professor Barrington; Research Associate Professors Laing, Morselli; Extension Associate Professor Gotlieb; Research Assistant Professor Lintilhac.

BIOLOGY

1,2 Principles of Biology (3-3) Introduction to structure, functions, and evolution of animals and plants. Concepts important for advanced study in a life science and for understanding the biological world. *Prerequisite:* 1 for 2. Four hours.¹

255 Structure and Function of Chromosomes Analysis of recombination. Arrangement of DNA and proteins; DNA duplication; mapping of DNA regions. Molecular nature of meiosis; the nucleolus and control of gene expression. *Prerequisites:* Biology 101; Chemistry 42 or 141, 142. Three hours. II. Hyde.

BOTANY

4 Introduction to Botany (3-3) Structure, function, and reproduction of plants. Fundamental aspects of plant science with implications of botanical knowledge needed for applied plant sciences. Four hours. Cook¹

6 The Green World Evaluation of the impact of plants on the aesthetic, cultural, social, medical, and religious lives of peoples of the world. Botany and Biological Science majors will not receive credit for Botany 6 as part of program distribution requirements. Three hours. I. Klein.

101 Genetics (See Zoology, Biology 101.)

104 Physiology of the Plant Body (3-3) Study of the plant as a whole, growth and development, water and mineral relations environmental factors, and regulatory processes. *Prerequisites:* 4 or Biology 1, 2; one semester each of organic chemistry and physics, or permission of instructor. Four hours. Ether-ton.

107 Algae, Fungi, and Bryophytes (3-3) Structure, reproduction, and evolutionary relationships of the non-vascular plants; ecological roles and economic significance; field identification and culture techniques. *Prerequisites:* 4 or Biology 1, 2. Four hours. Cook.

108 Morphology and Evolution of Vascular Plants (3-3) An evolutionary survey of living and fossil vascular plants with emphasis on morphology and geography. Discussion of pertinent literature on phytochemistry, genetics, and ecology. *Prerequisites:* 4 or Biology 1, 2. Four hours. Barrington.

109 Systematics and Phylogeny (2-4) Classification; evolution of flowering plants; characterization and recognition of major families; species and generic concepts; biosystematics; taxonomic keys; preparation of herbarium specimens. *Prerequisite:* 4 or Biology 1, 2. Four hours. Vogelmann.

117 Plant Pathology (3-2) Diagnosis, life history, and control diseases

¹Credit will not be given for both Biology 1, 2 and Botany 4 or Zoology 9. Credit will not be given for both Biology 1,2 and Biology 3. Botany and Zoology majors will not receive credit for Biology 3.

caused by fungi, viruses, bacteria, nematodes, parasitic plants, and environmental factors. Physiology, biochemistry, and genetics of host-parasite interaction. *Prerequisite*: 4 or Biology 1, 2. Four hours. Ullrich.

149 Maple Science and Practice (1-2) Ecology, anatomy, physiology, pathology, and propagation; sap and syrup chemistry. Maple industry problems: sap gathering, syrup production, methodology, and marketing. Trips to Maple Research Farm. *Prerequisites*: 4 or Biology 1, 2; Chemistry 3 or 1,2; or permission of instructor. Two hours. Alternate years, 1982-83.

160 General Ecology Analysis of the environment and its effects upon organisms; interrelationships among organisms; ecological adaptations. *Prerequisite*: 4 or Biology 1,2. Three hours. Worley.

162 General Ecology Laboratory (0-3) Field work and experiments to illustrate concepts presented in Botany 160. *Prerequisite*: Previous or concurrent enrollment in 160. One hour. Worley.

197, 198 Undergraduate Research and Apprenticeships Individual projects under the direction of a faculty member. The project may involve original research, readings, or apprenticeships. *Prerequisites*: Junior or senior standing, departmental permission. Three to six hours.

205 Mineral Nutrition of Plants Role of essential elements for plant growth including classical and modern approaches to the study of ion availability and transport. *Prerequisite*: 104. Three hours. Etherton, Bartlett. Alternate years, 1982-83.

209 Biology of Ferns Evolutionary biology; a survey of New England ferns and discussion of their phylogenetic relationships; current research emphasizing morphological, biogeographical, genetic, and phytochemical aspects of speciation. *Prerequisite*: 108. 101 recommended. Three hours. Barrington. Alternate years, 1981-82.

213 Plant Communities (2-2) Plant sociology; structure and organization of the plant community; sampling methods and analysis of data; climatic and edaphic factors; field work. *Prerequisite*: 109 or departmental permission. Three hours. II. Vogelmann.

229 Water Relations of Plants (See Forestry 229).

232 Botany Field Trip Trips to selected environments outside Vermont. Led by several faculty members representing different fields of botany. Overall, integrated approach to ecology, structure, and function. One hour. Christmas or spring vacation or end of school year.

234 Ecology of Freshwater Algae (2-3) Environmental factors influencing the distribution and seasonal succession; quantitative methods for estimating standing crop productivity; kinetics of algal growth; competitive and synergistic interactions. *Prerequisite*: 160 or Biology 102. Three hours. Cook. Alternate years, 1982-83.

241 Tropical Plant Systematics Diversity of tropical flowering plant communities; recent systematic and evolutionary angiosperm research; anatomy, morphology, ecology, and geography of major families. Student presentations on recent research. *Prerequisite*: 109. Three hours. Barrington. Alternate years, 1982-83.

250 Microtechnique (1-4) Theory and practice in the preparation of biological materials for anatomical and cytological study, including histochemistry and photomicrography. *Prerequisites*: Introductory Chemistry; some knowledge of organic chemistry, anatomy, or cytology is desirable. Three hours. Cook. Alternate years, 1981-82.

252 Molecular Genetics II: Regulation of Gene Expression in Eukaryotes Processing of information present in nucleic acids; knowledge

generated from recombinant DNA techniques applied to higher cells; control in transposition, transformation, transcription, and processing transcript. *Prerequisites:* Biology 101 or Biochemistry 301, or equivalents; Medical Microbiology 211 preferred; permission of instructor. Three hours. Ullrich.

257 Physiology of the Plant Cell (3-2) Detailed study of photosynthesis, plant cell membrane function, and plant cell growth. *Prerequisites:* 104, Chemistry 141, 142 or Chemistry 42, Physics 11, 12 or 15, 16. Four hours. Ether-ton. Alternate years, 1981-82.

281, 282 Botany Seminar Presentations of personal research by faculty, graduate students, and outside guest speakers. Required attendance of botany graduate students and seniors in botanical research programs. Without credit.

295 Special Topics For advanced students within areas of expertise of faculty. Aspects of ecology, physiology, genetics, cytology, bryology, pteridology, paleobotany, photobiology, membrane physiology, and cell biology. *Prerequisite:* Permission of department.

Business Administration

DIVISION OF ENGINEERING, MATHEMATICS, AND BUSINESS ADMINISTRATION
Professors Grief, Grinnell, Laber, Severance (Chairperson); Associate Professors Gatti, Michael, Shirland, Squire, Tashman; Assistant Professors, Battelle, Parke, Rogowski; Adjunct Instructor Erdmann, McCormick.

BUSINESS ENVIRONMENT AND GENERAL BUSINESS

17, 18 Business Law First semester: concepts of law as related to business, including law of contracts, sales, bailments, and negotiable instruments. Second semester: business and laws of agency, partnerships, and corporations. Three hours. Erdmann, McCormick.

132 Legal and Political Environment of Business Interaction of business and society. Emphasis is placed on business roles in the complex and dynamic, legal, political, and social environment. *Prerequisite:* Economics 12. Three hours. Squire.

133 Government and Business Interaction of business and government. Emphasis on industrial concentration and power, history and enforcement of legislation, and conflicting goals of economic efficiency and political feasibility. *Prerequisite:* Economics 12. Three hours. Squire.

191 Business Policy A variety of policy questions are examined. The viewpoint is global rather than functional. Problems include make or buy, plant location, product addition, and expansion. *Prerequisite:* Senior standing. Three hours.

195, 196 Special Topics

197, 198 Independent Study

293, 294 Special Projects (Not offered for graduate credit.)

295, 296 Special Topics (Not offered for graduate credit.)

297, 298 Independent Study (Not offered for graduate credit.)

ACCOUNTING

60 Financial Accounting (3-2) An introduction to generally accepted accounting principles and techniques regarding corporations, partnerships, and pro-

prioritorships, as they apply to income determination and financial position presentation. *Prerequisite:* Sophomore standing. Four hours. Michael.

61 Managerial Accounting (3-2) An introduction to the use of accounting for planning, cost behavior and control, and decision making. *Prerequisite:* Sophomore standing. Four hours. Michael.

161, 162 Intermediate Accounting Principles, concepts, techniques, and issues involved in accounting for the assets, liabilities, and owners equity and their related effect on income determination of an enterprise. *Prerequisites:* 60 for 161; 161 for 162. Three hours. Battelle.

164 Introduction to Federal Taxation Examination of the Internal Revenue Code primarily regarding income tax law for individuals and partnerships. Corporate and trust tax law introduced. *Prerequisite:* 60. Three hours. Michael.

168 Cost Accounting Accounting for inventory valuation and income determination, non-routine decisions, policy-making and long range-planning. *Prerequisite:* 61. Three hours. Grinnell.

265 Accounting Theory Study of underlying concepts, principles, and structure of accounting theory. Topics covered include financial accounting standards, opinions of the APB, professional literature, and current applications. *Prerequisite:* 162. Three hours. Battelle.

266 Advanced Accounting Accounting for partnerships, special sales contracts, parent-subsidiary relationships, fiduciary relationships, and governmental units. *Prerequisite:* 162. Three hours. Battelle.

267 Auditing Independent and internal auditing. Topics include standards, ethics and legal responsibilities of the profession, financial statements, audit concepts and techniques, and the audit option. *Prerequisite:* 266. Three hours. Battelle.

269 C.P.A. Problems Review of questions and problems from past C.P.A. examinations coupled with a study of the Opinions of the Accounting Principles Board. *Prerequisite:* 266. Three hours.

FINANCING AND BANKING

180 Managerial Finance The financial function in the corporation is described. Techniques for evaluating current use of resources and proposed resource acquisitions or dispositions are covered. *Prerequisites:* 61, Economics 12, Statistics 111, junior standing. Three hours. Laber.

181 Issues in Financial Management Examines key areas of financial decision making. With cases and problems, issues such as capital budgeting, leasing, mergers, and acquisitions will be examined. *Prerequisite:* 180. Three hours. Laber.

182 Security Valuation and Portfolio Selection An examination of the theories and evidence on the behavior of financial asset prices and rational portfolio selection. *Prerequisites:* 180, (184 recommended), Statistics 111. Three hours. Gatti.

184 Financial Institutions and Markets Financial institutions and credit allocation, determinants of the level and term structure of interest rates, and characteristics of financial institutions and markets. *Prerequisite:* 180. Three hours. Gatti.

185 Commercial Bank Management Problems facing bank managers are examined and solution techniques developed. Specific topics include asset selection, liability management, bank accounting systems, and the regulatory system. *Prerequisite:* 184. Three hours. Severance.

281 Municipal Finance Issues and policy options facing the financial administrators of municipal governments. Topics include taxation, debt and cash

management, budgeting, expenditure and revenue forecasting. *Prerequisite:* 180. Three hours. Tashman.

283 International Financial Management Theories and practices of international financial management are examined. Topics investigated include: systems of international exchange, spot and forward markets, and expropriation and exchange risk. *Prerequisites:* 180, 184. Three hours. Rogowski.

MANAGEMENT

140 Introduction to Decision Making Under Uncertainty Probability models as applied to the optimal choice among alternative actions or strategies when outcomes are uncertain. *Prerequisite:* Math. 18 or equivalent. Three hours.

170 Organizational Behavior An introductory course in organizational behavior focusing on ways through which individuals and work groups within organizations can be better utilized as organizational resources. *Prerequisite:* Three hours of psychology or sociology; junior standing. Three hours. Meyer.

171 Personnel Management Includes the study of: job analysis, recruitment, selection, training and employee development, health and safety, compensation, performance appraisal, and other employee-related topics. *Prerequisite:* 170. Three hours. Parke.

173 Operations Analysis I A study of methods used in planning, analysis, and control of production and service processes. Topics include forecasting, scheduling, inventories, sequencing, learning curves, and networks. *Prerequisites:* Math. 18, Statistics 111, junior standing. Three hours. Shirland.

174 Operations Analysis II A study of the operations function in industrial and service organizations. Practical applications of planning, analysis, design, and control are stressed. *Prerequisite:* 173. Three hours. Shirland.

175 Designs for Organizational Systems Examination of organization theories for their structural design implications. Organizational effectiveness/efficiency, goals, and technology, as well as bureaucratic and matrix designs will be reviewed. *Prerequisite:* 170. Three hours. Parke.

176 Current Issues in Management and Organizational Theory One credit seminars. Subjects include: performance appraisal, career dynamics, training and development, selection and recruitment. *Prerequisite:* 170 or 170/171. Gurdon, Meyer, Parke.

242 Management Information Systems The problems of designing business information processing systems. Manual and computer-based systems are evaluated in terms of cost versus effectiveness. *Prerequisites:* 173, Computer Science 11. Three hours.

243 Quality Assurance Analysis and design of systems for obtaining quality in operations. Topic areas include measurements, inspection, economic design, product design. *Prerequisites:* Math. 18, Statistics 111. Three hours. Shirland.

244 Applied Regression Analysis (Same as Statistics 225.) The nature and application of basic regression-correlation models in investigating relationships, testing hypotheses, and making predictions. *Prerequisite:* Any one of Statistics 111, 141, 211, 241, or 261. Three hours. Tashman.

245 Introduction to Operations Research Analysis, with emphasis on applications of business decision problems using mathematical modeling. Topics include mathematical programming, network analysis, and simulation. *Prerequisite:* 173. Three hours. Shirland.

272 Discrete Simulation Development of discrete traffic simulation using monte-carlo techniques and the GPSS simulation processor. *Prerequisites:* Statistics 111 or 141 or 151, senior or graduate standing. Three hours. Dawson.

- 274 **Safety Engineering (2-0)** (Same as Mechanical Engineering 152.)
 275 **Human Factors (2-3)** (Same as Mechanical Engineering 275.)
 276 **Plant Planning (3-3)** (Same as Mechanical Engineering 276.)

MARKETING MANAGEMENT AND SALES PROMOTION

153 Personal Selling and Sales Management Analyzes concepts of personal selling. Behavioral sciences are explored. Sales organization, coordination, related department functions, methods of selecting, training, compensating, and controlling are considered. Individual projects. *Prerequisite:* 154. Three hours. Greif.

154 Foundations of Marketing The place of marketing in our economy. Analysis of the market structure by function, institutions, and commodities. Consumer and organizational activities reviewed. *Prerequisites:* Economics 12, junior standing. Three hours. Grief.

157 Marketing Research The role of research in a marketing information framework. Emphasis on data collection methodology. *Prerequisites:* 154, Statistics 111. Three hours.

158 Fundamentals of Advertising Principles and techniques of copy, layout, media selection, and campaign development. Actual preparation of advertisements. *Prerequisite:* 154. Three hours.

257 Consumer Behavior Exploration and analysis of research evidence from marketing and behavioral science relevant to a theory of consumer behavior. Emphasis also given to research methodologies. *Prerequisite:* 154 or 157. Three hours.

258 Current Marketing Developments Analysis of both present and future changes affecting marketing theory and practice. Topics: social changes, functional and institutional marketing system changes. Individual research projects required. *Prerequisite:* 154. Three hours. Greif.

259 Marketing Management The use of advanced cases to aid in the formulation of overall policies and planning strategies for marketing programs. Topics include product planning and channel selection. *Prerequisite:* 154. Three hours.

Chemistry

COLLEGE OF ARTS AND SCIENCES

Professors Allen, Brown, Bushweller (Chairperson), Flanagan, Krapcho, Kuehne, Strauss, White, Wulff; Associate Professors Geiger, Weltin; Assistant Professors Carrano, Leenstra.

Note: Credit cannot be given for: 1, 2 and also 11, 12, 13, 14; 3, 4 and also 1, 2; 160 and also 162, 163.

1, 2 Introductory Chemistry (3-3) A basic course in the principles and concepts of general chemistry. These courses, or Chemistry 11, 12 serve as suitable prerequisites for 100-level courses in Chemistry. *Prerequisite:* 1 or 11 for 2. Four hours.

3 Outline of General Chemistry (3-3) A one-semester survey of the principles and concepts of general chemistry, designed primarily to meet the needs of students in agricultural and health sciences. Four hours.

4 Outline of Organic and Biochemistry (3-3) A broad overview of the most important facts and principles of organic and biochemistry and of the interrelationships between these branches of chemistry. *Prerequisite:* 3 or 5. Four hours.

5 Concepts of Chemistry (3-3) A one-semester course in the principles,

ideas, and concepts of general chemistry for students in engineering programs. Four hours.

7 Earth, Air, Fire, and Water An introductory course for non-science majors which deals with man's understanding of his surroundings in molecular terms. Concepts of energy, structure, and change as related to the observable universe. Three hours.

11, 12 General Chemistry (3-0) General and analytical chemistry for students with a strong background in physical sciences and mathematics. Recommended for students concentrating in physical sciences. *Prerequisites:* One year of high school chemistry, concurrent enrollment or background in calculus. High school physics recommended; concurrent enrollment in 13, 14 required, 1 or 11 for 12. Three hours.

13, 14 General Chemistry Laboratory (0-6) A laboratory course in general and analytical chemistry. Basic techniques of gravimetric, volumetric, potentiometric, and spectrophotometric analyses and applications to determination of basic chemical properties. Selected experiments in thermochemistry and kinetics. *Prerequisite:* Concurrent enrollment in 11, 12 required. Two hours.

19 Mathematical Preparation for General Chemistry. Designed to fill in gaps, largely mathematical, in students' backgrounds and preparation for introductory chemistry. Enrollment by permission. No credit. This course will meet only during the first four weeks of the semester.

42 Introductory Organic Chemistry (3-3) Concepts for understanding chemistry of structurally simple organic compounds of everyday importance. These principles applied to more complex molecules such as polymers and biologically important compounds such as proteins, lipids, and carbohydrates. (Does not satisfy medical school entrance requirements for undergraduate preparation in organic chemistry). Credit cannot be granted for both 42 and 4. *Prerequisite:* 3 or 5. Four hours.

121 Quantitative Analysis (2-6) Theory and practice of volumetric and gravimetric analysis. Theoretical discussion of indicators, buffers, pH, etc. Introduction to data analysis, spectrophotometry, and chromatography. *Prerequisites:* 1, 2. Not open to students with credit for 13, 14. Four hours.

141, 142 Organic Chemistry (3-3) Survey of properties and reactions of organic compounds with consideration of bonding, stereochemistry, mechanisms, principles of reactivity, spectroscopy, syntheses, and utilization. Designed for premedical, pre dental, and preveterinary students and for those majoring in biological and physical sciences. *Prerequisites:* 1, 2 or 11, 12; 141 for 142. Four hours.

143, 144 Organic Chemistry for Chemistry Majors (3-0) A survey of the principles and reactions of organic chemistry for chemistry majors. Concurrent enrollment in 145, 146 required. *Prerequisites:* 1, 2 or 11, 12. Three hours.

145, 146 Organic Chemistry Laboratory (0-6) Laboratory practice in separation, purification, synthesis, identification, spectroscopy, and physical organic techniques as applied to organic compounds. For chemistry majors. Concurrent enrollment in 143, 144 or 141, 142 required. Two hours.

160 Physical Chemistry for Biological Science Students Aspects of physical chemistry most pertinent to work in the biological sciences: acid-base equilibrium, theory of solutions, thermodynamics and kinetics. *Prerequisites:* 2, Physics 16. Three hours.

162, 163 Physical Chemistry Elementary quantum chemistry, introduction to statistical mechanics, thermodynamics, properties of solutions and chemical kinetics. *Prerequisites:* 2 or 12, Physics 16 or 25, Math. 121 for 163. Three hours.

201 Advanced Chemistry Laboratory (2-6) Lectures emphasize analytical

instrumentation (spectroscopic instrumentation, electrochemistry, electronics, chromatography). Laboratory problems require modern analytical, physical, and synthetic techniques as applied primarily to inorganic systems. *Prerequisites:* 146, credit for or concurrent enrollment in 162 or 163. Four hours.

202 Advanced Chemistry Laboratory (1-8) Laboratory and discussion only. Problems require modern analytical, physical, and synthetic techniques. *Prerequisites:* 146, credit for or concurrent enrollment in 162 or 163. Note: Although it is highly recommended that 201 be taken before 202, in special cases this may not be necessary. Four hours.

211 Chemical Kinetics and Mechanism Important aspects and applications of chemical kinetics. Theoretical and mathematical aspects are covered at an introductory level. Considerable emphasis on interpretation of experimental rate laws in terms of mechanistic hypotheses for selected reactions. *Prerequisites:* 142, 162, 163. Three hours.

214 Polymer Chemistry Polymer size and weight distributions. Synthesis and properties of organic and inorganic polymers. Kinetics of polymerization. Polymer characterization. Polymer formulation. *Prerequisites:* 144, 162. Three hours. Allen.

221 Advanced Analytical Chemistry A systematic survey of modern methods of chemical analysis. Principles and applications of analytical and molecular spectroscopy, electrochemistry, and separation techniques. *Prerequisites:* 162, 163. Three hours. Geiger.

222 Electroanalytical Chemistry Principles of modern electrochemical analysis focusing mainly on finite current methods — voltammetry, polarography, chronoamperometry, cyclic voltammetry, etc. Introduction to modern operational amplifier instrumentation. Double layer theory and electron transfer kinetics. *Prerequisite:* 163. Three hours. Geiger.

224 Chemical Separations Theory and practice of chromatographic separations. Emphasis on gas-liquid, liquid-liquid, and liquid-solid chromatography. *Prerequisite:* 221. Two hours. Geiger.

227, 228 Special Topics in Analytical Chemistry Selected topics of current interest in the area of analytical chemistry. New techniques and methodologies, especially in chemical instrumentation, are typically covered. Credit as arranged.

231 Inorganic Chemistry Fundamental concepts and facts of inorganic systems. Molecular symmetry, models for structure and bonding, acid-base chemistry, descriptive chemistry of ionic and covalent compounds, introductory crystal field theory, reaction mechanisms. *Prerequisite:* 162. Three hours. Allen, Brown, Carrano.

232 Advanced Inorganic Chemistry Selected topics include applications of group theory to vibrational spectroscopy and electronic structure, multiple bonding in main group and transition metal compounds, electron-deficient bonding, bioinorganic chemistry. *Prerequisite:* 231. Three hours. Allen, Brown, Carrano.

234 Organometallic Chemistry A systematic survey of the syntheses, properties, structures, bonding, and reactions of both main group and transition series organometallic compounds. Variation of structure and stability metal-carbon bond throughout periodic system. *Prerequisite:* 231. Three hours. Allen Brown.

236 Physical Inorganic Chemistry Fundamental physical basis for spectroscopic techniques and other observable phenomena important to field of inorganic chemistry. Topics include ligand field theory, magnetism, magnetic resonance, Mossbauer spectroscopy, and optical activity. *Prerequisites:* 163, 232. Three hours. Allen, Brown.

237, 238 Special Topics in Inorganic Chemistry Advanced theoretical treatment of bonding and of physical properties of transition metal complexes; detailed treatment of inorganic reaction mechanisms. Credit as arranged.

241 Advanced Organic Chemistry Stereochemistry, reactivity criteria, reaction mechanisms, and synthetic methods are stressed. Reactive intermediates such as carbanions, carbocations, carbenes, and free radicals are used to systemize mechanistic discussions. *Prerequisites:* 142, 162. Three hours. Krapcho, Kuehne, Strauss, White.

242 Advanced Organic Chemistry Detailed mechanistic descriptions of processes which may include enolate reactions and stereochemical considerations, addition processes such as halogenation, cycloadditions, hydroboration, hydride and metal-ammonia reductions, annulations such as biomimetic cyclizations, oxidation processes, rearrangements, eliminations, and examinations of approaches to multi-step syntheses. *Prerequisite:* 241. Three hours. Krapcho, Kuehne, Strauss, White.

251 Physical Organic Chemistry Structure-reactivity relationships, molecular properties and their interpretation. Methods and results of investigations of mechanisms of common organic reactions. *Prerequisites:* 142, 162. Three hours. Bushweller, Krapcho, White.

257, 258 Special Topics in Organic Chemistry Advanced level discussion of specific topics in organic chemistry of current interest such as photochemistry, carbenes, bio-organic chemistry, magnetic resonance, etc. Credit as arranged.

262 Chemical Thermodynamics Systematic study of application of thermodynamics to chemical problems. Concepts of statistical thermodynamics introduced. *Prerequisites:* 162, 163. Three hours. Flanagan.

263 Introduction to Quantum Mechanics General considerations of quantum mechanics. Development of techniques pertinent to the application of quantum mechanics to chemical problems. *Prerequisites:* 162, 163. Three hours. Weltin.

264 Fundamentals of Spectroscopy A general discussion of molecular spectroscopy, rotational and vibrational states of molecules, symmetry of vibrations; introduction to electronic spectra. *Prerequisites:* 162, 163, Math. 121. Three hours. Weltin, Leenstra.

265 Statistical Mechanics Development of statistical mechanics and its application to problems of chemical interest. *Prerequisites:* 162, 163; 263 recommended. Three hours. Flanagan.

266 Molecular Orbital Theory Introduction to Huckel molecular orbital method. Energy levels and orbitals, molecular properties and their interpretation. Effects of substituents on electronic structure. Extensions of Huckel method. *Prerequisites:* 142, 163. Three hours. Weltin.

267, 268 Special Topics in Physical Chemistry Advanced level discussion of specific topics in physical chemistry and chemical physics; group theory, solid state theory; irreversible thermodynamics, solution theory. Credit as arranged.

282 Senior Seminar Oral and written presentation of a subject of current chemical interest. *Prerequisite:* Audit of 381. One hour.

285, 286 Special Topics Selected topics of an interdisciplinary nature, designed particularly for advanced undergraduate chemistry majors. Possible subjects include environmental chemistry, chemical technology, chemical economics. Offered as occasions arise. Variable credit.

291 Undergraduate Research Special study in inorganic, analytical, physical, or organic chemistry and with an assigned staff member. Findings submitted in written form. *Prerequisite:* Departmental permission. Credit as arranged with a maximum of four hours per semester and 12 hours for the undergraduate program.

Classics

COLLEGE OF ARTS AND SCIENCES

*Emeritus Professors Bliss, Kidder; Professors Ambrose (Chairperson), Davison, * Gilleland, Schlunk; Assistant Professor B. Rodgers; Adjunct Professor R. Rodgers.*

**On sabbatical 1981-82*

GREEK

(There are no prerequisites to any Greek course. Students who have previously studied Greek should consult the department.)

1-2 Elementary Greek Four hours. Ambrose.

11, 12 Intermediate Greek Review of syntax. Readings from Plato, Herodotus, Euripides, and Homer. Three hours. Ambrose, Davison.

111, 112 Prose Composition Required of students who concentrate in Greek, Greek 111: one hour. Greek 112: two hours.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

201 Greek Orators Three hours. B. Rodgers. Alternate years, 1981-82.

202 Greek Comedy Three hours. Ambrose. Alternate years, 1982-83.

203 Greek Historians Three hours. Davison. Alternate years on demand.

204 Greek Tragedy Three hours. Ambrose. Alternate years, 1981-82.

205 Greek Philosophers Three hours. Schlunk. Alternate years, on demand.

206 Greek Epic Three hours. Alternate years, on demand.

LATIN

(There are no prerequisites to any Latin course. Students who have had two years of high school Latin normally enroll in Latin 9 or Latin 12. Those who have had more normally enroll in Latin 101. Students with two years of high school Latin may take Latin 1 for credit only by departmental permission and only if the two years were taken two years prior to entrance into the University.)

1, 2 Elementary Latin For students who present less than two years of high school Latin. Four hours. Schlunk.

9 Basic Latin Grammar Review Extensive review of Latin syntax. Selections from prose writers. Three hours. Davison, Gilleland.

12 Intermediate Latin Selections from Vergil and Ovid. Three hours. Schlunk, Gilleland.

101, 102 Survey of Latin Literature Selections from principal Roman authors. Three hours. Gilleland, Ambrose.

111, 112 Latin Prose Composition Required of students who major in Latin and of those who wish to be recommended to teach Latin. Latin 111: one hour. Latin 112: two hours. Schlunk.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

203 Republican Prose Three hours. B. Rodgers.

204 Epic Poets Three hours. Schlunk.

227 Roman Lyric Poets Three hours. Alternate years, on demand.

251 Roman Letters Three hours. Alternate years, on demand.

- 252 **Comedy** Three hours. Alternate years, on demand.
 253 **Roman Oratory** Three hours. Gilleland. Alternate years, on demand.
 255 **Historians of the Empire** Three hours. Davison. Alternate years, on demand.
 256 **Satire** Three hours. Gilleland. Alternate years, on demand.
 271 **Silver Latin** Three hours. Gilleland. Alternate years, on demand.

Courses entitled "Classics" are not foreign language courses. All readings are in English and no prior knowledge of Greek and/or Latin is required.

Classics 22 Etymology* Derivation of English words from Greek and Latin bases. Training in analysis of unfamiliar words, special attention to scientific vocabulary. Three hours.

Classics 42 Mythology** Greek myth in literature, art, and music from antiquity to modern times. No prerequisites. Three hours. Spring semester. Ambrose.

Classics 153 Greek Drama Three hours. Alternate years, on demand.

Classics 154 Greek Historians Three hours. B. Rodgers. Alternate years, on demand.

Classics 155 Ancient Epic Three hours. B. Rodgers. Alternate years, 1980-81.

Classics 156 Greek and Roman Satiric Spirit Three hours. Alternate years, on demand.

*This course may be used towards the distribution requirement of the College of Arts and Sciences in category A as part of the non-foreign language courses.

**This course may be used toward the distribution requirements of the College of Arts and Sciences in either category A or B.

See also: Art 51 (Greek Art) and Art 52 (Roman Art); European Studies; General Literature 151 (Development of Prose Fiction); History 9 (Ancient Mediterranean Civilization), 105 (Ancient Near East), 106 (Greek History), and 107 (Roman History).

For The Teaching of Latin, See Secondary Education 179.

Prizes from endowed funds are awarded to outstanding graduating seniors and outstanding students in sophomore Latin.

Communication

COLLEGE OF ARTS AND SCIENCES

Professors Lewis, London, Manchel (Chairperson); Associate Professors Worden, Yadav; Assistant Professor Creps; Visiting Assistant Professors Church, Ehrlich.

COMMUNICATION STUDIES

- 1 **Introduction to Human Communication** Three hours.
 11 **Effective Speaking** Three hours.
 14 **Small Group Communication** Theory and performance in small group communication, including leadership, problem-analysis, decision-making and interpersonal relations. Three hours.
 111 **Advanced Public Speaking: Emotive Means of Persuasion** Human motivation, attitudes, emotion, stereotypes, attention, and audience psychology as applied in the speaking situation. *Prerequisite:* 11. Three hours.

112 Argument and Decision Inductive, deductive, causal, and analogical reasoning as applied in the speaking situation. *Prerequisite:* 11. Three hours.

113 Methods of Rhetorical Criticism Introduction to the major principles and theories of speech criticism. *Prerequisite:* Six hours including 11. Three hours.

121 General Semantics An analysis of the relationships between language and human behavior. *Prerequisite:* 1. Three hours. Lewis.

193, 194 College Honors (Available in both majors of the department.)

195, 196 Special Topics (Available in both majors of the department.)

197, 198 Readings and Research (Available in both majors of the department.)

201 Theories of Human Communication A behavioral approach to the role of language, meaning, perception, thinking, and social context in human communication process. *Prerequisite:* Nine hours of related courses, including 1. Three hours. Yadav.

210 Classical Origins of Communication Theory Major trends in rhetorical thought. An examination of outstanding works of criticism, speaking, and writing. Selected works from classical, modern, and contemporary sources. *Prerequisite:* Nine hours of related courses. Three hours.

211 Persuasive Communication Analysis of contemporary approaches to persuasion. Study of recent research contributions including credibility, controversy, and political influence. *Prerequisite:* Nine hours. Three hours.

213 Theories of Speech Analysis An in-depth study of major theories of criticism of public address and an application of those theories to speakers, speeches, and religious, social, and political movements. *Prerequisite:* Nine hours of related courses. Three hours. (Not offered for graduate credit.)

214 Issues in Public Address Each semester this course will emphasize analysis of specific speakers, movements, theses, and strategies encompassed by a selected topic of public address. *Prerequisite:* Nine hours of related courses. Three hours. May be repeated up to nine credit hours.

215 Group Communication *Prerequisite:* Nine hours of related courses, including 14. Three hours. May be repeated up to nine credit hours.

223 Interpersonal Communication *Prerequisite:* Nine hours of related courses, including 121. Three hours. Lewis.

225 Cross-Cultural Communication A study of cultural factors and cognitive process in cross-cultural communication. *Prerequisite:* Nine hours of related courses. Three hours. Yadav.

283, 284 Seminar *Prerequisite:* Departmental permission. Three hours.

294 Seminar for Prospective Teachers of Communication *Prerequisite:* Twelve hours. Three hours.

MASS COMMUNICATION

63 Survey of Mass Communication The historical development, socioeconomic, and political impacts of the press, radio, television, and film in American society. Three hours. Yadav.

161 Audio Production A practicum in the use of audio recording techniques and technology as employed in broadcasting, film, and multimedia presentations. *Prerequisite:* 63. Three hours.

164 Basic Television Production. Three hours.

165, 166 Development of the Motion Picture. *Prerequisite:* Three hours. Manchel, Ehrlich.

167 Basic Filmmaking Theories of film expression. Students produce films. Three hours. Worden.

260, 261 Seminar in Mass Media An intensive examination of selected areas of study related to mass media. *Prerequisite:* Nine hours of related courses, including 63. Three hours. Yadav.

262 Writing for Mass Communication *Prerequisite:* 63. Three hours. Lewis, Worden.

263 International Mass Communication Mass media systems of other countries. *Prerequisite:* Six hours of related courses. Three hours. May be repeated up to nine credit hours. Yadav.

264 Advanced Television Production Emphasis on the following types of programs: educational, news, documentary, dramatic, and variety. *Prerequisite:* 164. Three hours.

265 Cinematography Advanced study of film expression and production of student films. *Prerequisite:* 167 or permission of the instructor. Three hours. Worden.

266 Seminar in Film *Prerequisite:* Six hours of related courses, including 165 or 166. Three hours. May be repeated up to nine credit hours.

267 The Contemporary Cinema Lectures, screenings, and reports on modern filmmakers, recent trends, and new techniques. *Prerequisite:* Six hours of related courses, including 165 or 166. Three hours. Manchel, Ehrlich.

268 The Black Man in Film A study of black artists in movies from 1895 to the present, with an emphasis on American films. *Prerequisite:* Six hours of related courses, including 165 or 166. Three hours. Manchel.

269 Broadcast News A study of radio and TV news in the United States in terms of its historical, political, social, and economic roles. *Prerequisite:* Six hours of related courses, including 63. Three hours. (Not offered for graduate credit.)

293 Canadian Mass Media A study of mass communications in Canada to include analysis of radio-television-film and press, and how they reflect that nation's social, political, and cultural components. Field trip to CBC, the National Film Board, and other Montreal-based media centers. *Prerequisite:* Six hours of related courses. Three hours.

Communication Science and Disorders

COLLEGE OF ARTS AND SCIENCES

Professors Daniloﬀ (Chairperson), Wilson; Associate Professor Guitar; Assistant Professors Hoffman, Kramer; Lecturers Houghton, Turnbaugh.

74 Communication (Speech and Hearing) Science A beginning course for intending majors; physics and biology of human communication. Three hours. (Required of majors.)

76 Introduction to Communication Problems (Speech Pathology) A general survey course of the problems of communication. *Prerequisite:* Sophomore standing. Three hours. (Not offered 1981-82.)

81 Voice and Articulation Elements of speech and phonetics for the improvement of voice and articulation in communication. *Prerequisite:* Sophomore standing. Three hours. (Not offered 1981-82.)

101 Phonetics Acoustic and physiologic phonetics. Analysis of English speech sounds used in the International Phonetic Alphabet. *Prerequisite:* Sophomore standing. Three hours. Daniloﬀ.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

270 Learning and Development of Speech and Language Speech and language acquisition in relation to current learning theory and methods of linguistic analysis. *Prerequisite:* Nine hours of speech and psychology, including 74. Three hours. Wilson.

271 Communication Disorders I The etiology, symptomology, and principles of habilitation for articulation deviancies, language, and fluency disorders. *Prerequisites:* 74, 101, and 270. Three hours. Turnbaugh.

272 Communication Disorders II Problems of voice, cleft palate, cerebral palsy, and aphasia. *Prerequisite:* 281. Three hours. (Not offered 1981-82.)

273 Principles of Audiology An introduction to clinical audiology including a consideration of hearing disorder, tests of the hearing function, and hearing conservation programs. *Prerequisite:* Twelve hours of speech and psychology, including 74. Three hours. Houghton.

275, 276 Clinical Study Supervised practicum experiences with children and adults presenting disorders of speech, hearing, and language. *Prerequisites:* Twelve hours in speech and hearing science courses, including 271 or 272, department permission. Credit as arranged.

278 Neurological Bases of Communication Study of the neurological bases of communication and various behavioral correlates; structure and junction of sensory-motor systems and higher center. *Prerequisite:* Nine hours of speech and psychology, including 74. Three hours. Wilson. (Not offered for graduate credit.)

281 Anatomy-Physiology of Speech *Prerequisite:* Nine hours of speech and psychology, including 74. Three hours. Hoffman.

282 Anatomy-Physiology of Audition *Prerequisite:* Nine hours of speech and psychology, including 74. Three hours. Daniloff.

283, 284 Seminar Discussion and research in the selected areas of communication science and disorders. *Prerequisite:* Departmental permission. Three hours.

287 Current Research in Language Acquisition Recent advances in the study of child language. *Prerequisite:* 270. Three hours. Wilson. (Not offered 1981-82.)

Computer Science

DIVISION OF ENGINEERING, MATHEMATICS, AND BUSINESS ADMINISTRATION
Professors Absher, Dawson, Hill (Director); Associate Professor Shub; Assistant Professor Davis; Lecturers Charbonneau, Fischl, Halsted, Thomas.

3 Computers and Their Application (3-0) Survey for nonspecialists. Basic concepts and vocabulary. Applications and future trends. Some elementary programming, but not intended for majors in quantitative areas. No credit for Computer Science majors. *Prerequisite:* Two years high school algebra. Three hours.

11 Computer Programming I (2-2) Structure of a digital computer. Development of algorithms for problem solution. Expression of algorithms using

flowcharting techniques. Implementation of algorithms utilizing a higher level language (e.g. FORTRAN). *Prerequisite:* Credit in Math. 18 or 19, or concurrent enrollment or credit in Math. 21. Three hours.

12 Computer Programming II (3-0) Concepts of programming style. Continuation of programming concepts to include the development of program specifications, efficient organization and coding techniques, documentation, debugging, and testing. *Prerequisites:* 11, Math. 18, 19, 21, or 23. Three hours.

101 Introduction to Computer Science (3-0) Assembly language and machine structure for current host computer (DECSYSTEM 2060). Debugging techniques. System services to include I/O services and trap handling. *Prerequisite:* 12. Three hours.

102 Software Fundamentals (3-0) An overview of design, concepts associated with assemblers, loaders, compilers, and operating systems. *Prerequisite:* 101. Three hours.

103 Programming Languages (3-0) Formal definition of programming languages including specification of syntax and semantics. Global properties of algorithmic languages including scope of declarations, storage allocations, binding time of constituents and recursive procedures. List processing and string manipulation languages. Precision of arithmetic operations and run time representation of data structures. *Prerequisite:* 102. Three hours.

104 Data Structures (3-0) Lists, Strings, Arrays, Trees and Graphs. Storage systems and structures. Storage allocation and "garbage collection." Searching and sorting techniques. Generalized data management systems. *Prerequisites:* 12, Math. 104. Three hours.

195 Special Topics *Prerequisite:* Consent of instructor. Hours variable.

200 Discrete Simulation (3-0) (See Civil Engineering 227.)

201 Operating Systems (3-0) Introduction to principal components and algorithms involved in operating systems design and implementation. Memory, processor, device, and file management techniques presented and compared. Protection and security schemes examined for both memory and file organizations. Synchronization primitives discussed. *Prerequisite:* 222. Three hours.

202 Compiler Construction (3-0) Practice in design and implementation of translators for ALGOL-like languages. Regular and context-free grammars, parsing, code generation for stack and register machines. Interpreters. Run-time storage administration for block-structured languages. *Prerequisites:* 102, 103, 104, or 301.

204 Advanced Systems Programming Advanced study and research in a selected area of systems programming. *Prerequisite:* 201. Three hours.

222 Computer Architecture (3-3) Architecture of computing systems. Levels of computer description. Taxonomy of computing machines. Addressing structures, memory concurrency, processor concurrency. Hardware features desirable for various software systems. Hardware, software, firmware tradeoffs. *Prerequisites:* 102, Math. 104, Electrical Engineering 231. Three hours.

223 Introduction to Formal Language Theory (Same as Math. 223.)

241 Introduction to the Theory of Computing (3-0) (Same as Math. 218.) Capabilities and limitations of finite state automata. Minimization, control, and identification of machines. Structure and loop-free decomposition of machines. State-identification and fault-detection experiments. Finite state recognizers and regular expressions. *Prerequisite:* 241 or Math. 104 or Electrical Engineering 231. Three hours.

242 Sequential Machines and Automata Theory (3-0) Computability, effective procedures, algorithms, and recursive functions. Post's symbol manipulation systems and formal languages. Undecidable problems. Abstract and concrete complexity. *Prerequisite:* Math. 104.

Dental Hygiene

SCHOOL OF ALLIED HEALTH SCIENCES

Assistant Professor Hill (Chairperson); Associate Professors Brown, Farnham, Wootton; Assistant Professor Levi; Instructors Bowen, Grundler, Preston, Reed, Venmar; Lecturers Bellhouse, Hamidiani, Lamoray, McKechnie, Mercier, Welsh.

3 Dental Hygiene Core I Introduction to the morphology and physiology of the oral tissues and to the practice of dental hygiene with emphasis on patient education and preventive procedures. Seven hours. Wootton, Hamidiani.

4 Dental Hygiene Core II Continuation of Dental Hygiene 3 including in-depth study of head and neck anatomy and the development of clinical skills. Five hours. Hamidiani, Wootton.

145 Dental Hygiene Senior Major Introduction to general pathology, oral pathology, and periodontics. Five hours. Hill, Levi.

146 Dental Hygiene Senior Major Continuation of Dental Hygiene 145 including pharmacology and anesthesiology in dental practice. Three hours. Farnham, Mercier.

61 Radiology Study, demonstration, and practice of fundamentals of intraoral radiographic technic including electrophysics; angulation of the machine; placement and complete processing of films. Two hours.

62 Dental Practice Discussion and project participation in the planning, development, and implementation of dental health education, public health dentistry, and the private practice of dentistry. Two hours. Long.

71 Myofunctional Therapy Discussion designed to provide an understanding of the etiology and symptomatology of oral pressure habits which affect occlusion, mastication, deglutition, facial expression, and speech. One hour.

91 Dental Materials Study of the materials used routinely in dental practice. Two hours. Lamoray.

181-182 Senior Clinic and Seminar Clinical practice with patients from simple to more difficult cases both children and adults. Field practice at local dental clinics, hospitals, and private institutions. *Prerequisites:* 3, 4. Four hours.

Economics

COLLEGE OF ARTS AND SCIENCES

Professors Alnasrawi, Campagna, Chase (Chairperson), Nadworny; Associate Professor Bates; Assistant Professor Woolf; Instructor Heaps.

11 Principles of Economics Introduction to economic concepts, institutions, and analysis, particularly as these relate to the macroeconomy. Open to freshman majors in economics. Sophomore standing required for non-majors. Three hours.

12 Principles of Economics Study of individual economic units with particular emphasis on the tools of microeconomic analysis. For majors and others interested in more thorough understanding of economic analysis. *Prerequisite:* 12. Three hours.

101 Money and Banking Commercial and central banking with special attention given to the Federal Reserve system, monetary theory and policy. *Prerequisite:* 12. Three hours.

103 Public Finance Revenues and expenditures of federal, state, and local governments and intergovernmental relationships; the effects of expenditures

and taxation upon individuals, business institutions, and the national economy. *Prerequisite:* 12. Three hours.

105 International Trade and Finance Theories of international values, adjustment of international balances, foreign exchange, international aspects of money and banking, and tariffs. *Prerequisite:* 12. Three hours.

130 Mathematical Economics Basic mathematical techniques employed by economists; use of maximum and minimum criteria and optimization problems; partial and general equilibrium analysis; comparative statics; some dynamic analysis. *Prerequisites:* 12, one semester of calculus. Three hours.

138 Evolution of Capitalism Origins and development of capitalism; their social-economic institutions and their transference from Western Europe to North America. *Prerequisite:* 12. Three hours.

141 Labor Economics Labor as an economic factor, the labor force, wages, productivity, and income. Wage and hour legislation, social security, and unemployment insurance. *Prerequisite:* 12. Three hours.

167 Statistical Methods for Economists Data organization and presentation; construction and weighting of index numbers; analysis of central tendencies and probability; confidence intervals and hypothesis testing; measurement of correlation; simple linear regression with application to secular trend and seasonal variation of time series. *Prerequisite:* 12. Three hours.

185 Comparative Economic Systems Major economic systems of mixed capitalist and socialist variety, their theoretical models, basic institutions and policies from a comparative point of view. *Prerequisites:* 12, six hours in another social science. Three hours.

186 Microeconomic Theory Analysis of consumer demand, supply, market price under competitive conditions and monopolistic influences, and the theory of income distribution. *Prerequisite:* 12. Three hours.

187 Industrial Organization The structure, conduct, and performance of U.S. industry and appraisal of its economic efficiency and social impact, including governmental policies. *Prerequisite:* 12. Three hours.

190 Macroeconomic Theory Keynesian and post-Keynesian theories of economic development; government policies in relation to the problems of employment, stability, and growth in developed economies. *Prerequisite:* 12. Three hours.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

200, 201 Economic History of the United States Economic development and the evolution of capitalism in the U.S. First semester (200): Origins and growth of economy to 1900. Second semester (201): The American economy in 20th century. *Prerequisite:* 186 or 190 or permission of instructor. Three hours. Alternate years.

210 Income, Wealth, and Welfare Analysis of the distribution of income and wealth and policies which affect them. *Prerequisite:* Nine hours in economics. Three hours. (Not offered 1981-82.)

216 Economic Development Theories of economic growth applied to underdeveloped areas of the contemporary world including the political and social determinants of economic progress. *Prerequisite:* 12; 190 recommended. Three hours.

217 Urban and Regional Economics Economic analysis applied to the problems of cities, states, and regions. *Prerequisite:* Nine hours in economics. Three hours. (Not offered 1981-82.)

234 Advanced Macro and Monetary Theory Analysis of classical Keynesian and modern macroeconomic models; micro and macro demand for and supply of money; portfolio choice and the influence of financial intermediaries. *Prerequisites:* 101, 190. Three hours.

241 Human Resources The theory and policy, the labor sector, and human capital in an advanced economy. *Prerequisite:* 141. Three hours.

242 Labor-Management Relations Economic influences of unionization. The grievance process, arbitration, and labor relations laws. *Prerequisite:* 141. Three hours.

258 Problems of Communism A comparative study of economic and political problems of applied communism with particular emphasis on current developments in selected Communist countries. *Prerequisite:* Twelve hours in history and/or social sciences. Three hours.

267 Econometrics A combination of economic theory, mathematics, and statistics for testing of economic hypotheses and developing economic models. *Prerequisites:* 167, 186, 190, 130 recommended. Three hours.

290 The Soviet and Eastern European Economies Analysis of the economic development, structure, performance, and direction of the Soviet and related economies. *Prerequisite:* Nine hours in economics or permission of instructor. Three hours.

295 Development of Economic Thought Development of economic ideas. The Pre-Classical, Classical, Socialist, Neo-Classical, Keynesian Schools and individual theoreticians. *Prerequisites:* 186, 190 or concurrent enrollment. Three hours.

296 Seminar and Special Topics

297 Readings and Research

299 Departmental Honors

Education

COLLEGE OF EDUCATION AND SOCIAL SERVICES

Any information concerning course instructor may be obtained from department chairperson at the beginning of each semester.

Professors Abruscato, Agne, Boller, Carlson, Conrad, Ducharme, Fox, Gobin, Grams, Hanley, Hunt, Leggett, McKenzie, Nash, Peterson, Petrusich, Rippa, Shiman, Tesconi; Associate Professors Barbour, Burrell, Clements, Erb, Goldhaber, Griffin, Knight, Lang, Larson, Letteri, Meyers, Nevin, B. Nichols, Rathbone, Sandoval, Shelton, Thompson, Whittlesey; Assistant Professors Bright, Chase, Cheney, DeWeaver, Edwards, Hasazi, Holmes, Jameson, Knight, Leean, McEntee, O'Donnell, Paolucci-Whitcomb, Pierce, Ponzio, Smith, Stevenson, Williams; Lecturers Burdett, Christie, Garrett, Michael, Perelman, Pierson, Roberts, Royce, Slack, Watson, Wood, Extension Associate Professor E. Nichols.

The College of Education and Social Services offers the following courses on a program basis. Departmental permission is required for enrollment.

55 Special Topics I Designed so that its content and structure may accommodate special issues not especially appropriate within the boundaries of an existing course. Open to underclassmen. Two to six hours.

154 Special Topics II Lectures, readings, or projects relating to contemporary areas of study. Open to upperclassman. Two to six hours.

181 Student Teaching Teaching in elementary or secondary schools under

guidance of cooperating teachers, principals, and college supervisors. For most undergraduates this is a full-time, 16-week, 12-credit experience during a semester. *Prerequisites:* Acceptance in a teacher education program, acceptance by the Coordinator of Professional Laboratory Experiences. Variable-credit, three to 12 hours.

197 Readings and Research Individual research problem or directed reading in an area of special interest to the student. *Prerequisite:* Permission of instructor. Variable credit, one to four hours. Course may be repeated for a maximum of eight hours credit.

200 Contemporary Issues Designed so that its content and structure may accommodate special issues not especially appropriate within boundaries of an existing course. *Prerequisites:* Twelve hours in education and related areas. Two to six hours.

295 Laboratory Experience in Education Supervised field work designed to give students experience in specialized areas for their professional development. *Prerequisite:* Permission of Coordinator of Professional Laboratory Experiences. Credit as arranged.

EDSS —GENERAL EDUCATION

1 Schooling, Learning, and Society Introduction to issues and problems in American education: schools and learning, professional careers, individuals in systems, characteristics of learners. Required readings and papers. Non-CESS students only. Three hours.

2 Foundations of Education Social foundations of education: development of American education; education as a profession. Three hours. I or II.

60 An Introduction to Helping Skills for the Educator Examines phenomenon of "helping" in American society within its sociological, cultural, economic, political, and educational contexts. Emphasis on how helping professionals function both to help and to hinder clients in society. Three hours.

62 Life Planning Introduction to self, career, and academic resource awareness geared to students who want to assess their own values systems, decision making processes, and life goals. Three hours.

193 Environmental Education Philosophy, concepts, and teaching-learning strategies of environmental education. *Prerequisite:* Three hours in education or permission of instructor.

211 Educational Measurements Essential principles of measurement in education. Topics include validity, reliability, principles of test construction, item analysis, and analysis of standardized tests as they apply to classroom. *Prerequisite:* Twelve hours in education and related areas. Three hours.

236 Professional Writing Focuses on problems in writing faced by professionals in educational and human service settings. Students will write reports, critiques, and reviews; analyze examples of published work in similar modes; and receive detailed critiques of their work. Three hours.

237 The Middle School Child: Education and Social Implications Intensive analysis of unique problems faced by middle school child. Middle school organization, curriculum, teaching procedures, and family life adjustments examined in depth. *Prerequisite:* Twelve hours of education or psychology or permission of instructor. Three hours. (Not offered for graduate credit.)

238 Teaching for Global Awareness Focuses on three important value issues — peace and prevention of war, social and economic justice, environmental harmony — and their relationship to global problems. Curriculum materials developed and shared. Ways of teaching about global issues stressed and links made between local and global concerns. *Prerequisite:* Twelve hours of education and related areas. Three hours.

248 Educational Media Modern instructional aids, theory and practice; educational media related to psychology of teaching and learning. *Prerequisite:* Twelve hours in education and related areas. Three hours.

EDLS —LEARNING STUDIES

43, 44 Learning Theory Studies in behavior with emphasis in cognitive, emotional, and psychological development. Examination of views of learning styles and developmental processes. Non-CESS only. *Prerequisite:* Three hours in education or permission of instructor. Three hours.

45, 46 Learning and Human Development The developing individual; psychology of learning with particular application to human development; measurement and evaluation of learning and development; opportunities for related field experiences. *Prerequisite:* Three hours in education or permission of instructor. Three hours.

212 Child and Adolescent Psychology Examination of children and adults as emerging individuals and impact of sociocultural ethics, values, and institutions on that individual. Themes include human needs, values, self concept, personal freedom, bureaucratic society, cross-cultural issues; as relative to children and youth. *Prerequisite:* Twelve hours in education and/or related areas. Three hours.

EDFS —FOUNDATIONS

190 Approaches to Education Senior Seminar. Ideas and values, historic and contemporary, with emphasis upon ideological bases of American education. Students develop new perspectives as guide toward resolving some crucial issues of our time. *Prerequisites:* Senior standing, three hours in education or permission of instructor. Three hours.

204 Seminar in Educational History Struggles for Freedom and Equality. Selected topics in history of education. Special attention to education in democratic and authoritarian social orders. Discussions and research around such topics as education of women, black heritage, American higher education in transition. *Prerequisite:* Twelve hours in education and related areas or permission of the instructor. Three hours.

205 History of American Education Educational principles and practices in the U.S. as they relate to main currents of social history. Discussions focus on key ideas of historic and contemporary significance. *Prerequisite:* Twelve hours in education and related areas or permission of instructor. Three hours.

206 Comparative Education A cross-cultural examination of education and selected social services in several countries, e.g. China, U.S.S.R., England. Ideology, social class, and social change are some of the themes to be explored. *Prerequisite:* Twelve hours in education and related areas. Three hours.

209 Introduction to Research Methods in Education and Social Services Seminars and research projects will introduce the students to the methods of historical, descriptive, experimental, quasi-experimental, field studies, and survey research. Three hours.

252 Seminar in Aesthetic Education Critical examination of aesthetic values in contemporary society. The aesthetic quality of natural and built environments with implications for present and future educational practice given special attention. *Prerequisite:* Twelve hours in education and related areas. Three hours.

255 School as a Social Institution Examination of the school and related social institutions, with particular focus on: social class, race, and ethnicity, socialization, role of the family, and social change. *Prerequisite:* Twelve hours of education and related areas. Three hours.

EDEL —ELEMENTARY EDUCATION

4 Child and Community Supervised experiences with children's groups in the community. Students should plan a schedule which will enable them to have blocks of time, such as a morning or afternoon, free of regular classes. *Prerequisite:* Sophomore standing. Two hours.

115 Experience Analysis of American Primary Schools Designed for students enrolled in the American Primary Program. Includes readings on the American school, observation in several schools, instruction work with children, and seminars about interns' experiences in the schools. *Prerequisite:* Three hours in education or permission of instructor. Three to six semester hours.

121 Reading and Language Arts Principles underlying teaching reading at elementary level. Materials and methods; reading readiness; development of vocabulary; word analysis and comprehension skills; reading in content area. *Prerequisites:* Elementary majors, sophomore standing. Three hours.

122 Developmental Reading Current practices and controversial issues relative to teaching reading. Study of recent innovations, methods, materials, and assessment techniques. *Prerequisites:* Elementary majors, 121. Three hours.

134 Children's Literature and Language Arts Appreciation, evaluation, and selection of children's literature in the Language Arts program; development of oral and written expression. *Prerequisites:* Elementary majors, sophomore standing. Three hours.

136 Introduction to Drama in Education Workshop in dramatic activities for elementary children. Creative expression based on selections from children's literature as well as plays and vignettes written by class participants. *Prerequisite:* 134. Three hours.

138 Analysis of Problems in Reading and Related Language Instruction Introductory course in analysis and evaluation of reading and writing difficulties; critiquing assessment instruments; interpretation of test data; strategies for improvement. *Prerequisite:* 122. Three hours.

139 Laboratory Experience in Reading and Related Language Instruction Introductory course in prevention and correction of reading and writing difficulties; methods and materials for remediation. Involvement with students is required. *Prerequisite:* 138 or permission of instructor. Three to six hours.

144 Teaching Science and Social Studies Teaching methods, curriculum planning in social studies and science for primary through middle school. Variety of nationally developed curriculum projects examined and micro-taught. Wide variety of instructional activities and strategies considered. *Prerequisite:* Three hours in education or permission of instructor. Three hours.

160 Teaching Mathematics and Critical Thinking in the Elementary School Investigation of modern approach to mathematics with emphasis on instructional strategies, curriculum resources, and problem solving. Emphasis on a manipulative approach to teaching mathematics in elementary school. *Prerequisites:* Math. 15 and 16 or permission of instructor. Three hours.

186 Seminar for Primary School Teachers On-site psychological and instructional support to American Primary Experience Program interns during student teaching experience. Weekly meetings and personal conferences centering around difficulties and successes of student teaching held in the various field sites. *Prerequisites:* Acceptance in APEX, concurrent enrollment in Student Teaching. Three hours.

222 Improvement of Reading Instruction in the Elementary School Analysis of philosophies, program, and instructional practices for teaching reading. Examination and evaluation of basal textbook, individualized,

and specialized reading programs. *Prerequisites:* Twelve hours in education and/or related areas including an introductory course in reading or permission of the instructor. Three hours.

234 Literature and Language for Children and Youth Characteristics, interests, and reading habits of children and young people; criteria for selection and evaluation of literature; organizing book unit for teaching literature and for content areas emphasizing development of oral and written expression. *Prerequisite:* Twelve hours in education and related areas or consent of instructor. Three hours.

241 Science for the Elementary School Examines a number of elementary school science programs. Emphasis on methods and materials relating to construction and use of science units for children in grades K-6. *Prerequisite:* Twelve hours in education and related areas and permission of instructor. Three hours.

242 Modern Trends in Elementary Education Study of modern educational principles and practices in today's elementary schools. Emphasis on communication in classroom, interaction between students and teachers, materials, emerging trends. Different teaching modes that assist in development of more critical analysis of the teaching act. *Prerequisite:* Twelve hours in education and related areas. Three hours.

244 Social Studies in the Elementary School Study of literature, research, and problems in teaching social studies in the elementary school. *Prerequisite:* Twelve hours in education and related areas. Three hours.

256 Methods and Materials in Elementary School Mathematics Evolution of mathematical concepts and notations, meaning of numbers and number systems, theory underlying fundamental operations, metric measurement, analysis of modern approach to mathematics. Emphasis on manipulative approach to teaching mathematics in elementary school. *Prerequisite:* Twelve hours in education and related areas. Three hours.

270 Kindergarten Methods and Organization Objectives, organization, curriculum, methods and materials, and relationships of kindergarten to Head Start and other pre-school experiences. *Prerequisite:* Twelve hours in education and related areas. Three hours.

271 Kindergarten Education With Laboratory Experiences To acquaint the prospective kindergarten teacher with educational research conducted by Piaget, Bruner, Montessori, and others with experiences provided for working with children of kindergarten age. *Prerequisite:* Twelve hours in education and related areas. Three hours.

EDSC — SECONDARY EDUCATION

6 Participation Minimum of 30 clock hours of observation and participation in classroom work in formal learning environment. Weekly seminars on campus. Students should plan a schedule which will enable them to have blocks of time, such as morning or afternoon, free of regular classes. *Prerequisites:* Sophomore standing, acceptance by coordinator of Professional Laboratory Experiences. Two hours.

137 Reading in the Secondary School Principles underlying the teaching of reading in the content areas; materials of instruction; development of word recognition, vocabulary, comprehension, and study skills. *Prerequisite:* Junior standing. Three hours.

138 Analysis of Problems in Reading and Related Language Instruction Analysis and evaluation of reading and writing difficulties in the content areas; critiquing tests and interpreting data, strategies for improvement. *Prerequisite:* 137. Three hours.

178 Secondary Methods and Procedures Prepares students for teaching in secondary school. Microteaching, role playing, classroom simulation, analysis of classroom behavior, and preparation of individualized materials. *Prerequisites:* Satisfactory completion of 145 and 146, acceptance in a teacher education program. Three hours.

179 Secondary Methods and Procedures in Special Subject Areas (Latin, mathematics, romance languages, and social studies.) *Prerequisites:* Prior or simultaneous enrollment in 178, acceptance in a teacher education program. Variable credit, two or three hours; i.e. Latin, three hours; mathematics, three hours; romance language, three hours; social studies, three hours. (English majors enroll in 282 and Speech majors in 294. Speech minors are encouraged to enroll in 294.)

217 Secondary School Curriculum Principles and problems in curriculum development. Analysis of recent curricular innovations in American secondary schools. *Prerequisite:* Twelve hours of education and related areas. Three hours.

223 Reading Programs in Secondary Schools and Colleges Relationship of reading to learning; study of organization, instructional procedures, and materials for developing reading improvement programs for secondary and college students; reading in content areas. *Prerequisite:* Twelve hours in education and/or related areas or consent of instructor. Three hours. (Also offered for undergraduates under 137.)

225 Teaching Social Studies in Secondary Schools Multiple teaching modes, questioning techniques, micro-teaching laboratory, analysis of historical content to determine students' prerequisite cognitive skills and processes for construction of historical scenarios. *Prerequisite:* Twelve hours of education and related areas. Three hours.

227 Teaching Science in Secondary Schools Consideration of science curricula for grades 7-12. Teaching science as problem-solving, research in science teaching, evaluation strategies, instructional techniques, and affective education through science. *Prerequisites:* Twelve hours in education and related areas, permission of instructor. Three hours.

294 Seminar for Prospective Teachers of Communications (See Communication 294.)

EDAR — ART EDUCATION

140 Foundation Studio for Elementary Education Majors Students select a foundation studio course (Art 2,3 or 4) from those sections designated each semester on the course schedule. See course descriptions listed under Art in College of Arts and Sciences. Three hours.

141 Practicum in Field Experience Student works as teaching assistant to faculty member in foundation, studio, advanced studio, art history, or museology depending on his/her interest and capabilities. *Prerequisites:* Senior standing, permission. Four hours.

177 Curriculum and Practice in Elementary Art Study and implementation of curriculum in elementary school. Students work directly in an elementary classroom. Lectures and discussions. *Prerequisites:* Eighteen hours studio art, junior standing. Four hours.

183 Seminar: Current Issues in Art and Education Research and discussion of issues relevant to contemporary art and the teaching of art. *Prerequisite:* Senior standing or permission plus 12 hours in art and/or related areas. Three hours.

EDMU — MUSIC EDUCATION

The Music Department offers a number of pedagogy courses in specific musical

areas. All are open to non-majors by permission of the instructor. See Music listings under the College of Arts and Sciences.

111 Music for Elementary Teachers Development of musical skills, understandings, and attitudes pertinent to the teaching of music in elementary classroom. *Prerequisite:* Sophomore standing. Three hours.

112 Elementary Music Methods To aid the elementary classroom teacher in developing the potential musicality of students to highest level through practical application of musical skills and understandings already acquired by teacher. *Prerequisite:* 111 or music major or instructor's permission. Three hours.

131 Music Methods Methods and materials in the teaching of vocal and instrumental music in elementary and secondary schools. *Prerequisites:* 145, 146, senior standing in music education. Five hours.

240 Musical Creativity in the General Music Class Designing a course of study for the general music class. Developing musical concepts and perception through individual differences. Aural approach through class performance on recorders. *Prerequisite:* Undergraduate major in music education or permission of instructor. Three hours.

243 Recent Trends in Music Education Study of recent thought and practices in music education. Examination of current trends. *Prerequisite:* Undergraduate major in music education or permission of instructor. Credit variable, one to four hours.

253 Practicum in Music Education Current methodology in music education for music specialist and classroom teacher. Each year emphasis in a different area of concentration. *Prerequisites:* Undergraduate major in music education or elementary education and teaching experience or permission of instructor. Credit variable. Course may be taken for one to four hours each semester and may be repeated for maximum of eight hours.

290 Basic Concepts in Music Education Disciplinary backgrounds; historical and philosophical foundations; fundamental considerations of the functions of music in the schools; development of a personal philosophy. Three hours.

EDRT — RESPONSIVE TEACHER

3 Introduction to Special Education Overview of causes, behaviors, and educational programs of those with psychological and educational needs different from those of the general population. Three hours.

53 Providing for Exceptional Individuals Public Law 94-142, Education for all Handicapped Children Act (1975) and its implications for classroom teachers. Review of components of Individualized Education Program (IEP) required for every child receiving special education. Required practicum in neighboring school. Three hours.

100 Specifying Minimum Objectives for Basic Skills The concept of minimum instructional objectives and their use for developing language, arithmetic, and social interaction curricula. Observation of selected public school classrooms using basic skills minimum objectives. *Prerequisite:* Three hours in education or permission of instructor. Three hours.

150 Classroom Management Procedures Survey of researched procedures for managing children eligible for special education services within regular and special classrooms, and home and institutional environments. Students develop, apply, and evaluate specific procedures in simulated and classroom environments. *Prerequisite:* Three hours in education or permission of instructor. Three hours.

151 Special Education Methods I Modules introduce students to historical

issues and current trends in special education, concept of minimum instructional objectives and use for developing language, arithmetic, and social interaction curricula; analysis of specific teachers' and childrens' behavior in classroom setting. *Prerequisite:* Acceptance into Responsive Teacher Program. Six hours.

152 Special Education Methods II Modules facilitate the Responsive Teacher Practicum. Procedures for dealing with special education children; measurement systems to assess pupil progress; peer tutoring techniques; program development for children with learning deficits; norm and criterion reference testing; evaluation of learning environments. *Prerequisites:* Acceptance into Responsive Teacher Program, concurrent enrollment in 160. Six hours.

155 Measurement and Implementation of Minimum Objectives for Basic Skills Specification and implementation of measurement system to assess pupil progress in language, arithmetic, and social interaction curricula. Practicum applications of measurement system required for at least one child eligible for special education services in regular or special classroom. *Prerequisite:* 100. Three hours.

160 Responsive Teacher Practicum Practicum in public school or institution designed to provide opportunities for application of data-based model of education to serve children eligible for special education services. Time required: Four hours, Monday through Thursday mornings, plus travel time. *Prerequisites:* Acceptance into Responsive Teacher Program, concurrent registration in 152. Six hours.

165 Seminar in Special Education Students develop personal vitae and materials describing experiences and achievements during college career. Interviews with school administrators, classroom teachers, and peers provide opportunities to survey positions and careers in special education. *Prerequisites:* Acceptance into Responsive Teacher Program or permission of instructor. Seniors. One hour.

201 Foundations of Special Education Examination of historical and current trends in treatment of handicapped individuals, including effects of litigation, legislation, and economic considerations on educational and residential service delivery systems. *Prerequisite:* Twelve hours in education and related areas or permission of instructor. Three hours.

216 Instruction for Mildly Handicapped Individuals I Introduction to curriculum for instruction of children with learning disabilities, mental retardation, and behavior disorders with emphasis on objectives, assessment, task analysis, curriculum, and evaluation. *Prerequisite:* Permission of instructor. Three hours.

224 Introduction to Behavioral Principles of Education Analysis of specific teachers' and childrens' behavior in classroom setting that function to facilitate or impede attainment of educational goals. Emphasis on application of basic behavioral principles in regular class setting that will improve student's academic and social behaviors. *Prerequisites:* Twelve hours in education and related areas, permission of instructor. Juniors and seniors. Three hours.

ECHD — EARLY CHILDHOOD AND HUMAN DEVELOPMENT

60-61 The Context of Human Development The impact of the family, community, and various agencies, systems, and conditions within society upon the developing individual. Three to four hours.

62 Adolescent Development Physical growth, physiological, psychological, and social development in adolescence. Emphasis on interrelationships of these processes and the developing personality. *Prerequisites:* Sophomore standing, Psychology 1. Three hours. Shelton.

63 Child Development The biological, psychological, and social growth

and development of the child and his relationships with his family, peers, and institutions. *Prerequisites:* Sophomore standing, Psychology 1. Three hours. Jameson, Shelton, Goldhaber.

64 Maturing and Aging Physical change, physiological, social development during the maturing years and older age. Interrelationships between these processes will be stressed. *Prerequisites:* Sophomore standing, Psychology 1. Three hours. Grams.

65 Human Relationships and Sexuality Sexual responsibility and the biological, social, psychological growth, and development of human beings in terms of sex role identity. Three hours. Barbour.

69 Freshman Program Seminar First half of two-year program in which advisor and students meet to discuss contemporary issues in human development and early childhood. Students may enroll twice in this course. Two hours.

80-81 Human Development A two-semester comprehensive survey of development across the life cycle. Three hours lecture and one hour optional discussion each semester. Six to eight hours. Goldhaber, Shelton.

82 Creative Curriculum Activities for the Early Childhood Years I Planning interdisciplinary program materials for children on an individual and group basis using movement, graphic, plastic, language arts. *Prerequisite:* Permission of instructor. Three hours. Jameson.

83 Creative Curriculum Activities for the Early Childhood Years II Planning interdisciplinary program materials for children on an individual and group basis emphasizing mathematics, the natural ecology, and general sciences. *Prerequisite:* 82 in preceding semester or permission of instructor. Three hours. Jameson.

163 The Emerging Family Development of parents and children in various stages of the family life cycle and various emerging family forms. *Prerequisite:* Sophomore standing. Three hours.

164 Parent-Child Relations Interpersonal relations of adults and children and the application of underlying principles in parent education and family consulting. *Prerequisite:* 63 or consent of instructor. Three hours. Grams.

165 Practicum: Facilitating Human Sexuality Discussion Groups. Designed to train participants to become affective facilitators of discussion groups dealing with human relationships and sexuality. *Prerequisites:* 65, sophomore standing, permission. Three hours.

169 Sophomore Program Seminar An ongoing seminar for Human development majors. Readings, study, and discussion of current issues, research, publications, and professional affairs. *Prerequisites:* Sophomore standing, Early Childhood and Human Development major. A student may enroll twice in this course. Two hours.

184 Early Childhood Programs An active examination of present day early childhood programs in relationship to their historical development from early history. Three hours.

187 Field Practicum Supervised teaching in accredited early childhood facilities licensed or approved by responsible boards. *Prerequisite:* Permission. Eight hours. Jameson.

188 Prepracticum Internship Administration and planning for an early childhood development center. *Prerequisites:* Early Childhood major, permission. Three hours.

189 Early Childhood Practices Supervised planning and conducting the early childhood laboratory center integrated with readings and research, advanced child development seminar, and curriculum workshop. *Prerequisite:* Permission. Fifteen hours.

260 Family Ecosystem Family viewed in and as an environment for human development. The family ecological approach will be applied to practical family concerns. *Prerequisite:* Senior standing or permission of instructor. Three hours. Edwards.

263 Advanced Child Development A survey of the professional literature in child development with special emphasis on the influence of early life experiences throughout the life cycle. *Prerequisite:* 80-81 or equivalent. Three hours. Goldhaber.

264 Contemporary Issues in Parenting Contemporary cultural factors that influence adult lifestyles and their relationship to successful parenting. *Prerequisite:* Nine hours in human development or permission of instructor. Three hours. Goldhaber, Jameson.

265 Teaching Human Development Designed for individuals who teach or plan to teach human development. Emphasis on group-building skills and interpersonal relationships. *Prerequisites:* Six hours in human development, permission of instructor. Three hours. Barbour.

266 Seminar in Human Development Intensive study of issues in human development and their application in a wide variety of professional areas. May be taken more than once up to a maximum of 12 credits. *Prerequisites:* Junior standing, nine hours of human development or equivalent. Three hours.

281 Infancy Development and rearing from conception to 18 months and the relationship to subsequent development. *Prerequisites:* Nine hours in human development, nutrition, and physiology or biology or permission of instructor. Three hours. Shelton.

EDPE — PHYSICAL EDUCATION

16 Driver Education Workshop, Basic A mandatory teacher preparation course to teach driver education in Vermont secondary schools. The first of two courses that must be completed. Three hours.

18 Driver Education, Advanced Extensive course in driver and traffic safety for teachers in driver education. Deals with problems experienced by teachers in driver education and highway safety involving driving practice, introduction to range operations, and simulations. *Prerequisite:* 16. Three hours.

21 Foundations of Physical Education Review of historical, philosophical, and scientific foundations as a basis for physical education. Study of vocational opportunities associated with physical education as a profession. Three hours.

22 First Aid and Safety To prepare students with the first aid knowledge and skills necessary to care for most injuries and to meet most emergencies. Red Cross certification for successful performance in Standard First Aid and Personal Safety. One hour.

23 Advanced First Aid and Emergency Care To meet the needs of individuals who are in a position to provide first aid and emergency care frequently. Red Cross certification for successful performance in Advanced First Aid and Emergency Care. *Prerequisite:* Permission of instructor. Two hours.

26 Water Safety Advanced performance skills in swimming, diving, survival, and rescue techniques. Theory and practice in techniques of teaching aquatic skills. Red Cross certification as Water Safety Instructor or Instructor for Beginning Swimming. *Prerequisite:* Current Red Cross Lifesaving Certificate. Two hours.

30 Career Planning in H.P.E.R. Study of alternatives, issues, and skills related to career options for students majoring in Health, Physical Education, and Recreation. Special emphasis on factors pertaining to preparation, locating, and application for employment. One and one-half hours, half semester.

54 History, Philosophy, and Trends in Recreation Review of chronological history of evolution of recreation movement; examination of past and emerging theories and philosophies of recreation and leisure; exploration of trends in recreation and leisure and probable impact on our life styles. Three hours.

100 Teaching Physical Education in the Elementary School Planning, organization, and practice skills appropriate for teaching movement patterns to children aged 4-12. *Prerequisite:* Six credits in Elementary Education. Two hours.

104, 105 Physical Education Teaching Experience (Pretext) Experience-based course sequence emphasizing relationship of motor development to learning. Includes age level needs and appropriate physical education activity sequences. First semester focuses on grades K-3; second semester (105) grades 4-6. *Prerequisites:* 23 or 157, junior standing. Five hours.

122 Coaching Basketball Experiences include theory and technique in coaching basketball, as well as the organization and conduct of a basketball program, defensive and offensive strategies, etc. *Prerequisite:* Skill competency in basketball, sophomore standing or permission of instructor. Three hours.

123 Coaching Baseball/Softball Theory and technique of coaching interscholastic baseball and softball. Includes practice, game and schedule organizations. *Prerequisites:* Skill competency in baseball/softball, sophomore standing or permission of instructor. Two hours.

124 Coaching Tract Analysis and practice of the skills, techniques, and knowledge involved in coaching, interscholastic track. *Prerequisites:* Skill competency in track, sophomore standing or permission of instructor. Two hours.

125 Coaching Soccer Theory and technique of coaching interscholastic soccer. Includes practice, game and schedule organization. *Prerequisites:* Skill competency in soccer, sophomore standing or permission of instructor. Two hours.

126 Coaching Gymnastics Analysis and practice of skills, techniques, and knowledge involved in teaching and coaching gymnastics. *Prerequisites:* Skill competency in gymnastics and aquatics, sophomore standing. Two hours.

127 Coaching Aquatics Analysis and practice of skills, techniques, and knowledge involved in coaching aquatics. *Prerequisites:* Skill competency in aquatics, sophomore standing or permission of instructor. Two hours.

135 Adaptive Aquatics Skills and techniques for teaching the handicapped to swim. Prepares instructors to deal with a full range of physical, mental, and emotional handicapping conditions in an aquatic setting. *Prerequisite:* 26 or permission of instructor. Two hours.

140 Seminar in Physical Education Strategy, analysis, techniques, and contemporary issues in selected areas of physical education. Variable credit based upon the nature of the semester topic selection. One-three credits.

145 Seminar in Athletics Contemporary issues, strategy, analysis, and problem areas related to selected comparative sports. Variable credit. One-four hours.

155 Physical Education in the Secondary School Theories of teaching which include unit plan development, classification and grouping of students for instruction, and a variety of teaching methods. Laboratory experience in teaching activity skills to youth from age of 12-18 years. *Prerequisite:* Junior standing. Three credits.

157 Care and Prevention of Athletic Injuries Prevention, recognition, and care of injuries related to school physical education and athletic programs. Two hours.

158 Organization and Administration of Physical Education Organization

and administration of instructional programs, intramurals, interscholastic athletics, school recreational programs, schedules, personnel, budgets, equipment, records, tests, and public relations. Three hours.

166 Kinesiology Study of joint articulation, muscular action, and basic principles of body mechanics as a foundation for the analysis of motor performance in physical education activities, athletics, and physical therapy. *Prerequisite:* One year biological science. Three hours.

167 Physiology of Muscular Activity Study of physical exercise upon the circulatory, respiratory, digestive, and nervous system. Relationship of endurance, fatigue, training, and nutrition to the efficiency of physical performance. *Prerequisite:* One year biological science. Three hours.

168 Tests and Measurements in Physical Education and Health Principles and techniques in evaluation of instruction. Emphasis given to test selection, administration, construction, application of statistical procedures, and development and interpretation of research data. *Prerequisite:* Six credits in EDPE or health education, junior standing. Three hours.

172 Psychology of Coaching Application of psychological sub-disciplines to coaching. Learning, motivation, transfer, retention, emotion, and personality variables discussed with implications for the coach. *Prerequisites:* Psychology 1, junior standing. Three hours.

173 Practicum in Field Experience Individually prescribed teaching experience involving work with youth groups in activities related to physical education, health, or recreation. Responsibilities approximate those commonly associated with student teaching. *Prerequisite:* 104, 105, or 155 or permission of instructor. Variable credit (two-four hours).

185 Advanced Athletic Training Advanced concepts and skills in screening tests for injuries, rehabilitation, athletic fitness and conditioning programs, injury recognition and treatment, the use of drugs in athletics, and pathology. *Prerequisite:* 157, permission of instructor. Three hours.

192 Intramural Programs Organization and administration of intramural sports programs for junior high through college levels. Philosophy, program planning, units of competition, and financing of intramural programs. Laboratory experience in the UVM Intramural Program. *Prerequisite:* 22 or 157. Three hours.

195 Recreation Leadership and Programming A practical approach to the significance, theories and characteristics of leadership content, and methods of program planning. Field work practice in planning and leadership techniques. *Prerequisite:* 54. Three hours.

201 Administration of Athletic Programs Designed to provide athletic director, school administrator, and teacher-coach with background for effective administration of athletic program of schools. Scheduling, budgeting, management, equipment, policy, public relations, and educational justification. *Prerequisites:* Twelve hours of education and psychology. Three hours.

203 Principles of Physical Education Principles basic to sound philosophy of physical education for appraisal of historical development; relationship to health education, recreation and other areas; foundation and functions of physical education in contemporary society. *Prerequisites:* Admission to the program, junior standing. Three hours.

240 Principles of Motor Learning and Human Performance Study of nature of motor learning; factors affecting motor learning, such as motivation, emotion, and stress; concepts of transfer and retention; alternatives in teaching and coaching methodologies based upon applied principles in motor learning. *Prerequisites:* 166, EDSS 145 or 146. Three hours.

241 Seminar in Physical Education and Athletics Examination and analysis of contemporary issues and trends in physical education and athletics not especially appropriate within boundaries of an existing course. *Prerequisites:* Twelve hours in physical education and related areas. Variable credit (two-four hours).

253 Curriculum Design in Health and Physical Education Philosophy and techniques of curriculum innovation in health and physical education. Emphasis upon inter-relationships between student needs and interests, teaching methodology, evaluative procedures, community involvement, and administrative organization patterns. *Prerequisites:* Junior standing, 104, 105, 46 or 155. Three hours.

260 Adaptive Physical Education Recognition, prevention, and correction of functional and structural deviations from normal body mechanics. Organization of programs adapted to needs of handicapped individuals in both special class and mainstreamed settings. *Prerequisites:* 155, 104, 105 or equivalent teaching experience. Three hours.

EDHE — HEALTH EDUCATION

46 Health Education Concepts of personal health related to problems of daily living. Mental health, sex education, nutrition and weight control, fatigue and relaxation, chronic and communicable disease, stimulants and depressants. Three hours.

150 Seminar in Health Education Research, discussion, and critical examination of selected topics and special issues in health not currently covered in existing courses. *Prerequisite:* Six credits in health education or permission of instructor. Variable credit. One-four hours.

173 Practicum in Field Experience Individually prescribed teaching experience involving work with health agencies, both public and private. Responsibilities approximate those commonly associated with student teaching.

182 Health Methods and Materials Fundamental methods of teaching health as applied to school and public health education. Consideration of materials applicable to health education, evaluation techniques, preparation of teaching units and bibliographies. *Prerequisite:* 46. Three hours.

208 School Health Programs Organization of total school health program. Problems and administration in area of school environment, health services, health education, and school-community relationship. *Prerequisite:* 46 or equivalent. Three hours.

SWSS — SOCIAL WORK

2 Foundations of Social Work Introductory course in social work to develop an understanding of existing social service delivery systems and their history. Three hours.

6 Participation Designed so content and structure may accommodate special issues in social work not especially appropriate within boundaries of an existing course. Three hours. (Optional).

47, 48 Human Behavior in the Social Environment A systems approach to understanding of biological, psychological, cultural and social determinants of human behavior. *Prerequisite:* Social Work major. Three hours.

51 Human Needs and Social Services Students give service in a social agency, relate observations to learnings about agency structure, programs, and operations. Students assess their commitment to working with people. Three hours. (Optional)

165, 166 Issues and Policy in Social Work Philosophy, purpose, history of

social welfare; review of fields and processes of social work. *Prerequisites:* Sociology 10, Psychology 1, Economics 11, Political Science 21. Three hours.

167 Racism and Contemporary Issues Study of perception, conceptualization, and comprehension of racism. Strategies, techniques, and procedures to deal and combat many facets of racism. Three hours.

168, 169 Social Work Intervention I & II Means of intervention or methods employed by social workers in providing services on individual, group, and community levels. *Prerequisites:* 165, 166, Social Work major. Three hours.

170 Field Experience Field experience under supervision given in social agencies four and one-half days each week. To be taken concurrently with 171. *Prerequisites:* 168, 169; majors, senior standing. Twelve hours.

171 Field Experience Seminar Weekly seminar in conjunction with 170. *Prerequisite:* Concurrent enrollment in 170. Three hours.

194 Basic Methods in Social Work Research Introduction to social research skills for social workers. *Prerequisite:* Junior standing. Three hours.

291, 291 Senior Seminar Weekly seminar for social work majors to examine issues in social work practice. *Prerequisite:* Social work majors. Three credits.

EDLI — LIBRARY SCIENCE

272 Public and School Library Services *Prerequisite:* Twelve hours in education and related areas or permission of instructor. Three hours.

273 Cataloging and Classification *Prerequisite:* 272 or equivalent. Three hours.

274 Reference Materials and Teaching the Use of Libraries *Prerequisite:* 272 or equivalent. Three hours.

275 Selection of Books and Materials for Young Adults *Prerequisite:* 272 or equivalent. Three hours.

276 Reference Sources and Services *Prerequisite:* Three hours.

277 Library Materials and Services for Media Personnel *Prerequisites:* 272, 273. Three hours.

278 Cataloging and Organization of Media Materials *Prerequisite:* 273.

279 Selection of Library Materials for Children *Prerequisite:* 272 or equivalent. Three hours.

EDHS — HUMAN SERVICES

209 Introduction to Research Methods in Education and Social Services Seminars and research projects introduce students to methods of historical, descriptive, experimental, quasi-experimental, field studies, and survey research. Three hours.

258 Community Organizations and Resources Introduction to range of clients served by human service agencies and response patterns typically initiated. Survey of facilities and services available. *Prerequisite:* Permission of instructor. Three hours.

291 Special Topics in Organizational and Human Resource Development Designed to accommodate various special issues in counseling, administration and planning, social work, or higher education not appropriate to content of an existing course. Courses reflect the social services orientation of OCFS. Variable hours.

EDSP — SPECIAL EDUCATION

201 Foundations of Special Education Examination of historical and cur-

rent trends in treatment of handicapped individuals, including effects of litigation, legislation, and economic considerations on educational and residential service delivery systems. *Prerequisite:* Twelve hours in education and related areas or permission of instructor. Three hours.

207 Cooperative Learning Theoretical and experiential instruction in procedures to increase social acceptance and academic achievement of exceptional learners in mainstream settings through cooperative learning. *Prerequisite:* Permission of instructor. Three hours.

216 Instruction for Mildly Handicapped Individuals Introduction to curriculum for instruction of children with learning disabilities, mental retardation, and behavior disorders with emphasis on objectives, assessment, task analysis, curriculum, and evaluation. *Prerequisite:* Permission of instructor. Three hours.

217 Instruction for Severely Handicapped Individuals Individualized instruction for severely handicapped learners with emphasis on objectives, assessment, task analysis, curriculum and evaluation. *Prerequisite:* Permission of instructor. Three hours.

224 Instruction for Mildly Handicapped Individuals Students apply principles of behavior analysis to improve academic and social skills of individuals with learning disabilities, mental retardation, and behavior disorders. *Prerequisite:* Permission of instructor. Three hours.

228 Instruction for Severely Handicapped Individuals Students apply principles of behavior analysis to improve skills in learners severely handicapped in motor, social, communication, or self-care areas. *Prerequisite:* Permission of instructor. Three hours.

275 Developing Vocational Instruction for Students With Special Needs (See Vocational Education and Technology 275.)

290 Curriculum for Handicapped Individuals Intensive study of that aspect of curriculum that constitutes the basic skills and knowledge to be learned at a given instructional level. Curriculum specified in terms of instructional objectives and an evaluation system is developed to measure each learner's achievement. *Prerequisite:* Permission of instructor. Credit as arranged.

296 Special Education Practica For Classroom Teachers Credit as arranged.

297 Curriculum for Handicapped Individuals Students develop and implement an objectives-based curriculum for learners with learning disabilities, mental retardation, behavior disorders, and/or multi-handicaps. *Prerequisite:* Permission of instructor. Credit as arranged.

298 Special Education Practicum Students provide direct instruction for six learners with learning disabilities, mental retardation, behavior disorders, and/or multi-handicaps. *Prerequisite:* Permission of instructor. Credit as arranged.

EDAP — ADMINISTRATION AND PLANNING

185 Future Cognition A survivable future will require development of expanded cognitive and affective abilities, consensus on values, new behaviors and skills. Alternative futures examined to determine implications for these abilities and for current educational processes. Students develop scenarios of alternative future. Three hours.

264 Evaluation in Education and Social Services To acquaint educational and social service personnel with overview of state-of-the-art of evaluation, emerging concepts, related models, and potential applications to settings requiring data to be systematically analyzed. Twelve hours in education or permission of instructor. Three hours.

266 Educational Finance Consideration of national and state statutes and practices in educational finance and taxation; local practices in taxation; other revenue sources; methods for school budgeting; financial expenditure procedures. *Prerequisites:* Twelve hours in education or permission of instructor. Two-three hours.

268 Educational Law Survey of the legal basis for education. Investigations of state and federal statutes; related court cases; Attorney General opinions; special education procedures; Vermont State Board and State Education Department policies and regulations. *Prerequisites:* Twelve hours in education or permission of instructor. Two-three hours.

291 Special Topics in Organizational and Human Resource Development To accommodate various special issues in counseling, administration and planning, social work, or higher education not appropriate to content of an existing course. Courses reflect social services orientation of OCFS. Variable hours.

EDHI — HIGHER EDUCATION

291 Special Topics in Organizational and Human Resource Development To accommodate various special issues in counseling, administration and planning, social work, or higher education not appropriate to content of an existing course. Courses reflect social services orientation of OCFS. Variable hours.

EDCO — COUNSELING

220 Personality Development Approaches to understanding human behavior in applied settings. Emphasis on behavior development as an interpersonal process. *Prerequisite:* Twelve hours in education and psychology. Three hours.

274 Counseling Theory and Practice A theoretical and practical approach to understanding dynamics of counseling process. Emphasis upon refinement of a personal philosophy and theory of counseling and implementation of it in practice. *Prerequisite:* Graduate standing, twelve hours in education and/or psychology, and permission of instructor. Three hours.

283 Group Dynamics: Theory and Experience Encounter group experience for prospective counselors geared to provide them with increased awareness of self and of their modes of relating to others. Study of theory and practice of group dynamics. *Prerequisites:* Twelve hours in education and psychology, permission of instructor. Three credits.

291 Special Topics in Organizational and Human Resource Development To accommodate various special issues in counseling, administration and planning, social work, or higher education not appropriate to content of an existing course. Courses reflect social services orientation of OCFS. Variable hours.

PEAC — PHYSICAL EDUCATION ACTIVITIES

Physical Education. Two to three hours weekly. One credit.

One year of physical education is required of undergraduate students. (See page 43.) The program is centered around the physical needs, abilities, and interests of young adults. The aims are to help all to improve and maintain physical fitness; to provide opportunity to establish skills in a variety of movement activities; to bring performance in elected physical activities to a high level of satisfying proficiency; to find enjoyment in physical activity and lasting interest in

continuing voluntary participation. Classes are coeducational unless indicated for men or women only.

Advanced Life Saving	Golf	Square Dance
Archery	Gymnastics	Squash
Badminton	Handball	Stretch & Relaxation
Basketball	Ice Hockey	Swimming
Conditioning	Judging Women's Gym	Synchronized Swim
Cross Country Skiing	Lacrosse	Tennis
Diving	Modern Dance	Track and Field
Fencing	Officiating Basketball	Trampoline
Field Hockey	Ski Instructors	Umpiring Softball
Field Hockey	Skin and Scuba Diving	Volleyball
Officiating	Soccer	Weight Reduction
Fitness Assessment	Soccer-Speedball	YMCA Lifeguard
Flag Football	Social Dance	Certification
Folk Dance	Softball	Yoga

The following activities require special fees for transportation and/or instruction. The student must also provide special attire and/or equipment in skiing, ice skating, and karate:

Ballet	Horseback Riding	Karate, Korean,
Bowling	Ice Skating	Okinawan
Downhill Skiing	Judo	Modern Jazz
		Sailing

The following activities, co-offered by the Physical Education and ROTC Departments, may be counted toward the physical education requirements:

Back Packing	Orienteering	Wilderness Survival
Marksmanship	Rappelling	Physical Training (by special permission of ROTC)

Activities are offered at various levels of instruction and numbered as follows:

- Level 1. Beginner, very first experience with an activity.
- Level 2. Beginning mastery of basic skills and knowledges, equivalent to seven weeks of previous instruction.
- Level 3. Intermediate; equivalent of 14 weeks of instruction.
- Level 4. Intermediate-Advanced; introduction to more complex skills and strategy.
- Level 5. Advanced.

OTHER COURSES IN EDUCATION

In addition to the courses previously described, the following courses are also offered, usually in the Summer Session and Evening Division.

- 172 The Creative Process Through Art Three hours.
- 209 Education of Teachers of the Mentally Retarded I — Early Years Three-six hours.
- 210 Education of Teachers of the Mentally Retarded II — Later Years Three-six hours.
- 214 The Slow Learner (Education of the Exceptional Child) Three-six hours.
- 215 The Gifted Child Three hours.
- 219 Workshop in Economic Education One-four hours.

229 Communicative Arts in Secondary Schools (Teaching English in Secondary Schools) Three hours.

257 Teaching Mathematics in Secondary Schools Three hours.

259 Teaching Foreign Language in the Elementary (Secondary) School Three hours.

261 Seminar in Business Education Three hours.

282 Seminar for Prospective Teachers of English Three hours.

291 Psychology of Music Three hours.

294 Seminar for Prospective Teachers of Communication Three hours.

Engineering

DIVISION OF ENGINEERING, MATHEMATICS, AND BUSINESS ADMINISTRATION

2 Graphical Communication (3-0) An intensive six-week course covering the elements of technical sketching and mechanical drawing. Students who have already mastered these skills may be exempted by successfully completing an examination given in the fall semester. Two hours.

Engineering, Civil

DIVISION OF ENGINEERING, MATHEMATICS, AND BUSINESS ADMINISTRATION

Professors Cassell, Dawson, Oppenlander; Associate Professors Downer, Fay, Hemenway, Laible, Olson (Acting Chairperson); Assistant Professor Kapuscinski; Lecturer Dunham; Adjunct Professor Knight; Professor Emeritus Milbank.

1 Statics (3-0) Fundamentals of statics; composition and resolution of forces; the analysis of force systems in two and three dimensions; and centroids and moments of inertia. *Prerequisite:* Math. 22. Three hours.

2 Dynamics (3-0) Fundamentals of kinematics covering rectilinear and curvilinear motion, relative motion. Kinetics of particles and rigid bodies; work, energy, power; impulse and momentum; and harmonic motion. *Prerequisite:* 1. Three hours.

10 Surveying (3-4) Fundamental surveying methods; propagation of errors as applied to surveying measurements; triangulation; control surveys; and traverse adjustments. *Prerequisites:* Math. 21 and Computer Science 11. Four hours.

11 Geomtronics (2-4) Selected items in analytical photogrammetry; celestial observations, elements of photo-interpretation; theory of curves; and digital terrain analysis. *Prerequisites:* 10 or 12 and Math. 22. Three hours.

12 Plane Surveying (3-4) Fundamental surveying methods; elements of topographic surveying; and special problems according to student interest. For those not enrolled in Civil Engineering. *Prerequisites:* Math. 2 and/or equivalent. Four hours.

100 Mechanics of Materials I (3-0) The behavior of materials; normal and shearing stresses; deflections; applications to statically indeterminate members; analysis of plane stress and strain. *Prerequisite:* 1. Three hours.

101 Mechanics of Materials Laboratory (1-3) Experimental stress analysis methods; fundamental properties of metals, plastics, and wood; effects of size, shape, method, speed of loading, and strain history on these properties. *Prerequisite:* 100. Two hours.

125 Engineering Economy (3-0) Comparison of alternatives to maximize the financial return on engineering decisions; project feasibility studies; design decision making; effect of taxes on engineering decisions; analysis of risk. *Prerequisite:* Junior standing. Three hours. Oppenlander.

130 Engineering Planning (2-0) Principles and techniques for determination of design loads on civil engineering systems; estimating concepts for point and interval forecasts; and stochastic and economic considerations. *Prerequisites:* Statistics 141, senior standing. Two hours.

140 Transportation Planning (3-0) Analysis of transportation systems; technological characteristics; the transportation planning process and techniques of travel modeling and forecasting for both urban and rural areas. *Prerequisite:* 10. Three hours.

141 Traffic Operations and Design (3-0) Characteristics of vehicular and pedestrian traffic; highway and intersection capacity; measurement and analysis of traffic characteristics; design and application of controls. *Prerequisite:* 140. Three hours. Dawson, Oppenlander.

142 Structural Roadway Design (3-0) Properties of construction materials; design of mixes; analyses of pavement performance; structural design of pavements; highway earthwork, drainage, and construction techniques. *Prerequisites:* 141, 180. Three hours. Olson, Oppenlander.

150 Environmental Engineering (3-0) Basic environmental engineering concepts: water supply, water and air pollution control, solid wastes. Emphasis on basic phenomena. *Prerequisites:* Chemistry 5, Math. 21. Three hours. Hemenway.

151 Water and Wastewater Engineering (2-3) Functional design of water supply systems and wastewater management facilities; population projections, estimation of water and waste quantities, sewers, distribution systems, treatment facilities; governmental regulations. *Prerequisite:* 150. Three hours.

155 Quantitative Analysis for Environmental Engineers (2-3) Chemistry and microbiology of water quality management; diffusion, equilibria, reaction kinetics, acids and bases, colloids, enzymes, bacterial physiology, pollution indicator organisms; laboratories demonstrate standard techniques. *Prerequisites:* Chemistry 4, Math. 22. Three hours. Hemenway.

160 Hydraulics (3-3) Mechanics of incompressible fluids; flow meters; flow in closed conduits and open channels; elements of hydraulic machinery; laboratory studies of flow and hydraulic machinery. *Prerequisite:* 2. Four hours. Downer.

161 Fundamentals of Fluid Mechanics (3-0) Introduction to statics and dynamics of fluids. One third of semester spent acquiring necessary level of competence in mathematics, statics, and dynamics. *Prerequisites:* One year of college calculus, one year of related science. Three hours.

162 Applied Fluid Mechanics (3-3) The application of basic principles of fluid mechanics to practical problems; flow in closed conduits and open channels; and hydraulic structures and machinery. *Prerequisite:* 161. Four hours.

163 Principles of Hydrology (3-0) Detailed discussion of occurrence, distribution, and movement of water in environment; precipitation, interception, evaporation, soil moisture, groundwater, runoff, and methods of measurement. *Prerequisites:* Junior standing, one year of college science. Three hours. Downer.

170 Structural Analysis I (3-3) Analysis of statically determinate beams, frames, and trusses; expected loads; reactions; influence lines; moving loads; geometric methods for displacement calculations; introduction to matrix analysis for trusses. *Prerequisites:* 100, Computer Science 11. Four hours. Laible.

171 Structural Analysis II (3-0) Statically indeterminate structural analysis by consistent deformation and stiffness methods; determinations of deflections by energy methods; matrix analysis for frame structures and computer-aided analysis. *Prerequisites:* 170, Computer Science 11. Three hours. Laible.

172 Advanced Structural Design (3-0) Theory and design of steel structures including flexural members, axially loaded members and combined stress members; design of composite members; and plastic analysis and design. *Co-requisite:* 171. Three hours. Dunham.

173 Reinforced Concrete (3-0) Analysis of stresses in plain and reinforced concrete members; design of reinforced concrete structures; and theory of prestressed concrete. *Prerequisite:* 171. Three hours. Dunham.

180 Soil Mechanics (3-3) (Same as Geology 180.) Identification, description, and physical properties of soils; characteristics of natural deposits; stress distribution, permeability, consolidation, shear strength, and stability of soils; laboratory testing of particulate systems. *Prerequisite:* 100. Four hours. Olson.

181 Substructure Analysis and Design (3-3) Evaluation of subsoil conditions and earth pressures; design of retaining walls, substructures for buildings and bridges, and cofferdams. *Prerequisite:* 180. Four hours. Olson.

191, 192 Special Projects (3-0) Investigation of a special topic under the guidance of a faculty member. Library investigations, unique design problems, laboratory and field studies. *Prerequisites:* Senior standing, departmental permission. Three hours.

195 Special Topics

210 Airphoto Interpretation (2-3) Techniques in aerial photographic interpretation; principles of stereoscopic viewing and identification of airphoto features related to landform, vegetation, drainage, soil color/tone, topography, and cultural features. *Prerequisite:* Senior or graduate standing. Three hours. Olson.

226 Civil Engineering Systems Analysis (3-0) Graph theory, dynamic programming, linear programming, scheduling, resource allocation, simulation; applications to public works problems; comparison of solution models and selection of models for complex problems. *Prerequisite:* Senior or graduate standing. Three hours. Dawson.

227 Discrete Simulation (3-0) Discrete simulation using monte-carlo techniques and the GPSS simulation processor; mathematical modeling of systems; control systems; validation and sensitivity analyses. *Prerequisites:* Statistics 111, 141 or 151, senior or graduate standing. Three hours. Dawson.

230 Community Planning Techniques (3-0) Size, spacing, and functions of cities; economic, social, and physical determinants of land-use elements; studies for urban planning; process of land-use planning. *Prerequisite:* Senior or graduate standing. Three hours. Oppenlander.

231 Community Planning Analysis (3-0) History of urban planning; city design and appearance, quantitative methods, and social welfare planning; plan implementation; organization and administration of planning agencies; and financial planning. *Prerequisite:* Senior or graduate standing. Three hours. Downer, Oppenlander.

232 Community Design (2-1) Basic principles and methods of planning and designing the community; site selection; and elements such as subdivisions, in-

dustrial parks, new town, etc. *Prerequisite:* 230 or 231. Three hours. Downer, Oppenlander.

233 Rural Planning (See Resource Economics 233.)

240 Traffic Engineering Characteristics (3-0) Basic components of highway travel; traffic flow and intersection characteristics; highway and intersection capacities; performance of traffic systems; techniques for measuring traffic characteristics. *Prerequisites:* Statistics 141, senior or graduate standing. Three hours. Dawson, Oppenlander.

241 Transportation Systems Engineering (3-0) Interdisciplinary aspects of transportation systems; mathematical analysis and synthesis of system problems; economic considerations; fiscal studies and financial planning; administration of transportation systems. *Prerequisites:* Statistics 141, senior or graduate standing. Three hours. Dawson, Oppenlander.

244 Urban Transportation Systems (3-0) Transportation planning process for urban areas; inventory, use, and desire studies; travel forecasting and trip generation, distribution, and assignment; mass transit systems; terminal facilities. *Prerequisite:* Senior or graduate standing. Three hours. Oppenlander.

250 Environmental Facilities Design-Water (2-3) Design of water supply systems including source evaluation, transmission, distribution, water treatment plant design; equipment selection; wells. *Prerequisite:* 151. Three hours.

251 Environmental Facilities Design-Wastewater (2-3) Design of wastewater conveyance and treatment facilities; sewage treatment plant design; equipment selection. *Prerequisite:* 151. Three hours.

252 Industrial Hygiene (3-2) Industrial hygiene problems; effects of pollutants on health; threshold limit values; emphasis on the engineering evaluation of hazard and control techniques. *Prerequisites:* Chemistry 5, Physics 25. Three hours. Hemenway.

253 Air Pollution (3-0) Sources of air pollution, methods of measurement, standards, legal aspects and control techniques available. Emphasis placed on source testing and source control. *Prerequisites:* Chemistry 5, Math. 21. Three hours. Hemenway.

254 Solid Wastes (3-0) Significance of solid wastes from municipal, industrial, agricultural, mining; optimization and design of collection, disposal, recycle systems; sanitary landfills, incineration, composting, material recovery. *Prerequisites:* Chemistry 5, Physics 25. Three hours.

255 Water Renovation Processes-Chemical/Physical (2-3) Theory of chemical/physical processes for treating waters and wastewaters; mass transfer, coagulation/precipitation, sedimentation, filtration, mixing, absorption, ion exchange, membrane processes; pilot plant experimentation. *Prerequisites:* 160, Chemistry 5, Math. 22, senior or graduate standing. Three hours.

256 Water Renovation Processes - Biological (2-3) Design theory of biological processes for treating waters and wastewaters; aerobic, anaerobic, photosynthetic processes; disinfection; pilot plant experimentation. *Prerequisites:* Math. 22, senior or graduate standing. Three hours.

257 Analysis of Aquatic Systems (3-0) Quantitative study of biological, chemical, and physical phenomena in lakes, streams, and estuaries; mathematical modeling applied to management of water quality. *Prerequisites:* 150, 160. Three hours.

258 Environmental Facilities Design-Air (2-3) Advanced design principles for air pollution control equipment including scrubbers, precipitators, cyclones, and filters. *Prerequisites:* 150, 252 or 253. Three hours. Hemenway.

259 Measurement of Airborne Contaminants (2-3) Quantifying airborne contaminants from processes and ambient levels. Laboratories demonstrate

calibration and measurement, stack sampling and ambient air monitoring, and specific contaminants. *Prerequisite:* 252 or 253. Three hours. Hemenway.

260 Hydrology (3-0) Theory of precipitation, run-off, infiltration, and ground water; precipitation and run-off data; and application of data for use in development of water resources. *Prerequisites:* 160, Statistics 141. Three hours. Downer.

261 Open Channel Flow (3-0) Application of the laws of fluid mechanics to flow in open channels; design of channels and transition structures including riprap and culverts; gradually-varied flow problems. *Prerequisite:* 160. Three hours. Downer.

263 Measurements in Applied Hydrology (2-3) Design of hydrologic experiments; observational methods, and equipment; data reduction and handling techniques; application to the instrumentation and study of a small watershed. *Prerequisite:* 163 or 260. Three hours. Downer.

270 Advanced Indeterminate Structures (3-0) Matrix analysis of framed structures; finite element theory and application in structural mechanics and hydrodynamics; emphasis on computer applications and numerical analysis techniques. *Prerequisites:* 171, a basic knowledge of matrix algebra and computer programming. Three hours. Laible.

271 Prestressed Concrete Structures (3-0) Matrix analysis of framed structures; finite element theory and application in structural mechanics and hydrodynamics; emphasis on computer applications and numerical analysis techniques. *Prerequisites:* 171, a basic knowledge of matrix algebra and computer programming. Three hours. Laible.

280 Applied Soil Mechanics (3-0) Use of soil mechanics in evaluation of building foundations, braced excavations, earth structures; lateral earth pressures, pile foundations, caisson foundations, slope stability, and construction problems. *Prerequisite:* 180. Three hours. Olson.

282 Engineering Properties of Soils (2-3) Soil properties that influence engineering behavior of soils including soil mineralogy, physio-chemical concepts, plasticity properties, permeability, and compaction. *Prerequisite:* 180. Three hours. Olson.

295 Special Topics (Not offered for graduate credit.)

Engineering, Electrical

DIVISION OF ENGINEERING, MATHEMATICS, AND BUSINESS ADMINISTRATION
Professors Absher, Anderson, Evering, Handelsman, Lai, Mirchandani, Roth, Rush (Chairperson), Williams; Adjunct Professor Koss; Adjunct Lecturer Bullis.

UNDERGRADUATE COURSES

3 Engineering Analysis I (3-0) Circuit elements, laws, and basic techniques of circuit analysis. Network principles and theorems. Energy-storage elements. Transient analysis and time-constants. Sinusoids and phasors. Sinusoidal steady-state response and steady-state power. *Prerequisite:* Math. 21. Three hours. Mirchandani.

4 Engineering Analysis II (3-0) Complex frequency and network functions. Resonance. Magnetically coupled circuits. Two-port networks. Application of Fourier series and Fourier transforms in circuit and systems analysis. Laplace transform techniques. *Prerequisite:* 3. Three hours. Mirchandani.

94 Bioengineering Applications of Physical Principles II (3-3) Application of principles of electromagnetism and electrical engineering to an understanding

of the structure and function of the human body and to diagnostic and therapeutic instrumentation. Four hours. Rush.

100 Electrical Engineering Concepts (3-3) Designed for students not majoring in Electrical Engineering; introduction to electrical measurements and circuit theory; energy conversion, instrumentation, and digital systems for science and industry. *Prerequisites:* Math. 121, Physics 25. Four hours. Evering.

101 Electronic Circuits and Instruments (3-3) Active circuit analysis and design, application of Laplace Transforms, s-plane impedance concepts, design applications to analog and digital circuits and instruments. *Prerequisite:* 100 or related undergraduate preparation. Four hours. Evering.

110 Control Systems (3-0) Theoretical background for analysis and synthesis of feedback control systems. Concepts of stability, signal flow, performance criteria, and classical compensation methods. State variable approaches. Simulation as a design tool. *Prerequisite:* 171. Three hours. Absher.

113 Electromechanical Energy Generation and Distribution (3-0) Principles basic to electromechanical energy conversion devices and systems. Energy interchange among magnetic and mechanical circuit elements. Continuous energy conversion in ideal and practical rotating machines. *Prerequisite:* 141. Three hours. Handelsman.

114 Electric Energy Conversion Systems (3-0) Systems for energy conversion to electricity, primarily. Emphasis on systems (e.g. fossil fuel, hydro, fission, solar, wind, etc.), their technical operation characteristics, economics, and environmental impact. Designed for engineers and scientists. *Prerequisite:* Physics 25. Three hours. Handelsman.

120 Electronics I (3-0) Properties of semiconductors. PN junctions. Application of diodes. Circuit models for transistors, and other active devices. Biasing techniques and regions of operation. *Prerequisite:* 4. Three hours. Williams.

121 Electronics II (3-0) Properties of amplifiers. Amplifier design. Feedback in electronic circuits. High-frequency circuit models and limitations. Operational amplifiers. *Prerequisite:* 120. Three hours. Williams.

122 Electronics III (3-0) Analysis of pulse and digital circuits. Design of transistor logic gates, multivibrators, and blocking oscillators. *Prerequisite:* 121. Three hours. Williams.

131,132 Fundamentals of Digital Computer Design (3-0) Fundamentals of design of combinational and sequential logic circuits. Logic circuits implemented with MSI and LSI. Register transfer logic. Memory systems. Instruction codes. Processor and control logic design. Introduction to system design for computers and microcomputers. *Prerequisites:* Computer Science 11 or equivalent, 131 for 132. Three hours.

133 Fundamentals of Mini/Microcomputer Based Systems (3-0) Introduction to digital computers. Hardware and software structure. Techniques of interfacing. *Prerequisites:* Computer Science 11. Three hours. Williams.

140, 141 Electromagnetic Field Theory (3-0) Basic laws and elementary applications of electromagnetic fields; electrostatics, magnetostatics, Faraday's law, Maxwell's equations, plane waves, transmission lines, waveguides, and antennas. *Prerequisites:* 4 or Physics 25 for 140; 140 or Physics 213 for 141. Three hours. Handelsman.

146 Wave and Diffusion Analogies (3-0) Electromagnetic waves on lines and in space. Vibration of strings and membranes. Mechanical waves in fluids and solids. Electromechanical transducers. Thermal waves. Diffusion process. *Prerequisite:* 141. Three hours.

163 Solid State Physical Electronics I (3-0) Physical principles underlying electronic materials - particularly semiconductors. Topics include atomic and

electronic structure of solids, electronic band and band models, statistical mechanics and carrier transport. *Prerequisite:* Physics 128. Three hours. Williams, Anderson.

164 Solid State Physical Electronics II (3-0) Physical basis of operation of currently important electronic devices, primarily semiconductor devices. Topics include p-n junctions, bipolar junction transistors, power devices, field-effect transistors, lasers and photosensitive cells. *Prerequisite:* 163. Three hours. Williams, Anderson.

171 Signals and Systems (3-0) General properties of signals and systems. Time-domain, frequency-domain, and other representation of signals and systems. Pulse, periodic, and random signals and their spectra. Transmission of signals through linear systems. Characteristics of filters. *Prerequisite:* 4. Three hours. Lai.

172 Discrete-time Signals and Systems (3-0) Properties of discrete-time signals and systems. Representation of signals for use in digital computers. The z-transform and systems transfer function. Elements of digital filters and their design. Elements of FFT and digital signal processing. *Prerequisites:* Computer Science 11, Math. 22, 171 desirable. Three hours. Lai.

174 Information-Transmission Systems (3-0) Introduction to information transmission. Modulation and demodulation. Noise and noise figures. Comparison of information transmission systems. Transmission lines and propagation. *Prerequisite:* 171. Three hours.

195 Special Topics

LABORATORIES

Each student will keep a laboratory notebook which will be collected and checked periodically by the instructor. He/she will prepare one experiment in a form suitable for publication and will present his/her paper to the class and other interested persons. The student will be graded on the notebook as well as the final written and oral presentation.

81 Sophomore Laboratory (1-3) Direct current measurements, nonlinear resistive elements, the cathode ray oscilloscope, transients in RC circuits, alternating current measurements, sinusoidal behavior of RL and RC circuits, transients and sinusoidal behavior of RLC circuits. Two hours.

82 Sophomore Laboratory (1-3) Alternating current bridges, resonant harmonic analyzer, measurement of charge, current, voltage, power, resistance, capacitance, inductance, and time. *Prerequisite:* 81. Two hours.

183 Junior Laboratory (1-3) A-C and D-C machines. Active device and basic amplifier characteristics. *Prerequisite:* 82. Two hours.

184 Junior Laboratory (1-3) Amplifiers, A-D and D-A conversion, control systems, microwaves, and electromagnetic waves on lines. *Prerequisite:* 183. Two hours.

185 Senior Laboratory (0-3) Electrical conductivity in solids, the Hall effect, properties of gaseous conductors and dielectric materials. Control systems. Electromechanical transducers. *Prerequisite:* 184. One hour.

186 Senior Laboratory (0-3) Design and construction of pulse and digital circuits including logic gates, astable multivibrators, bistable multivibrators, monostable multivibrators, and blocking oscillators. *Prerequisite:* 185. One hour.

ADVANCED UNDERGRADUATE AND GRADUATE COURSES

187 Senior Project Experimental or theoretical project selected by the student and conducted under staff supervision. Variable credit.

201 Linear System Theory (3-0) Analysis of systems and application to problems in electrical engineering. Modeling and analysis of both discrete and continuous-time linear systems. Continuous and discrete time Fourier transforms. Approximation and model reduction using state-space methods. *Prerequisite:* Graduate standing in Electrical Engineering. Three hours. Mirchandani.

202 Network Analysis (3-0) Characterization of and computational methods for analysis of linear and nonlinear circuits with emphasis on large-scale circuits. State variable, modified nodal and sparse tableau formulations. Detailed transistor modeling for D.C., transient and steady-state analysis. Methods for determining sensitivity. *Prerequisites:* 171, Math. 124 or equivalent background. Three hours. Mirchandani.

209 Transient Phenomena (3-0) Study of complex variable basis of Laplace and Fourier Transforms; applications to transient behavior of lumped and distributed parameter systems, root locus. Nyquist criterion and two-dimensional field problems. *Prerequisite:* 4. Three hours. Rush.

220 Electronic Instrumentation for Scientists (3-3) Introduction to electrical components and circuit theory, electrical measurements, oscilloscopes, power supplies, amplification, oscillators, measurements, servos, operational amplifiers, electronic switching, timing and digital counting circuits. Not for credit for students in Electrical Engineering. *Prerequisites:* College physics, calculus or permission of instructor. Four hours.

231, 232 Digital Computer Design Hardware components design, organization, realization. Design concepts and procedures illustrated through design of small instructional computer. Microprogrammed control units, memory organization, hardware realization of high-speed arithmetic operations. Interrupt and I/O systems, interfacing and inter-system communications. *Prerequisite:* Departmental permission. Three hours. Absher, Lai.

233, 234 Microprocessor-Based Systems and Applications (2-3) Basic principles of mini/microcomputers; A/D; D/A; channels, magnetic devices, display devices, mechanical devices; interface designs of analog systems to mini/microcomputers; principles of microprogramming; bit-slice-based microcomputers. *Prerequisite:* Departmental permission, Computer Science 101 desirable, 233 for 234. Three hours. Williams.

237 Digital Computer Logic, Circuits and Systems (3-0) Logical design digital computers. Boolean algebra as aid to circuit design. Circuits and components for transmission, storage, and modification of information and their combination into arithmetic units, memory devices, program controls, and microprocessors. *Prerequisite:* Graduate standing or departmental permission. Three hours. Absher.

238 Computer Applications for Design and Manufacturing (3-0) Computer hardware and software concepts. Basic and advanced APL Program Language, practical computer applications. *Prerequisite:* Department permission. Three hours.

240 Boundary Value Problems in Electromagnetism (3-0) Solution of classical problems of electromagnetism using images, conformal mapping, and separation of variables methods. *Prerequisite:* 141. Three hours. Rush.

242 Theory and Applications of Time-Varying Fields (3-0) Maxwell's Equations and boundary conditions for time varying systems. Propagation and reflection of electromagnetic waves, guided electromagnetic waves, resonant cavities, and microwave networks. *Prerequisite:* 240 or departmental permission. Three hours. Handelsman.

244 Radar Systems Engineering (3-0) Radar theory including antennas,

propagation, signal detection, and parameter estimation. Applications including search and track radars, aircraft control and landing, radio/radar astronomy, and modern phased array radars. *Prerequisite: 174 or departmental permission.* Three hours. Handelsman.

261 Semiconductor Materials and Devices I (3-0) Introduction to energy band theory and the effective mass concept. Effect of band structure on electronic properties of semiconductors. Transport of electrons and holes in bulk materials and across potential barriers. Homojunctions, heterojunctions, and Schottky barriers. *Prerequisites: Physics 128, Math. 121.* Three hours. Williams, Anderson.

262 Semiconductor Materials and Devices II (3-0) Operating principles of bipolar junction transistors and field effect transistors. Derivation of equivalent circuits. Applications to integrated circuits, charge-transfer devices, integrated logic. *Prerequisite: 261.* Three hours. Williams, Anderson.

263 Solid State Physical Electronics I (3-0) Introduction to physics of atoms and crystals through quantum and statistical mechanics. Application of principles to semiconductor devices. *Prerequisite: Physics 128.* Three hours. Anderson.

264 Solid State Physical Electronics II (3-0) Electronic proper ties of dielectric, magnetic, and superconducting materials. Applications to devices. *Prerequisite: 263.* Three hours. Anderson.

270 Signal Analysis (3-0) General signal concepts. Random signals. Correlation techniques. Noise in linear systems. Wiener and Kalman filters for data smoothing and prediction. Spectral estimation. *Prerequisite: 171 or equivalent.* Three hours. Lai.

271 Signal Processing: Detection and Estimation (3-0) Principles of detection and estimation. Detection of signals in noise. Estimation of signal waveforms and signal spectra. Wiener and Kalman filters. Applications to communication and radar systems, pattern recognition, and biomedical signal analysis. *Prerequisites: 270.* Three hours. Lai.

272 Information Theory (3-0) Introduction to probability concepts of information theory; entropy of probability models; theoretical derivations of channel capacity; coding methods and theorems, sampling theorems. *Prerequisite: Statistics 151.* Three hours.

275 Analog Signal Processing and Filtering (3-0) Introductory filter concepts. Approximation techniques. Filter realizations. Design of practical filters. Switched capacitor filters. A/D and D/A converters. Processing and filtering of real-world signals. *Prerequisite: 201 or 171, 172 or equivalent.* Three hours. Lai, Mirchandani.

276 Digital Signal Processing and Filtering (3-0) Introductory digital signal concepts. Structure of digital filters. Design of digital filters. Use of FFT in signal processing and filtering. Hardware implementation. Applications to signal processing and filtering. *Prerequisite: 275.* Three hours. Lai, Mirchandani.

277 Advanced Topics in Digital Signal Processing and Filtering (3-0) Approximation methods in design of digital filters. Effect of finite word length. Two-dimensional signal sampling, transforms and digital filters. Hardware implementation. Application in signal processing. *Prerequisite: 276.* Three hours. Lai, Mirchandani.

281 through 284 Seminars (1-0) Presentation and discussion of advanced electrical engineering problems and current developments. *Prerequisite: Senior or graduate engineering enrollment.* One hour.

285 Creative Engineering (3-0) Creative techniques applied to problems in process control, biomedical engineering, communications, circuit design. *Pre-*

requisite: Graduate standing in EE or departmental permission. Three hours. Roth.

295 Special Topics (3-0) Formulation and solution of theoretical and practical problems dealing with electrical circuits, apparatus, machines, or systems. *Prerequisite:* 4. Three hours.

Engineering, Mechanical

DIVISION OF ENGINEERING, MATHEMATICS, AND BUSINESS ADMINISTRATION
Professors Francis, Hundal (Acting Chairperson), Marshall, McLay, Outwater, Tuthill, von Turkovich; Associate Professor Carpenter; Research Professor Pope; Adjunct Professor Liu; Professors Emeriti Duchacek, Martinek.

1 Technical Graphics I (0-6) Drawing materials and equipment; geometric constructions; free hand sketching and lettering; pictorials; charts and graphs; orthographic projection and multiview drawings; topographic drawings; introduction to descriptive geometry. Students expected to furnish their own drafting equipment. Three hours.

41 Thermodynamics and Heat Transfer (4-0) Principles of engineering thermodynamics; applications of these principles to thermodynamic cycles; introduction to heat transfer. *Prerequisites:* Physics 24, Math. 22. Four hours.

42 Engineering Thermodynamics (3-0) Properties and processes of fluids; the perfect gas, and approximate relationships for real gases; application of thermodynamics principles to areas such as combustion, mixtures, power cycles, gas compression, and refrigeration. *Prerequisite:* 41 or 115. Three hours.

46 Engineering Analysis and Computations (2-0) Concepts of modeling of engineering systems. Introduction to numerical techniques and algorithms. Digital computation. *Prerequisites:* Computer Science 11, Math. 121, concurrent enrollment in Math. 124 or 271. Two hours.

50 Mechanics (3-2) First course in mechanics after the fundamentals of physics course. Statics, motion of particles, rigid bodies, kinematics, and kinetics. Energy methods. *Prerequisites:* Physics 25, Math. 121, concurrent enrollment in Math. 271. Four hours.

53 Materials Processing I (2-0) Properties of materials pertinent to processing; principles of casting; forming; metal removal and welding processes. Emphasis on material behavior and economics. *Prerequisite:* Physics 24. Two hours. Marshall.

93 Bioengineering Applications of Physical Principles I (3-3) Applications of the principles of mechanics, thermodynamics, and mechanical engineering to an understanding of the structure and function of the human body and to diagnostic and therapeutic instrumentation. Four hours.

100 Mechanical Structures (3-0) Mechanics concepts; force transmission; stress, strain, temperature relationships; torsion; bending stresses; reflections in torsion and bending; stability; redundant structures. *Prerequisite:* 50. Three hours. Outwater.

101 Engineering Materials (3-0) Atomic, electronic, molecular, crystalline structures; imperfections; phases in solids; equilibrium diagrams; non-equilibrium transformations; diffusion; corrosion phenomena. *Prerequisite:* 100. Three hours. Outwater.

115 Thermodynamics (3-0) The first and second laws of classical thermodynamics; Boltzmann, Bose-Einstein and Fermi-Dirac statistics; kinetic

theory of gases; statistical thermodynamics; Maxwell relations. *Prerequisites:* Physics 128, Math 121. Three hours. Martinek.

123, 124 Junior Laboratory (0-3), (0-3) Engineering measurements, data analysis and theory of experimentation. Experiments with fluids and material testing machines and instrumentation for dynamic measurements. *Prerequisites:* 46, junior standing in ME. One hour.

133 Engineering Vibrations (3-0) Vibrations of single and multi-degree freedom systems; response to periodic and transient excitation; passive and active isolation of shock and vibration; non-linear phenomena. *Prerequisites:* 46, 50. Three hours.

134 Systems Control (3-0) Dynamic analysis of lumped parameter systems. Modeling of systems with mechanical, fluid, thermal, electrical, and biological elements; linearization; theory of feedback control; transient and frequency response; graphic and computer methods of systems analysis and design. *Prerequisite:* 50. Three hours. Hundal.

135 Engineering Design I (3-3) Application of fundamental principles to design of machine elements including consideration of function, production, and economic factors with emphasis on engineering mechanics. Projects including experimental and analytical work. *Prerequisite:* Senior standing in ME. Four hours. Carpenter.

137 Manufacturing Engineering Design (3-3) Design of manufacturing equipment and processes. Machine tool design, control systems, microprocessors. Design of mechanical production tooling, thermally assisted equipment and assembly systems. Projects. *Prerequisite:* Senior standing in ME. Four hours.

143 Fluid Mechanics (3-0) Dynamics of an ideal fluid; energy and momentum relationships; similitude; flow in conduits; boundary layer mechanics; compressibility phenomena; wing theory; hydrodynamic lubrication; fluid machines and controls. *Prerequisites:* 41 and 50, Math. 271. Three hours.

144 Heat and Mass Transfer (4-0) Principles of heat transfer; conduction, convection, radiation; steady and unsteady state; the electric analogy; diffusion and mass transfer; applications to heat and mass transfer problems. *Prerequisite:* 143. Four hours. Martinek.

150 The Engineering Profession (2-0) The professional practice of engineering; laws and professional attitudes regarding design, standards of patient safety, liability, insurance, industrial hygiene, and contracts. *Prerequisite:* Senior standing. Two hours. Outwater.

152 Safety Engineering (2-0) (Same as Business Administration 274.) Safety management and standards, recognition and control of environmental, mechanical, electrical and chemical hazards, fire prevention, personal protective equipment. *Prerequisite:* Senior standing in Engineering or Business Administration or permission of instructor. Two hours. Marshall.

185 Mechanical Engineering Laboratory (0-9) An individual engineering study designed to particular interest of the student, utilizing and synthesizing the student's total mechanical engineering educational experience. *Prerequisite:* Senior standing in ME. Three hours.

191, 192 Thesis (0-9) Investigation of a research or design project under the supervision of an assigned staff member culminating in an acceptable thesis. *Prerequisites:* Senior standing and departmental permission. Three hours.

195 Special Topics.

202 Dynamics (3-0) Advanced topics in dynamics of particles and systems of particles. Kinematics and kinetics of rigid bodies. Euler's equations of motion. Gyroscopic effects. *Prerequisite:* 50. Three hours. Hundal.

206 Application of Computers in Engineering (3-0) Utilization of computers as engineering tools for the solution of complex engineering problems. *Prerequisite:* Senior standing in Engineering. Three hours. Hundal.

211 Advanced Mechanical Structure I (3-0) Statically indeterminate problems in bending; strain energy; theorem of Castigliano; curved beams; beams on elastic foundations; unsymmetrical bending; torsion of thin sections. *Prerequisites:* 50, 100. Three hours. McLay.

222 Advanced Mechanical Structures II (3-0) Theory and applications of the force, and displacement matrix methods of analysis; basic theory of elasticity; compatibility equations, generalized Hooke's law; introduction to plasticity; finite differences and variational methods. *Prerequisite:* 211. Three hours. McLay.

231 Materials Processing II (2-3) Fundamentals of forming from liquid state, plastics forming, metal joining, powder metallurgy. *Prerequisite:* 233. Three hours. von Turkovich.

232 Micromanufacturing Technologies (3-0) Crystal growth, defects, diffusion mechanisms. Thin film processes, vacuum, chemical vapor deposition; selection of integrated circuit materials and processes; manufacturing of semiconductors. *Prerequisite:* Senior standing or department permission. Three hours. von Turkovich.

233 Mechanical Metallurgy (3-0) Mechanical testing; fracture and failure mechanisms; strengthening mechanisms; ceramics; polymers; plastic deformation. *Prerequisite:* 101. Three hours. Outwater.

243 Advanced Fluid Mechanics (3-0) Foundations of compressible flow; isentropic flow; normal and oblique shock waves; Prandtl-Myer flow; flow with friction and with heating and cooling; flow in electric and magnetic fields; potential flow; linearized flows; method of characteristics. *Prerequisite:* 143. Three hours. Martinek.

246 Aerodynamics (3-0) Application of the principles of fluid mechanics to the design and performance of aircraft; airfoil characteristics; transition and separation on various shapes; compressibility phenomena. *Prerequisite:* 143. Three hours. Martinek.

252 Engineering Design II (2-3) Application of engineering principles to the design of mechanical systems and their components. Group projects on current industrial problems. *Prerequisite:* 135. Three hours. Carpenter.

261 Energy (3-0) The study of energy, including sources, methods of conversion, utilization, and the effects on the environment. Recognition of the second Law is emphasized. *Prerequisites:* 42, 144. Three hours.

262 Thermal Systems (2-3) Application of engineering thermodynamic machines and processes; problems of gas turbine, jet propulsion, nuclear power plants, energy conversion devices, and other areas of current interest. *Prerequisite:* 261. Three hours.

264 Thermal Environmental Engineering (3-0) The principles of psychrometrics, heat transfer and fluid mechanics applied to thermal environments and their control for man, animal, or process. *Prerequisites:* 143, 144. Three hours. (Not offered for graduate credit.)

272 Mechanical Behavior of Materials (3-0) Elastic and plastic behavior of single crystals; dislocations; approximate plastic analysis; anisotropic materials; hardness; residual stress, brittle, transitional and ductile fractures; fatigue; damping; creep and surface phenomena. *Prerequisite:* 233. Three hours. Outwater, von Turkovich.

275 Human Factors (2-3) (Same as Business Administration 275.) Human sensory capabilities and limitations, design of information input, human motor

activities and space relationships, introduction to work measurement. *Prerequisite:* Junior standing. Three hours. Marshall. (Not offered for graduate credit.)

276 Plant Planning and Design (3-3) (Same as Business Administration 275.) Analysis of facilities and services requirements, material handling, office and clean room layout, mathematical and computer techniques, safety and plant conservation. *Prerequisite:* 53 or permission of instructor. Four hours. Marshall. (Not offered for graduate credit.)

281, 282 Seminar (1-0) Presentation and discussion of advanced mechanical engineering problems and current developments. *Prerequisite:* Senior or graduate engineering enrollment. One hour.

295, 296 Special Topics (3-0) Advanced study and discussion in areas dependent on the interest of the students. *Prerequisites:* Senior or graduate standing, departmental permission. Three hours. (Not offered for graduate credit.)

297 Nuclear Engineering (3-0) Neutron chain reactions and criticality condition; slowing down of neutrons in an infinite medium; one-speed diffusion of neutrons in a multiplying and non-multiplying system combined slowing down and diffusion; bare and reflected homogeneous reactors; time-dependent behavior of reactors; reactor control theory; reactor accident and transient analysis. *Prerequisite:* Senior standing. Three hours. von Turkovich, Martinek.

English

COLLEGE OF ARTS AND SCIENCES

Professors Bogorad, Bradley, Broughton, Clark (Chairperson), Cochran, Eschholz, Howe, Jones, Long, Orth, Poger, Rosa, Rothwell, Shepherd; Associate Professors A. I. Dickerson, Edwards, Gutman, Hall, Huddle, Stanton, Stephany, Thompson; Assistant Professors Bidle, Simone, Sweterlitsch; Lecturers M. J. Dickerson, Kohler; Emeritus Professors Bandel, Dean, Hughes, Pope, Trevithick.

Unless otherwise indicated, all courses in the Department of English carry three hours of credit.

1 Written Expression A course in writing with some selected readings as examples of style and writing strategies.

Courses numbered 11-26 are introductory literature courses. They are appropriate preparation for reading and writing about literature. Prospective English majors, see also English 81, 82.

11 Types of Literature An introduction to fiction, poetry, and drama — past and present, British and American.

12 Genre: Drama An approach to the play as a work of literature and as a dramatic experience. Continental, British, and American drama, drawn from all ages.

13 Genre: Fiction Exploration of variety of fictional forms which will include the short story, the novella, and the novel.

14 Genre: Poetry An examination of the forms of poetry, past and present, British and American. The course will provide a wide variety of perspectives on the poem.

21, 22 British Literature A survey of major figures in British literature such as Chaucer, Milton, Swift, Wordsworth, and Shaw.

23, 24 American Literature A survey of major figures in American writers, from the beginning of the 19th century down to the present, such as Poe, Thoreau, Hawthorne, and Melville (23); Twain, Eliot, Hemingway, and Faulkner (24).

25, 26 World Literature A survey in comparative literature dealing with the great writers of the world, to include Vergil, Dante, Goethe, and similar major figures.

30 Introduction to the English Language Topics will include consideration of language as a part of human behavior, history of the language, dialects of American English, lexicography, and the new analyses of English. Clark, Eschholz, Jones, Rosa, Sweterlitsch.

Courses numbered in the 40's are open to freshmen but will not count as prerequisites for 100-level English courses.

40 Science Fiction and Fantasy Literature Representative modern works of fantasy and science fiction, including works by Asimov, Tolkien, and Clarke. I, II. Stanton.

41 Utopian and Anti-Utopian Fiction Themes and literary characteristics of selected English and American utopias and dystopias from the Renaissance to the present. Bogorad.

42 Women in Literature Consideration of the changing roles of women through examination of the images, archetypes, and stereotypes of women characters in selected literary works. Clark.

50 Expository Writing Writing and analysis of expository (non-fiction) essays. *Prerequisite:* Sophomore standing. Biddle, Howe, Jones, Kohler, Sweterlitsch.

53 Writing: Poetry and Fiction An introductory course in the techniques of writing poetry and short prose fiction. Classes are organized around the discussion of student work; weekly writing assignments (preference in enrollment given to sophomores). Broughton, M. J. Dickerson, Edwards, Huddle.

81, 82 Survey of British and American Literature A study of literary movements, themes, and backgrounds as illustrated in selected representative texts. No prerequisite, but recommended only for students with sophomore standing, or freshmen with Advanced Placement. Required of all English majors.

The prerequisites for courses numbered 100-199 are three hours in English courses numbered 11-26, or 81, or 82, and sophomore standing.

Unless otherwise indicated, 100-level courses will be offered every year. Occasionally a 200-level seminar will replace a specialized 100-level course.

101 Structure of the English Language Descriptive study of modern American English. I, II. Clark.

102 History of the English Language The principles of historical linguistics and their application to English. Clark. Alternate years, 1982-83.

105 Technique and Criticism of Poetry Intensive analysis of various kinds of poetry to develop appropriate critical methods and standards. Required of all students in secondary school certification program. Bogorad.

106 Introduction to Critical Approaches A survey of major critical approaches, with emphasis on both critical problems and specific critical attitudes

toward literary works. Readings include major critical statements and several exemplary literary texts. Gutman, Stanton. (Not offered 1981-82.)

110 **Old English** The sounds, words, and structure of Old English; simple prose texts and selections from *Beowulf*. A. I. Dickerson. Alternate years, 1981-82.

111 **Chaucer** Study of the principal works of Chaucer, with emphasis on Chaucer's literary scope, talents, and position in medieval literature. A. I. Dickerson, Stephany.

112 **Medieval Literature** Major works of medieval literature in translation, with some principal non-Chaucerian works in Middle English. Works by Dante and works in the Arthurian tradition will be included. A.I. Dickerson, Stephany.

113 **Medieval and Renaissance Drama** From drama as religious ritual to the highly sophisticated plays of Shakespeare's contemporaries and the early 17th century. Howe, Rothwell. Alternate years, 1982-83.

114 **Elizabethan Prose and Poetry** Poetry of Spenser, Donne, and Jonson — their predecessors, contemporaries, and followers; development of prose from ornateness towards simplicity. Long.

115, 116 **Shakespeare** Howe, Rothwell, Simone.

118 **Milton** *Paradise Lost*, *Paradise Regained*, *Samson Agonistes*, some minor poems, and selected prose works. Bogorad.

121 **Restoration and 18th Century Prose, Poetry, and Drama** Significant writers and dramatists from Dryden to Sheridan and Johnson. Bogorad. Alternate years, 1982-83.

123 **18th Century English Novel** English fiction from its origin through the 18th century. Hall, Stanton.

124 **19th Century English Novel** English fiction of the 19th century. Hall, Stanton.

125 **Romantic Period I** Development of the Romantic Movement through Wordsworth and Coleridge. Jones, Stanton.

126 **Romantic Period II** Development of the Romantic Movement through Byron, Shelley, Keats, and other Romantic poets and prose writers. Jones, Stanton.

127 **Victorian Literature** Significant writers, exclusive of novelists, from 1832 to 1900. Long.

131 **Modern British Drama** British and continental plays of the 19th and 20th centuries, including plays by Ibsen, Pinter, and Beckett. Simone.

132 **Modern British Novel** Bradley, Stanton.

134 **Modern Irish Literature** Irish literature from 1890 to the present, with emphasis on Joyce and Yeats. Bradley.

135 **Canadian Literature** The development of a national literature. Required of students in the Canadian Area Studies Program. Thompson.

136 **Contemporary Canadian Literature.** Thompson.

140 **Modern Poetry** A survey of poetry from the beginning of the modern period to the end of World War II, emphasizing the poetry of Yeats, Eliot, Stevens, Auden, Frost, Williams, and others. Edwards, Poger.

141 **19th Century American Novel** The flowering of the novel in the United States. Hawthorne, Melville, Twain, Howells, James, and others. Biddle, Cochran, Eschholz, Shepherd.

144 **American Poetry to World War I** Major American poets to 1917, including Poe, Whitman, Dickinson, and others. Cochran, Gutman.

145 **The Literature of Vermont** An exploration of Vermont writing from

the narratives of the Allen brothers to the poetry and fiction of today. Normally offered in summers only. Biddle, Eschholz. (Not offered 1981-82.)

150 **Modern Short Fiction.** I, II. Cochran, Gutman, Jones, Shepherd.

151 **Modern American Novel** American novelists from 1915 to 1945. Biddle, Cochran, Eschholz, Gutman, Poger, Shepherd.

152 **Modern American Drama** Recent and contemporary, including plays by O'Neill, Miller, and Williams. Orth. (Not offered 1981-82.)

153 **Contemporary American Poetry** American Poetry since 1950. Edwards, Gutman.

154 **Contemporary American Novel** Significant American novelists since 1945. Cochran, Gutman, Shepherd.

155 **Literature of Black America** Poetry, fiction, and drama by black writers since the turn of the century. M. J. Dickerson.

162 **Bible as Literature** Jewish and Christian scripture analyzed as literary documents. Stephany.

165 **Introduction to Folklore** Basic concepts of folklore — folklife study; development of the discipline; survey of major genres: material culture, oral literature, custom, and kinetic lore; role of folklore in modern society. I, II. Sweterlitsch.

177, 178 **Advanced Writing** Students follow their own interests in the writing of poetry, fiction, and non-fiction. Permission of instructor required. *Prerequisite:* 53 for poetry and fiction, 50 for non-fiction. Broughton, Edwards, Huddle.

180 **Techniques for Teaching Composition in Middle and Secondary Schools** Sweterlitsch. (Not offered 1981-82.)

193, 194 **College Honors** Departmental permission required. Not to exceed three hours per semester.

195, 196 **Special Topics** Not to exceed three hours per semester.

197, 198 **Reading and Research** Departmental permission required. Not to exceed three hours per semester.

The prerequisite for courses numbered 200-262 is 81, 82, and six hours at the intermediate level (100-199). Seminar instructors may specify particular intermediate courses as prerequisite to their seminars.

201, 202 **Seminar in Language, Criticism, and Rhetoric**

211, 212 **Seminar in British Literature to 1660**

221, 222 **Seminar in British Literature, 1660-1900**

231, 232 **Seminar in Modern British Literature**

241, 242 **Seminar in American Literature to 1900**

251, 252 **Seminar in Modern American Literature**

261, 262 **Seminar in Literary Themes, Genres, and Folklore**

282 **Seminar for Prospective Teachers of English** Grammar and language; literary interpretation and criticism; allied problems useful to teachers of English. *Prerequisites:* 50, 81, 82, 101, 105. Biddle.

Environmental Studies

COLLEGE OF AGRICULTURE

COLLEGE OF ARTS AND SCIENCES

COLLEGE OF EDUCATION AND SOCIAL SERVICES

DIVISION OF ENGINEERING, MATHEMATICS, AND BUSINESS ADMINISTRATION

SCHOOL OF NATURAL RESOURCES

Professor Reidel (Director); Associate Professor Worley; Assistant Professor Hudspeth (Assistant Director); Lecturers Bradley, Brande, Houston; Adjunct Assistant Professors Eddy, Huffman.

1 Introduction to Environmental Studies I A survey of environmental studies examining the ecological, socioeconomic, aesthetic, and technological influences determining the quality of life on earth. *Prerequisite:* Freshman or sophomore standing or permission of instructor. Four hours. Reidel.

2 Introduction to Environmental Studies II A follow-up to Environmental Studies I with an emphasis on the political-legal-social aspects of environmental policy and problem-solving. *Prerequisite:* 1. Four hours. Reidel

51 Major Seminar An analysis of environmental problems and issues from the perspective of various academic disciplines and professional fields, with emphasis on interdisciplinary scholarship and research. *Prerequisites:* 1, major in Environmental Studies, permission of instructor. Three hours. Hudspeth.

100 Environmental Theory A comparative analysis of emerging concepts of man/environmental relationships; the history, philosophy, and theoretical framework of environmental studies. *Prerequisites:* 2, standing as a major or coordinate major. Three hours. Worley, Eddy.

191 Environmental Practicum Individual readings and research, internship, or field-based learning experience under the direction of a faculty member or environmental practitioner. Credit arranged. *Prerequisite:* Permission of course coordinator. Hudspeth.

195, 196 Special Topics Special topics courses taught by Program faculty and community environmental practitioners. These vary from semester to semester. Topics in the past have included environmental law, policy, economics, design, health, etc.

201 Research Seminar Planning, design, and methods of research for the study of environmental problems. Open to junior majors in Environmental Studies. *Prerequisites:* 51, 100. Three hours. Worley. (Not offered for graduate credit.)

202 Senior Project and Thesis Individual research under staff direction. *Prerequisites:* 201, permission of Environmental Program, major in Environmental Studies. Credit arranged. Reidel, Worley. (Not offered for graduate credit.)

204 Seminar in Environmental Studies Review and discussion of current environmental research and literature. *Prerequisites:* 100, senior standing, major or coordinate major in Environmental Studies. Three hours. (Not offered for graduate credit.)

294 Environmental Education Philosophy, concepts, and strategies of environmental education, with emphasis on integrating environmental concerns into formal and non-formal educational programs for youth and adults. *Prerequisites:* Six hours of intermediate or advanced courses in environmental studies, natural resources, or related areas. Three hours. Hudspeth. (Not offered for graduate credit.)

295, 296 Special Topics (Graduate)

Extra-Departmental Courses

COLLEGE OF AGRICULTURE

AGRICULTURE

195, 196 **Special Topics** Appropriate for interdepartmental and interdisciplinary topics in Agriculture. Permission of Dean's Office. Credit as arranged.

COLLEGE OF ARTS AND SCIENCES

7 **Earth, Air, Fire and Water** See course description under Chemistry.

GENERAL LITERATURE

72 **Romance Literature in Translation** Selected topics in romance literature. No knowledge of romance languages required. *Prerequisite:* One year course in any literature. Three hours. Sandler.

151, 152 **Development of Prose Fiction** First semester: Latin, Spanish, French. Second semester: 1700 to present; French, Russian, English, and/or German. *Prerequisite:* Sophomore standing. Three hours.

153 **Greek Drama** Three hours. Alternate years, 1982-83.

154 **Greek Historians** Three hours. Alternate years, on demand.

155 **Ancient Epic** Three hours. Alternate years, 1981-82.

156 **Greek and Roman Satiric Spirit** Three hours. Alternate years, on demand.

161, 162 **German Literature in Translation** Lectures on the development of German literature; readings and discussion of representative works in English translations. No knowledge of German required. *Prerequisites:* Sophomore standing, one year course in any literature. Three hours. Richel, Scrase.

181, 182 **Russian Literature in Translation** First semester: Russian masters of the 19th century. Second semester: 20th century writers from the symbolists to the present. *Prerequisites:* Sophomore standing, one year course in any literature. Three hours. Nalibow, Pomar.

251, 252 **Study of Movement, Genre or Topic** Precise content of course announced before registration period, chosen from among the following (or similar) topics: Women in Literature; The Comic Spirit; The Grotesque in Modern Literature; Politics in Modern Literature; Existentialism; The Enlightenment. *Prerequisite:* Any 100-level literature course in any of the cooperating departments. Three hours.

LINGUISTICS

101, 102 **Introductory course** to acquaint student with the methods and theory of systematic observation and explanation of language phenomena (linguistics). *Prerequisite:* 101 for 102. Three hours. Clark, Wilson, Woolfson.

COLLEGE OF ENGINEERING AND MATHEMATICS

Engineering—see page 178

Technology—see page 260

Forestry

SCHOOL OF NATURAL RESOURCES

Professors Hannah, John, Reidel, Whitmore (Program Chairperson); Associate Professors Armstrong, Donnelly, Forcier, Newton; Assistant Professors Bergdahl, DeHayes; Extension Assistant Professor Bousquet, McEvoy; Lecturer Turner.

1 Introduction to Forestry Introduction to forestry and conservation sciences. Three hours. Armstrong.

3 North American Trees (2-3) Survey of the principal forest trees of North America; their identification, silvics, and major uses. Primary emphasis is directed toward trees of the eastern United States. (Not open to Forestry majors). Three hours. Forcier.

5 Dendrology (3-4) Classification, silvical characteristics, and identification features of native and introduced trees and shrubs. *Prerequisite:* Biology 1 or Botany 4. Four hours. DeHayes.

73 Small Woodland Management (2-4) Concepts of forest ecology, resource inventory, cultural practices, and multiple use management for small woodland areas. *Prerequisite:* Junior standing. Three hours. Turner.

120 Forest Ecology (2-4) Forest environment and its effects on the development and distribution of forest communities. Forest succession and species interactions. *Prerequisites:* 5, Plant and Soil Science 161 or permission. Three hours. Donnelly.

122 Forest Ecosystem Analysis Composition, structure, and dynamics of selected forest communities. *Prerequisite:* 120. Twenty days in summer camp. Four hours. Donnelly, Fuller.

123 Silviculture (3-4) Natural regeneration, production, and tending of forest stands. *Prerequisite:* 142 or Wildlife Biology 151. Four hours. Hannah.

124 Forest Tree Improvement Forest genetics and its application to the improvement of trees for artificial regeneration purposes. *Prerequisites:* Botany 4, junior standing. Three hours. DeHayes.

132 Forest Fire Behavior and Management Forest fire ecology and behavior; fire weather; causes and effects; danger measurement; prevention and management; prescribed fire in forest management; smoke management; fire simulation. *Prerequisites:* Sophomore standing, one course in forestry. Three hours. Bergdahl.

133 Forest Entomology (See Plant and Soil Science 107.) Three hours. Parker.

134 Forest Pathology (2-4) A survey of principal diseases of forest and shade trees with emphasis on identification, morphology, ecology, epidemiology, and integrated disease management. *Prerequisites:* Botany 4, Zoology 9, or Biology 1, 2. Four hours. Bergdahl.

140 Forest Biometry I (3-4) Introductory concepts in forest biometry. Measurement of trees and forest products; forest sampling and inventory with application in multiple-use management. *Prerequisites:* Math. 19, Statistics 141. Four hours. Newton.

142 Forest Biometry II Boundary and topographic survey methods in forest management. Principles of forest biometry in forest-data collection. *Prerequisites:* 5, 140, Civil Engineering 12. Twenty days in summer camp. Four hours. Newton, Turner.

146 Remote Sensing of Forest Resources (2-3) Identification, interpretation, measurement, and mapping of forest resources from aerial photographs and other remote sensing devices. *Prerequisites:* Junior standing, nine hours of Natural Resources courses. Three hours. Whitmore.

151 Forest Economics The economic principles and problems in the management and utilization of forest resources; taxation of forest lands. *Prerequisites:* A course each in economics, statistics, and calculus. Three hours. Armstrong.

161 Wood Technology (2-3) Properties, uses, and identification of commercial woods of the United States. *Prerequisites:* Botany 4, a course in tree identification. Three hours. Whitmore.

163 Timber Harvesting (2-4) Methods of harvesting timber under different forest conditions and silvicultural treatments; organization and costs of logging operations. *Prerequisites:* Junior standing, two courses in forestry. Three hours. Turner.

176 Urban Forestry (2-4) Value of trees in the urban environment; selecting, planting, and maintaining landscape trees; diagnosis and control of disease, insect, and injury problems. *Prerequisites:* A course in tree identification, permission. Three hours. Donnelly.

181 Forestry Work Practicum Supervised work experience in forest resource area. *Prerequisites:* Junior standing, permission. Credit arranged.

185 Special Topics Readings, investigations, and lectures in selected forest resource subjects. *Prerequisites:* Junior standing, permission. Credit arranged.

205 Mineral Nutrition of Plants (See Botany 205.) Three hours.

221 Forest Soils and Site Relations (2-4) Forest soils from an ecological perspective. Profile development, physical properties, roots, water relations, nutrient cycling, topographic factors, site quality, and the potential to produce biomass. *Prerequisites:* 120, Plant and Soil Science 161, permission. Three hours. Hannah. Alternate years, 1981-82.

222 Advanced Silviculture (2-4) Scientific basis and contemporary status of silvicultural practices. *Prerequisites:* 123, permission. Three hours. Hannah.

229 Water Relations of Plants Soil-plant water relations. Terminology and measurement of soil moisture. Absorption, transport, and transpiration by plants. Effects of water excesses and deficits. *Prerequisite:* Permission. Three hours. Donnelly, Botany and Plant and Soil Science staff. Alternate years 1981-82.

242 Advanced Forest Biometry (2-4) Advanced principles of estimation, prediction, inventory, and evaluation of forest resources. Use of system analysis techniques in natural resource management. *Prerequisite:* 140 or permission. Three hours. Newton. Alternate years, 1981-82.

251 Forest Policy and Administration History of natural resource use and management in the U.S.; analysis of contemporary forest policy; organizational administration of forestry and related natural resource instructions. *Prerequisites:* 123, 151, or permission of instructor. Three hours. Reidel. (Not offered for graduate credit.)

252 Forest Valuation Principles of valuation of forests, growing stock, and other forest resources. Real estate appraisal principles as applied to forests. *Prerequisite:* 151. Two hours. Armstrong.

254 Advanced Natural Resource Policy Advanced seminar in natural resource policy; with emphasis on current issues in forest policy. *Prerequisites:* Graduate or advanced undergraduate standing; 251 or permission of instructor. Three hours. Reidel.

262 Forest Products (2-4) Wood products manufacture and distribution including lumber, veneer and plywood, pulp and paper. Wood preservation. *Prerequisite:* 161. Three hours. Bousquet. Alternate years, 1981-82.

271 Applied Forest Management Decision Theory Operations research

procedures in forest management. Management strategies for industrial and public forestry operations. *Prerequisite*: 151. Three hours. Armstrong.

272 Forest Management (2-2) The planning and organization of forests for multiple-use sustained yield production: environmental impact statements. *Prerequisites*: 123, 140. Three hours. Armstrong. (Not offered for graduate credit.)

275 Forest Watershed Management (2-4) Concepts of forest hydrology and forest watershed management; emphasis on natural processes and impacts of quantity, quality, and seasonal distribution of flow from watersheds. *Prerequisites*: 120 or permission. Three hours. Donnelly. (Not offered for graduate credit.)

285 Advanced Special Topics Advanced special topics courses or seminars in forestry beyond the scope of existing formal courses. *Prerequisites*: Graduate or advanced undergraduate standing, permission of instructor. Credit as arranged.

291, 292 Senior Research Work on research problem under direction of a staff member. Findings submitted in written form as prescribed by department. *Prerequisites*: Senior standing, permission. Three hours. (Not offered for graduate credit.)

Geography

COLLEGE OF ARTS AND SCIENCES

Professors Gade, Miles, VanderMeer (Chairperson); Associate Professors Barnum, Lind, Meeks; Assistant Professors Bodman, Ryerson.

Note: The normal introductory sequence is 1, 2 although 3,2 is a recommended alternative especially for students in economics and business administration.

1 Introduction to Geography Basic geographic concepts. The cultural diversity among people as it affects the organization and use of the environment. Three hours. I, II.

2 World Natural Environments The patterns of man's natural environment with particular attention to land-forms, climate, soil, vegetation, and water resources. Three hours. I, II.

3 Introduction to Economic Geography Elementary spatial models of economic patterns, processes, and relationships. Three hours. Bodman.

16 Human Role in Changing the Face of the Earth Geography and ecology of the human modification of the world's major regions. Three hours. Gade.

17 Introduction to Urban and Regional Planning Spatial, social, and economic patterns in contemporary cities and the planning problems these raise. Focus on Burlington metropolitan area. Three hours. Bodman.

43 Weather and Climate Elements of weather and climate and their interaction to produce world climate patterns. Daily weather analysis to facilitate understanding of various climatic systems. Three hours. Lind, Ryerson.

51 to 58 The regional courses numbered 51 to 58 listed below each concern the character and development of the contemporary cultural, economic, and political patterns of the area against the background of its physical and resource base. Three hours each.

51 Africa Miles.

- 52 Canada Miles.
- 53 The Soviet Union Meeks.
- 55 Europe Barnum.
- 56 Latin America Gade.
- 57 The United States Meeks.
- 58 China and Japan VanderMeer.

61 **Vermont in New England** Physical, economic, and cultural patterns of Vermont in the context of New England. Evolution of the Vermont landscape; problems of land use planning and development. Three hours. Meeks.

62 **Geography of Place Names** Investigation and interpretation of the names found on maps of Vermont, North America, and Europe. Three hours. Barnum.

81 **Introduction to Cartography** Maps and map preparation, principles of map construction, information suitable for map presentation, techniques of map drawing, methods of map reproduction, graphs and frequency distributions. *Prerequisite:* Permission of instructor. Three hours. I, II. Barnum, Ryerson.

85 **Introduction to Remote Sensing** Geographic analysis and evaluation of aerial imagery produced by remote sensors and its relationship to environmental problems in the social and physical sciences. Three hours. Lind.

95, 96 Special Topics

142 **Physical Geography** Patterns and processes in the interactions between the earth, atmosphere, hydrosphere, and biosphere; effects of human intervention in environmental systems. *Prerequisite:* 2. Three hours. Lind.

143 **Climatology** Analysis of regional and local climatic data with special reference to climatic controls; special laboratory projects. *Prerequisite:* 43. Three hours. Lind, Ryerson.

146 **North American Resources** Identification and analysis of natural regions as they reflect elements of the physical environment. Emphasis on distributional patterns and resource significance. *Prerequisite:* 1, 2, 3, or 57. Three hours. Meeks.

155 **Historical Geography of Europe** (Same as History 155.) European geography within a framework of past times; the historical development and distribution of settlement, economic, and political patterns. *Prerequisite:* 55 or History 5, 6, 15, or 16. Three hours. Barnum.

170 **Historical Geography of the United States** (Same as History 170.) Physical setting of American historical development emphasizing the sequence of peoples and cultures which have occupied the land and their varied appreciation of its resources. *Prerequisite:* 57 or History 7 or 8. Three hours. Miles.

171 **Cultural Geography** Concepts and theories of cultural ecology, culture area, culture history, and the cultural landscape. *Prerequisites:* 1 or Anthropology 21 and three additional hours in geography or anthropology. Three hours. Gade.

173 **Industrial Location and Regional Development** Classical and contemporary theories of location and measurement of spatial change. Locational planning in developed and developing areas. Problems of regional disequilibrium and growth strategies. *Prerequisite:* 3 or Economics 11 or 12. Three hours. Bodman.

174 **Agricultural Geography** World, national, and local rural land use patterns. Landscape elements as they reflect prevailing and historic agricultural patterns. Ecologic and social problems of modern agriculture. *Prerequisite:* 1, 2, or 3, or Agricultural and Resource Economics 2 or 61, or Plant and Soil Science 11. Three hours. Meeks, VanderMeer.

175 Urban Geography An analysis of the morphology and function of cities. Consideration of urban growth and development, methods of classification, distribution, and theories of location. *Prerequisite:* 1, 3, or 17. Three hours. Barnum, Bodman.

177 Political Geography (Same as Political Science 177.) Location, resources, and distributional relationships of the variety of human factors as they bear on the structure and functioning of political units. Relationship between geopolitics and political geography. *Prerequisite:* 1 or 3, or Political Science 11, 51, or 71. Three hours. Miles.

179 Cultural Ecology (Same as Anthropology 179.) Interrelationships of social groups and their natural environments and resource bases, with primary emphasis on non-industrial cultures, examined from the perspectives of anthropology and geography. *Prerequisite:* 1 or 16 or Anthropology 21. Three hours. S. Pastner (Anthropology) and Gade.

181 Computer Cartography Computer graphics as an alternative and supplement to manual cartography; advanced concepts in cartographic design; applications of computer mapping in planning and resource management. *Prerequisite:* 81. Three hours. Ryerson.

183 Geography and Public Policy Critical perspectives on the locational aspects of planning at a variety of geographic scales. *Prerequisite:* 3 or 17. Three hours. Bodman.

191 Geography Internship A supervised internship in applied geography working with a local public agency or private firm. Individually arranged. *Prerequisites:* Junior or senior standing, permission of Department. One to six hours. Bodman, Meeks, Ryerson.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

201 Perspectives on Geography Geographic concepts and research methodology; the formulation, conduct, and presentation of a research effort. *Prerequisite:* Junior, senior, or graduate standing with at least 12 hours in geography. Three hours.

210 Special Topics in Regional Geography Specialized study of a particular region. *Prerequisites:* Junior, senior, or graduate standing with at least 12 hours in geography, permission of instructor. Three hours.

216 Biogeography Processes and patterns of distribution, domestication, and human utility of plant and animal species and communities in varying environmental and historical contexts. *Prerequisite:* Nine hours in geography or biology. Three hours. Gade.

233 Rural Planning (See Agricultural and Resource Economics 233.)

242 Problems in Physical Geography *Prerequisite:* Senior or graduate standing with at least 12 hours in geography. Three hours. Gade, Lind, Meeks, Ryerson.

261 Problems in Vermont Geography *Prerequisite:* Senior or graduate standing with at least 12 hours in geography. Three hours.

270 Problems in Human Geography *Prerequisite:* Senior or graduate standing with at least 12 hours in geography. Three hours. Barnum, Bodman, Gade, Meeks, Miles, VanderMeer.

281 Problems in Cartography Special laboratory projects. *Prerequisites:* 81, junior, senior, or graduate standing with at least 12 hours in geography. Three hours. Barnum, Ryerson.

285 Remote Sensing and Environmental Problems (Same as Geology 219.)

Research projects in remote sensing; application of multispectral data for environmental studies. *Prerequisite:* 85, Civil Engineering 210, or Forestry 142. Three hours. Lind.

287 Spatial Analysis Analysis of spatial pattern and interaction through quantitative models; introduction to measurement, sampling, and covariation in a spatial framework. *Prerequisite:* Junior, senior, or graduate standing with at least 12 hours in geography or graduate standing in planning. Three hours. Bodman.

297, 298 Readings and Research

Geology

COLLEGE OF ARTS AND SCIENCES

Professors Hunt, Stanley; Associate Professors Drake (Acting Chairperson), Assistant Professors Bucke, Doolan; Visiting Assistant Professor Rahmanian; Adjunct Professors Ratte, Hatch; Lecturer Detenbeck.

1 Introductory Geology (3-3) Processes, agents, and their effects on materials, structure, and morphology of earth's crust. Laboratory includes field trips, study and interpretation of rocks, minerals, and maps. Four hours. Bucke.

42 Geological Oceanography Characteristics and development of oceans, their basins and shorelines. Plate tectonics and related investigations. *Prerequisite:* 1 or introductory science course. Three hours. Hunt, Bucke.

51 Environmental Geology Survey of geologic perspective on resources, waste disposal, environmental health hazards, environmental impact, and natural systems; with emphasis on geologic applications and contemporary issues. *Prerequisite:* 1 or introductory courses in science, engineering, or permission of instructor. Three hours. (Not offered 1981-82.)

105 Elementary Field Geology (0-12) Geological evolution of western Vermont as seen through actual field mapping in the Burlington area. Specifically designed for sophomores majoring or minoring in geology or related sciences. *Prerequisites:* 1; 42 or 51. Four hours. Stanley.

111 Earth Materials (3, 3) Study of the chemical and physical properties of minerals and rocks with special regard to their mode of origin. Laboratory stresses identification of minerals and rocks in hand specimen. *Prerequisite:* 1, 42, or introductory courses in physics or chemistry. Four hours. Drake.

115 Geomorphology Examination and interpretation of landforms resulting from the action of rivers, glaciers, waves, and the wind. Emphasis on processes. *Prerequisite:* 1 or 51. Three hours. Rahmanian.

121 Geologic History of Life (2,3) Survey of origin, preservation, and diversification of ancient life. Interaction of organisms with their environment and the effect that organisms have had on the evolution of earth. *Prerequisite:* 1, 42, or Biology 1, or equivalent. Senior Biology majors by permission only. Three hours. Hunt.

145a, b, c Optical Mineralogy (1-6) A sequence of three units of minicourses studying optical properties of minerals: 145a Petrographic microscope and behavior of light in isotropic and anisotropic media; 145b Examination of minerals in thin section; 145c Specialized microscopic procedures. Students may enroll in from one to three units for one credit each. *Prerequisites:* 111 (may be

taken concurrently) for 145a, 145a for 145b, and 145c. One to three credits. Drake.

155 Sedimentary Petrology (3-3) Origin, identification, and basis for classification of sedimentary rocks, with emphasis on interpretation of depositional and post-depositional environments. *Prerequisite:* 111. Four hours. Rahmanian.

156 Igneous and Metamorphic Petrology (3-3) The origin and analysis of igneous and metamorphic rocks. Laboratory stresses modern approaches to petrologic problems. *Prerequisite:* 105, 111, 145. Four hours. Doolan.

160 Geology of Mineral Resources The geologic and geochemical factors controlling the formation and distribution of mineral resources. *Prerequisite:* 111. Three hours. Drake.

166 Structural Geology (3-3) Rock deformation, description, and geometry of structural types, and the interpretation of structures of all sizes in terms of finite strain and causal stress fields. *Prerequisite:* 105, 111, or Physics 16, 25, or Civil Engineering 100, 180. Four hours. Stanley.

170 Geophysics The structure of the solid earth, using seismic, magnetic, and gravitational methods. *Prerequisites:* Six hours calculus, six hours physics. Three hours. Doolan, Detenbeck. Alternate years. (Not offered 1981-82.)

180 Soil Mechanics (See Civil Engineering 180.) Four hours. Olsen.

193, 194 College Honors

195, 196 Special Topics

197, 198 Research in Geology Supervised research and readings in selected field of geology. Students from allied sciences, mathematics, and engineering may elect a research problem that combines their major field of study and geology. *Prerequisite:* Consultation with staff. Three hours.

211 Seminar in Sedimentary Processes Selected readings and field studies emphasizing the interpretation of clastic sedimentary deposits including transportation, processes of sedimentation, and geomorphology of ancient and recent sedimentary environments. *Prerequisite:* 155. Three hours. Rahmanian.

212 Seminar in Sedimentary Processes Paleoenvironmental analysis of carbonate rocks including selected readings, field investigations, and petrographic studies. *Prerequisite:* 155. Three hours. Bucke.

216 Glacial Geology (2-3) The Quaternary history of North America with emphasis on the origin, mechanics, and effects of past and present glaciation. *Prerequisites:* 105, junior standing or above. Three hours. (Not offered 1981-82.)

218 Hydrogeology The origin, occurrence, movement, and character of ground water, with particular emphasis on pump test methods. *Prerequisite:* Junior standing or above. Three hours. (Not offered 1981-82.)

219 Remote Sensing of the Environment (See Geography 285.) Three hours. Lind.

221 Soil Classification and Land Use (See Plant and Soil Science 261.) Three hours. Bartlett.

235 Advanced Structural Geology Selected topics in analytical structure. *Prerequisite:* 166. Three hours. Stanley.

237 Structural Analysis of Deformed Rocks Elastic and ductile behavior of rocks. Fracture phenomena and analysis; fold generation analysis; stress and strain interpretation of deformational features in rocks and minerals. Field work. *Prerequisites:* 166, 145. Four hours. Stanley, Detenbeck.

238 Field Geology (1-6) Field mapping in Vermont. Methods of analysis of field data. Geological reports. Held in late summer. *Prerequisite:* 166 or permission of instructor. Three hours.

240 Plate Tectonics Development and current status of plate tectonic concepts with applications to selected parts of the globe. *Prerequisites:* 156 or 166, permission of instructor. Three hours. Stanley.

242 a, b Regional Geology 242a (1 credit) Discussion of the geology of a selected region of North America; **242b (3 credits)** A four-week summer field trip to the area in question. *Prerequisites:* 105, 11; 242a for 242b. Four hours.

245 Geology of the Appalachians Origin of mountain belts; the Appalachian mountain system discussed in terms of tectonics and geologic processes active in modern continental margins. *Prerequisites:* 105, 11, junior standing. Three hours. Doolan.

250 Advanced Mineralogy (2-3) Crystallographic, chemical, and physical properties of the common rock-forming minerals. Laboratory stresses techniques of mineral identification and analysis of mineral assemblages. *Prerequisite:* 111. Three hours. Doolan.

252 Clay Mineralogy (2-3) The structure, composition, properties, occurrence, origin, distribution, and environmental significance of the various clay minerals. Laboratory techniques in identification of clay minerals and measurement of their physical and chemical parameters. *Prerequisite:* Permission of instructor. Three hours. Bucke. (Not offered 1981-82.)

254 Geochemistry The application of basic concepts in chemistry to geological problems, including solution geochemistry, weathering, mineral stability. *Prerequisite:* 111 or permission of instructor. Three hours. Drake. (Not offered 1981-82.)

262, 263 Seminar in Petrology Modern concepts of the evolution of igneous and metamorphic rocks. Emphasis directed toward application of petrologic concepts to interpretation of earth history and tectonophysics. *Prerequisite:* 156 or equivalent. Three hours. Doolan.

270 Invertebrate Paleontology (2-3) Classification, geological distribution, evolution, paleoecology, and morphology of major invertebrate fossil groups. *Prerequisites:* 121, Biology 1, or equivalent. Three hours. Hunt.

272 Recent Sedimentation (1-6) Investigation of recent sedimentary environments using geolimnological and oceanographic techniques. Group and individual projects. Field oriented with use of the University research boats. *Prerequisites:* 155 or 42, permission of instructor. Three hours. Hunt.

275 Geology of Oil and Gas (2-3) Origin, migration, and entrapment of petroleum. Geology and classification of source and reservoir rocks and traps. Methods of subsurface basin analysis. *Prerequisite:* 155. Three hours. Rahmanian.

277 Stratigraphy (2-2) Study and interpretation of development and distribution of sedimentary rocks. *Prerequisite:* 155. Three hours. Bucke, Hunt.

291 Seminar in Geology Selected topics of current interest. *Prerequisite:* Senior or graduate standing. One to three hours.

German

COLLEGE OF ARTS AND SCIENCES

Professor Mieder (Chairperson); Associate Professors Richel, Scrase; Assistant Professors Doane, Mahoney.

1-2 Elementary German Four hours.

11, 12 Intermediate German Literature and discussion of selected prose with review of grammar. *Prerequisites:* 1-2 or equivalent for 11; 11 for 12. Three hours.

13, 14 Intermediate German Composition and conversation. Guided conversation, discussion, and written work leading to free composition and oral presentations. Grammar review. *Prerequisites:* 1-2 or equivalent for 13; 13 or 11 for 14. Three hours.

21-22 German for Reading Knowledge To develop reading proficiency in German for research or graduate study. Does not fulfill distribution requirements. Credit not granted for both German 1-2 and 21-22. Freshmen and sophomores by permission only. Four hours.

101, 102 Introduction to German Literature Survey of German literature from the beginnings to the 20th century. *Prerequisite:* 12 or 14 or equivalent. Three hours. Doane, Richel, Scrase.

121, 122 German Culture and Civilization Emphasis on increasing oral and written command of the language. Class discussions focus on German history and culture. *Prerequisite:* 12 or 14 or equivalent. Three hours. Doane, Mahoney.

193, 194 College Honors

195, 196 Special Topics Advanced study in accordance with students' needs and interests. *Prerequisites:* 101, 102 or the equivalent, departmental permission. Three hours.

197, 198 Readings and Research

201 Proseminar: Methods of Research and Bibliography An introduction to tools and methods of research. *Prerequisite:* 101 or equivalent. Three hours. Mieder.

203 Development of German Intellectual Movements A comprehensive survey of the history of ideas as a framework for the study of German literature. *Prerequisite:* 101, 102 or equivalent. Three hours. Mahoney.

204 Courtly Epic and Minnesang Cultural background and major works of medieval classicism. *Prerequisite:* 101, 102 or equivalent. Three hours. Mieder.

205, 206 Goethe and Schiller and Their Time Origin, development, characteristics and criticism of German Classicism. *Prerequisite:* 101, 102 or equivalent. Three hours. Mahoney, Richel, Scrase.

207 19th Century Prose Narrative prose of representative authors such as Kleist, Droste-Hülshoff, Stifter, Storm, and Keller. *Prerequisite:* 101, 102 or equivalent. Three hours. Mieder.

208 19th Century Drama Works by Kleist, Büchner, Grillparzer, Hebbel, Wagner, and the early Hauptmann. *Prerequisite:* 101, 102 or equivalent. Three hours. Richel.

209, 210 The 20th Century Selected works in poetry, prose, and drama by Brecht, George, Hauptmann, Hofmannsthal, Kafka, Thomas Mann, Rilke, and others. *Prerequisite:* 101, 102 or equivalent. Three hours. Doane, Scrase.

221, 222 Advanced Composition and Conversation Oral and written practice in German of advanced difficulty with emphasis on stylistics. *Prerequisite:* 121, 122 or equivalent. Three hours. Doane, Mieder.

232 History of the German Language Historical linguistic development of the German language from earliest times to the present. No knowledge of the older stages of the language is presupposed or required. *Prerequisite:* 121, 122 or equivalent. Three hours. Mieder.

281, 282 Senior Seminar Readings and research. Required of all senior concentrators. Three hours.

GENERAL LITERATURE

161, 162 German Literature in Translation (See course description under Extra-Departmental Courses.)

Hebrew

COLLEGE OF ARTS AND SCIENCES

1-2 Elementary Hebrew The spoken language of everyday use with oral, aural, and written practice in speaking, reading, and comprehension. Four hours.

11, 12 Intermediate Hebrew Reading, translation, and discussion in Hebrew of texts selected to show the development of Hebrew culture from Biblical times to the present. Three hours.

Historic Preservation

COLLEGE OF ARTS AND SCIENCES

201 Architecture and the Environment Introduction to basic skills necessary to preserve, document, and re-use America's visible past, its architectural heritage. Students do projects in actual preservation problems in Vermont. *Prerequisite:* Junior or senior standing. Three hours. Liebs.

202 Historic Preservation Special topics. Three hours.

History

COLLEGE OF ARTS AND SCIENCES

Professors Daniels, Davison, Evans (Emeritus), Felt, Hand, Metcalfe (Chairperson), Schmokel, Schultz (Emeritus), Seybolt, Spinner, Steffens, Stout (Director of Graduate Studies); Associate Professors Andrea, Hutton, Liebs, Overfield, Stoler, True; Assistant Professors McGovern, Rodgers; Adjunct Professor Morrissey.

The Department of History has recently renumbered all of its courses, in order to help guide students to courses appropriate for them. Numbers are designed to indicate method of instruction and expected preparation level of students, as follows:

1-9 Civilization Surveys — Open to freshmen and sophomores, but primarily designed for freshmen. Generally emphasize the textbook-lecture-exam approach.

10-99 Specialized Introductory Courses — Designed for sophomores and juniors, open to all except graduate students. Generally the format emphasizes lectures and discussion. Short papers, book reviews, etc., will be required in addition to exams. No prerequisites.

100-199 Advanced Intermediate Courses — Intended primarily for juniors

and seniors with specific prerequisites. Discussion-lecture, with some seminar type work. Evaluation methods tend to emphasize written work other than exams.

200-299 Advanced (Seminar) Courses — *Advanced work in interpretation, research, and writing. Seminar format, limited enrollment. Primarily for students majoring in history (or related disciplines) and graduate students. Substantial prerequisites.*

1, 2 Major Civilizations An introductory survey of major world civilizations. First semester: Ancient, medieval, and non-European civilizations. Second semester: the emergence of modern world civilization from European roots. Three hours.

5 European Civilization to 1815 An introduction to the political, social, and intellectual movements which have shaped the foundations of western civilization: from the Renaissance to the French Revolution. Three hours.

6 European Civilization, 1815 to 1945 A survey emphasizing the ideas and institutions which have helped shape western society and culture from the Napoleonic Era to the end of the Second World War. Three hours.

7, 8 History of the United States Survey from the pre-Revolutionary period to the present. Three hours.

9 Ancient Mediterranean Civilization A detailed study of Athens in the 5th century B.C. continuing to the rise of Rome through the first century A.D. (Students who have already taken 106 may not take 9.) Three hours. Rodgers.

15 The Birth of Europe Survey of the history of Western Europe from the late Roman Empire to the stabilization of Medieval Civilization. Three hours. Andrea.

16 The High and Later Middle Ages Western Europe from the Age of the Crusades to the Renaissance. Three hours. Andrea.

20 The Study of History An introduction to the methods of studying the past. Use of the works of major historians as a means of investigating the ways in which historians think and write history. Three hours.

21, 22 History of Science A survey of the history of the physical and biological sciences from antiquity to the present. Stresses science as an intellectual activity, within the contemporary context of philosophy, religion, and social organization. Three hours. Steffens.

25 Biography Readings in the history and criticism of biography, the role of the individual in history, and biographies of individuals. Three hours.

31 Traditional Chinese Civilization An historical examination of the thought, social structure, politics, economics, science, literature, art, and music of traditional China. Three hours. Seybolt.

32 History of Japan A survey of Japanese political, social, economic, and aesthetic thought and institutions from 600 A.D. to the present. Three hours. Seybolt.

33 Introduction to the Modern History of Latin America A lecture survey of Latin American history which concentrates on the post-independence period. Selected national histories studied. Three hours. True.

35 Rise of Islam Arab/Islamic civilization during its formative period, from the 6th through the 13th centuries A.D. Three hours.

36 The Modern Middle East Major historical developments in the Middle East from the late 18th century to the present. Three hours.

37 Introduction to African History Lecture survey: traditional Africa, the European impact, colonial rule, African nationalism and independence. Three hours. Schmokel.

40, 41 World History Since 1945 First semester: the Soviet Union, Eastern Europe, Western Europe, and the United States. Second semester: Asia, Africa, and Latin America. Three hours. Spinner.

50, 51 English History Political and social history of England. First semester: Middle Ages and Tudor-Stuart. Second semester: 1715 to the present. Three hours. Metcalfe, Spinner.

52 Modern Germany and Its Historical Background Lecture survey of German history from 1871, including consideration of major events and forces which shaped German society and politics from the reformation to the 19th century. Three hours. Schmokel.

53 French History Survey of the major historical forces which have shaped modern French civilization (1700-1971). Principal themes: Absolutism, Enlightenment, French Revolution, 19th Century Society and Culture. Lectures and discussions. Three hours. Hutton.

54 History of Russia and Eastern Europe A broad survey from the Middle Ages to the present time, with emphasis on political history since 1815. Three hours. Daniels.

56 Introduction to Scandinavia. History, culture, and contemporary life of Scandinavia (including Finland), emphasizing an area rather than a country-by-country approach and considering basic historical turning points, examples of literary and artistic expression, and the region's efforts to solve problems of modern society. Some comparisons with social reform efforts of U.S. (Normally spring semester.) Three hours. Felt.

70 Black History Economic, social, political, and intellectual developments in U.S. history as they have affected and been affected by the Black American; emphasis on the period since 1865. Three hours.

71 Vermont History A survey of Vermont history from early times to the present. Three hours. Hand.

72 History of Women in the United States Special emphasis on the women's movements of the 19th and 20th centuries and on the relationships among them. Three hours. McGovern.

75, 76 Canadian History Introduction to history of Canada, from earliest French exploration and settlement to present, concentrating on La Nouvelle France, British North America, achievement of self-government, international relations, and issues of cultural diversity. First semester: To 1867. Second semester: 1867-present. Three hours. Kenny.

79 Rural America Survey of rural-agrarian side of American history from colonial times to present. Topics include history of farming methods from medieval Europe to age of agribusiness, Frontier Thesis, agrarian protest movements, and culture of rural America. Three hours. Stout.

80 U.S. Military History The development of the American Military Establishment within the framework of American history from the colonial era to the present. Three hours. Stoler.

95, 96 Special Topics

105 Archaeology and History of the Ancient Near East Survey of the primary civilizations of Egypt and Mesopotamia and the secondary cultures of Anatolia, Syria-Palestine, Assyria, and Iran, with major emphasis on the archaeological evidence. *Prerequisite:* 1 or 9 or appropriate work in Classics. Three hours. Davison.

106 History of Greece Survey of the history of ancient Greece from prehistoric times (with special emphasis on the Minoan and Mycenaean cultures) to the Hellenistic Age. *Prerequisite:* 1 or 9 or appropriate work in Classics. Three hours. Davison.

107 History of Rome Survey of the history of ancient Italy from prehistoric times (with special emphasis on the Italic peoples, the Etruscans, and Greek colonization) to the age of Justinian. *Prerequisite:* 1 or 9 or appropriate work in Classics. Three hours. Davison.

111 The Renaissance European society from the 14th to early 16th century, emphasizing the transition from medieval to "modern" society and the roots of Renaissance Italy's cultural and artistic brilliance. *Prerequisite:* 5 or 16. Three hours. Overfield.

112 The Reformation European society from the Renaissance to mid-17th century. Emphasis on the religious struggles growing out of the Protestant Reformation and their impact on the social, political, economic, and cultural movements of the era. *Prerequisite:* 5 or 16. Three hours. Overfield.

116 Topics in Medieval Culture Examines selected issues relating to the social and/or religious history of medieval Europe. Topics include: medieval town life, popular piety in the Middle Ages, the Crusades, monasticism, and heresy. *Prerequisite:* 5 or 16. Three hours. Andrea.

120 Special Methods in Secondary Education for the Social Studies (Same as Education 179.) Social studies curricula and selected social studies topics. (Not acceptable toward fulfilling Arts and Science College major requirements.) *Prerequisite:* Acceptance in teacher certification program. Three hours. True.

121 Quantitative Methods in Historical Research Applications of quantitative methods to selection and analysis of historical source materials; emphasis on political and social data. Use of University's Computation Center facilities and other data-processing equipment. *Prerequisite:* Statistics 111 or permission of instructor. Three hours. McGovern.

122 Philosophy of History (Same as Philosophy 132.) An investigation of the theories of history from the perspectives of both historians and philosophers. *Prerequisites:* Six hours of history or philosophy. Three hours. Steffens.

123 American Biography Investigation and portrayal of personalities; the uses of biography in the study of American history. Subjects selected to represent a variety of vocations and aspects of history. *Prerequisite:* 7 or 8. Three hours.

124, 125 Intellectual History of Modern Europe Emphasis upon ideas in their relation to major political and social movements. First semester: Humanism, the Scientific Revolution, and the Enlightenment (1500-1800). Second semester: The Modern Era. *Prerequisites:* For 124, 5; for 125, 6. Three hours. Hutton, Overfield.

126, 127 Intellectual History of the U.S. *Prerequisites:* For 126, 7; for 127, 8. Three hours. Felt.

128 Science and Culture A study of science as an integral part of the culture of our age with emphasis on the published works of leading scientists, mathematicians, and "humanists" of the 20th century. *Prerequisite:* 22, or six hours of European History or Philosophy 112 or science major. Three hours. Steffens.

129 The Scientific Revolution The interrelationship between scientific activity and social change during 16th and 17th centuries in Europe. Study of early stages of "Scientific Revolution," emphasizing lives and works of Copernicus, Kepler, Galileo, Newton. Special emphasis on broad philosophical, religious, artistic, and social context of their times. *Prerequisite:* 21 or six hours of European History or Philosophy 112 or junior/senior majors in science. Three hours. Steffens.

131 Modern China Examination of Chinese history from 1800 to 1949 including discussion of Western imperialism, breakdown of the Confucian order,

and 20th century struggle to find a viable alternative, culminating in Communist victory of 1949. *Prerequisite*: Six hours of history; 31 recommended. Three hours. Seybolt.

132 People's Republic of China An examination of the domestic and foreign affairs of China from 1949 to the present. *Prerequisite*: Six hours of history; 31 recommended. Three hours. Seybolt.

133 Topics in the History of Modern Latin America Topics will include plantation economy, slavery, race relations, immigration, militarism, economic development, *indigenismo*, and influence of U.S. Students encouraged to do independent research and study on Latin American topics of their choice. Classroom emphasis on dialogue and question-asking rather than lecture and recitation. *Prerequisite*: 33. Three hours. True.

134 History of Mexico Reading knowledge of Spanish strongly recommended. *Prerequisite*: 33. Three hours. True.

137 Problems in the History of Modern Africa Topics include African response to European penetration (collaboration vs. resistance), theories and practices of colonial rule, ideologies and organizational forms of African nationalism, and problem of development in present-day Africa. *Prerequisite*: 37. Three hours. Schmokel.

150 Tudor-Stuart England England from 1485 to 1660, with particular emphasis on the central period from the 1530's to the 1640's (the Henrician Reformation to the Revon). *Prerequisite*: 5 or 50. Three hours. Metcalfe.

151 Victorian England Selected topics in the 19th century English history with emphasis on "industry and empire," changing class relationships, and the growth and development of political parties. *Prerequisite*: 6 or 51. Three hours. Spinner.

152 Political and Social History of Modern Germany The political development and changing social and economic structure of Germany during the Bismarckian empire, the Weimar Republic, the Nazi dictatorship, and the period 1945-69. *Prerequisite*: 52. Three hours. Schmokel.

153 France in the Contemporary World French history since 1870; the Commune and the decline of the revolutionary movement; emergence of mass politics; art and society of the "Belle Epoque;" French Fascism; Vichy; French Communism; Religious Renewal; Existentialism; demise of the French colonial empire; de Gaulle; student protest of 1960's; the "American challenge." *Prerequisite*: 53. Three hours. Hutton.

154 The Russian Revolution and the Soviet Regime A detailed study of the revolutionary movement, the revolutions of 1917, Marxism, Leninism, and the evolution of the Soviet Regime to 1939. *Prerequisite*: 54. Three hours. Daniels.

155 Historical Geography of Europe (Same as Geography 155.) Three hours.

158 Modern Spain (Same as Spanish 158.)

170 Historical Geography of the United States (Same as Geography 170.) Three hours.

171, 172 Social History of the U.S. Selected topics in the history of American society, including social movements, rural history, or urban history. *Prerequisites*: For 171, 7; for 172, 8. Three hours. McGovern.

173, 174 History of U.S. Foreign Relations First semester: 1763-1900. Second semester: 1900-present. *Prerequisites*: For 173, 7; for 174, 8. Three hours. Stoler.

175 Canadian-American Relations Historical examination of Canada's relationship with the United States, investigating the process of political, economic, social, and cultural integration and subordination through Canada's

rejection of the Revolution, its diplomacy, its continental approaches, and the Myth of Friendship. *Prerequisites:* 7, 8, 75, or 76. Three hours. Kenny. Alternate years.

176 Quebec: Province or Nation? French-speaking Canada in 19th and 20th centuries. Concepts of "nationalisme," "survance," and "messianisme." Study of political, economic, and social development, important public figures, and the relationship with the rest of Canada, stressing Quebec's particular and separate historical evolution. *Prerequisite:* 75 or 76 or 3 hours of Canadian Studies. Three hours. Kenny. Alternate years.

181 Colonial America, 1607-1791 A survey of the colonial period of U.S. history from the earliest settlements through the establishment of the Constitution. *Prerequisite* for any seminar course in the Colonial period and American Revolution. *Prerequisite:* Six hours of history or other social science, of which History 5 is highly recommended. Three hours. Stout.

182 The Early National Period A chronological survey of U.S. history from 1790 to 1847. *Prerequisite:* 7. Three hours. True.

183 U.S. History 1847-1876 A history of the United States, 1847-1876, with emphasis on the sectional conflict of the 1850's, the Civil War, the life of Lincoln, and Reconstruction. *Prerequisite:* 7. Three hours.

184 The U.S. in the Age of Industrialization A chronological survey of U.S. History from 1876 to 1914. *Prerequisite:* 8. Three hours.

185 The United States as a World Power A history of the U.S. from 1914 to 1945. *Prerequisite:* 8. Three hours.

186 American History Since 1945 A topical review of United States history since 1945 with special emphasis upon the problems of interpreting and reconstructing the recent past. *Prerequisite:* 8. Three hours. Hand.

191 Internship in History Supervised cooperative internship work in history in archives, museums, libraries, etc. To be individually arranged for each student. *Prerequisites:* Junior or senior standing, permission of department. Three to six hours.

193, 194 College Honors *Prerequisites:* Junior or senior standing, permission of department. Three hours.

195, 196 Special Topics *Prerequisites:* Junior or senior standing, six hours of history. Three hours.

197, 198 Readings and Research *Prerequisites:* May be prescribed by an individual instructor, junior or senior standing. Three hours.

Prerequisites for Seminar Courses (all following courses): Enrollment limited to juniors, seniors, and graduate students who have taken at least 12 hours of previous work in history. Individual instructors will prescribe specific prerequisites appropriate for their seminars. Students who wish to enroll in seminars should check the current schedule of courses for these prerequisites.

210, 211 Seminar in History of Traditional Societies Three hours.

220, 221 Seminar in Historical Methods, Historiography, History of Ideas Three hours.

222 Seminar in Comparative History Three hours.

230, 231 Seminar in Third World History Three hours.

250, 251 Seminar in Modern Europe Three hours.

261 Seminar in Vermont History A topical approach to the Vermont experience through original research utilizing primary sources available at the University of Vermont, the Vermont Historical Society, and the Vermont State Library. *Prerequisites:* 71, permission of instructor. Three hours.

270, 271 Seminar in American Statesmen Thought and practical politics of American statesmen. First semester: 1783-1865. Second semester: Since 1865. Three hours.

278 Seminar in Foreign Policy of the USSR (Same as Political Science 278.) An historical topical study of Soviet foreign relations since 1917, including the international Communist movement and ideological, economic, and strategic aspects. Three hours. Daniels.

280, 281 Seminar in Early American History Three hours.

282, 283 Seminar in Modern American History Three hours.

284 Seminar in Canadian History Three hours.

285 Seminar in Quebec History Three hours.

Human Nutrition and Foods

COLLEGE OF AGRICULTURE

Professor Carew; Associate Professors Livak, Schlenker (Acting Chairperson); Assistant Professors Ross, Soule, Tyzbir; Instructor F. Emanuel; Lecturer Guild; Extension Professor Coffey; Extension Assistant Professor Wright; Research Associate Professor Hopp; Research Assistant Professor Clarke; Adjunct Assistant Professor Stowell.

37 Basic Concepts of Foods (2-3) An introduction to the study of food which includes the physical and nutritional properties as well as the basic principles of food preparation. Laboratory application. Three hours. Soule.

43 Fundamentals of Nutrition A comprehensive study of specific nutrients in terms of their availability, function, utilization, and requirements in mammalian species. Credit will not be given for both 43 and 46. Three hours. Carew.

44 Survey of the Field: Human Nutrition and Foods (2-0) Introduction to the professional field and career opportunities in human nutrition and foods. Required of all freshmen and transfers. One hour. Soule.

46 Introduction to Human Nutrition Introduction to the nutrients; nutritional implications in growth, development, and performance throughout the life cycle and in major health problems. Credit will not be given for both 43 and 46. Three hours. Ross.

130 Food and the Consumer (2-3) An investigation of factors which influence food intake. Decisions in food selection as they are affected by skill, time, energy, and money. *Prerequisites:* 37, a college course in nutrition. Three hours. Soule.

131 Food Preservation History of, and current techniques in, extending the availability of the food supply. *Prerequisite:* 130. Two hours. Soule.

133 Politics of Food An investigation of policies affecting current food systems and their influence on nutrition, cost, and quality of food. *Prerequisite:* Three hours in nutrition. Three hours. Livak.

135 Applied Food Science (3-3) Study of the scientific principles involving the chemical and physical properties of food and the changes that occur in food preparation and processing. *Prerequisites:* 37, three hours in nutrition, organic chemistry. Four hours. Livak.

136 Nutritional Evaluation of Food (3-0) Stability and biological availability of the nutrient components of food. *Prerequisites:* 37, three hours in nutrition, organic chemistry. Three hours.

138 Quantity Food Production and Service (3-4) Application of principles

and techniques of food production and service in different establishments including equipment, sanitation, and time-motion studies. *Prerequisites:* 130 and permission. Four hours.

139 Institutional Purchasing and Food Cost Control (3-0) Principles of institutional purchasing, accounting, food cost control, and menu planning. *Prerequisite:* Concurrent enrollment with 138. Three hours. F. Emanuel.

141 Nutrition and Health (3-0) Basic principles of nutrition. Nutrient content of foods. Practice in recording and evaluating dietary intake of individuals. Credit will not be given for both 43 and 141. *Prerequisites:* Chemistry 4 or 42, Zoology 5. Three hours. Guild.

144 Applied Normal Nutrition (3-0) Nutritional needs of individuals during the life cycle. Physiological and environmental factors which affect nutritional status. Designed for nutrition majors. *Prerequisites:* 43 or 46; organic chemistry, physiology. Three hours. Livak.

145 Clinical Nutrition I (1-4) Students are assigned to a variety of approved clinical centers for supervised observation and participation. *Prerequisite:* 247 (concurrent). Three hours. Guild.

146 Clinical Nutrition II (1-4) Students are assigned to a variety of approved clinical centers for supervised observation and participation. *Prerequisite:* 145. Three hours. Guild.

235 Recent Advances in Foods and Nutrition Interpretation and application of particular topics and trends in foods and nutrition as evidenced through literature and research. May be taken more than once for a maximum of nine hours. *Prerequisites:* 43, junior standing, chemistry, physiology, permission of instructor. Three hours.

236 Introduction to Food Research (1-6) Independent laboratory study of problems in food analysis, preparation, processing, or product development. *Prerequisites:* 135, a course in biochemistry with laboratory. Three hours.

237 Readings in Foods Critical survey of the literature on the recent developments in food research. *Prerequisites:* 135, junior standing, biochemistry. Three hours.

239 Institutional Organization and Management (3-0) Institutional organization and management; personnel policies; laws and regulations; promotion and advertising. *Prerequisites:* 138, 139, or equivalent. Three hours. F. Emanuel.

240 Methods in Nutrition Education Nutrition education in community, school, or institutional setting including observation, needs assessment, and planning appropriate methods and materials for the identified audience. *Prerequisites:* 130; a college course in nutrition; permission based upon an interview. Three hours. Soule.

241 Nutrition and Aging Study of the physiologic, psychologic, sociologic, and economic factors which influence the nutrient requirements, nutritional status, and food habits of older people. *Prerequisite:* 144. Three hours. Schlenker.

242 Advanced Nutrition (3-0) A study of nutrients and their specific functions in metabolic process integrating cellular physiology, biochemistry, and nutrition. *Prerequisites:* 43 or equivalent, a course in biochemistry and physiology. Three hours.

245 Nutritional Biochemistry I (3-0) Comprehensive study of metabolism of carbohydrates, lipids, and protein with emphasis on hormonal control, nutritional and metabolic interrelationships, and dietary abnormalities (e.g. starvation and obesity). *Prerequisites:* 242 and permission of instructor. Three hours. Tyzbir. (Not offered spring 1982.)

247 Diet Therapy (4-0) Adaptations of the normal diet in conditions affected by or affecting the utilization of food. *Prerequisites:* 130, 144, 242. Four hours. Ross.

248 Nutrition Counseling in the Community Focus on nutrition counseling in the community as related to holistic health and disease prevention. *Prerequisites:* 144 and/or 247; physiology; biochemistry; permission. Three hours. Livak. (Not approved for graduate credit.)

249 Nutrition Seminar A review of recent developments in nutrition research. *Prerequisites:* 242, permission of instructor. Two hours.

290 Introduction to Research Research procedures with lectures and discussions of problem selection, objectives, bibliographical techniques, and analysis of data. *Prerequisite:* Departmental permission. Two hours.

294 History of Nutrition Foremost investigators and methods involved in the development of present day nutritional knowledge. *Prerequisite:* Three hours in nutrition. One hour.

295 Special Topics Lectures, laboratories, readings, or projects relating to contemporary areas of study. Enrollment may be more than once, accumulation up to 12 hours. *Prerequisite:* Departmental permission.

296 Field Experience Professionally-oriented field experience under joint supervision by faculty and business or community representative. Hours credit arranged up to 15 hours. *Prerequisite:* Departmental permission.

Mathematics

DIVISION OF ENGINEERING, MATHEMATICS, AND BUSINESS ADMINISTRATION
Professors Chamberlain, Cooke, Izzo, Meserve, Moser (Chairperson), Riggs, Schoonmaker, Sylwester, Wright; Associate Professors Ashikaga, Burgmeier, Haugh; Assistant Professors Costanza, Dinitz, Kadas, Margolis, Pence; Lecturers Aleong, Johansson, Kost, Lawlor, Morency, Puterbaugh.

The Mathematics Department provides basic courses for all students throughout the University. The following lists of courses, grouped according to their prerequisites, are provided for the information of students seeking a first elective in mathematics.

Minimal background one year of high school algebra:

Math. 1 Elementary College Algebra (evenings and summers only)

One year each of high school algebra and geometry:

Math. 7 Fundamentals of Mathematics I

Two years of high school algebra and one year of geometry:

Math. 2 Plane Trigonometry

Math. 4 Mathematics of Finance

Math. 9 College Algebra

Math. 10 Pre-Calculus Mathematics

Math. 18 Mathematics for Business

Four years or more of college preparatory mathematics in high school:

Math. 19 Fundamentals of Calculus I

Math. 21 Analytic Geometry and Calculus I

Students entering with Advanced Placement in Calculus may take Math.

22 or 121 as their first mathematics course at UVM.

1 Elementary College Algebra Review of fundamental operations and a

more extensive study of fractions, exponents, radicals, linear, and quadratic equations, ratio, proportion, variation, progressions, and the binomial theorem. Covers topics normally included in intermediate algebra in high school. Students who have satisfactorily completed two years of high school algebra, or the equivalent, will receive no credit for this course. Offered only in Evening Division and Summer Session. *Prerequisite:* One year of high school algebra. Three hours.

2 Plane Trigonometry Trigonometric functions, their graphs and other properties, logarithms, solution of triangles, trigonometric equations and identities, and inverse trigonometric functions. May not be taken for credit concurrently with, or following receipt of, credit for any mathematics course numbered 19 or above. Credit will not be given for both 2 and 10. *Prerequisite:* 1 or 9. Three hours.

4 Mathematics of Finance Pre-calculus mathematics applied to interest, annuities, life insurance, and other business areas. *Prerequisite:* 1 or 9. Three hours.

7 Fundamentals of Mathematics I A liberal arts elective designed to illustrate both the enjoyment and the utility of a variety of mathematical concepts. Students with four years of college preparatory high school mathematics will not receive credit for this course. *Prerequisites:* One year each of secondary school algebra and geometry. Three hours.

9 College Algebra Sets, relations, and functions with particular attention to properties of algebraic, exponential, and logarithmic functions, their graphs and applications. May not be taken for credit concurrently with, or following receipt of, credit for any mathematics course numbered 18 or above. Credit will not be given for both 9 and 10. *Prerequisites:* Two years of secondary school algebra, one year of secondary school geometry. Three hours.

10 Pre-Calculus Mathematics Skills in working with numerical, algebraic, and trigonometric expressions are developed in preparation for 21. May not be taken for credit concurrently with, or following receipt of credit for any mathematics course numbered 19 or above. Credit will not be given for both 2 and 10 nor 9 and 10. *Prerequisites:* Two years of secondary school algebra, a good background in geometry and trigonometry. Three hours.

15, 16 Fundamental Concepts of Elementary School Mathematics Comprehension of operations with counting numbers and natural numbers, measurements, and informal geometry provide background for algebra, statistics, and probability. Open only to students in elementary education. *Prerequisites:* Sophomore standing, 15 for 16. Three hours.

18 Mathematics for Business Elements of matrix operations, logarithms, exponential equations, differential and integral calculus, and probability with applications to business. The Department recommends that credit not be given for any two of the courses 18, 19, 21. *Prerequisite:* Two years of secondary school algebra. Four hours.

19 Fundamentals of Calculus I Introduction to limits and differential calculus with a wide variety of applications. Students interested in intensive use of mathematics should take 21. Credit will not be given for more than one of the courses 19, 21. *Prerequisite:* 9 or sufficiently strong background in secondary school algebra and trigonometry. Three hours.

20 Fundamentals of Calculus II Introduction to integral calculus and linear algebra with a wide variety of applications. Credit will not be given for more than one of the courses 20, 21. A student who completes 20 may be admitted to 22. *Prerequisite:* 19. Three hours.

21* Analytic Geometry and Calculus I Plane analytic geometry and introduction to the calculus of one variable including limits, continuity, and the

techniques and applications of differentiation. Credit will not be given for more than one course in either of the pairs 19, 21 and 20, 21. *Prerequisites:* 10; or 9 and 2; or strong background in secondary school algebra and trigonometry. Four hours.

*Those who are deficient in high school mathematics for their chosen curriculum are urged to attend summer school prior to their first semester in college.

22 Analytic Geometry and Calculus II Techniques and applications of integration of functions of one variable, the calculus of vector functions, and polar coordinates. *Prerequisite:* 21. Four hours.

104 Fundamentals of Mathematics of Computation Introduction to mathematical theory and techniques underlying computer science. Set theory, graph theory, Markov chains, game theory, semi-groups, free monoids, finite groups, and wreath products. *Prerequisites:* 22, Statistics 151 desirable. Three hours.

121 Analytic Geometry and Calculus III Solid analytic geometry, the calculus of functions of two and three variables, infinite series, and elementary differential equations. *Prerequisite:* 22. Four hours.

124 Linear Algebra Matrices, linear dependence, vector spaces, linear transformations, characteristic equations and applications. *Prerequisite:* 22 or 20. Three hours.

162 Geometry for Elementary School Teachers An informal approach to geometry with emphasis upon use of intuitive geometric concepts in the introduction or clarification of most topics of elementary school mathematics. Not open to Mathematics majors. *Prerequisite:* 15 or a teaching certificate. Three hours. Alternate years, 1982-83.

179 Teaching Secondary School Mathematics Contemporary secondary school mathematics curricula, their content from an advanced standpoint, unifying mathematical concepts and their implications at various levels, and introduction of selected mathematical topics. Intended only for students with an interest in teaching secondary school mathematics. Not acceptable as part of any mathematics requirement for a degree. *Prerequisite:* Education 178, acceptance to teacher education, or permission of instructor. Three hours.

191, 192 Special Project An approved project under the guidance of a staff member and culminating in a written report. Involvement with off-campus groups is permitted. *Prerequisites:* Junior or senior standing, approval of department chairperson. One to three hours as arranged.

193, 194 College Honors.

195 Special Topics

207a, b Probability Theory (Same as Statistics 251.)

217 Introduction to the Theory of Computing (Same as Computer Science 242.) Computability, effective procedures, algorithms, and recursive functions. Post's symbol manipulation systems and formal languages. Undecidable problems. Abstract and concrete complexity. *Prerequisite:* 104. Three hours.

218 Automata Theory (Same as Computer Science 241.) Capabilities and limitations of finite state automata. Minimization, control, and identification of machines. Structure and loop-free decomposition of machines. State-identification and fault-detection experiments. Finite state recognizers and regular expressions. *Prerequisite:* 104. Three hours.

221 Deterministic Models in Operations Research Techniques of linear and dynamic programming and game theory. Graphs and tree models. Classical

problems are discussed, and problem formulation stressed. *Prerequisites:* 124; 121 desirable. Three hours. Alternate years, 1982-83.

222 Stochastic Models in Operations Research Stochastic processes and their use in analysis of industrial problems. Markov chains, queueing theory, linear and dynamic programming under uncertainty. *Prerequisites:* 151 or 207, 221. Three hours. Alternate years, 1982-83.

223 Introduction to Formal Language Theory (Same as Computer Science 223.) Introduction to the theory and applications of context-free languages. Phrase structure and context free grammars, normal forms, pushdown automata, decision problems, power series in non-commuting variable, applications to parsing. *Prerequisite:* 104, 217 and/or 218 highly recommended. Three hours.

224 Analysis of Algorithms Models of computation, design of efficient algorithms, integer and polynomial arithmetic, sorting, binary-search trees and adaptive merging. NP complete problems. Parallel processing. *Prerequisites:* 104, 121, Computer Science 103. Three hours. Alternate years, 1981-82.

230 Ordinary Differential Equations Solutions of linear ordinary differential equations, the Laplace transformation, and series solutions of differential equations. *Prerequisites:* 121, 124. Three hours.

236 Calculus of Variations Necessary conditions of Euler, Legendre, Weierstrass, and Jacobi for minimizing integrals. Sufficiency proofs. Variation and eigenvalue problems. Hamilton-Jacobi equations. *Prerequisite:* 230. Three hours. Alternate years, 1981-82.

237 Numerical Methods I Concept of error, polynomial approximation, summation techniques, solution of equations, linear systems, eigenvalues. *Prerequisites:* 121, 124, knowledge of computer programming. Three hours.

238 Numerical Methods II Finite differences, differentiation and integration, ordinary and partial differential equations, linear programming. *Prerequisite:* 237. Three hours.

240 Operational Mathematics Orthogonal functions, transforms, and boundary value problems. *Prerequisite:* 230 or 271. Three hours.

241 Advanced Calculus I Calculus of several variables, Euclidean spaces, open and closed sets, limits, continuity, differentiation (emphasizing the linearity), maxima and minima, Lagrange multipliers and integration of functions of several variables. *Prerequisites:* 121, 124. Three hours.

242 Advanced Calculus II Jacobians, change of variables in a multiple integral, line and surface integrals, Green's, Gauss', and Stokes' Theorems, Fourier Series, Fourier and Laplace transforms. *Prerequisite:* 241. Three hours.

251 Modern Algebra Fundamental concepts of Abstract Algebra. Sets, mappings, groups, rings, integral domains, fields, homomorphisms, and isomorphisms. *Prerequisites:* 22, 102 or 104 highly desirable. Three hours.

252 Advanced Linear Algebra Linear transformations and vector spaces, including Jordan forms. Symmetric, Hermitian, orthogonal and unitary matrices, and quadratic forms. *Prerequisites:* 124, 251 desirable. Three hours. Alternate years, 1981-82.

253, 254 Topology The elements of point set topology; closed sets and open sets in metric spaces, continuous mappings, connection, Peano curves, separation theorems and homotopy. *Prerequisites:* 104, 253 for 254. Three hours. Alternate years, 1981-82.

255 Elementary Number Theory Divisibility, prime numbers, Diophantine equations, congruence of numbers, and methods of solving congruences. *Prerequisite:* One year of calculus. Three hours.

257 Theory of Groups The study of the various kinds and structures of groups. *Prerequisite:* 251. Three hours. Alternate years, 1981-82.

258 Galois Theory The Galois theory leading to the insolubility of general quintic equations by radicals and theorems on construction with straightedge and compass. *Prerequisite:* 257. Three hours. Alternate years, 1981-82.

260 Foundations of Geometry Geometry as an axiomatic science; various non-Euclidean geometries; relationships existing between Euclidean plane geometry and other geometries; invariant properties. *Prerequisite:* One year of calculus. Three hours.

261 The Development of Mathematics Historical development of the mathematical sciences with emphasis on the interrelations among them. Individual assignments correspond to background and interests of students. *Prerequisite:* Nine hours of college mathematics. Three hours.

264 Vector Analysis Introduction to general vector methods, including the elements of vector algebra and vector calculus with applications to physics and mechanics. *Prerequisite:* 121. Three hours. Alternate years, 1981-82.

271 Applied Mathematics for Engineers and Scientists Matrix Theory, Vector Analysis, Linear Ordinary Differential Equations. Emphasis on methods of solution, including numerical methods. No credit for mathematics majors. For a mathematics concentration, a sequence beginning with 230 is advised. *Prerequisite:* 121. Three hours.

272 Applied Analysis Partial Differential Equations of Mathematical Physics, Calculus of Variations, Functions of a Complex Variable, Cauchy's Theorem, integral formula. Conformal mapping. *Prerequisite:* 230 or 271. Three hours.

273 Introduction to Combinatorics Combinatorial relations, elementary problems of existence, enumerative combinatorics; generating functions and graphs. Applications to problems in probability, mathematics of computers, graph theory, and number theory. *Prerequisite:* 104. Three hours.

274 Computational Linear Algebra Efficient computer algorithms for Gaussian elimination, stable orthogonal and least-squares matrix computations, and for matrix eigenvalue computations. Analysis of numerical stability of algorithms, determination of conditioning of matrices. *Prerequisites:* 124 or 271, modest experience with digital computer programming. Three hours.

276 Mathematics of Space Flight Topics include orbit determination and prediction of natural and artificial satellites and projectiles. Astrodynamical coordinate systems and their transformations. Integration schemes and perturbation theory. Attitude determination. *Prerequisites:* 237, modest experience with digital computer programming. Three hours. Alternate years, 1982-83.

295 Special Topics For advanced students in the indicated fields. Lectures, reports, and directed readings on advanced topics. *Prerequisite:* Consent of instructor. Credit as arranged. Offered as occasion warrants.

Medical Microbiology

COLLEGE OF MEDICINE

Professors Albertini, Gump, Johnstone, T. Moehring, Schaeffer (Chairperson), Stinebring; Associate Professors Boraker, Fives-Taylor, Novotny; Research Professor J. Moehring; Adjunct Associate Professor Smith.

197, 198 Undergraduate Research Undergraduate honors students can be

accommodated in individual research projects sponsored by a department member. Arrangement with the individual department member and approval of department chairperson. Credits negotiable.

203 The Mammalian Cell in Biomedical Research Cellular and molecular biology of vertebrate cells in culture; principles and techniques of cell tissue and organ culture and their application to problems in cell biology and medicine. Laboratory exercises provide practical experience. Designed for biology students of varied training. *Prerequisite:* Permission of instructors. Four hours. T. Moehring, Schaeffer.

211 Molecular Genetics I Analysis of organization, replication, and expression of genetic material in procaryotes. The standard methods of bacterial and bacteriophage genetics, including the fundamentals of recombinant DNA technology are presented. Recommended prerequisite for Molecular Genetics II (see Botany 252). *Prerequisite:* Permission of instructor. Three hours. Novotny.

220 Clinical Microbiology Comprehensive study of human pathogenic micro-organisms and their disease states in man. Collecting and handling specimens, pathogenic bacteriology, medical mycology, and virology. Laboratory sessions provide practical experience in handling and identifying these pathogens. *Prerequisite:* Microbiology and Biochemistry 55 or its equivalent. Immunology recommended but not required. Four hours. Fives-Taylor.

223 Immunology Analysis of the immune response with respect to structure and function of immunoglobulins, cytokinetics and immunocompetence, tolerance, ontogeny and phylogeny of adaptive immunity, immunogenetics of transplantation, hypersensitivity states, and theories of antibody formation. *Prerequisite:* Consent of instructor. Four hours. Boraker.

Medical Technology

SCHOOL OF ALLIED HEALTH SCIENCES

Associate Professors Breen, Lachapelle (Chairperson), Reed, Sullivan; Assistant Professor Soweck; Instructors Czerniawski, Russell; Clinical Instructors Albarelli, Broder, Cote, Coughlin, Dopp, Franco, Isham, Keagle, Knight, Letourneau, Morgan, Page, Powden, Scanlon, Standage, Thibault, Thomas.

2 Dynamics of Health Care Introduction to the whole pattern of comprehensive health care; a core course limited to students in the Allied Health programs. Spring. Two hours. Breen.

3 Medical Terminology Terminology related to medical science and hospital services. Required of all students in Medical Technology. Open to Health Science students by permission of instructor. Fall. One hour. Breen.

20 Clinical Chemistry Lecture and laboratory experiences in basic clinical chemistry. Practicum in Rowell student lab and MCHV Laboratory. Required of all second-year students. Fall and spring. Six hours. Sullivan, Soweck.

30 Hematology Theory and laboratory techniques of basic hematology, coagulation, and urinalysis. Clinical laboratory experience provided by MCHV. Required of all second-year students. Fall and spring. Five hours. Reed, Soweck.

40 Clinical Immunology Introduction to immunology and its application to serology and blood banking. Includes lectures, lab exercises, and clinical practicum in MCHV Blood Bank. Required of all second-year students. Fall and spring. Five hours.

50 Clinical Microbiology Introduction to isolation and identification of clinically significant bacteria, fungi, and intestinal parasites. Includes lecture, laboratory exercises, and a clinical practicum in MCHV Laboratory. Required of all second-year students. *Prerequisite:* Microbiology and Biochemistry 55. Fall and spring. Five hours. Page.

121 Clinical Chemistry Practicum: Generalists Practicum in advanced clinical chemistry, primarily in MCHV Laboratory. Fall. Three hours. Sullivan.

126 Clinical Chemistry: Specialists Advanced work in clinical chemistry, providing for experience on multiple-channel auto-analyzers, application of isotopes to clinical laboratory, advanced laboratory instrumentation and "trouble shooting." Managerial and educational skills also emphasized. MCHV Laboratory. Spring. Thirteen hours. Sullivan.

128 Clinical Chemistry: Generalists Lectures in advanced clinical chemistry. Spring. Three hours. Sullivan.

132 Pathophysiology of Blood Advanced theory and practice of hematology and coagulation. Includes in-depth study of physiology and pathophysiology of blood cells, including peripheral and bone marrow smears. Spring. Three hours. Reed.

135, 136 Hematology for Specialists A two-semester course involving a weekly seminar, clinical rotation, and didactic instruction in advanced hematology. Fall and spring. An extended course (XC). Four hours. Reed.

141 Principles of Immunology Basic concepts of the immune mechanism including structure and function of immunoglobulins, antigen-antibody reactions and the lymphoid system. Application of these concepts in health and disease of humans will be covered. Fall. Three hours. Lachapelle.

151 Advanced Practicum in Clinical Microbiology Includes rotation in MCHV and State Health Laboratories. *Prerequisites:* Microbiology and Biochemistry 55, Medical Microbiology 120. Fall. Five hours. Page.

152 Selected Topics in Clinical Microbiology In-depth study of anaerobic bacteria, fungi, and mycobacteria. Includes lectures, laboratory exercises, and a clinical practicum. *Prerequisite:* Medical Technology major. Spring. Four hours. Page, Lachapelle.

159 Microbiology Seminar Case histories of microorganisms of clinical significance. *Prerequisite:* Senior Medical Technology standing. Fall. One hour. Page.

161 Blood Bank: Generalists Advanced study of human blood groups and transfusion practice. Emphasis on problem solving, advanced theory, and special lab exercises. Laboratory experiences at UVM, MCHV, and Red Cross Blood Center. Fall. Three hours.

172 Senior Clinical Practicum Supervised instruction in classroom/laboratory and clinical settings in microbiology, parasitology, serology, and urinalysis. Spring. Two hours. Page.

195 Principles of Education and Management Introduction to procedures and methods of instruction in various teaching situations and to basic principles of management, supervision, and administration. Fall. Three hours. Breen, Russell.

196 Senior Seminar Review of case studies for clinical correlation; introduction to other laboratory sections. Spring. Two hours. Breen.

197-198 Senior Research Individual research in field of medical technology. *Prerequisite:* Medical Technology major. Fall and spring. Variable credit.

260 Blood Bank Seminar Discussion on recent advances and practices used in transfusion of patients. *Prerequisite:* 40 or permission of instructor. Spring. One hour. (Not offered for graduate credit.)

Microbiology and Biochemistry

COLLEGE OF AGRICULTURE

Professor Racusen (Chairperson), Weller; Associate Professor Sjogren; Assistant Professor Currier; Lecturer Husted.

55 Introductory Microbiology (2-4) The study of microorganisms, especially bacteria, their structure, development, and activities. *Prerequisite:* Four hours of chemistry. Four hours. Sjogren, Husted. Also offered each spring. The fall term is reserved for Allied Health Science students except by permission of instructor.

191 Biochemistry of Nucleic Acids Structure, function, and properties of nucleic acids, nucleoproteins, and enzymes or proteins that act on nucleic acids. Emphasis on experimental approach. *Prerequisite:* A course in biochemistry or permission of instructor. Two hours. Weller.

195 Special Topics *Prerequisite:* Permission of instructor.

197, 198 Undergraduate Research *Prerequisite:* Departmental permission. One to three hours.

201 General Biochemistry (3-3) Broad coverage of biochemistry including principles of analytical biochemistry. *Prerequisite:* Chemistry 42 or 141. Four hours. Also offered each spring.

202 Advanced Biochemistry (3-3) A study of metabolic cycles with emphasis on research methods involving radioisotopes and chromatography. *Prerequisite:* 201 or 203 or permission of instructor. Four hours.

203 Molecular Biology (3-3) The structure and biological function of nucleic acids, proteins, and enzymes. Emphasis is on optical, electrophoretic, and ultracentrifugal methods. *Prerequisite:* Chemistry 160 or 162 or permission of instructor. Four hours.

220 Environmental Microbiology (2-3) The activities of microorganisms, primarily bacteria, in air, soil, and water. *Prerequisite:* A previous course in microbiology. Four hours. Sjogren. Alternate years, 1981-82.

254 Microbial Biochemistry (2-4) The chemical composition and metabolism of microbial cells. *Prerequisites:* 55, 201, or permission of instructor. Four hours. Sjogren. Alternate years, 1982-83.

295 Special Topics *Prerequisite:* Permission of instructor.

Military Studies

Lieutenant Colonel Czechut (Chairperson); Major Arnold; Captains Chadick, Millett, Leal; Sergeant First Class Kirkpatrick.

Note: Total allowable credit for Military Studies varies by college/school; check with Department of Military Studies. Military studies courses are open to all students, regardless of major or intentions to complete the full cadet program. Students interested in pursuing an officer's commission through the ROTC should refer to page 124, or check with the Department of Military Studies.

1 Introduction to Military Studies (2) Military heritage; customs and tradi-

tions of the service; historical development of the Army and its role in support of national objectives; diversity of missions performed during peace and war; role of ROTC, the National Guard and Reserve; the military as a profession. *Prerequisite:* Freshman or sophomore standing. Fall and spring. Two hours. Chadick.

2 War and Society (2) War and military systems in historical perspective. Effects of society on war and of war on society; the military thinkers; issues in the control of military force. *Prerequisites:* Freshman or sophomore standing. Fall and spring. Two hours. Leal.

3 The Non-Battle Role of the Military (2) Examines political, social, economic, and educational implications generated by existence of armies; traditional role of nation building; an agent of social and economic rehabilitation. *Prerequisite:* Freshman or sophomore standing. Fall and spring. Two hours. Leal.

4 Contemporary World Military Scene (2) Examines international uses of military forces, viewed against a background of long-range national concerns, especially of the U.S., NATO, U.S.S.R., The Warsaw Pact, and China. *Prerequisite:* Freshman or sophomore standing. Fall and spring. Two hours.

5 Simulations and Wargaming (3) Examines historical evolution of simulations; methods of simulation in current use; methods, applications, and uses of simulations in resolving conflict including play-test of models. *Prerequisite:* Freshmen or sophomore standing. Fall and spring. Two hours. Chadick.

***12 Rappelling** (½ Physical Education credit) Basic instruction in rope management, rope installation, and rappelling, consisting of both classroom instruction and outdoor practical exercises. Fall and spring. Chadick.

***14 Physical Training** (½ Physical Education credit) Physical conditioning which provides the student an opportunity to assess his/her physical condition, utilizing traditional conditioning techniques and the national "Run for Your Life Program." Also provides a means of getting into proper physical condition. Fall, twice; spring, twice. Millett.

***16 Survival** (1 Physical Education credit) Instruction in wilderness survival techniques, to include land navigation, procurement of food, water, and shelter. Fall and spring. Kirkpatrick.

***17. Marksmanship** (½ Physical Education credit) Instruction in basic rifle marksmanship, to include hand and eye coordination, posture and breath, and trigger control. Fall and spring. Kirkpatrick.

***18 Backpacking** (1 Physical Education credit) Instruction in the basics of backpacking, to include an overnight hike in the Green Mountains of Vermont. Fall and Spring. Kirkpatrick.

101 Special Studies (academic credit as arranged) In-depth analysis of topics broached in 1, 2, 3, or 4. Guided research. Student proposes topic. Fall and spring. Two hours. (Not offered for graduate credit.)

102 Special Studies (continuation of 101) Fall and spring. Two hours. (Not offered for graduate credit.)

****201 Leadership and Management I (2)** Military cartography. Individuals and group leadership, problems in an organization. Leader's role in directing and coordinating efforts of individuals and small groups in obtaining goals. Fall. Two hours. Millett.

****202 Leadership and Management II (2)** Fundamentals of educational psychology applicable to instruction; techniques used in planning, presenting, and evaluating instruction. An orientation to military occupational specialties. Two hours. Millett.

****203 Leadership and Management III (2)** Analysis of techniques and

procedures used in managing organizations. Role of interdisciplinary teams and development of courses of action to solve typical stressful leadership problems. Fall. Two hours. Arnold.

****204 Leadership and Management IV (2)** Investigation of selected leadership and management problems associated with unit administration, military law, and the Army Readiness Program. Obligations and responsibilities of an officer. Spring. Two hours. Arnold.

*Prerequisites for 12, 14, 16, 17, 18 are freshman or sophomore standing or departmental permission.

**Prerequisites for 201, 202, 203, and 204 are acceptance into Army ROTC Advanced Course or departmental permission.

Music

COLLEGE OF ARTS AND SCIENCES

Professors Chapman (Acting Chairperson), Lidral, T. Read; Associate Professors J. Ambrose, Kinsey, Schultz, Wigness; Assistant Professors Brown, Weinrich; Instructors Ather-ton, Boyer, Dahl, Fleming, Gonzales, Karstens, Klimowski, E. Metcalfe, Parker, E. Read, Scoones, Storandt.

Students in all music courses are required to attend a designated portion of major ensemble concerts, faculty recitals, and formal student recitals as part of the course requirements.

THEORY AND COMPOSITION

1 Introductory Music Theory Rudiments of notation, rhythm, melody, harmony, scales, form, and terminology. Three hours.

15, 16 Theory I Melodic and rhythmic dictation, sight singing, and elementary harmony. Four hours.*

115, 116 Theory II Contrapuntal and harmonic dictation, advanced harmony, and elementary counterpoint. *Prerequisites:* 16; 115 for 116. Four hours.

203, 204 Orchestration First semester: Characteristics of instruments, arranging for orchestra. Second semester: Advanced exercises in orchestral scoring. *Prerequisites:* 116; 203 for 204. Three hours.

205, 206 Counterpoint First semester: Tonal counterpoint. Second semester: Canon and fugue. *Prerequisites:* 116; 205 for 206. Three hours. 206 in alternate years, 1981-82.

207 Pedagogy of Theory Objectives, viewpoint, content, and specific approach to the organization and teaching of theory courses. *Prerequisite:* Eighteen hours in theory. Three hours. (Not offered for graduate credit.)

208, 209 Form and Analysis Creative approach to aural and sight analysis of musical construction. *Prerequisites:* 116, 205 recommended. Three hours.

215, 216 Composition Creative work in free composition with instruction according to the needs and capabilities of the individual student. *Prerequisite:* 205, 208, or consent of instructor. Three hours. May be repeated for credit.

*Enrollment in 15 will cancel credit for 1.

HISTORY AND LITERATURE

2 Introductory Music Listening A concise view of western music from plain

song to the present, with emphasis on baroque, classical, romantic, impressionistic, and modern music. Involves both in-class and outside listening. Three hours.

11, 12 Survey of Western Music A historical study of the development of Western music. First semester: Earliest times through the baroque. Second semester: Classical period to contemporary. Involves both in-class and outside listening. Three hours.*

21, 22 History of Music I A chronological, analytical study of musical literature. First semester: Medieval and early Renaissance. Second semester: Late Renaissance to baroque. Required of all music majors, open to others with departmental permission. Three hours.

113 Contemporary Music Development and stylistic characteristics of 20th century music from the late romanticists to the experimentalists. Both European and American composers presented. *Prerequisite:* 11, 21 or permission. Three hours.

121, 122 History of Music II A chronological, analytical study of musical literature. First semester: Late baroque through romantic. Second semester: Post-romantic to contemporary. Required of all music majors, open to other presenting normal prerequisites. *Prerequisites:* 21, 22 or departmental permission. Three hours.

123 through 128 Music Literature Studies in the literature of music. *Prerequisites:* Three hours of music history/literature and ability to read music. Several different topics offered each semester. Consult pre-enrollment printed course schedules. Three hours.

193, 194 College Honors

195, 196 Special Topics

197, 198 Reading and Research

245, 246 Chamber Music Literature Study through analysis and performance of masterworks for small groups leading to public performance. *Prerequisites:* Twelve hours or equivalent in performance field, departmental permission. One hour.

281 through 284 Independent Study Studies in theory, composition, history, or literature under direction of assigned staff member. Advanced students and candidates for honors only. Credits as arranged.

For Music Education, see page 85.

*Enrollment in 12 will cancel credit for 2.

PERFORMANCE

For the fees for instruction, see page 21.

A senior recital in the performance major field is required of all music majors. Regular appearances in informal recitals are required of all performance students. Appearance in one formal departmental recital a semester is required of all music majors. At the end of each semester jury examinations are given in applied music.

All music majors in any curriculum are required to pass a FUNCTIONAL PIANO FACILITY examination before certification for graduation. Music Education majors should pass this exam prior to student teaching (i.e. by the end of their third year). This will include:

- a. Ability to sight-read songs of the type found in a community song book.
- b. Ability to harmonize at sight; to improvise a simple piano accompaniment

for songs requiring the use I, IV, and V chords and some simple modulations; to transpose the songs and harmonizations to other keys.

- c. Ability to sight-read fairly fluently simple accompaniments, vocal or instrumental, and simple piano compositions of the type used for school rhythmic activities.

41, 42 Major Ensembles (0-3) University Band, Choir, Women's Choir, Choral Union, and Orchestra. Attendance at all rehearsals and public performances required. *Prerequisite:* Departmental permission. One hour. May be repeated for credit.

45, 46 Chamber Music (0-2) Study and performance of masterworks for small groups. Attendance at all rehearsals and public performances required. Outside practice required. *Prerequisite:* Departmental permission. One hour. May be repeated for credit.

51, 52 Performance Study* Individual instruction in piano, organ, classical guitar, harpsichord, voice, strings, woodwinds, brass, percussion, and harp. Class instruction in piano is also available. One to four hours.**Credit is not given for beginning level Private Performance Study; audit status will be recorded on transcript. For specific instruments, see course schedules each semester.

71, 72 Class Study (0-2) Required of music education students, elective to others to limit of facilities and equipment. Class study in performance fields of voice, strings, woodwinds, brass, percussion. One hour. May be repeated for credit.

74 Instrument Repair Class (0-2) A laboratory for music education students in minor repair and adjustment of string, woodwind, brass, and percussion instruments. *Prerequisites:* String, woodwind, brass, and percussion classes or concurrent enrollment, departmental permission. One hour.

74A Piano Repair — Tuning To acquaint students with the basic knowledge of piano construction, tuning and repairing. Departmental permission. One hour.

111 Music for Elementary Teachers The development of musical skills, understandings, and attitudes pertinent to the teaching of music in the elementary classroom. *Prerequisite:* Sophomore standing. Three hours.

211, 212 Conducting (2-2) First semester: Technique of the baton, score reading, laboratory practice. Second semester: Preparation and performance of selected scores, including rehearsal procedures. Selected students may conduct University major ensembles. *Prerequisites:* 16, 211 for 212. Three hours.

271, 272 Performance Pedagogy Methods of teaching voice, strings, woodwinds, brass, percussion, or keyboard instruments including repertoire suitable for use at various levels of ability. Significant literature of all historical periods in the major field. *Prerequisites:* Senior standing in performance, consent of instructor. Three hours. (Not offered for graduate credit.)

*Indicated courses in performance may be repeated for credit.

**Each hour of credit in performance study requires one hour's practice per day, and credit will be given only on condition that the instruction be accompanied or preceded by a three-credit course in music and participation in ensemble, unless excused from the latter by the chairperson.

Natural Resources

SCHOOL OF NATURAL RESOURCES

Professors Cassell, John, Reidel; Associate Professors Forcier, Newton; Assistant Professors, Hendrix, Manning; Extension Instructor Marek; Lecturer Flinn.

51 Environmental Aesthetics and Planning Study of what constitutes the man-made and natural landscapes; development of a higher level of perception and insights into the profession of environmental design. Three hours. Flinn.

235 Legal Aspects of Planning and Zoning Comparison of Vermont planning and zoning law with that of other states. Case studies in planning, zoning, and land use controls. *Prerequisite:* Senior standing. Three hours.

254 Advanced Natural Resource Policy (See Forestry 254.) Three hours. Reidel.

272 Environmental Impact Assessment Comprehensive perspective on methods and problems of assessing environmental and social impacts arising from natural resource management. *Prerequisite:* Senior standing. Three hours. Hendrix.

275 Natural Resources Planning: Theory and Techniques Consideration of historical and theoretical roots of resource planning. Development of some skills mandated of natural resource planners. *Prerequisite:* Senior or graduate standing. Three hours. Hendrix.

276 Water Quality for Natural Resource Managers Study of major contaminants and their behavior in surface and groundwater systems. Field methods for water quality analysis. Extensive field project. *Prerequisites:* Senior standing, permission. Three hours. Cassell.

278 Water Resources: Analysis, Planning, and Management Study of the physical, chemical, and biological phenomena in rivers, streams, and lakes. Concepts of water resources modeling, planning, and management. *Prerequisites:* Senior standing, permission. Three hours. Cassell.

Nursing

SCHOOL OF NURSING

Professor Milligan (Director).

Professional Nursing: Professors Beeker (Chairperson), Sawyer; Associate Professors Barrett, Cronin, Deck, Demers, Emerson, Forgione, Palmer, Murray, Schwalb; Assistant Professors DeHaven, Luce, Magee, Potter, Stiles, Valentine; Instructor Hadeka; Lecturers Jacoby, Menzel.

Technical Nursing: Associate Professor Clarke (Chairperson); Assistant Professors Ball, Cicone; Instructors Fischer, Sande; Lecturer Gower.

Note: All courses limited to students majoring in nursing except by permission of departmental chairpersons.

PRNU — PROFESSIONAL NURSING

25 Concepts of Health Study and discussion of health care systems, issues, culture, stress, roles of providers and consumers of health care. Lectures and

seminars. Opportunity for observational experiences. Three hours. Deck, DeHaven.

26 Introduction to Nursing Skills Identification and application of basic nursing skills. Self-directed study, creativity and application of knowledge emphasized. Includes supervised experience in clinical setting. *Prerequisites:* Satisfactory completion (C or better) of at least two of the following sciences — Chemistry 4, Zoology 5, Microbiology and Biochemistry 55. Three hours. Valentine.

125-126 Nursing I and II Development of knowledge and skills needed to assess and maintain psychosocial, physical, and physiological integrity of individuals of all ages during health and episodes of illness. Health problems resulting from common deviations from normal physical, physiological, and psychosocial functions are explored. Dynamics of groups (family and peer) introduced. Laboratory experiences in different hospital settings and with families in community. *Prerequisites:* 25, 26, Chemistry 3-4, Zoology 5-6, Microbiology and Biochemistry 55, Early Childhood and Human Development 80-81, Psychology 1, Human Nutrition and Foods 141, Sociology 10 or 11. Nine hours.

195 Independent Study Independent study in nursing as indicated by student's interest. *Prerequisite:* Departmental permission. One to three hours.

225 Nursing III Continuation and expansion of 125-126. Content and experiences organized around interrelationships of the individual, family, and community at varying level of wellness. Focus is on more complex nursing challenges. Laboratory experiences in community agencies including the hospital. *Prerequisite:* 126. Nine hours. (Not offered for graduate credit.)

226 Nursing IV Study and practicum focusing on knowledge and skills needed to assume role of a professional nurse. Core content includes theory on the nurse as change agent, leader, and accountable professional. Laboratory experience in leadership occurs in the same setting as 252. *Prerequisite:* 225. Nine hours. (Not offered for graduate credit.)

251 Nursing Research An introduction to research in nursing. Each student will participate in designing a study of a nursing problem. *Prerequisite:* 126. Three hours. Beeker, Milligan, Sawyer. (Not offered for graduate credit.)

252 Nursing Elective Practicum in a setting selected to meet student identified learning objectives. *Prerequisite:* 225. Six hours. (Not offered for graduate credit.)

TENU — TECHNICAL NURSING

15-16 Fundamentals of Nursing Principles of nursing care. Includes use of nursing process to meet physiological, safety, and individual needs of man throughout the life cycle. Concurrent experiences in direct care settings. *Prerequisites:* For 16: Anatomy 9. Six hours. Fischer.

123-124 Nursing Care of Children and Adults Use of nursing process to meet immediate needs of children and adults of any age who have common, well-defined health problems requiring care in structured settings. Concurrent clinical experiences included. *Prerequisites:* 15-16, Anatomy 9, Physiology 10, Human Nutrition and Foods 46, Early Childhood and Human Development 80-81 (or equivalents). Ten hours. Ball, Sande.

130 Nursing Seminar Focuses on issues in nursing and the role of the Associate degree nurse within the profession of nursing. *Prerequisite:* 16. Two hours. Clarke.

195 Independent Study Independent study in nursing as indicated by student's interest. *Prerequisite:* Departmental permission. One to two hours.

Pathology

COLLEGE OF MEDICINE

Professors Clemmons, Craighead (Chairperson), Howard, Korson, Stark, Trainer; Associate Professors MacPherson, J. B. McQuillen, Perl, Tindle, Winn; Assistant Professors Adler, Hardin, Lapenas, Lee, Little, Mossman, Ukena.

101 Introduction to Human Disease (2-3) An elementary course in human pathology designed for Allied Health students. The first portion will deal with general mechanisms of disease, to be followed by disorders of specific organs. *Prerequisites:* One year college level general biology or equivalent, permission of departmental chairperson. Three hours.

Pharmacology

COLLEGE OF MEDICINE

Professors Gans (Acting Chairperson); Jaffe, Krakoff, McCormack, Soyka; Associate Professor Reit; Assistant Professors Hacker, Newman, Redmond, Scollins; Visiting Professor Maxwell.

190 Pharmacology for Physical Therapy Basic pharmacology and classes of drugs which may alter the responsiveness of patients to physical therapy. Last six weeks of second semester. Two hours.

272 Toxicology The biology of environmental intoxicants and of drug abuse. Ecologic and physiologic consequences of the dissemination of agricultural, industrial, and medicinal chemicals. *Prerequisite:* Organic chemistry and background in biology. Three hours. Gans.

290 Introduction to Pharmacology Consideration of the factors which determine the efficacy and safety of drugs with emphasis on representative agents used in medicine. *Prerequisites:* Introductory course in organic chemistry and background in biology or health sciences. Three hours.

Philosophy

COLLEGE OF ARTS AND SCIENCES

Professors Dykhuizen (Emeritus), Hall, Mann (Chairperson), Sher; Associate Professors Hansen, Kitcher, Kitcher, Moneta; Assistant Professors Kornblith, Kuflik, Miller; Adjunct Professor Cahn.

Indications about the frequencies with which courses are offered are in some cases only estimates. Students should consult the department for further information.

1 Introduction to the Problems of Philosophy* Introduction to philosophy through such fundamental problems as the existence of God, the basis of morality, and the possibility of knowledge. Contemporary and historical readings.

Readings from historical and contemporary sources. *Prerequisite:* 1, 2, or 3. Three hours. Offered once every two years. Miller.

132 Philosophy of History An investigation of theories of history from the perspectives of both historians and philosophers. *Prerequisite:* Six hours of philosophy or history. Three hours. Offered once every two years. Mann, Moneta.

135 Philosophy of Religion Typical topics: the nature of religion, the concept of God, the grounds for belief in God, mortality, truth and revelation. Historical and contemporary sources. *Prerequisite:* 1, 2, or 3. Three hours. Offered once a year. Hall, Mann, Moneta.

140 Social and Political Philosophy An analysis of such fundamental theories and problems in social and political thought as political obligation, rights, and justice. *Prerequisite:* 1, 2, 3 or 4. Three hours. Offered once every year. Hall, Kuflik, Sher.

142 Philosophy of Law An analysis of the nature of law and some of the problems of law, e.g. liberty and paternalism, justice, rights, and punishment. *Prerequisite:* 1, 2, 3, or 4. Three hours. Offered once a year. Hall, Hansen, Kuflik, Sher.

144 Philosophical Problems in Medicine A critical and intensive examination of such problems as abortion, euthanasia, dying and death, the ethics of organ transplantation, and the ethics of genetic engineering. *Prerequisite:* 1, 2, 3, or 4. Three hours. Offered once a year. Kuflik, Mann, Sher.

151 Philosophical Ideas in Literature Philosophical themes as exemplified in literature. *Prerequisite:* One course in philosophy. Three hours. Offered once a year. Hall, Mr. Kitcher, Moneta.

152 Philosophy of Art A consideration of some leading theories of art, and their application to problems of art as they appear in music, literature, painting, and in the general criticism of the arts. *Prerequisite:* One course in philosophy. Three hours. Offered once a year. Hall, Mrs. Kitcher.

160 Phenomenology I A systematic study of fundamental principles of the phenomenological method such as: intentionality of consciousness, phenomenological reflection, phenomenological reduction, concept of constitution, and inner time consciousness. *Prerequisite:* One course in philosophy. Three hours. Offered every fall semester. Moneta.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

201 Theory of Knowledge A critical examination of the nature and sources of knowledge; belief, truth, evidence, perception, memory, and induction. *Prerequisite:* 102 or 112. Three hours. Offered every fall semester. Mr. Kitcher, Kornblith, Sher.

202 Metaphysics A critical examination of such topics as the nature of space and time, the concept of change, the identity of the self, the nature of the world and man's place in it. *Prerequisites:* 101, 102 or 110. Three hours. Offered every spring semester. Mann, Moneta, Sher.

210 Philosophy of Mind Major philosophical theories of the mind and its relation to the physical world, the nature of sensation, desire, and belief, and the relation between thought and action. *Prerequisite:* 102 or 110. Three hours. Offered once every two years. Mrs. Kitcher, Kornblith, Sher.

212 Philosophy of Science A thorough investigation of one or two problems in the philosophy of science. Emphasis on modern attempts to solve them. *Prerequisite:* 112 or any 100-level history of science course or junior or senior

Three hours. Offered every semester. Hall, Hansen, Mrs. Kitcher, Kornblith, Miller, Sher.

2 Historical Introduction to Philosophy* Works of major philosophers in the Western tradition considered in their historical and philosophical contexts. Three hours. Offered every semester. Hall, Moneta.

3 Comparative East-West Philosophy* Introduction to historical dialectic of philosophy by comparisons and contrasts between Chinese and Western traditions of philosophy. Three hours. Offered every semester. Hansen.

*Credit will not be given for more than one of 1, 2, and 3.

4 Introduction to Ethics An analysis of the principal problems and theories of ethics. Three hours. Offered every semester. Hall, Kuflik, Sher.

13 Introduction to Logic A study of the basic principles of deductive inference. Three hours. Offered every semester. Mr. Kitcher, Mann.

101 History of Ancient Philosophy A study of the works of the Pre-Socratics, Plato, Aristotle, and their successors. *Prerequisite:* 1, 2, or 3. Three hours. Offered every fall semester. Hall, Mann.

102 History of Modern Philosophy A study of the works of the major philosophers of the 17th and 18th centuries: Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, Kant, and others. *Prerequisite:* 1, 2, or 3. Three hours. Offered every spring semester. Mrs. Kitcher, Mr. Kitcher.

105 History of Medieval Philosophy A study of the works of such major philosophical figures as Augustine, Anselm, Abelard, Aquinas, Duns Scotus, and William of Ockham. *Prerequisite:* 101 is recommended. Three hours. Offered once every two years. Mann.

107 19th Century Philosophy A study of the works of such philosophers as Hegel, Fichte, Schopenhauer, J. S. Mill, Kierkegaard, Nietzsche, and Marx. *Prerequisite:* 102 is recommended. Three hours. Offered once every two years. Hall.

110 Nature of Mind An examination of philosophical issues raised by influential psychological views of the nature of the human mind. *Prerequisite:* 1, 2, or 3 or one course in psychology. Three hours. Offered every fall semester. Mrs. Kitcher, Kornblith.

112 Introduction to the Philosophy of Science An introduction to major philosophical problems raised by science. Typical topics: the nature of scientific inference, the structure of theories, causation, explanation, and scientific change. *Prerequisite:* One course in philosophy or one course in history of science or six hours in any natural science. Three hours. Offered every fall semester. Mr. Kitcher.

113 Intermediate Logic A study of the basic results about logical systems, including axiomatic treatments of sentential calculus and first-order logic, independence, consistency, soundness, completeness, and the Lowenheim-Skolem theorem. *Prerequisite:* 13. Three hours. Offered once every two years. Mr. Kitcher, Mann.

121 Chinese Philosophy I A study of the Classical Schools of Chinese thought, including Confucianism, Taoism, Mohism, and Legalism. *Prerequisite:* One course in philosophy, religion, or Asian studies. Three hours. Offered two out of every three semesters. Hansen.

122 Chinese Philosophy II Chinese thought from the Han Dynasty to Mao Zedong's thought. *Prerequisite:* 121. Three hours. Offered once every two years. Hansen.

130 Philosophical Foundations of Education A critical examination of the aims of education and the most appropriate means of achieving those aims.

standing in a science major. Three hours. Offered every other spring semester. Mr. Kitcher.

213 Mathematical Logic A study of important advanced results in mathematical logic, including Godel's Incompleteness Theorems and an introduction to proof theory and recursive function theory. *Prerequisite:* 113. Three hours. Offered once every two years. Mr. Kitcher.

215 Philosophy of Mathematics Philosophical topics connected with mathematics. What (if anything) is mathematics about? How do we acquire our mathematical knowledge? *Prerequisite:* 113 or 213 or extensive background in mathematics. Three hours. Offered once every two years. Mr. Kitcher.

217 Philosophy of Language A philosophical study of the nature of language. *Prerequisite:* 113 or Linguistics 101, 102. Three hours. Offered once every two years. Hansen, Mr. Kitcher, Kornblith, Sher.

221 Topics in Chinese Philosophy A detailed examination of a classical Chinese philosophical text or school. *Prerequisite:* 121 or 122. Three hours. Offered once every two years. Hansen.

240 Contemporary Ethical Theory An analysis of the ideas of contemporary moral philosophers in normative ethics and metaethics. *Prerequisites:* 140, 142, or 144. Three hours. Offered once every other year. Kuflik, Sher.

260 Phenomenology II A critical and intensive investigation of the thought of a major 20th century phenomenologist, e.g. Husserl, Heidegger, Merleau-Ponty, or Gadamer. *Prerequisite:* 160. Three hours. Offered every spring semester. Moneta.

262 Existentialism A study of existentialism as a philosophy, and an examination of its background, as displayed in the literary and philosophical writing of Pascal, Kierkegaard, Camus, Heidegger, and Sartre. *Prerequisites:* Any two of 101, 102, 107. Three hours. Offered once every other year. Hall, Mrs. Kitcher.

265 American Philosophy The thought of such leading American philosophers as Peirce, James, Royce, Santayana, Dewey, and Whitehead. *Prerequisites:* 101, 102. Three hours. Offered once every other year. Miller.

271, 272 Seminar: Major Philosophical Author or School A study of the major philosophical texts by a single author or school of thought. May be repeated for credit when different authors are studied. *Prerequisite:* An appropriate 100-level course in philosophy. Three hours. Offered once a year.

281, 282 Seminar Selected topics in philosophy. *Prerequisite:* An appropriate 200-level course in philosophy. Three hours.

297, 298 Readings and Research Independent study with an instructor on a specific philosopher or philosophical problem. *Prerequisite:* An appropriate 200-level course in philosophy.

Physical Therapy

SCHOOL OF ALLIED HEALTH SCIENCES

Professor Feitelberg (Chairperson); Associate Professors Page, Moffroid; Assistant Professor Held; Instructor Marcoux; Lecturers Bevins, Delehanty, Jette, Nelson, Zimny; Clinical Assistant Professor Smith; Clinical Instructors D. Nalette, E. Nalette, Sulima, Tandy.

21 Physical Therapy I History and current trends of profession with em-

phasis on medical-ethical-legal aspects of practice. Role of therapist in treatment, health care environment, and as team member. Supervised observation in approved clinical centers. Three hours. Feitelberg, Marcoux.

22-121-122-124-151-152 Physical Therapy Procedures II-VII This sequence develops increasing levels of competency in evaluation and treatment procedures: massage, physical agents, sensorimotor development, therapeutic exercise, and physical rehabilitation, culminating with the investigation of more complex medical problems and their management. II: three hours; III: three hours; IV: four hours; V: four hours; VI: five hours; VII: three hours. Page, Jette, Bevins, Delehanty, Held, Marcoux, Moffroid, Zimny.

110 Kinesiology Study of normal posture and movement. Principles of anatomy, biomechanics, and neurophysiology are studied in relation to static and dynamic components of motion. *Prerequisite:* Anatomy 201. Three hours. Moffroid, Bevins, Zimny.

128-158 Clinical Education I-II Students assigned to approved clinical centers in Northeastern U.S. Students begin with supervised observation and progress to fully participate in evaluation and treatment of patients. Learning experiences are designed to meet objectives of University and clinical facility for clinical competency. (Three full-time, six-week periods; May-June of junior year, and January-March of senior year.) I: three hours. II: six hours. Marcoux.

131-132-133 Clinical Medicine I-III Management of disease processes in the medical specialties such as General Medicine, Orthopaedics, Neurology, and Pediatrics. Lecture and clinical presentations. I: one hour; II: two hours; III: one hour.

142 Independent Study Selection and development of topic for investigation using assigned faculty member as preceptor. Seminar sessions for guidance and problem solving on related issues. Two hours. Moffroid.

144 Health Care Systems An overview of present health care system, emphasizing issues and aspects specifically related to physical therapists. Two hours. Feitelberg, Marcoux.

173-174 Principles of Organization and Administration-Principles of Education Analysis of current methods; investigation of new patterns to meet future needs, and identification of alternate models through group problem solving. Introduction to learning theory, motor control theory, and participation in teaching experiences. Two-two hours. Feitelberg, Marcoux, Moffroid, Nalette.

176 Scientific Inquiry Clinical inquiry presented as a methodology. Student defines problem, reviews literature, designs study, and identifies appropriate statistical tools for analysis. Plans for clinical inquiry and methods of dissemination of information are explored. *Prerequisite:* A statistics course. Two hours. Moffroid.

Physics

COLLEGE OF ARTS AND SCIENCES

Professors Arns, Brown, Crowell, Detenbeck, Juenker, Krizan, Lambert (Chairperson), Nyborg, Scarfone; *Associate Professors* Rankin, Sachs; *Assistant Professor* Spartalian.

1 Celestial Physics Description of various historical models of the observable universe. Nature of light and description of optical instruments, especially the telescope. Concept of space and time, Einstein's Relativity. Three hours.

2a, b, c Topics in Physical Science A sequence of three four-week mini-

courses offered for one credit each on topics to be announced in advance. Students may enroll in from one to three credits. Limited use of algebra. No prerequisites.

5, 6 Introductory Astronomy A survey of astronomy and astrophysics from a broad scientific and cultural perspective. First term: Stellar and galactic astronomy. Second term: Planetary and extragalactic astronomy, relativity, and cosmology. Limited use of algebra and geometry. *Prerequisite:* 5 for 6. Three hours.

11, 12 Elementary Physics (3-2) or (3-0) A survey of the principles of classical and modern physics without calculus, appropriate for students concentrating in life and health sciences. With laboratory, satisfies minimum requirement for premedical students. *Prerequisites:* 11 or 15 for 12; secondary school algebra and trigonometry. Four or three hours.

15, 16 General Physics (3-2) Introduction to principles of physics, in which students use calculus as course develops. Appropriate for students in the natural sciences and recommended for students in premedical programs. *Prerequisites:* 15 or 24 for 16; Math. 20 or concurrent enrollment or credit in Math. 21 for 15. Four hours.

24, 25 Fundamentals of Physics (3-2) For students concentrating in engineering or a physical science. *Prerequisites:* For 24, Math. 21 and credit or concurrent enrollment in Math. 22; for 25, 24 and credit or concurrent enrollment in Math. 121, Four hours.

121 Biological Physics (3-2) Physical laws, concepts, and methods discussed with respect to their reference to biology. *Prerequisites:* 12 or 16, Chemistry 2, Math. 22. Four hours.

128 Introductory Modern Physics (3-2) An introduction to the theory of relativity and to modern descriptions of radiation, the electron, the atom, the atomic nucleus, and elementary particles. *Prerequisites:* 16 or 25, Math. 121. Four hours.

155 Acoustics and Optics Introduction to two important areas of classical wave phenomena. Use of rays and waves in describing the propagation and superposition of sound and light; geometric and physical optics, physical acoustics. *Prerequisites:* 16 or 25, Math. 121. Three hours. Alternate years, 1981-82.

170 Geophysics (3-0) The structure of the solid earth, using seismic, magnetic, and gravitational methods. *Prerequisites:* Six hours calculus and six hours physics. Three hours. Alternate years, spring 1983.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

201, 201 Experimental Physics (1-3) Experiments in classical and modern physics. May be entered at beginning of either semester and repeated for credit up to a maximum of four semesters. *Prerequisites:* 16 or 128, Math. 121, junior standing. Three hours.

211 Mechanics Newtonian dynamics of particles and systems of particles, with applications to problems of special importance, such as driven and coupled harmonic oscillators and central field trajectories. *Prerequisites:* 16 or 25, Math. 121. Three hours.

213 Electricity and Magnetism Fundamental principles of electricity and magnetism; electrostatic fields, and magnetic fields of steady currents. Electrical and magnetic properties of matter and electromagnetic energy relationships. *Prerequisites:* 16 or 25, Math. 121. Three hours.

214 Electromagnetism An introduction to time dependent electromagnetic

fields. Maxwell's equations in vacuum and in matter. Electromagnetic waves and radiation. *Prerequisite:* 213. Three hours. Alternate years, 1981-82.

222 Advanced Biological Physics (3-2) Sound and electromagnetic waves; ionizing particles and radiation. Interaction of these physical agents with biological systems. Physical properties of macromolecules and their aggregates. *Prerequisites:* Chemistry 2, Math. 121, experience in applying differential equations, departmental permission. Four hours. Alternate years, 1982-83.

242 Introduction to Solid State Physics Introduction to crystal structures, reciprocal lattices, lattice vibrations. Thermal properties of solids and free electron theory of metals and semi conductors. Elementary band theory. *Prerequisite:* 128. Three hours. Alternate years, 1982-83.

254 Atomic and Nuclear Physics Phenomenological study of electronic structure of atoms. Structure of the nucleus and properties of nucleons. *Prerequisite:* 128. Three hours. Alternate years, 1981-82.

258 Relativity Development of Einstein's theory of special relativity. Lorentz transformation, time dilation, length contraction, mass variation, relative velocities. Introduction to four-dimensional space. Concepts of general relativity. Applications selected from astrophysics, elementary particles, etc. *Prerequisite:* 128. Three hours. Alternate years, 1981-82.

265a, b, c Thermal Physics A sequence of three units or mini-courses: 265a, Thermodynamics; 265b, Kinetic Theory; 265c, Statistical Mechanics. Students may enroll in from one to three units for one credit each. *Prerequisites:* 128 or 16, Math. 121 for 265a; 265a or other thermodynamics course for 265b; 265b for 265c. One to three credits. Alternate years, 1982-83.

273 Introductory Quantum Mechanics Introduction to nonrelativistic quantum mechanics. Schroedinger equation and applications to simple systems. *Prerequisites:* 128, 211. Three hours.

Physiology and Biophysics

COLLEGE OF MEDICINE

Professors Alpert (Chairman), Gibbons, Low, McCrorey; Associate Professors Halpern, Hendley, Webb, Whitehorn; Assistant Professors Hamrell, Kimura, Patlak; Research Assistant Professors Brann, Evans, Harder, Litten, Maughan, Mulieri.

10 Introduction to Human Physiology (2-3) A physical-chemical examination of the function of the human body, emphasizing the properties of cells, organ systems, and their interrelationships in health and disease. *Prerequisite:* Anatomy and Neurobiology 9. Three hours. Webb, Whitehorn.

101-102 Physiology and Biophysics (3-3) A comprehensive, in-depth presentation of human function on a scientific basis. Primarily for Physical Therapy students, a limited number of others may be admitted with permission. *Prerequisites or concurrent:* Chemistry 3 and 42, two semesters general physics or equivalent, one semester mathematics, permission. Five hours per semester.

Plant and Soil Science

COLLEGE OF AGRICULTURE

Professors Bartlett, Boyce, MacCollom, Wiggans, Wood; Associate Professors Magdoff, Murphy, Parker, Pellett; Extension Professor Way; Extension Associate Professors Flanagan, Gotlieb (Acting Chairperson); Extension Assistant Professors Costante, Nielsen; Lecturers Flinn, Watson, Whipkey; Extension Instructor Desrosier.

5 Beekeeping Principles and practices involved in beekeeping, including history, management practices, equipment needs, and honey production. Two Saturday field trips. Course does not meet distribution requirements for P&SS majors. Offered only in Evening Division. One hour. Thompkins.

10 Home and Garden Horticulture Planning, selecting, and maintaining shrubs, trees, flowers, lawns, fruits, and vegetables around the home. Designed primarily for non-agricultural students. Course does not meet distribution requirements for P&SS majors. Three hours. Wiggans.

11 Principles of Plant Science Principles and practices involved in the culture, management, and utilization of economically important horticultural and agronomic crops. Three hours. Boyce.

82 Plant and Soil Science Career Orientation Discussions of various careers in plant and soil sciences by professionals in the field. One hour. Wiggans.

106 Insect Pest Management (3-2) Survey of the major insect orders, and methods for controlling injurious species. *Prerequisite:* 11. Four hours. MacCollom.

107 Forest Entomology (2-2) Ecology and population dynamics of insects affecting forests and forest products. Insect control by silvicultural, biotic, and chemical means. *Prerequisite:* Junior standing in forestry. Three hours. Parker.

110 Soil Erosion and Conservation (2-4) General hydrologic processes involved in surface runoff and resultant soil erosion; land management techniques for controlling soil and sediment pollution. Two field trips by arrangement. *Prerequisites:* 161, Math. 2 or 9. Three hours. Whipkey. Alternate years, 1982-83.

112 World Crops Effect of environment, nutrition, and management on crop growth, distribution, and production of world food supplies. *Prerequisite:* 11 or Botany 4. Three hours. Wood. Alternate years, 1982-83.

114 Laboratory and Field Photography Introduction to still and super-8 photography for the student and researcher in the biological sciences. Course does not meet distribution requirements for P&SS majors. Offered only in Evening Division. *Prerequisite:* Math. 9. Three hours. Wood. Alternate years, 1981-82.

115 Weed Science (2-3) Principles and practices of weed science, including weed identification, ecology, reproduction, control, and integrated pest management. *Prerequisite:* 11. Three hours. Murphy. Alternate years, 1982-83.

122 Small Fruit Crops (2-2) Principles of small fruit production, including propagation, culture, management, and harvesting. *Prerequisite:* 11. Three hours. Boyce.

124 Vegetable Crops (2-2) Principles and practices of commercial vegetable production, including seed production, tillage, cultural practices, nutrition value, storage, and processing. *Prerequisite:* 11. Three hours.

126 Ornamental Horticulture (3-3) Identification, climatic requirements,

cultural management, and use of ornamental plant materials in landscape planting. *Prerequisite:* 11. Four hours. Pellett.

127 Greenhouse Management (2-3) An introduction to the principles and practices of commercial greenhouse flower and bedding plant production. *Prerequisite:* 138. Three hours. Pellett.

138 Commercial Plant Propagation (2-4) Principles and practices involved in propagating herbaceous and woody plants by seeds, division, layering, cuttings, budding, grafting, and aseptic culture. *Prerequisite:* 11. Four hours. Pellett.

141 Forage Crops (2-3) Identification, establishment, and management of crops grown for hay, pasture, and silage. *Prerequisite:* 11. Three hours. Murphy.

144 Field Crops Principles and practices essential to the establishment of field crops grown for food, feed, and fiber. *Prerequisite:* 11. Three hours. Wood. Alternate years, 1981-82.

145 Turfgrasses (2-3) Establishment, maintenance, and utilization of turf for lawns, parks, athletic fields, airports, cemeteries, roadsides, golf courses, and ski slopes. *Prerequisite:* 11 or Botany 4. Three hours. Wood. Alternate years, 1981-82.

151 Landscape Design I (2-3) An introduction to the theory of landscape design and its relationship to man, man-made structures, and the natural environment. *Prerequisites:* 11, 126. Three hours. Flinn.

152 Landscape Design II (2-6) Application of landscape design theory to residential and small buildings. *Prerequisite:* 151. Four hours. Flinn.

161 Introductory Soil Science (3-3) Introductory study of the nature and properties of soils and how they serve as media for plant growth. *Prerequisite:* One semester of chemistry. Four hours. Magdoff.

162 Soil Fertility and Management Principles of soil management including soil testing methods and interpretations, fertilizer manufacture, usage, and management practices. *Prerequisite:* 161. Three hours. Magdoff.

197 Undergraduate Special Topics Lectures, laboratories, readings, field projects, surveys, or research designed to provide specialized experience in horticulture, agronomy, soils, or plant environment. *Prerequisite:* Permission. One to three hours; up to 15 hours may be arranged through the department chairperson for approved off-campus project.

202 Micrometeorology (2-3) Theoretical and practical considerations of the micrometeorological factors that affect plant growth and agricultural practices. *Prerequisite:* 11. Three hours. Whipkey. Alternate years, 1981-82.

204 Plant Research Techniques (2-3) Methods of conducting research with plants including the organizing and planning of experiments. *Prerequisites:* 11, Botany 104. Three hours. Wiggans. Alternate years, 1982-83.

205 Mineral Nutrition of Plants (See Botany 205.) Alternate years, 1982-83.

207 Water Relations of Plants (See Forestry 229.) Three hours. Donnelly and Botany and Plant and Soil Science staff. Alternate years, 1981-82.

221 Advanced Tree Fruit Culture (2-3) Theory and practice of modern commercial fruit science. Nutrition and cultural responses to various management practices. *Prerequisites:* 11, 161. Three hours. Boyce.

232 Biological Control of Insect Pests (2-2) Survey of the biological agents used in controlling insects and related arthropods, and their application and limitations. *Prerequisite:* An intermediate course in entomology. Three hours. MacCollom. Alternate years, 1981-82.

261 Soil Classification and Land Use (2-4) Classification of soils throughout the world as they relate to soil development and land use. Three Saturday field trips. *Prerequisite:* 61 or a total of six hours in ecology, geography, or geology. Three hours. Bartlett, Watson. Alternate years, 1982-83.

264 Soil Chemistry (3-3) Chemistry and biology of soils affecting plant growth including the properties of clays and organic matter. *Prerequisites:* 61, two semesters chemistry. Four hours. Bartlett. Alternate years, 1981-82.

266 Soil Physics (2-3) Mathematical and physical principles of the soil-water-plant interaction and its relationship to production and management. *Prerequisites:* 161, one semester of physics. Three hours. Bartlett. Alternate years, 1982-83.

281 Seminar Presentation and discussion of papers on selected topics of current interest by students and staff. Fall semester students with odd number, spring semester students with even number S.S. numbers. *Prerequisite:* Senior standing. One hour.

Political Science

COLLEGE OF ARTS AND SCIENCES

Professors Hilberg, Kinnard, Little, Staron (Chairperson), Wertheimer; Association Professors Nelson, Pacy, Simon; Assistant Professors Bann, Bryan, Hoffman, Holland, Johnson, Mahler, Nivola.

11 Introduction to Political Science An examination of the scope and methods of political science including the subfields: American government, comparative politics, international relations, and political theory. Three hours. Hoffman, Holland, Staron.

13 Introduction to the Problems of Political Thought An examination of basic problems in political philosophy, e.g. morality and law; punishment; freedom; equality; obligation and disobedience. Three hours. Wertheimer.

21 American Political System Institutions, processes, and problems of American government. Three hours. Bryan, Johnson, Little, Nelson, Nivola, Simon.

51 International Relations The state as actor in international relations: Global division and problems. Three hours. Hilberg, Kinnard, Pacy.

71 Comparative Political Systems An examination of contrasting patterns of political development; the role played by political culture; politics in elected and non-elected regimes. Three hours. Mahler.

81 Political Behavior An analysis of how people react to political situations and the ways in which their behavior may be understood. Three hours. Bann.

96 Seminar Selected topics in political science. Three hours.

121 Law and Politics An examination of civil and criminal justice in the U.S. *Prerequisite:* Three hours in political science or sociology. Three hours. Holland.

123 Law, Morality, and Punishment An analysis of the justification and limits of the criminal law, the justification of punishment, and the empirical and

philosophical basis of various proposals for maintaining social order. *Prerequisite*: Six hours in political science. Three hours. Wertheimer.

161 The Vermont Political System An analysis of the political processes and institutions of governance in Vermont in the context of the federal system and other American states. *Prerequisite*: Three hours in political science. Three hours. Bryan.

171 Western European Political Systems A comparative examination of the British, German, and French political systems. *Prerequisite*: Three hours in political science. Three hours. Staron.

172 Russian and Eastern European Political Systems An examination of the Russian and some other Eastern European Communist political systems. *Prerequisite*: Three hours in political science. Three hours. Staron.

173 Canadian Political Systems Institutions, process, and problems of the Canadian polity. *Prerequisite*: Three hours in political science. Three hours. Mahler.

175, 176 Asian Political Systems The development of political institutions and processes in the 20th century with brief historical introductions. First semester: East Asia. Second semester: South and Southeast Asia. *Prerequisite*: Three hours in political science. Three hours. Little.

177 Political Geography (See Geography 177.) Three hours. Miles.

178 The Israeli Political System Background, contemporary political structures and behavior, and current foreign policy considerations in Israeli politics. *Prerequisite*: Three hours in political science. Three hours. Mahler.

181 Political Leadership Methods of identifying leaders, their relationships with non-leaders and with one another, their impact on public policy, and their personalities and social backgrounds. Empirical theories about political leadership. *Prerequisite*: Three hours in political science. Three hours. Nelson.

193, 194 College Honors

195, 196 Special Topics. *Prerequisite*: Three hours in political science. Three hours.

197, 198 Readings and Research

211, 212 History of Political Thought First semester: Development of political thought from Plato to Burke. Second semester: Political thought of the 19th and 20th centuries with emphasis on socialist ideologies from Marx to Marcuse. *Prerequisite*: Six hours in political science. Three hours. Staron.

216 American Political Thought American political thought from the colonial period to recent times. *Prerequisite*: Six hours in political science. Three hours. Simon.

221, 222 Constitutional Law First semester: Emphasis on developing skills of legal analysis. Historical origins and general principles of constitutionalism. Second semester: Selected topics in constitutional law. *Prerequisite*: For 221, six hours in a social science; for 222, 221. Three hours. Hoffman.

223 Comparative Criminal Policy The political bases of criminal law and law enforcement policy including conventional criminal behavior as well as repression of political activity and rights in cross-national perspective. *Prerequisite*: 121, 122, or permission of the instructor. Three hours. Holland.

227, 228 International Law Principles and applications of public international law. *Prerequisite*: Six hours in political science. Three hours. Little.

231 The Legislative Process Organization, procedure, and behavior of the chambers of the U.S. Congress. *Prerequisite*: Six hours in political science. Three hours. Nelson.

232 Lawmaking and Public Policy Influence of the executive and problems

of congressional and parliamentary control. *Prerequisite:* Six hours in political science. Three hours. Nivola.

233 The National Executive Analysis of the functions and organizations of the Presidency and the bureaucracy in American national government. *Prerequisite:* Six hours in political science. Three hours. Johnson.

235 Defense Politics U.S. defense politics, policies, and processes. Civil-military relations, strategic policy, arms control, defense-industrial complex, defense budget. *Prerequisite:* Six hours in political science. Three hours. Kinnard.

239 American Politics An examination of the politics of decision-making in the American political system. *Prerequisite:* Six hours in political science. Three hours. Simon.

241 Public Administration Administrative theory and the operation of public bureaucracies. *Prerequisite:* Six hours in political science. Three hours. Bryan.

242 Problems of Bureaucracy The political problems of the administrative state. *Prerequisite:* Six hours in political science. Three hours. Johnson.

250 Craft of Diplomacy Emphasis on experiences and reflections of diplomatic personalities, supplemented by studies of specialists. *Prerequisite:* Six hours in political science. Three hours. Pacy.

251, 252 American Foreign Policy First semester: Constitutional principles, institutional factors, and historic traditions in the formation of foreign policy. Second semester: Contemporary policies toward specified countries. *Prerequisite:* Six hours in political science. Three hours. Kinnard, Hilberg.

256 International Organization Theory and practice in supranational institutions. *Prerequisite:* Six hours in political science. Three hours. Pacy.

261 Urban Government and Politics An analysis of metropolitan governments and their problems and roles. *Prerequisite:* Six hours in political science. Three hours. Nivola.

262 Urban Public Order Urban crime as a political issue. Institutions of crime control. Urban police systems and law enforcement. *Prerequisite:* Six hours in political science. Three hours. Holland.

264 State Administration Problems in planning, policy development, and program coordination. *Prerequisite:* Six hours in political science. Three hours. Bryan.

265 Intergovernmental Relations Problems of the Federal system. National-state-local cooperative administration of selected public functions. *Prerequisite:* Six hours in political science. Three hours. Bryan, Nivola.

273 Comparative Political Analysis Selected topics. *Prerequisite:* Six hours in political science including 71. Three hours. Mahler.

278 Foreign Policy of the USSR (See History 278.) Three hours. Daniels.

281 Political Parties Analysis of political parties with special emphasis upon voting behavior and campaign techniques. *Prerequisite:* Six hours in political science. Three hours. Nelson.

283 Scope and Methods of Political Science Approaches, sources of information, research methods and systematization in the study of political phenomena. Open to graduate students or by permission of instructor. Three hours. Bann.

291, 292 Readings and Research For advanced undergraduates and graduate students. Three hours.

295, 296 Seminar Selected topics in political science. *Prerequisite:* Six hours in political science. Three hours.

Psychology

COLLEGE OF ARTS AND SCIENCES

Professors Albee, Achenbach, Ansbacher, Burchard, Forgays, Joffe, Lawson, Leitenberg, Musty (Chairperson); Associate Professors Damkot, Gordon, Hasazi, Howell, Kapp, Kessler, Leff, Rolf; Assistant Professors Barrera, Bond, Bouton, Compas, Edwards, Fitzhenry-Coor, Lobato, Lorenz, Miller, Peyser, Rosen; Research Assistant Professor S. Burchard; Adjunct Assistant Professor Dietzel.

1 General Psychology Introduction to the entire field, emphasizing the normal adult human being. Three hours. Forgays, Albee.

109, 110 Principles of Psychological Methodology and Research (2-4) Prepares students to understand and to do competent research in a variety of areas of psychology. Focus upon designs, methodologies, and statistical procedures essential for psychological research. Laboratory experiences. *Prerequisite:* 1. Four hours. Gordon, Joffe, Damkot.

119 History of Psychology Review of major theoretical and empirical developments in psychology, including schools of psychology that have influenced contemporary models of psychology. *Prerequisite:* 1. Three hours. Miller.

121 Biopsychology (S) Principles of biological bases of behavior through classical and contemporary issues, including introduction to nervous system, physiological and behavioral effects of drugs, chemical bases of behavioral disorders, hormonal control of behavior, intercerebral disorders of behavior, voluntary control of bodily functions, and possible physiological bases of extrasensory perception. *Prerequisite:* 1 or Biology 1. Three hours. Lorenz.

130 Social Psychology A psychological approach to social phenomena with emphasis on the concepts and methods used in the study of the behavior of individuals in various social situations. *Prerequisite:* 1. Three hours. Leff, Miller.

132 Environment and Behavior (F) Introduction into areas of interaction between the behavior of man and the environment. Major dimensions of the new discipline of Environmental Psychology discussed. *Prerequisite:* 1 or course in environmental studies. Three hours. Forgays.

140 Applied Psychology (F) Survey of applications of psychological principles and research methods. Topic areas include industry, transportation, health care, law, environment, consumer behavior, and product design. *Prerequisite:* 1. Three hours. Damkot.

150 Personality The cognitive, purposive, and social science approach to personality, exemplified by Adler, presented and contrasted with other approaches. Applicability to the student him/herself is stressed. *Prerequisite:* 1. Three hours. Ansbacher.

152 Abnormal Psychology Describing and defining abnormal behavior; explanatory models to account for disturbances; research evidence for biological and social models; neurotic, psychotic, and organic disturbances; methods of intervention and prevention. *Prerequisite:* 1. Three hours.

153 Behavior Modification (F) A survey of techniques for the modification of human behavior, and evaluation of their effectiveness. *Prerequisite:* 1. Three hours. Burchard.

161 Developmental Psychology: Childhood Survey of research and theories on child development from conception to adolescence emphasizing ex-

perimental analyses of early social, cognitive, and perceptual development. *Prerequisite:* 1. Three hours. Bond, Fitzhenry-Coor.

162 Development of Sex Differences (S) Critical analysis of research and theory on factors that influence the development of sex differences in behavior, personality, and cognitive and intellectual functioning. *Prerequisite:* 1. Three hours. Bond, Joffe.

193, 194 College Honors

195, 196 Special Topics

197, 198 Research Individual research under staff direction. *Prerequisite:* Departmental permission. Three to six hours.

205 Learning Examination of classical and recent research on the learning process, including respondent and operant learning, discrimination learning, and human learning and memory. *Prerequisite:* 110. Three hours. Bouton.

206 Motivation and Emotion (S) Nature and development of motives, emotions, and their relation to other psychological processes. *Prerequisite:* 110. Three hours. Joffe.

210 Principles of Human Perception. (F) Focus upon basic sensory and perceptual mechanisms that support acquisition and processing of information through auditory, visual, chemical, and haptic-somatic sensory systems of animals and humans. *Prerequisite:* 109. Three hours.

220 Animal Behavior (F) Behavior of animals under controlled experimental conditions, and in their natural environments. Consideration of evolution, development, function, and control of behavior. *Prerequisite:* 109 or 121. Three hours. Joffe.

221 Physiological Psychology I (F) The structure and function of the mammalian nervous system, with emphasis upon neurological correlates of sensory experience and perception. Individual laboratory experience. Four hours. Lorenz.

222 Physiological Psychology II (S) The study of the role of central nervous system mechanisms in the determination of innate behavior arousal, motivation, learning, and memory. Individual laboratory experience. *Prerequisite:* 221. Four hours. Lorenz.

223 Psychopharmacology (S) Intensive analysis of effects of drugs (both medical and recreational) on behavior. Topics such as drug effects on learning, memory, motivation, perception, emotions (both normal and abnormal), and aggression in both animals and men. *Prerequisites:* 110 and 121 or 222 or permission. Three hours. Musty.

230 Advanced Social Psychology (S) Advanced survey covering current research in various fields of social psychology. *Prerequisite:* 110. Three hours. Miller.

233 Psychology of Environmental Experience (F) Explores different ways of perceiving and thinking about social and physical aspects of the environment. Emphasis on enhancing creativity, aesthetic appreciation, and ecological consciousness. *Prerequisite:* Advanced background in psychology, education, or environmental studies. Three hours. Leff.

234 Psychology of Social and Environmental Change (S) Examines psychological foundations of potential changes in social and physical environment that would enhance quality of life for all people. Emphasizes action strategies and projects as well as utopian visions. *Prerequisite:* Advanced background in psychology or in environmental studies or a social science. Three hours. Leff.

241 Industrial Psychology (S) Survey of psychological issues and research in organizations. Personnel selection and training, motivational theories, leader-

ship and group dynamics, workplace analysis and design critically examined. *Prerequisites:* 109 or Business Administration 170, advanced standing in business and permission. Three hours. Damkot.

242 Human Factors Psychology (S) Examination of anthropometrics and psychophysical characteristics applied to designing things for human use. Critical review of research on human performance capabilities. *Prerequisites:* 109 or Mechanical Engineering 119 (123, 124), advanced standing in engineering, and permission. Students may not receive credit for 242 and Mechanical Engineering 275. Three hours. Damkot.

250 Introduction to Clinical Psychology Study of basic principles of interviewing, testing, assessment from life situations, and report writing. Examination of the most common approaches to psychotherapy, such as client-centered, habit change, cognitive change, emotional change, interpersonal relations, and group therapy approaches. *Prerequisite:* 110. Three hours. Kessler.

251 Behavior Disorders of Childhood A wide range of topics from brain damage to childhood psychoses and nightmares. Each problem behavior considered in context of normal child development. *Prerequisite:* 110. Three hours. Hasazi.

253 Advanced Behavior Modification (S) Application of technique for the manipulation and control of human behavior in a variety of educational and social situations involving the collection and analysis of behavioral data. *Prerequisites:* 153, 109. Three hours. Burchard.

261 Cognitive Development (F) Examination of research and theory concerning developmental changes in the human processing of information from infancy to adulthood centered around the work of Piaget. *Prerequisite:* 161 or 109 (concurrently), or permission of the instructor. Three hours. Bond.

262 Social Development (S) Examination of theory and research concerning interpersonal development in humans from infancy through adulthood. Relationships between language, cognition, and social development emphasized. *Prerequisite:* 161 or 109 (concurrently), or permission of the instructor. Three hours. Fitzhenry-Coor.

264 Developmental Psychobiology (F) Analysis of research on development of humans and animals that emphasizes effects of events in the prenatal and early neonatal period, development of physiological systems affecting behavior, and evolutionary origins of behavior. *Prerequisite:* 109 or 121 or 161. Three hours. Joffe.

295, 296 Contemporary Topics Three hours.

Note: Courses are offered every semester except those noted in parentheses after the course title. Abbreviations: F, fall semester; S, spring semester.

Radiologic Technology

SCHOOL OF ALLIED HEALTH SCIENCES

Associate Professor Izzo (Chairperson); Lecturers Farnsworth, Marschke; Adjunct Instructors Cunningham, Lacasse, Morley.

FOR NON-MAJORS

2 Radiographic Principles Radiographic exposure principles, X-ray generation, film processing, and radiation protection. *Prerequisite:* Permission of instructor. Summer only. Three hours.

3 Technical Radiography Anatomy, positioning, technical and safety considerations in radiography of the upper and lower extremities and the chest. *Prerequisite:* 2 and instructor's permission. Summer only. Three hours.

55 Radiation and Man A mini-course to introduce non-majors to radiation. Covers applications in medicine and industry as related to benefits and risks. *Prerequisite:* Sophomore standing. One hour (five weeks). Izzo, Marschke. (Offered in fall and spring)

76 Diagnostic Ultrasound Theory and Techniques Introduction to theory and applications of ultrasound for clinical diagnosis. Includes demonstrations and clinical practice. *Prerequisite:* Permission of instructors. Three hours. Izzo, guest lecturers.

145 Radiation Physics Designed for research technicians and graduate students desiring a basic understanding of radiation physics, biology, and protection. *Prerequisite:* Permission of instructors. One hour. Izzo, Marschke.

FOR MAJORS

1 Introduction to Patient Care (2-0) Introduction to patient care, emergency and isolation procedures, patient's rights, medical terminology, and ethics. Two hours. Farnsworth.

4 Introductory Radiologic Science (3-0) Introduces students to ionizing radiation, emphasizing its interaction with matter, its effect on the human body, and methods of protecting patients and technologists. *Prerequisite:* Permission of instructors. Three hours. Izzo, Marschke.

91, 92 Special Radiologic Projects Independent projects under the direction of faculty members. *Prerequisite:* Permission of the faculty. Variable credit hours.

191, 192 Advanced Radiologic Projects Independent projects under the direction of faculty members. *Prerequisite:* Permission of department chairperson. Variable credit hours.

NUCLEAR MEDICINE TECHNOLOGY MAJOR

31 Introduction to Nuclear Medicine Technology (1-0) Introduction to patient positioning, film processing, anatomical, pharmaceutical, and technical considerations in common imaging procedures. *Prerequisites:* Credit or concurrent-enrollment in 33, Anatomy 9. One hour. Izzo.

32 Radiopharmacology (3-0) Introduction to concepts of radioactivity, dose calculations, radionuclide generators, radiopharmaceuticals and their biological tracing mechanisms, radiation protection, patient dosimetry, and quality control. *Prerequisites:* 31, concurrent enrollment in 34 and 4. Three hours. Izzo.

33, 34 Nuclear Medicine Clinical Practicum (0-4) Routine imaging procedures emphasizing patient positioning, instrumentation, and film processing on Searle, Picker, and Ohio-Nuclear Gamma Cameras; includes introduction to pharmacology. *Prerequisite:* Enrollment in Radiologic Technology. One hour. Izzo.

131 Nuclear Medicine Imaging (5-0) Principles of imaging procedures emphasizing anatomy, physiology, pathology, radiopharmaceuticals, positioning, film critique and pathology recognition, instrumentation principles, computer applications, quality control, and current research. *Prerequisite:* 32 or permission of instructor. Five hours. Izzo.

132 Radioassays in Nuclear Medicine (2-2) Principles and technical considerations for in vivo and in vitro clinical tests, emphasizing competitive binding and immunological techniques; includes equipment operation, quality

control, and labs using commercial kits. *Prerequisites:* 32, Chemistry 3. Three hours. Izzo, guest lecturers.

133, 134 Advanced Nuclear Medicine Practicum (0-12) Experience in advanced clinical and pharmacological procedures, including portable gamma camera, DIGITAL and VIP computers, departmental administration, cardiac studies, and radioassays. *Prerequisites:* 34 for 133, 133 for 134. Three hours. Izzo.

138 Special Topics (2-0) Coverage of departmental administration, licensure, emerging and related imaging modalities, registry review, NRC regulations, and future trends. *Prerequisite:* Permission of instructor. Two hours. Izzo, guest lecturers.

187, 188 Summer Clinical Practicum: Nuclear Medicine Technology (0-40) Thirteen weeks during summer at affiliated hospital. Both courses required to meet eligibility for national certification examination. *Prerequisites:* 34 for 187, 134 for 188. Three hours. Izzo.

RADIOGRAPHY MAJORS

11, 12 Introduction to Radiography (1-2, 2-2) Study of radiographic anatomy and positioning, with an introduction to technique formulation, use and care of radiographic grids and screens, and applications of beam restrictors. *Prerequisite:* 11 for 12. Two hours, three hours. Farnsworth.

14 Radiographic Clinical Practicum (0-12) Introduction to the hospital setting with direct involvement in patient handling and basic radiographic procedures. *Prerequisites:* 1, 11. Three hours. Farnsworth, Cunningham, Lacasse.

110 Clinical Radiology for Radiographers (3-0) A system by system study of the etiology of human disease with emphasis on radiographic manifestations and diagnosis of that disease. *Prerequisite:* Anatomy 9. Three hours. Falby.

111 Advanced Radiography (2-2) Continued study in radiographic positioning and anatomy with emphasis on skull radiography and exposure principles. *Prerequisite:* 12. Three hours. Farnsworth.

112 Special Radiographic Procedures (3-0) Study of vascular and non-routine contrast studies and equipment to include sterile technique, pharmacology, and Computerized Tomography. *Prerequisites:* 113, Anatomy 9. Three hours. Farnsworth.

113, 114 Advanced Radiographic Clinical Practicum (0-12, 0-12) Continued development of clinical skills emphasizing all radiographic positioning with experience in special procedures and selected adjunctive techniques. *Prerequisites:* 185 for 113, 113 for 114. Three hours each. Farnsworth, Cunningham, Lacasse.

115 Radiographic Science (4-0) The continued study of exposure principles with additional investigation of special equipment and procedures adjunctive to radiography. *Prerequisites:* 4, 14. Four hours.

185, 186 Summer Clinical Practicum: Radiography (0-40) Thirteen weeks during summer at affiliated hospital. Both courses are required to meet eligibility requirements of national certification examination. *Prerequisite:* Enrollment in Radiography program. Three hours. Farnsworth.

RADIATION THERAPY TECHNOLOGY MAJOR

21, 22 Introduction to Radiation Therapy (1-0, 1-2) Designed to introduce students to the theories and practice of radiation therapy technology through discussion and laboratory sessions. *Prerequisite:* Enrollment in Therapy program. One hour, two hours. Marschke.

23, 24 Radiation Therapy Clinical Practicum (0-4) Students are required to observe and participate in the Medical Center Hospital of Vermont Radiation

Therapy Department. *Prerequisite:* Enrollment in Therapy program. One hour. Marschke, Morley.

121, 122 Radiation Therapy Techniques (3-0, 3-1) Designed to instruct students in the theory and clinical techniques involved in radiation therapy. *Prerequisites:* 4 for 121, 121 for 122. Three hours, four hours. Marschke.

123, 124 Senior Radiation Therapy Clinical Practicum (0-12) A continuation of 23, 24 with emphasis placed on increasing clinical capabilities. *Prerequisites:* 23, 24. Three hours each. Marschke, Morley.

125 Clinical Oncology (3-0) Designed to educate the student in various types of neoplasms, methods of treatment, and elementary pathology. *Prerequisite:* Anatomy 9 or permission of instructor. Three hours. Marschke, guest lecturers.

126 Senior Therapy Seminar (2-0) Designed to educate students in areas related to the physical and psychological care of the cancer patient. *Prerequisite:* Senior standing in Therapy program. Two hours. Marschke, guest lecturers.

189, 190 Summer Clinical Practicum: Radiation Therapy Technology (0-40) Thirteen weeks at one of the affiliated hospitals. Completion of both courses is required in order to meet eligibility requirements of national registry examination. *Prerequisite:* Enrollment in Therapy program. Summer only. Three hours. Marschke.

Recreation Management

SCHOOL OF NATURAL RESOURCES

Extension Professor Bevins; Associate Professors Gilbert, Lindsay (Program Chairperson); Assistant Professor Manning; Lecturers Baker, Flinn, Hudspeth, Kaufman, Koenemann.

8 Recreation and Resources Introduction to field of natural resource-based recreation. Broad perspective of recreation management including agencies, policies, history, and trends. Three hours. Manning.

138 Park Design Emphasis on park design methodology, employing actual parks in step-by-step procedures in park design. *Prerequisites:* Junior standing in Recreation Management, permission. Four hours (1-6). Flinn.

150 Recreation Management Field experience in recreation planning, design, and resource measurement. *Prerequisite:* Civil Engineering 12. Four weeks in the summer following the sophomore year. Four hours. Lindsay, Gilbert, Manning.

151 Food and Lodging Business Management Economic decision-making for the food and lodging industry. Emphasis on analysis of business investment and profitability over the recreation firm's life. *Prerequisite:* Permission of instructor. Three hours. Bevins. Credit cannot be granted for both 151 and Agricultural and Resource Economics 166.

153 Recreation Administration and Operations Administration and operation of public outdoor recreation areas. Special emphasis on recreation administrative structures, personnel management, and maintenance of parks and outdoor recreation areas. *Prerequisites:* Senior standing, permission. Three hours. Baker, Manning.

154 Recreation Policy Formulation The initiation, formulation, and im-

plementation of public outdoor recreation resource policy. *Prerequisites:* Senior standing, permission. Three hours. Koenemann.

155 Environmental Interpretation Discussions and application of principles and techniques used to communicate values, natural systems, and cultural features to park visitors. Exposure to collecting, analysis, planning, construction, and use of interpretive media and related outdoor facilities. *Prerequisites:* Senior standing, permission of instructor. Three hours. Hudspeth.

157 Ski Area Management An analysis of current management problems affecting private ski areas in Vermont and the Northeast. *Prerequisites:* Senior standing, permission. Three hours. Gilbert.

159 Participation in Recreation Management Supervised field experience in national, state, urban, or private park and recreation operations. *Prerequisites:* Junior standing, permission. Three hours. Gilbert, Lindsay, Manning.

182 Senior Recreation Seminar In-depth seminars on current problems in the field of public and private outdoor recreation management. *Prerequisites:* Senior standing, permission. Two hours. Lindsay.

188 Special Topics Readings, investigations, and lecture-discussions in selected areas of recreation management. *Prerequisites:* Junior standing, permission. One to three hours.

225 Economics of Outdoor Recreation and Tourism A socioeconomic analysis of recreation and tourism as an industry. Emphasis on regional, state, and community impact. *Prerequisites:* Economics 11, 12, or Agricultural and Resource Economics 61. Three hours. Bevins.

235 Outdoor Recreation Planning Planning large land areas for outdoor recreation use. *Prerequisites:* 150 or Forestry 140; Plant and Soil Science 161 or Geology 1. Three hours. Lindsay.

240 Wilderness and Wilderness Management An interdisciplinary examination of wilderness as a land use. Emphasis on maintaining recreation quality and controlling environmental impacts in wilderness, backcountry, and related areas. *Prerequisite:* 235 or permission. Three hours. Manning.

Religion

COLLEGE OF ARTS AND SCIENCES

Associate Professors Andrews, Martin (Chairperson), Paden; Assistant Professors Brenneman, Gussner, Sugarman, Yarian.

Credit will be given only for two courses at the introductory level. Credit will not be given for both Religion 22 and 23.

20 Introduction to the Study of Religion: Comparative An exploration of the forms of man's religious life in three contrasting worlds — the ahistorical world, the archaic world, and the historical world. Three hours. Andrews, Brenneman, Gussner, Martin, Paden, Yarian.

21 Introduction to the Study of Religion: Asian Traditions Introduction to the Hindu, Buddhist, and East Asian religious traditions as expressed in their basic symbolisms, writings, practices, and cultural forms. Three hours. Andrews, Brenneman, Gussner, Martin, Paden, Yarian.

22 Introduction to the Study of Religion: Western Traditions Study of the basic motifs, mythic patterns, and historical transformations in the religious life of man from the ancient Near East to the modern West. Three hours. Andrews, Brenneman, Gussner, Martin, Paden, Sugarman, Yarian.

23 Introduction to the Study of Religion: Bible Study of the basic motifs,

mythic patterns, and historical transformations in the religious life of Western man as exemplified in the Biblical tradition. Three hours. Martin, Paden, Sugarman, Yarian.

71 The Interpretation of Religion Examination of major theories and methods used in studying and interpreting religious phenomena. *Prerequisite:* Three hours in religion. Three hours. Gussner, Paden, Sugarman.

95, 96 Special Topics

101 Church, Cult and Totem: The Social Forms of Religious Life Comparative study of the communal forms of religious life, such as cosmic state, monasticism, sect, caste and denomination, from a variety of cultures — Eastern, Western, tribal, and modern — with a concern for their meanings as fundamental forms of religious expression. *Prerequisite:* Three hours in religion or sociology. Three hours. Andrews, Gussner, Yarian.

104 Mysticism, Shamanism, and Possession A comparative study of the ways in which the inward dimension of religious life finds expression. *Prerequisite:* Three hours in religion. Three hours. Martin, Paden, Yarian.

108 Myth, Symbol, and Ritual Study of the patterns and significance of myth and ritual as they appear in cross-cultural perspective, with reference to contemporary interpretations of symbol and language. *Prerequisite:* Three hours in religion. Three hours. Brenneman, Paden, Yarian.

111 Foundations of Western Religious Thought Study of ways in which Western religious thinkers — in both Greek and Biblical traditions — have expressed and responded to philosophical-theological questions about the nature of man, world, and God. *Prerequisite:* Six hours in religion. Three hours. Sugarman, Yarian.

114 Hebrew Scriptures Study of the history and writings of the Hebraic-Judaic religion to the first century B.C. *Prerequisite:* Six hours in religion. Three hours. Sugarman.

116 Judaism An investigation of the sustaining rituals, customs, institutions, and beliefs of normative Judaism. *Prerequisite:* Six hours in religion. Three hours. Sugarman.

120 The New Testament The origin and nature of early Christianity with emphasis on the New Testament writings. *Prerequisite:* Six hours in religion. Three hours. Martin.

122 Modes of Christian Expression I: Catholicism A study of the teaching, rites, art and piety of Eastern Orthodox and Roman Catholic Christianity. *Prerequisite:* Six hours in religion. Three hours. Yarian.

123 Modes of Christian Expression II: Protestantism A study of Protestant Christianity focusing on its orientation to the Word and its responses to developments formative of modern Western culture. *Prerequisite:* Six hours in religion. Three hours. Yarian.

128 Religion in America A study of the relationship between religion, the cultural ethos, and individual self-understanding in America. *Prerequisite:* Six hours in religion, including 22. Three hours. Martin.

131 Studies in the Hindu Tradition Selected writings, rituals, and developments in the Hindu tradition with reference to cultural assumptions of India. *Prerequisite:* Six hours in religion. Three hours. Gussner.

132 The Buddhist Tradition Selected texts, disciplines, and doctrinal developments in Indian, Tibetan, and Chinese Buddhism. *Prerequisite:* Six hours in religion. Three hours. Andrews, Gussner.

141 Religion in Japan The religion of shrine and temple, of Shinto and Buddhism, and their interaction with the rich folk traditions of Japan. *Prerequisite:* Six hours in religion. Three hours. Andrews.

145 Religion in China An examination in historical context of the Confucian, Taoist, and Chinese Buddhist traditions from a variety of interpretive perspectives, both Chinese and Western. *Prerequisite:* Six hours in religion. Three hours. Andrews.

161 'Primitive' Religions A study of the religiousness of man and its external expressions in small-scale hunting and planting societies, with reference to anthropological, sociological, and psychological contributions to the subject. *Prerequisite:* Six hours in religion, or three hours in religion and three in anthropology. Three hours. Gussner.

162 Studies in Cultural Lore Examination of loric dimensions of the sacred. A look into the little places that disclose those elements and qualities that define particularity of given culture, as expressed in tale, legend, festival, custom, craft, and architecture. *Prerequisite:* Six hours in religion, or three hours in religion and three hours in folklore studies. Three hours. Brenneman.

165 Religion and Secular Culture The effects of modern culture on religion, and the emergence of new forms of religious life and expression. *Prerequisite:* Six hours in religion. Three hours. Brenneman, Sugarman.

168 Contemporary Spiritual Life Study of man's involvement with the Spiritual as manifested in contemporary religious groups, or in modern theory and practice of meditation. *Prerequisite:* Six hours in religion. Three hours. Gussner.

175 Art and the Sacred A cross-cultural study of the role and meaning of visual objects and images which are religious expressions themselves or are in important ways related to religious experience, e.g. in the creative process and worship. *Prerequisite:* Six hours in religion, or three hours in religion and three hours in art. Three hours. Yarian.

180 Philosophy of Religion (See Philosophy 135.) *Prerequisite:* Six hours in religion. Three hours.

185 Rise of Islam (See History 35.) *Prerequisite:* Three hours in religion. Three hours. Engroff.

187, 188 Chinese Philosophy I and II (See Philosophy 121, 122.) *Prerequisite:* Six hours in religion, including 20 or 21. Three hours.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research Variable credit.

201 Senior Seminar: Creative Hermeneutics Workshop in theory and method incorporating current developments in the field. *Prerequisites:* Twelve hours in religion, including 71 and six hours at the intermediate level, senior standing. Three hours.

214 Studies in Judaica Selected topics of concentration emerging out of and related to the study of normative Judaism, e.g. the prophetic faith, Rabbinic Judaism, Hasidism, and Jewish mysticism. *Prerequisite:* Nine hours in religion with three hours at the intermediate level (116 recommended). Three hours. May be repeated up to six hours. Sugarman. (Not offered for graduate credit.)

226 Studies in Hellenistic Religion A study of religion in the Mediterranean area during the period from the 4th century B.C. through the 2nd century A.D. *Prerequisite:* Nine hours in religion, with three hours at the intermediate level. Martin. (Not offered for graduate credit.)

228 Studies in Western Religious Thought Important figures, issues, movements, or texts will be selected for special examination. *Prerequisite:* Nine hours in religion. Three hours. May be repeated up to six hours. Sugarman, Yarian. (Not offered for graduate credit.)

280 Symbol and Archetype A study of the work of C.G. Jung and the Jungian circle as it bears upon the interpretation of religion and as it represents a 20th century religious quest. *Prerequisite:* Nine hours in religion, with six hours at the intermediate level. Three hours. Martin, Paden. (Not offered for graduate credit.)

291, 292 Topics in the History and Phenomenology of Religion *Prerequisites:* Nine hours in religion, with six hours at the intermediate level, junior standing. May be repeated up to six hours.

297, 298 Interdisciplinary Seminar Student-faculty workshop on a topic of current interest, employing resources from various disciplines. *Prerequisites:* Nine hours in religion, with six hours at the intermediate level, junior standing, permission of instructor. Three hours. (Not offered for graduate credit.)

Resource Economics

SCHOOL OF NATURAL RESOURCES

Professor Sargent; Associate Professors Armstrong, Gilbert.

RSEC 121 Resource Economics An evaluation of the economic forces affecting resource allocation, tools of economic analysis, and economic implications of current resource utilization practices. *Prerequisite:* Economics 11 or Forestry 151 or Agricultural and Resource Economics 61. Three hours. Gilbert.

AREC 162 Land Use Issues (See Agricultural and Resource Economics 162.) Three hours. Sargent.

RSEC 222 Natural Resources Evaluation A critical investigation of current research, allocation procedures, and methods of analysis in natural resource economics with emphasis on the public sector. *Prerequisite:* 121. Three hours. Gilbert.

AREC 233 Rural Planning Study of rural, regional water, and natural resource planning concepts and principles. Field exercises in plan evaluation, carrying capacity, agricultural land protection, growth control, etc. *Prerequisites:* Senior standing, Agricultural and Resource Economics 61 or equivalent. Three hours. Sargent.

AREC 234 Practicum in Rural Planning Off-campus planning experience for seniors and graduate students. *Prerequisites:* 233, consent of instructor. One to six hours. Sargent.

RSEC 255, 256 Special Topics in Resource Economics

Romance Languages

COLLEGE OF ARTS AND SCIENCES

Professors Ugalde, Weiger, Zarate; Associate Professors Carrard, Crichfield, T. Geno, Julow, Murad, Wesseling, Whatley (Chairperson); Assistant Professors Senecal, Whitebook, Wiley-Sandler; Lecturer M. Geno.

French and Spanish language and literature courses are listed separately below by title and number. The language sequences are designed specifically to train students in the four skills of speaking, comprehension, reading, and writing. The

total sequence in each language represents a continuum into which a student with previous experience in the language will be placed according to his/her level of achievement, regardless of how many or how few years he/she may have studied it. For placement in advanced language courses (100 or above), first-year students should consult with this department. Those who have already taken courses here should simply follow the levels represented by the number sequences, 1-99, 100-199, etc. For convenience, we offer the following guidelines for placement in elementary and intermediate; in all cases of doubt students should seek the advice of this department.

FRENCH LANGUAGE

1-2 Elementary The fundamentals of pronunciation, reading, and writing are taught by use of dialogues, grammar drills, conversational activities, and short compositions. No prior knowledge is expected. Both semesters are required. Four hours each course.

9 Basic French Grammar Review A thorough review of French grammar in preparation for the intermediate level. Considerable emphasis on written exercises. Three hours.

101, 102 Composition and Conversation Intermediate French using contemporary attitudes and problems as a basis for class discussions and weekly written work. Three hours each course.

201, 202 Advanced Composition and Conversation Course activities (discussions, exposes, written work, etc.) are designed to lead to the mastery of French oral and written expression. Three hours each course. (Not offered for graduate credit.)

209 Advanced Grammar A comparative grammatical study centered on the specific problems encountered by Anglophones in written and spoken French. Three hours. M. Geno.

210 Romance Philology Development of French, Spanish, and Italian from Latin. Study of documents. *Prerequisites:* Intermediate level in at least two of the languages, or permission. Taught in English. Three hours. Whitebook. Alternate years, 1982-83.

215 Methods of Text Analysis An introduction to procedures and terminology used in the analysis of texts of various genres. Three hours. Carrard.

216 Stylistics Study of idiomatic difficulties faced by people who learn French; translation; analysis of the various "levels of speech" in French, with their stylistic features. Three hours. Carrard.

SPANISH LANGUAGE

1-2 Elementary The fundamentals of Spanish: pronunciation; speaking; reading; the structure of the basic Spanish sentence. Both semesters required. Four hours each course.

9 Basic Spanish Grammar Review A thorough review of Spanish grammar in preparation for the intermediate level. Considerable emphasis on written exercises. Three hours.

51-52 Intermediate Reading and Conversation Spanish texts will be read for content and discussed in Spanish. Topical grammar review as necessary. Three hours each course.

101, 102 Composition and Conversation Writing practice, sentence structure, correct expression, and guided discussions in Spanish of assigned topics. A good command of basic grammar is expected. Three hours each course.

201, 202 Advanced Composition and Conversation To improve both written and oral proficiency. Textbook supplemented by panel discussions, debates,

translation, and a weekly composition. Three hours each course. Ugalde. (Not offered for graduate credit.)

209 Advanced Grammar An in-depth study of Spanish grammar, its rules and practices going beyond conventional good usage into the reasons and theories for same. Three hours. Ugalde.

LITERATURE COURSES IN FRENCH AND SPANISH

As the language courses offer a continuum for the learning of the four skills, the literature courses provide a sequential study of the development of French and Spanish literatures from the Middle Ages to the present. In addition, they offer both practice and continued training in the four language skills. While the literature courses are divided into centuries, with subcategories of genres, themes, and individual authors, it is not essential to adhere strictly to chronological order. IN GENERAL, A ONE HUNDRED-LEVEL LITERATURE COURSE OR ITS EQUIVALENT IS THE PREREQUISITE FOR ALL OTHER LITERATURE COURSES: EXCEPTIONS ARE REGULARLY MADE WITH THE APPROVAL OF THE DEPARTMENT. Unless otherwise stated, all courses above the intermediate level will be conducted in the foreign language in question. Questions about the precise content of any literature course should be referred to the instructor listed for the course or to the department chairperson.

FRENCH LITERATURE AND CIVILIZATION

155, 156 Masterworks Overview of French literature (155: Middle Ages to Revolution; 156: 19th, 20th centuries) through reading of outstanding works representing major authors, periods, themes, and forms. *Prerequisite:* French 52 or equivalent. Three hours each course. Crichfield.

175 French Humor Analysis of theories of humor; comparison of French and American styles. Authors such as Rabelais, Moliere, Feydeau, Voltaire, Ionesco; Cami, Allais, Dac, Sempe, Daninos. Three hours. Whitebook. Alternate years, 1982-83.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

225 Medieval French Literature First semester: Old French language; 12th century epics, e.g. *La Chanson de Roland*, *Le Pelerinage de Charlemagne*, Breton lays; Marie de France. Three hours. Whitebook. Alternate years, 1981-82.

226 Medieval French Literature Second semester: Romances: Chretien de Troyes, Guillaume de Lorris and Jean de Meung; lyric poetry, Machaut; Pisan; Charles d'Orleans; farces and miracles. *Prerequisite:* 225. Three hours. Whitebook. Alternate years, 1981-82.

235 16th Century France: A World in Transition Focuses on literary, esthetic, and cultural aspects of the 16th century, a pivotal era between medieval and modern societies. Three hours. Wiley-Sandler. Alternate years, 1981-82.

236 The Developing Renaissance in France The Renaissance as a cultural and esthetic phenomenon in the years 1530-60, its changing influence on French thought and culture. Three hours. Wiley-Sandler. Alternate years, 1982-83.

245 The Baroque Age 1600-1650 The literature after France's civil wars, up to the triumph of classicism: religious, lyric, and political poetry; idealistic, picaresque, and fantastic novels; baroque drama; Pascal. Three hours. Whatley. Alternate years, 1982-83.

246 17th Century Selected works of the Century with emphasis on Corneille, Racine, and Moliere. Three hours. Julow. Alternate years, 1982-83.

255 18th Century Literature Writers of the early Enlightenment. Possible topics: the impact of the new science; the literary reflection of new social types;

the "pursuit of happiness." Three hours. Whatley. Alternate years, 1981-82.

256 18th Century Literature Rousseau, Diderot, Laclos, Sade: the generation before the Revolution. Possible topics: the attempts to define "natural man;" the relationship between the arts and morality, between liberty and libertinism. Three hours. Whatley. Alternate years, 1981-82.

265 The Romantic Period Major figures and themes of the Romantic movement, including Chateaubriand, Madame de Stael, Hugo, Balzac, Stendhal, Musset. Possible topics: the revolt against Classicism, the Romantic view of nature, *le vague des passions*. Three hours. Crichfield. Alternate years, 1981-82.

266 The Second Empire through 1900 The rise of modern literary realism, Naturalism, Symbolist poetry, Decadence. Authors will include Flaubert, Zola, Maupassant, Baudelaire, Verlaine, Rimbaud, Mallarme, Huysmans. Three hours. Julow. Alternate years, 1981-82.

275, 276 20th Century Literature Selected topics dealing with poetry and/or narrative related either to an historical period or a literary movement. Three hours. Carrard. Alternate years, 1982-83.

277 Topics in 20th Century French Theatre Subjects may include: *le theatre traditionnel*, *le theatre "de l'absurde," le theatre de la marge*, a combination of all the above. Each may be repeated up to six hours. Three hours. T. Geno. Alternate years, 1982-83.

285 French Canadian Literature A study of fiction and poetry from 1835 to 1940. Three hours. Senecal. Alternate years, 1982-83.

286 French Canadian Literature A continuation of 285, encompassing fiction, poetry, and theatre from 1940 to 1975. Three hours. Senecal. Alternate years, 1982-83.

289 African Literature of French Expression A study of West African poetry, theatre, novel, and civilization as an expression of the Black experience in the language of the French colonizer. Three hours. T. Geno. Alternate years, 1982-83.

291 Civilization of France A study of the geographical, political, social, economic, and intellectual development of France from the Middle Ages to the present. Three hours. M. Geno.

293 French Canadian Civilization A sociocultural study of the French civilization of Canada. Three hours. Senecal. Alternate years, 1981-82.

295, 296 Advanced Special Topics

297, 298 Advanced Readings and Research

SPANISH LITERATURE AND CIVILIZATION

155 Masterworks Representative novels, plays, poetry of the period before 1800. Three hours. Wesseling. Alternate years, 1982-83.

156 Masterworks Representative plays, novels, poetry since 1800. Three hours. Wesseling. Alternate years, 1982-83.

158 History of Modern Spain Topical approach to the study of Spanish history since 1808. Emphasis on causes and issues of the Civil War of 1936. Three hours. Wesseling. Alternate years, 1981-82.

185 Readings in Spanish American Literature A survey of the literature of Spanish America from pre-Columbian times through the colonial period and Romanticism. Three hours. Zarate. Alternate years, 1981-82.

186 Readings in Spanish American Literature A survey of the literature of Spanish America from *Modernismo* through *Vanguardismo*, *Realismo Magico* to the present. Three hours. Murad. Alternate years, 1981-82.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

235, 236 **Golden Age** The picaresque novel, the drama and poetry of the 16th and 17th centuries, with emphasis on Lope de Vega, Calderon, Quevedo, Tirso de Molina. Three hours each course. Weiger. Alternate years, 1982-83.

245, 246 **Cervantes** *Don Quijote*, the *Novelas Ejemplares*, and the theatre of Cervantes. Three hours each course. Weiger. Alternate years, 1981-82.

265 **19th Century Spanish Literature** Romanticism and realism: (1) Romantic theatre; (2) the realist and naturalist novelists: Galdos and Leopoldo Alas. Three hours. Wesseling. Alternate years, 1981-82.

276 **The Reawakening in the 20th Century** Origins and main aspects of the intellectual conflicts in modern Spain as reflected in the literary works from the "Generation of 1898" to the present. Three hours. Ugalde. Alternate years, 1981-82.

285, 286 **Spanish-American Literature of Social Protest** Readings of major works tracing the various directions of social protest against: a) the Spanish political system, b) local governments, c) imperialism. Three hours each course. Zarate. Alternate years, 1982-83.

291 **Civilization of Spain** Topical approach to the study of Spanish Civilization with emphasis on ideas, art, literature, and music. Three hours. Ugalde. Alternate years, 1982-83.

293 **Latin American Civilization** A study of the ideas, art, literature, and music of Latin America against the background of the history and culture of the region. Three hours. Zarate. Alternate years, 1981-82.

295, 296 Advanced Special Topics

297, 298 Advanced Readings and Research

The following extra-departmental courses may be taken for credit toward a major in the Department of Romance Languages:

General Literature 72 Romance Literature in Translation (see page 195).

Linguistics 101, 102 (See page 195.)

Russian

COLLEGE OF ARTS AND SCIENCES

Associate Professor Nalibow; Assistant Professor Pomar.

1-2 **Elementary Russian** Four hours each course. Nalibow, Pomar.

11, 12 **Intermediate Russian** *Prerequisite:* 1-2. Four hours each course. Nalibow, Pomar.

101, 102 **Introduction to Russian Literature** Outstanding authors of the 19th and 20th centuries from Pushkin to Pasternak and Solzhenitsyn. Oral discussion of readings, written practice. *Prerequisites:* 11, 12. Three hours each course. Nalibow, Pomar.

103, 104 **Russian Civilization** Introduction to the history of Russian culture including Russian secular and ecclesiastical painting, architecture, and music

from the earliest periods to the present. *Prerequisites:* 11, 12. Three hours each course. Nalibow, Pomar.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

203, 204 Advanced Russian Advanced oral and written drill, grammar review, lexical problems, roots of the Russian language. Lectures and discussions on the Russian language. Three hours each course. Nalibow, Pomar. (Not offered for graduate credit.)

271 Seminar in Slavic Linguistics The linguistic prehistory of Slavic and the study of Old Church Slavic. Linguistic history of the Russian language. Three hours. Nalibow. (Not offered for graduate credit.)

281, 282 Senior Seminar Required of all senior concentrators. Three hours each course. Pomar. (Not offered for graduate credit.)

GENERAL LITERATURE

181 Russian Literature in Translation (See Extra-Departmental Courses.) Nalibow.

182 Soviet Literature in Translation (See Extra-Departmental Courses.) Pomar.

Sociology

COLLEGE OF ARTS AND SCIENCES

Professors Folta (Chairperson), Lewis, Mabry, Sampson, Stanfield; *Associate Professors* Finney, Loewen, McCann, Nixon, Steffenhagen; *Assistant Professors* Berkowitz, Danigelis, Fengler, Mintz, Schmidt, Stedman.

10 Introduction to Sociology Fundamental principles and problems in the sociological analysis of the structure and dynamics of modern society. Three hours.

11 Social Problems An introduction to sociology through the detailed examination of a selected number of major structural problems characteristic of contemporary societies. Problems treated may vary. Three hours.

14 Deviance and Social Control Analysis of the causes and consequences of social behavior that violates norms. Examines patterns of deviant socialization and social organization and forms of deviance control. Three hours. Berkowitz, Finney, Folta, Mabry, Stanfield.

19 Race Relations in the United States Analysis of racial prejudice, discrimination and other dominant group practices directed toward Native, Asian-, and Afro-Americans and their social movements for integration, accommodation, and separatism. Three hours. Danigelis, Loewen.

25 Alienation in Modern Society Examination of the forms of social separation and estrangement of individuals in industrial societies; their origins in and consequences for sociocultural organization and change. Three hours. Sampson, Steffenhagen.

29 Sex, Marriage, and the Family Description and analysis of contemporary patterns in American sexual, marital, and familial behavior; their historical development, variants, and the evolving alternatives to traditional normative forms. Three hours. Berkowitz, Fengler, Lewis.

36 Technology and Social Organization Analysis of the interaction of

technologies, cultures, and social institutions in societal evolution by the critical examination of contemporary theories and historical and comparative evidence. Three hours. Berkowitz, McCann, Sampson.

51 Religious Deviance, Magic, and the Occult Analysis of the social and cultural organization of groups professing deviant spiritual, occult, mystical, and/or magical beliefs and their relationships to the institutions of society. Three hours. Sampson, Steffenhagen.

57 Drugs and Society Patterns of illicit drug distribution, use, abuse, and control in contemporary society. Examines the interaction of cultural, social, psychological, and physiological factors in prohibited drug-taking. Three hours. Steffenhagen.

58 Alcoholism and Society Examination of alcohol use and abuse in contemporary society. Special attention to the cultural, social, psychological, and physiological causes and consequences of alcohol addiction. Three hours. Steffenhagen.

63 Sociology of Sport Analysis of the sociocultural organization and institutional relationships of sport in contemporary society. Also examines the social origins of athletes and the functioning of athletic groups. Three hours. Nixon.

95, 96 Special Topics

All courses numbered 100-199 require three hours of sociology, preferably Sociology 10, specified experience or work in another discipline as indicated, or the permission of the instructor.

100 Fundamentals of Social Research Introduction to research methods in sociology. Includes examination of research design, measurement, data collection, data analysis, and the presentation and theoretical interpretation of research findings. *Prerequisite:* Three hours of sociology or six hours in a related social science. Three hours. Berkowitz, Danigelis, Finney, McCann, Stedman.

102 Population, Environment, and Society Analysis of the causes and consequences of varying relationships among population size, distribution and composition, social organization, technology, and resource base. *Prerequisite:* Three hours of sociology. Three hours. McCann, Stedman.

105 The Community Comparative examination of patterns of social interaction in social groups with common territorial bases in contemporary societies and the analysis of community structure and dynamics. *Prerequisite:* Three hours of sociology. Three hours. Lewis, Loewen, Mabry, Schmidt, Stedman.

109 The Self and Social Interaction Analysis of the roles of sociocultural and situational factors in individual behavior and experience and the social genesis, development, and functioning of human personality. *Prerequisite:* Three hours of sociology or Psychology 1. Three hours. Folta, Nixon, Sampson.

115 Crime Analysis of the nature and types of behavior that violates law, the mechanisms for defining such behaviors as criminal and their causes and consequences. *Prerequisite:* Three hours of sociology. Three hours. Finney, Folta, McCann, Stanfield.

119 Minority Groups Analysis of the causes and consequences of the subordination of ethnic, racial, and religious groups in society. Examination of patterns of prejudice, discrimination, and intergroup relationships. *Prerequisite:* Three hours of sociology. Three hours. Danigelis, Loewen.

120 Aging in Modern Society Analysis of contemporary needs and problems of the elderly, including discrimination, poverty, health care, and loneliness, and the evaluation of services and programs for the elderly. *Pre-*

requisite: Three hours of sociology or professional experience working with the elderly. Three hours. Fengler, Folta.

122 Women and Society Analysis of the changes in the role of women in contemporary society and their consequences for female socialization, the family, and the other major social institutions. *Prerequisite:* Three hours of sociology. Three hours. Fengler, Folta, Lewis, Mintz, Stedman.

126 Social Problems in Organizations Examination of selected problems associated with modern organizations, including worker injury and dissatisfaction, democratic participation, public accountability, corporate concentration, crime, corruption, and organizational effectiveness. *Prerequisite:* Three hours of sociology. Three hours. Berkowitz, Finney, Folta, McCann, Sampson.

129 Problems in Family and Kinship Analysis Presentation and critical examination of selected contemporary approaches to family and/or kinship research in sociology. Approaches and topics will vary. *Prerequisite:* 10, 29, or six hours in a related social science. Three hours. Berkowitz, Fengler, Lewis.

132 Affluence and Poverty in Modern Society Examination of structured social inequality in contemporary American society with special attention to the distribution of wealth and its relationship to power, prestige, and opportunity. *Prerequisite:* Three hours of sociology. Three hours. Berkowitz, Danigelis, Finney, Nixon, Mabry, McCann, Mintz, Sampson.

144 Sociology of Education Analysis of the social organization of education with special attention to the causes and consequences of educational changes in relationship to other institutions in modern society. *Prerequisite:* Three hours of sociology. Three hours. Finney, Folta, Lewis, Loewen.

148 Social Organization of Science Analysis of science as a social institution, its social structure and its relationships to other institutions in society. Examines scientific organizations, stratification, social control, and communication. *Prerequisite:* Three hours of sociology or three hours of social science and six hours of natural science. Three hours. Berkowitz, McCann.

151 Sociology of Religion Analysis of the sociocultural organization of religions with special attention to the changing forms of religion in contemporary society and their relationships to other institutions. *Prerequisite:* Three hours of sociology or six hours of religion. Three hours. Sampson.

154 Social Organization of Death and Dying Comparative examination of sociocultural adaptations to mortality with special attention to family, medical, legal, religious, and economic responses to fatal illness and death in contemporary society. *Prerequisite:* Three hours of sociology. Three hours. Folta.

161 Sociology of Leisure Analysis of the sociocultural organization of non-work activity, with emphasis on the relationships of class, life style, education, and work to contemporary recreation and leisure use patterns. *Prerequisite:* Three hours of sociology. Three hours. Danigelis.

165 The Social Structure of the United States Examination of the major institutions of American society and their interrelationships with emphasis on the key contemporary social processes affecting societal integration, conflict, stability, and change. *Prerequisite:* Three hours of sociology, or either History 8, Political Science 21, or Geography 107. Three hours. Sampson, Schmidt, Stedman.

167 The Social Structure of Canada Analysis of Canada as a social system with emphasis on Canadian identity, the integration of an ethnically plural society, social class, and national and regional interests. *Prerequisite:* Three hours of sociology, or either History 76, Political Science 173, or Geography 102. Three hours. Berkowitz, Stanfield.

193, 194 College Honors

195, 196 Special Topics**197, 198 Readings and Research**

All courses numbered 200-299 require a minimum of six hours of sociology, three of which must be at the 100 or intermediate level, equivalent preparation as indicated or permission of the instructor.

202 Population Dynamics Analysis of the factors affecting human population growth and distribution, migration patterns, and the relationship between economic activity and population trends. *Prerequisites:* Six hours of sociology or 10 and an introductory course in biology, economics, geography, or zoology. Three hours. McCann, Stedman.

204 Ecological Perspective on Human Communities Analysis of relationships between the social, economic, and technological organization of communities and their physical and sociocultural environments. Emphasis upon community land use and settlement patterns. *Prerequisite:* Six hours of sociology or Anthropology/Geography 179. Three hours. Mabry, Schmidt, Stedman.

205 Rural Communities in Modern Society The changing structure and dynamics of rural social organization in the context of modernization and urbanization. Emphasis on rural communities in the United States. *Prerequisite:* Six hours of sociology. Three hours. Finney, Schmidt.

206 Urban Communities in Modern Society The changing structure and dynamics of urban social organization in the context of modernization and urbanization. Emphasis on cities and metropolitan areas in the United States. *Prerequisite:* Six hours of sociology. Three hours. Lewis, Loewen, Stedman.

207 Community Organization and Development Communities as changing sociocultural organizational complexes within modern society. Special attention given to problems of the formulation and implementation of alternative change strategies. *Prerequisite:* Six hours of sociology. Three hours. Finney, Schmidt.

209 Small Groups An examination of the structure and dynamics of small groups and the interpersonal, informal network of relations that characterize the interaction of members. *Prerequisite:* Six hours of sociology. Three hours. Nixon, Steffenhagen.

211 Social Movements and Collective Behavior Examination of origins, development, structure, and consequences of crowds, riots, crazes, rumors, panics, and political and religious movements and their relationships to cultural and social change. *Prerequisite:* Six hours of sociology. Three hours. Danigelis, Finney, Foltz, Sampson, Schmidt, Stanfield.

214 Delinquency Analysis of the nature and types of juvenile behavior that violates law, the mechanisms for defining such behaviors as delinquent and their causes and consequences. *Prerequisite:* Six hours of sociology. Three hours. Foltz, McCann.

216 Criminal Justice Analysis of the social structures and processes involved in the identification and labeling of individuals as criminal offenders: criminal law, its enforcement and the courts. *Prerequisite:* Six hours of sociology. Three hours. Foltz, Stanfield.

217 Corrections Analysis of the social structures and processes involved with individuals designated as offenders of criminal law: probation, prison, parole, and programs of prevention and rehabilitation. *Prerequisite:* Six hours of sociology. Three hours. Stanfield.

219 Race Relations Examination of American racial subordination in social and historical perspective. Analysis of interracial contacts, racial sub-cultures and social structures, and responses to racial prejudice and discrimination. *Prerequisite:* Six hours of sociology. Three hours. Danigelis, Loewen.

225 Organizations in Modern Society Examination of basic classical and contemporary theory and research on the human relations, internal structures, environments, types, and general properties of complex organizations and bureaucracies. *Prerequisite:* Six hours of sociology. Three hours. Berkowitz, Finney, Folta, Sampson.

228 Organizational Development and Change Examination of basic and applied research on problems of organizational effectiveness and innovation. Includes presentation of organizational development and change techniques and practical class exercises. *Prerequisite:* Six hours of sociology, or one college course on organizations, or equivalent organizational experience with permission of instructor. Three hours. Berkowitz, Finney.

229 The Family As a Social Institution Examination of the institution of the American family in cross-cultural and historical perspective. Theories and research on family continuity, change and institutional relationships will be explored. *Prerequisite:* 129 or six hours of sociology. Three hours. Berkowitz, Fengler, Folta, Lewis, Mabry.

232 Social Class and Mobility Comparative and historical analysis of the causes, forms and consequences of structured social inequality in societies. Examination of selected problems in contemporary stratification theory and research. *Prerequisite:* Six hours of sociology. Three hours. Danigelis, Finney, Nixon, Mabry, McCann, Mintz, Sampson, Schmidt, Stedman.

237 Occupations and Professions Analysis of social organization of economic roles in industrial societies, the institutional relationships of occupations and professions, and impact of work structure on the individual. *Prerequisite:* Six hours of sociology. Three hours. Finney, Folta, Mintz.

240 Political Sociology Examination of the social organization of power and authority in modern societies and the dynamics and institutional relationships of political institutions, interest groups, parties, and publics. *Prerequisite:* Six hours of sociology. Three hours. Berkowitz, Danigelis, Finney, Nixon, Loewen, Mintz.

241 Methods of Public Opinion Research Methods used in conducting public opinion research, emphasizing design, sampling, questionnaire construction, administration, data control, and the analysis of cross-sectional, longitudinal and time series data. *Prerequisite:* 100 or equivalent with permission of instructor. Three hours. Berkowitz, Danigelis.

249 Sociology of Knowledge Reviews the development and current status of sociological theory and research concerning the emergence and roles of belief and normative systems in sociocultural organization and change. *Prerequisite:* Six hours of sociology. Three hours. Loewen, Sampson, Steffenhagen.

254 Sociology of Health and Medicine The social organization and institutional relationships of medicine in society and the role of sociocultural factors in the etiology, definition, identification, and treatment of illness. *Prerequisite:* Six hours of sociology. Three hours. Berkowitz, Folta, Mabry, Stedman.

255 Sociology of Mental Health Analysis of the social structures and processes involved in the identification, definition, and treatment of mental illness and its sociocultural etiology and consequences. *Prerequisite:* Six hours of sociology. Three hours. Folta, Mabry, Steffenhagen.

258 Sociology of Law Analysis of the sociocultural structure of the legal institution and its relationships to other institutions: the social organization of the legal profession, lawmaking, and the courts. *Prerequisite:* Six hours of sociology. Three hours. Folta, Stanfield.

274 Methods of Data Gathering in Social Research Techniques for generating and using observational, interview, survey, and existing source data

to systematically test sociological ideas; includes design, sampling, measurement, and ethical issues. *Prerequisite*: 100 or equivalent with permission of instructor. Three hours. Berkowitz, Danigelis, Loewen, Finney, Folta, Sampson, Schmidt, Stedman.

275 Methods of Data Analysis in Social Research Quantitative analysis of sociological data; includes table, regression, and path analysis, scaling and factor analysis, and the analysis of variance with emphasis on multivariate techniques. *Prerequisite*: 100 or equivalent with permission of instructor. Three hours. Berkowitz, Danigelis, Finney, McCann, Stedman.

278 The Development of Sociological Theory Major classical traditions in sociological theory and their contemporary research relevance. Includes detailed critical examination of the contributions of Marx, Spencer, Durkheim, Weber, Simmel, Pareto, and Mead. *Prerequisite*: Six hours of sociology or equivalent preparation in another social science with permission of instructor. Three hours. Loewen, McCann, Schmidt, Sampson.

279 Contemporary Sociological Theory Critical examination of contemporary functional, conflict, exchange, interactionist, and structural theoretical approaches. A number of other theoretical approaches selected by seminar participants may also be examined. *Prerequisite*: 278. Three hours. Folta, McCann, Sampson.

281, 282 Seminar Presentation and discussion of advanced problems in sociological analysis. *Prerequisites*: Twelve hours of sociology, permission of instructor. Three hours.

285, 286 Internship *Prerequisites*: Twelve hours of sociology including at least one 200-level course in substantive area relevant to field placement, permission of department.

288, 289 Seminar: Research and Methods of Teaching Sociology The development and evaluation of the teaching of sociology. *Prerequisites*: Twelve hours of sociology, permission of department. Open only to graduate students who serve concurrently as teaching assistants in the department. Three hours.

295, 296 Special Topics

297, 298 Readings and Research

Statistics

DIVISION OF ENGINEERING, MATHEMATICS, AND BUSINESS ADMINISTRATION
Statistics Program Steering Committee: Professors McCrorey, Sylwester (Director); Associate Professors Ashikaga, Gordon, Haugh, Howell, Newton, Tashman; Assistant Professor Costanza; Research Assistant Professors Aleong, McAuliffe; Adjunct Assistant Professor Dorsey.

NOTE: A student may receive credit for only one of 111 and 141, unless special permission has been given by the Statistics Program.

51 Discrete Probability Models Introduction to probability emphasizing models of real world phenomena (e.g. genetics, screening for diseases, birth and death processes). *Prerequisite*: Two years of high school algebra. Three hours. No credit for juniors or seniors in the math. sciences.

95 Topics in Statistics Lectures, reports, and directed readings at an introductory level. *Prerequisite*: As listed in course schedule. One to three credit hours as announced.

111 Elements of Statistics Basic statistical concepts, methods and applications; includes correlation, regression, confidence intervals, and hypothesis tests. *Prerequisites:* Two years of high school algebra, sophomore standing. Three hours.

141 Basic Statistical Methods Introductory methods course for students planning to take additional statistics courses or quantitative courses in their respective fields. Development of working knowledge and calculational skills for statistical description, estimation, and hypothesis testing. *Prerequisites:* Math. 18, 19 or 21, sophomore standing. Three hours.

151 Applied Probability Development and application of probability models to real world phenomena. Emphasis on the classical distributions. Introduction to statistical theory used in studying probability models. *Corequisite:* Math. 121. Three hours.

191 Special Projects Student-designed special project under the supervision of a staff member culminating in a report. *Prerequisites:* Junior standing, permission of Program Director. One to four credit hours as arranged.

195 Special Topics For Undergraduate Students Lectures, reports, and directed readings. *Prerequisite:* As listed in course schedule. One to three credit hours as arranged.

211 Statistical Methods I Fundamental ideas and techniques of statistics, with applications, used in experimental design and data analysis including descriptive and inferential statistics, correlation, regression, and analysis of variance. *Prerequisites:* Junior standing, college algebra. Three hours.

221 Statistical Methods II Continuation of 211 concentrating on multiple regression, experimental design, analysis of variance and covariance, and non-parametric methods. Realistic data is used in projects, with calculations performed on UVM computer. *Prerequisites:* Any one of 141, 211, 241, or 262, junior standing. Three hours. Aleong.

225 Applied Regression Analysis (Same as Business Administration 244.) Nature and applications of basic regression-correlation models in investigating relationships, testing hypotheses, and making predictions. Emphasis on developing appropriate models and evaluating existing research. *Prerequisite:* Any one of 111, 141, 211, 241, or 261. Three hours. Tashman.

227 Statistical Methods for the Behavioral Sciences (3-1) (See Psychology 341.)

229 Statistical Methods for the Engineering Sciences Multiple regression and response surface modeling, factorial design of experiments, statistical quality control. Probability distributions used in reliability and life testing. *Prerequisite:* Any one of 141, 211, 241, or 262. Three hours. Haugh.

231 Experimental Design Basic experimental designs, complete and incomplete blocking, factorial designs; response surface methods, fixed and random effects models. *Prerequisite:* Any one of 225, 241, or 262 with permission of instructor; or any one of 221, 227, 229, or 313. Three hours. Aleong.

233 Sample Survey Methods Analysis, applications and comparisons of various sampling schemes: simple and stratified random, systematic, and cluster sampling. *Prerequisite:* Any one of 141, 211, 241, 261, or 313 plus any one of 51, 151, or 251. Three hours. Ashikaga. Alternate years, 1981-82.

235 Multivariate Methods Properties and statistical methods, with applications, for the multivariate normal distribution including discriminant and factor analysis. *Prerequisites:* 241 or 261 plus any one of 221, 225, 227, 229, or 313. Three hours. Ashikaga. Alternate years, 1982-83.

237 Nonparametric Methods Nonparametric procedures for hypothesis tests and confidence intervals, including rank and chi-square tests. *Prerequisite:*

Any one of 141, 211, 241, or 261. Three hours. Alternate years, 1981-82.

241 Introduction to Statistical Inference Continuation of statistical theory begun in 151: parameter estimation, hypothesis testing, chi-square tests, regression analysis, and analysis. *Prerequisite:* 151 or 251. Three hours.

251 Probability Theory (Same as Math. 207.) Non-measure theoretic course in probability, meeting for first 11 weeks of fall semester. Derivation of classical distributions, laws of large numbers, and central limit theorems. *Prerequisite:* Math. 121, Statistics 151 recommended. Three hours. Sylwester.

252a, b, c Stochastic Processes and Time Series Analysis Three one-credit mini-courses.

252a Discrete Processes Random walks, Markov chains, and discrete branching processes. *Prerequisite:* 151 or 251.

252b Continuous Processes Poisson, birth and death, and queueing processes. *Prerequisite:* 151 or 251.

252c Time Series Analysis Autoregressive-moving average models, auto and partial correlation functions, computer modeling. *Prerequisite:* Any one of 141, 211, 225, 241, or 262.

261, 262 Statistical Theory I, II Methods of point and interval estimation, hypothesis testing, and decision theory. Application of general principles to specific areas such as non-parametric tests, sequential analysis, and linear models. *Prerequisites:* For 261: 151 with instructor permission or 241 or 251. For 262: 241 with instructor permission or 261. Credits: 261: one hour, meeting last four weeks of fall semester. 262: four hours. Sylwester.

281 Statistics Practicum Intensive experience in carrying out a complete statistical analysis for a research project in a substantive area with close consultation with the project investigator. *Prerequisites:* One year of statistics, elementary computer programming. One to four credit hours.

293, 294 Undergraduate Honors Thesis A program of reading, research, design, and analysis culminating in a written thesis and oral defense. Honors notation appears on transcript and Commencement Program. Contact Statistics Program Director for procedures. Six to eight credit hours.

295 Special Topics For Advanced Students Lectures, reports, and directed readings on advanced topics. *Prerequisites:* As listed in course schedule. One to four credit hours as arranged.

Technology

DIVISION OF ENGINEERING, MATHEMATICS, AND BUSINESS ADMINISTRATION
Professors Roth, von Turkovich.

The Division of Engineering, Mathematics, and Business Administration offers the following courses on a non-departmental basis.

51 Technology and Society (3-0) Effects of modern technology on society. Non-technological views as well as those of engineers and scientists. Readings from current literature. Group study projects. *Prerequisite:* Sophomore standing. Three hours. von Turkovich.

80 Introduction to System Dynamics (3-0) For biologists, economists, engineers, foresters, geographers, sociologists, and other natural and social scientists. Growth, stagnation, cyclic fluctuations and feedback loops are stressed. Models of industrial, ecological, social, economic, biomedical, political and

engineering systems are studied. *Prerequisite:* Operating experience with UVM computer system desirable. Roth.

201 System Dynamics Seminar (0-3) Review of system dynamics literature. Detailed study of conceptualization, paradigms, generic structures, validation, and implementation. Term project and paper in field of interest of student are required. *Prerequisite:* 80. Roth.

251 Technology and Society Seminar (3-0) Current views on the influence of technology on society through extensive study of contemporary writings and involvement in seminars, discussion, and project assignments. *Prerequisites:* Either 51 or permission of the instructor, senior or graduate standing. Three hours. von Turkovich.

Textiles, Merchandising, and Consumer Studies

COLLEGE OF AGRICULTURE

Associate Professors Atwood, Caldwell, Emanuel (Acting Chairperson); Lecturers Ainsworth, Ashman, Gora; Extension Professor Strassburg; Extension Associate Professor Jodoin.

15 Design (1-4) Design principles from nature applied to visual art. Materials and techniques in composition. Emphasis on color in selection and creation of aesthetic and functional design. Three hours. Caldwell.

16 Sketching and Illustration (1-4) Techniques of sketching, color rendering, and scale drawing in relation to nature forms, the human figure, and interior space. Preparation of portfolio. *Prerequisite:* 15. Three hours.

20 Textiles and Clothing for the Consumer (2-2) Clothing: its impact on wearer and observer. Today's fibers, fabrics, and finishes. Consumer problems and responsibilities in selection, use, and care. Three hours.

22 Apparel Construction and Analysis (1-4) Basic concepts related to apparel construction, pattern and fabric selection. Analysis and evaluation of ready-to-wear. Three hours.

25 Career Seminar An integrated look at the professional aspects and opportunities available to students. Minimum of two credits. Required for majors. One hour.

51 Housing Selection Considerations in selecting living environments for individuals and families including site location, financing, structural, functional, spatial, and aesthetic aspects. Three hours.

54 Household Equipment (2-2) Principles underlying operation and construction of household equipment; use and maintenance, recent developments, estimation of cost, including energy efficiency. Three hours.

56 Consumer Management Principles Application of the management process of decision-making for individuals and/or families in the use of human and material resources. Three hours.

58 Introduction to Consumer Problems An overview of the buyer-seller relationships with emphasis on consumer information and protection. Three hours.

107 Fashion Design and Trend Analysis (1-4) Analysis of 20th century style trends and innovative designers. Planning and rendering original designs. Continuation of portfolio. *Prerequisite:* 16.

114 Weaving: Spinning and Hand Techniques (1-4) An introduction to

spinning and weaving with emphasis on hand methods as practiced in past and present cultures. *Prerequisite:* A course in design. Three hours. Atwood.

115 Textile Design (1-4) Application of design to fabric printing techniques. Emphasis on the use of natural and historical motifs for repeat patterns. *Prerequisites:* 16, 20, or departmental permission. Three hours. Atwood.

116 Weaving (1-4) An introductory course in four harness loom weaving. Application of design fundamentals to woven textiles. *Prerequisites:* 15 and 20, or departmental permission; junior standing. Three hours. Atwood.

117 History of Costume (3-0) Costume throughout history and its inter-relationship to economic, political, social, and cultural settings. Individual projects in areas of special interest. *Prerequisite:* Art 6. Three hours. Caldwell.

118 History of Textiles (3-0) Impact of the textile industry on economic, political, social, and cultural world history. Aesthetic analysis of fabrics and design motifs as related to period styles. *Prerequisites:* 20, Art 6, or permission of instructor. Three hours. Caldwell. Alternate years.

120, 121 Intermediate Textiles (2-2) First semester: Economic and historic aspects of textile industry. Review of textile fiber properties, emphasis on structure-property relationships. Introduction to textile testing and evaluation. Second semester: current developments in yarn and fabric formation, dyeing and finishing. *Prerequisites:* 20, 120 for 121, Chemistry 42. Three hours.

122 Apparel Design I (1-4) Principles of apparel design using flat pattern methods. Garments analyzed for design and construction techniques. Development of basic sloper from which original designs are created. *Prerequisites:* 22 or permission of instructor. Three hours.

125 Retail Management The organization of retail institutions and the functions of personnel management, buying, and merchandising as related to the fashion industry. *Prerequisites:* Economics 11. Three hours.

126 Fashion Marketing and Promotion The marketing concept as it applies to fashion; visual merchandising, advertising and sales promotion, and customer operations. *Prerequisites:* 125, Business Administration 154. Three hours.

151 Housing and Energy Fundamentals of energy; interactions of energy and housing with respect to location, siting, structural aspects, comfort conditioning, water usage, lighting, and appliances. *Prerequisite:* 51. Three hours.

153 Design for Living Interiors (1-4) Planning interior space for function, comfort, beauty, and expression. Study of period and contemporary styles. Selection of furniture and materials. Scale renderings. *Prerequisite:* 16 or permission of instructor. Three hours.

155 Consumer Economics The consumer's role in the economic society with analysis of consumer interactions with public and private institutions. *Prerequisites:* 56, 58, Economics 12. Three hours.

156 Consumer Motivation Analysis of decision-making toward consumer choices from a sociological/psychological perspective. The impact of social class, family structure, cultural background, and behavior. *Prerequisite:* 56. Three hours.

157 Consumer Law Legal aspects of consumerism including historical development, legislation, and case law. *Prerequisite:* 58. Three hours.

159 Home Furnishing Studio Aesthetic and practical problems in design, construction, or restoration of furniture or furnishings for the home. Emphasis varies with semester. Students may enroll more than once. *Prerequisite:* 15 or permission of instructor. Three hours.

222 Apparel Design II (1-4) Creative designing through a combination of flat pattern and draping techniques using design principles. Problems relate

fabrics to the line of the garment. Original projects. *Prerequisites:* 15, 122. Three hours. (Not offered for graduate credit.)

231 Advanced Workshops Independent laboratory work. Emphasis on planning, research, management, techniques, production, and evaluation. Individual projects planned, progress discussed with instructor, and shared with class. *Prerequisite:* Completion of highest level course in concentration. May be repeated with permission of instructor. Three hours. (Not offered for graduate credit.)

258 Consumer Education Seminar Examination and/or development of programs, materials, and research in consumer education. Individual project required. *Prerequisites:* 155 or permission of instructor. Three hours. (Not offered for graduate credit.)

97, 197, 297 Mini-Course Short courses dealing with limited topics offered in various disciplines in home economics. Enrollment may be more than once. *Prerequisite:* Varies with course. One hour.

195 Special Topics Lectures, laboratories, readings, or projects relating to contemporary areas of study. *Prerequisite:* Varies with course. Enrollment may be more than once, accumulation up to 12 hours.

291 Special Problems Reading, discussion, and special field and/or laboratory investigations. *Prerequisite:* Departmental permission. Students may enroll more than once for a maximum of 12 hours. One to six hours.

296 Field Experience Professionally-oriented field experience under joint supervision by faculty and business or community representative. *Prerequisite:* Departmental permission. Credit arranged up to 15 hours.

Theatre

COLLEGE OF ARTS AND SCIENCES

Professor Feidner, Associate Professors Bryan, Cover, Schenk (Acting Chairperson); Assistant Professor Williams.

1 Introduction to Theatre A description of the operation of contemporary American theatre, an overview of dramatic analysis, and an introduction to European and American theatre history. I, II. Three hours. Bryan.

5 Oral Interpretation of Literature The performance of literature that is traditionally non-dramatic. *Prerequisite:* Three hours. I, II. Cover.

10 Acting Development of basic vocabulary and skills necessary for effective acting. Students learn to: relax the body, concentrate attention, focus energies; control and increase body and vocal flexibility; develop inherent histrionic sensibility and imagination. *Prerequisite:* 1. Three hours. I, II. Williams.

15 Stagecraft Scenic elements of play production; analysis of theatre forms, study and application of basic elements of scenery construction. *Prerequisite:* 1. Three hours and lab. I, II. Schenk.

40 Fundamentals of Stage Costuming A primary skills course in the area of stage costuming. *Prerequisite:* 1. Three hours. I, II.

41 Historic Costume for the Stage An overview of period costume and its adaptation for the stage. *Prerequisite:* 1. Three hours. I.

105 Oral Interpretation of Literature *Prerequisites:* 1, 5. Three hours. I, II. May be repeated up to nine credit hours. Cover.

110 Advanced Acting. *Prerequisites:* 10. Three hours. I, II. May be repeated up to nine credit hours. Williams.

115 Basic Scene Design Fundamental principles of scenic design, history, and practice. *Prerequisite:* 1. Three hours. I. Schenk.

120 Stage Lighting Practice and theory in the illumination of stage productions and the creation of aesthetic effects. *Prerequisites:* 1, 15. Three hours. II. Schenk.

125 Dramatic Analysis: Form An examination of the structural characteristics of the basic forms of drama and the manner in which they affect theatrical representation. *Prerequisites:* 1, three additional hours in theatre. Three hours. I, 1981-82. Bryan.

126 Dramatic Analysis: Style Examination of manner in which a playwright's manipulation of parts of a drama is affected by his/her intellectual and cultural milieu and physical shape of theatre for which he/she is writing. *Prerequisites:* 1, three additional hours in theatre. Three hours. I, 1982-83. Bryan.

127 The Classical Theatre Earliest dramatic rituals and the theatres of Greece and Rome as evidenced by historical remains and extant dramas. *Prerequisites:* 1, three hours. I, 1982-83. Bryan.

128 The Medieval and Renaissance Theatre Medieval and Renaissance theatre, accompanied by an evaluation of relevant historical materials and representative dramas. *Prerequisites:* 1, three hours. Three hours. II, 1982-83. Bryan.

129 17th and 18th Century Theatre Dramas and theatrical conditions in Europe and America from the closing of the English theatres to the end of the 18th century. *Prerequisites:* 1, three hours. Three hours. I, 1981-82. Bryan.

130 19th and 20th Century Theatre Backgrounds, theatrical conventions, and dramas representative of Romanticism, Realism, and revolts against Realism. *Prerequisites:* 1, three hours. Three hours. II, 1981-82. Bryan.

140 Stage Costume Design Elements, principles, and styles of design applied to the visual creation of a dramatic character. *Prerequisites:* 1, 40. Three hours. II.

193, 194 College Honors

195, 196 Special Topics

197, 198 Readings and Research

215 Advanced Scene Design Analysis of the drama from the standpoint of its visual creation upon the stage; audience-stage relationships, styles of production. *Prerequisite:* 115. Three hours. II. Schenk. (Not offered for graduate credit.)

243 Repertory Theatre Operation *Prerequisite:* Permission. Summer only. (Not offered for graduate credit.)

250 Play Directing *Prerequisite:* Six hours, including 1 and permission. Three hours. I, II. Feidner. (Not offered for graduate credit.)

283, 284 Seminar (Not offered for graduate credit.)

297, 298 Senior Reading and Research (Not offered for graduate credit.)

Vocational Education and Technology

COLLEGE OF AGRICULTURE

Professor Fuller (Chairperson); Associate Professors Albright, Bloom, Ferreira, Harris, Kelly, Shimel; Assistant Professor Hasazi; Extension Associate Professors Moore, Patterson, Wells; Lecturers Mohler, Zimmerman.

AGRICULTURAL TECHNOLOGY AND INDUSTRIAL EDUCATION

2 General Shop (0-6) Introduction to basic materials, tools, equipment, and processes commonly employed in general shops with emphasis on woodworking and metalworking. Three hours. Zimmerman, Ferreira.

6 Fundamentals of Energy and Power (2-0) Concepts of energy, work, and power. Energy conversion, utilization, and conservation. Alternatives to fossil fuels including solar, wind, biomass, etc. Energy systems for rural areas. Two hours. Wells, Zimmerman.

20 Metalworking Technology (2-2) Common methods, processes, materials, and equipment employed in transforming dimensional metals into useful products. Three hours. Ferreira, Bloom.

30 Woodworking Technology (2-2) Common methods, processes, materials, and equipment employed in transforming wood into useful products. Three hours. Ferreira, Bloom.

100 Welding and Founding (2-2) Oxyacetylene, electric arc, MIG and TIG welding and the methods, processes, and equipment of basic founding. *Prerequisite:* 20 or permission of instructor. Three hours. Ferreira.

105 Machine Tools (2-2) Methods, processes, tools, and related equipment utilized in precision cutting and shaping of metal products. Emphasis on lathe, drill press, milling machine, and surface grinder. *Prerequisite:* 20 or permission of instructor. Three hours. Alternate years, 1982-83. Ferreira.

110 Industrial Production (1-4) Principles, concepts, methods employed in organizing capital, labor, tools, machines for producing identical products. Students function as labor source and mass produce a product. *Prerequisites:* 20 or 30, permission of instructor. Three hours. Alternate years, 1981-82. Ferreira, Bloom.

121 Soil and Water Management (2-0) Small watershed hydrology; elementary hydraulics; water measurement; design of erosion and water control structures; principles of drainage and irrigation. *Prerequisite:* Math. 10 or equivalent; Plant and Soil Science 161 desirable. Two hours. Wells.

122 Soil and Water Management Lab for Agriculture (0-3) Elementary surveying applied to soil and water conservation; design problems in agricultural conservation planning, erosion control structures, drainage, and/or irrigation. *Prerequisite:* 121 (prerequisite or concurrent). One hour. Alternate years, 1981-82. Wells.

123 Soil and Water Management Lab for Recreation and Rural Development (0-3) Field problems in recreational pond design; design of irrigation, drainage, and conservation practices for environmental protection. *Prerequisites:* 121 (prerequisite or concurrent); 122 or knowledge of surveying. One hour. Alternate years, 1982-83. Wells.

131 Light Frame Buildings (2-0) Site planning, building planning, material selection. Functional and structural considerations including heating, ventilating, and insulation. Consideration of environmental relationships. *Prerequisite:* Math. 9 or 10, or permission of instructor. Two hours. Alternate years, 1981-82. Moore, Zimmerman.

132 Building Construction Laboratory (0-2) Principles and practices in rough and finish carpentry, masonry, roofing, and other construction skills. *Prerequisite:* 131 or concurrent. One hour. Alternate years, 1981-82. Moore, Zimmerman.

140 Mobile Power Equipment (2-0) Practical theory, operational procedures, adjustment, preventive maintenance, minor repair, and economic operation of tractors and other internal combustion engine powered equipment. *Prerequisites:* 6, Math. 9, or permission of instructor. Two hours. Zimmerman.

141 Mobile Power Equipment Laboratory (0-2) Shop procedures for repair and service of engines, hydraulics, power trains, and other components of mobile power equipment. *Prerequisite:* 140 or concurrent enrollment. One hour. Zimmerman.

145 Machinery Management (0-2) Principles of selection, operation, adjustment, replacement, preventive maintenance, and management of agricultural and industrial machinery based on optimum economical performance. *Prerequisites:* 6, Math. 9, or permission of instructor. Two hours. Alternate years, 1982-83. Zimmerman.

162 Building Utility Systems (2-2) Wiring systems and applications of electricity, water sources and systems, sewage disposal for agriculture, residences, recreation, and rural development with environmental considerations. *Prerequisites:* Sophomore standing, Math. 9 or 10, or permission of instructor. Three hours. Alternate years, 1982-83. Moore, Zimmerman.

165 Electrical Power and Equipment (2-2) Principles of electricity, circuits and wiring, electrical devices and controls, instrumentation, and basic electronics. *Prerequisites:* 6, Math. 10, Physics 3. Three hours. Alternate years, 1981-82. Ferreira, Moore, Zimmerman.

OCCUPATIONAL AND EXTENSION EDUCATION

52 Introduction to Occupational and Home Economics Education Careers (3-0) Principles and philosophies of occupational and home economics education. Career exploration provided through 30 hours of observation and participation in actual school settings. Three hours. Harris, Mohler.

53, 54 Teaching Internship in Occupational and Home Economics Education Teaching under the guidance of college supervisor, and seminars. For newly-employed teachers who have not completed a formal teaching practicum. *Prerequisites:* Employment as a teacher in an appropriate subject, permission of department. Two hours each. Through Continuing Education. Bloom, Fuller, Harris.

82 Exploring Careers in Adult and Extension Education (3-0) Introduction to adult and extension education techniques. Career exploration provided through 30 hours of observation and participation in actual adult and extension education programs. Three hours. Kelly.

151 Methods and Procedures in Occupational and Home Economics Education (3-0) Three modules of five weeks' duration. Laboratory management, multi-media techniques youth organizations and advisory councils, managing the home economics education program. May enroll for total of three hours. *Prerequisite:* 52. One hour for each module. Ferreira, Fuller, Harris, Mohler.

152 Methods and Procedures in Occupational and Home Economics Education (3-0) Three modules of five weeks' duration. Curriculum development, instructional planning, teaching methods, micro-teaching and test construction. May enroll for total of three hours. *Prerequisite:* 151. One hour for each module. Bloom, Mohler.

155 Teaching Practicum in Occupational and Home Economics Education Teaching in elementary or secondary schools under the guidance of

cooperating teacher and college supervisors. Usually a full-time 16-week experience. *Prerequisites:* 152, acceptance into teacher education. Variable credit, nine to 12 hours. Bloom, Ferreira, Harris, Mohler.

157 Organizing and Managing Occupational Education Laboratories (3-0) Offered through Continuing Education upon request.

158 Evaluating Achievement in Occupationally-Oriented Education (3-0) Offered through Continuing Education upon request.

159 Developing Courses for Occupational Education (3-0) Offered through Continuing Education upon request.

182 Leadership Preparation (3-0) Methods for educators, officers of organizations, and members of groups to improve their leadership ability. Includes group and independent study, observation, and practice. *Prerequisite:* 52 or 82. Three hours. Alternate years, 1982-83. Harris.

183 Communication Methods (2-0) (0-1) Presentation of information through the media of press, radio, television, and audio-visual techniques. *Prerequisite:* 52 or 82 or permission of instructor. Variable credit, two hours lecture, one hour laboratory. Fuller.

184 Adult and Extension Education Experience (3-0) Field work to provide experience in adult or extension education. Supervised jointly by adult educators or extension faculty and department faculty. May enroll more than once. *Prerequisite:* 183 or permission of instructor. Variable credit, three to 12 hours. Fuller, Mohler.

251 Methods for Teaching Occupationally-Oriented Subjects (3-0) Offered through Continuing Education upon request.

270 Educating Students With Special Needs In Vocational Education (3-0) Legal, social, and economic forces affecting vocational programming for special needs students. Various programs, resources, and procedures for educating special learners in vocational education. *Prerequisite:* Admission to an approved teacher certification program or permission of instructor. Three hours. Albright.

271 Workshop in Teaching Students With Special Needs in Vocational Settings Intensive preparation in selecting contemporary instructional strategies and materials, adapting and using equipment in regular and special vocational education programs. *Prerequisites:* Completion of 12 credits in vocational or special education at the 100 or 200 level or permission. Offered during summer sessions. Variable credit; one to three hours; may enroll more than once for total of six credits. Albright, Fuller.

275 Developing Vocational Instruction for Students With Special Needs (3-0) Development of instructional strategies for including handicapped students in vocational education. Procedures for developing, implementing, and evaluating individualized vocational plans. *Prerequisite:* Admission to an approved teacher certification program or permission of instructor. Three hours. Albright, Hasazi.

283 Teaching Adults Problems related to organizing and planning adult education programs for schools, community organizations, government agencies, or business. Techniques for teaching adults analyzed. *Prerequisites:* Senior standing, 82 or 52 and 182, or permission of instructor. Three hours. Kelly.

SPECIAL STUDY AND RESEARCH

150 Technical Internship Planned, supervised, off-campus work experience. Technical theory plus practical application in field experiences. May enroll more than once up to 30 hours. Employment coordinated through University Cooperative Education Program. *Prerequisites:* Voc. Ed. majors-52, admis-

sion to teacher education, permission of instructor; Agr. Tech. majors-12 hours VOTC, permission of instructor. Credit as arranged. Summer. I, II.

197 Special Problems Individual investigation of a problem selected to meet special needs of students. May enroll more than once up six hours. *Prerequisites:* Six hours, departmental permission. Credit as arranged. Summer. I, II.

199 Senior Technology Laboratory Utilizing and synthesizing the total technology educational experience to formulate and solve practical problems, under the guidance of a faculty member. *Prerequisites:* Twelve hours VOTC at 100 level, department permission. One to three hours. Summer. I, II.

292 Seminar Reports, discussions, and investigations in selected fields. Students may enroll more than once for total of six hours. *Prerequisites:* Six hours VOTC at 100 level, permission of instructor. One to three hours. I, II.

295 Special Topics Lectures, laboratories, and/or readings and reports to provide background and specialized knowledge relating to contemporary areas of study. May enroll more than once up to nine hours. *Prerequisites:* Senior standing, six hours 100 level, departmental permission. Credit as arranged. Summer. I, II.

Wildlife and Fisheries Biology

SCHOOL OF NATURAL RESOURCES

Associate Professors Hirth, LaBar (Program Chairperson); Assistant Professors Capen, Fuller.

74 Fundamentals of Wildlife Conservation An elementary course to acquaint non-majors with the historical, ecological, and administrative foundations associated with appreciative and consumptive uses of wildlife. Not open to Wildlife Biology majors. *Prerequisite:* Sophomore standing or instructor permission. Three hours. Fuller.

83 Introductory Wildlife and Fisheries Seminar Introduction to wildlife profession. Function of professional wildlife biologists in society. Introduction to topics concerning wildlife populations, legislation, administration, and management. Preference to Wildlife Biology majors. One hour. Capen.

130 Ornithology Identification, taxonomy, behavior, ecology, and field studies of birds, emphasizing resident species. *Prerequisite:* Biology 1, 2 or equivalent. Four hours. Capen. (Summer Session).

151 Wildlife Biometry Measurement, analysis, description, and mapping of wildlife habitat; censusing and surveying wildlife populations. *Prerequisites:* Forestry 122, 144. Four hours. Fuller, Capen.

161 Fisheries Biology Detailed life histories of major sport and forage fish species. Overview of traditional and contemporary fishery management principles and practices including censusing, sampling of fish populations, and determination of parameters necessary for intelligent management of fish stocks. *Prerequisites:* Biology 1, 2 or equivalent. Four hours. LaBar.

165 Endangered Species Management Ecological and political management of endangered vertebrates in North America; recovery efforts for selected species. *Prerequisites:* 74 or 174, junior standing. Two hours. Capen.

174 Principles of Wildlife Management Plant and animal ecology applied to management of wildlife populations; properties of species, populations, and habitats; consideration of game, nongame, and endangered species. *Pre-*

requisites: Biology 1, 2 or equivalent, an ecology course or concurrent enrollment. Three hours. Fuller.

175 Wildlife Behavior Behavior and social organization of game and nongame species as they pertain to population management. *Prerequisites:* One year of biology, an ecology course, 74 or 174 recommended. Three hours. Hirth.

185, 186 Special Topics

187, 188 Undergraduate Special Projects Individual projects supervised by a faculty member. Projects may involve independent field, laboratory, or library investigations. Formal report required. *Prerequisites:* Junior standing, submission of a project prospectus for permission. One to five hours total enrollment.

232 Ichthyology Biology of fishes. Study of the structure and function of systems; behavior and ecology of modern fishes. *Prerequisites:* Zoology 104 or 219 or equivalent. Three hours. LaBar.

264 Nongame Wildlife Management Selected topics which emphasize nongame birds and mammals: endangered species, vertebrate pests, urban wildlife, specialized survey and management practices. *Prerequisite:* 174. Three hours. Capen.

271 Wetlands Wildlife Ecology Life histories and management emphasizing North American waterfowl and furbearers: integration of aesthetic, ecological, recreational, and socioeconomic values with contemporary uses of land and water. Field studies and one weekend trip. *Prerequisites:* Courses in ornithology and mammalogy, 174. Four hours. Fuller.

272 Uplands Wildlife Ecology Integration of ecological principles, wildlife biology, land use, and human dimensions in wildlife. Emphasis on development and maintenance of wildlife habitat, and population regulation of upland species. *Prerequisites:* Courses in ornithology and mammalogy, 151, 174. Four hours. Hirth.

281, 282 Wildlife Seminar A topical seminar in contemporary issues of fish and wildlife conservation presented by students, faculty, and visiting personnel. Permission. One hour. (Not offered for graduate credit.)

285, 286 Advanced Special Topics

287, 288 Graduate Special Projects Advanced readings and discussions or special field and/or laboratory investigations dealing with a topic beyond the scope of existing formal courses. *Prerequisite:* Undergraduate major in wildlife biology or ecology. Others by permission. Credit arranged. (Not offered for graduate credit.)

Zoology

COLLEGE OF ARTS AND SCIENCES

Professors Bell, Glade, Happ (Chairperson), Heinrich, Henson, Potash; Associate Professors Davison, Kilpatrick, Landesman, Stevens; Assistant Professors Herbers, Pennypacker, Schall, VanHouten.

Biology

1, 2 Principles of Biology (3-3) Introduction to structure, functions, and evolution of animals and plants. Concepts important for advanced study in a life science and for understanding the biological world. *Prerequisite:* 1 for 2. Four hours.¹

3 Biology and Man An introduction for nonscience majors. Selected

biological topics relevant to man such as cancer, human genetics, environmental toxicants; biological concepts necessary for understanding these problems. *No prerequisite.* Three hours. I, II. Landesman.¹

7 Biological Aspects of Environmental Problems The harmful biological impact of air and water pollutants; their physiological, genetic, and ecological action on plants and animals, particularly man. Three hours. II. Potash. (Not offered 1981-82).

101 Genetics Structural basis of inheritance; gene mutations; chromosomal aberrations; genes and enzymes; gene action in differentiation; genetics of populations; nonchromosomal inheritance. *Prerequisites:* 1, 2; organic chemistry recommended. Three hours. II. Van Houten.

102 Environmental Biology (3-3) An ecological introduction to adaptation of organisms and populations, and to the structure and dynamics of biological populations, natural communities, and the biosphere. *Prerequisites:* 1, 2. Four hours. I. Herbers.

103 Cell Structure and Function (3-3) Structure and physiology of cells, with emphasis on basic features common to all forms of life. *Prerequisites:* 1, 2, chemistry. Four hours. Happ.

105 Genetics Laboratory (0-3) Illustration of concepts presented in Biology 101. *Prerequisites:* 101 or concurrent enrollment, permission of instructor. One hour. II. Van Houten.

203 Population Ecology Analysis of growth, regulation, and interrelations of biological populations in theoretical, laboratory, and natural systems. Biology 102. Three hours. II. Herbers. Alternate years, 1981-82.

Zoology

5-6 Human Anatomy and Physiology (3-2) Dissection of the cat, plus various vertebrate organs, with direct comparisons to corresponding structure in the human body; physiological experiments; microscopic study of tissues. Three hours. Stevens, Schall.²

9 Introductory Zoology Principles of zoology from the cellular to the organismal level, including animal diversity, elementary genetics, evolutionary biology, and the relationship between form and function of the vertebrate. Four hours. Glade.³

104 Comparative Structure and Function (3-3) Anatomy and physiology of organs and organ systems in animals with emphasis on basic physiology common to all forms. *Prerequisite:* Biology 103. Four hours. Pennypacker.⁴

193, 194 College Honors

195, 196 Special Topics

197, 198 Undergraduate Research Individual laboratory research under the guidance of a faculty member. *Prerequisites:* Junior or senior standing, departmental permission. Three or six hours.

¹Credit will not be given for both Biology 1, 2 and Botany 4, or Zoology 9. Credit will not be given for both Biology 1, 2 and Biology 3. Botany and Zoology majors will not receive credit for Biology 3.

²May be taken for credit in the College of Arts and Sciences but does not satisfy the requirements of a course in biology for premedical and pre dental students. Students will not receive credit for both this course and Zoology 104 or Zoology 9.

³This course is not intended for students who plan to become Biology or Zoology majors but may be taken by transfer students who have already taken a semester of botany. Credit will not be allowed for both Zoology 9 and Biology 1, 2 or Zoology 5-6.

⁴Students will not receive credit for Zoology 104 and Zoology 5-6, nor for Zoology 104 and Anatomy 9 and/or Physiology 10.

209 Field Zoology (2-4) Collection and identification; study of local habitats, their nature, and adaptations to them; factors governing distribution; methods of preparing study specimens. *Prerequisite:* 104 or Biology 102. Four hours. Bell.

211 Embryology (2-4) Principles exemplified by typical invertebrate and vertebrate embryos. *Prerequisite:* 104. Four hours. Glade.

212 Comparative Histology (2-4) Anatomy of tissues, chiefly vertebrate. Tissue similarities and specializations of organs among the various groups of animals in relation to function. *Prerequisite:* 104. Four hours. Glade.

216 Human Genetics Inheritance; population genetics; interaction of heredity and environment; application to human problems. *Prerequisite:* Biology 101. Three hours.

217 Mammalogy (3-3) Classification, identification, morphology, evolution, behavior, and distribution. *Prerequisite:* Biology 102. Four hours. Kilpatrick. Alternate years, 1981-82.

219 Comparative and Functional Vertebrate Anatomy (2-4) Structure, function, and phylogeny; survey of evolutionary and functional trends; investigation of the structure of all chordate groups. *Prerequisite:* 104. Four hours. II. Kilpatrick. Alternate years, 1981-82.

222 Experimental Embryology (2-6) Theoretical approach based on research in embryology, genetics, physiology, bacteriology, and related fields. *Prerequisites:* 211, departmental permission. Four hours. Glade. Alternate years, 1982-83.

223 Biochemical Embryology Biochemical and structural differentiation of cells and tissues during oogenesis and embryogenesis. *Prerequisites:* 101, 211. A course in biochemistry is recommended. Three hours. II. Landesman. Alternate years, 1981-82.

225 Environmental Physiology (2-4) Processes by which animals cope with moderate, changing, and extreme environments. *Prerequisites:* Biology 102, 104. Four hours. II. Heinrich.

231 Cell Physiology (2-4) Experimental techniques used to elucidate chemical and physical mechanisms within living cells. *Prerequisites:* Biology 103, Chemistry 141, 142, departmental permission. Four hours. Pennypacker. Alternate years, 1982-83.

236 Limnology (2-4) The ecology of standing waters: the biota of lakes as related to the geological, physical, and chemical conditions of lakes. *Prerequisites:* Biology 102, introductory chemistry, junior standing. Four hours. I. Henson. (Not offered 1981-82).

237 Ecology of Running Waters (2-4) Stream and river environments, adaptations of organisms to varying physical, chemical, and biotic conditions. *Prerequisites:* Biology 102, introductory chemistry, junior standing. Four hours. Potash. (Not offered 1981-82).

250 Invertebrate Zoology (2-4) Anatomy, physiology, and life histories of representatives of the more important phyla. Four hours. Henson. (Not offered 1981-82).

255 Comparative Animal Physiology (2-6) General principles of function in invertebrates and vertebrates. *Prerequisites:* 104, Chemistry 141, 142. Four hours. II. Davison.

262 Biological Basis of Behavior The structure and function of neural and hormonal mechanisms involved in animal behavior with emphasis on phylogeny. *Prerequisite:* Biology 103 or permission of instructor. Three hours. Stevens. Alternate years, 1982-83.

202 Quantitative Biology Mathematical concepts applied to biological problems such as growth, metabolism, temperature effects, kinetics, and graphic interpretation of data. Statistics not treated. *Prerequisite:* At least one intermediate level course in biology, Math. 9, or permission of instructor. Three hours. I. Davison.

208 General Entomology (2-4) Morphology, physiology, and evolution of insects. *Prerequisite:* 104 or Biology 102. Four hours. Bell. Alternate years, 1982-83.

270 Modern Evolutionary Theory Contributions of modern research in genetics, systematics, distribution, experimental embryology, serology, and related fields to problems of evolutionary change. *Prerequisite:* Biology 101 (Biology 102 recommended). Three hours. Kilpatrick. Alternate years, 1982-83. mended). Three hours. Kilpatrick. Alternate years, 1982-83.

271 Advanced Limnology Analyses of current concepts and problems. *Prerequisite:* 236. Four hours. II. Henson. (Not offered 1981-82).

281 through 283 Seminar Review and discussion of current zoological research. Graduate students and seniors in zoological research programs may enroll. Without credit.

295, 296 Special Topics

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Emeriti Faculty

ABAJIAN, JOHN, JR., M.D.	Professor of Anesthesiology
ADAMS, WILLIAM RITCHIE, Ph.D.	Professor of Forestry
ALLEN, SINCLAIR T., JR., M.D.	Professor of Medicine
AMIDON, ELLSWORTH L., M.D.	Professor of Medicine
ANSBACHER, HEINZ, Ph.D.	Professor of Psychology
ARNOLD, EARL LEE, Ph.D.	Professor of Agricultural Engineering
BAILEY, FLORENCE EMILY, M.S.	Professor of Home Economics
BANDEL, BETTY, Ph.D.	Professor of English
BARNEY, BERNARD B., M.D.	Associate Professor of Surgery
BENNETT, HOWARD GORDON, A.M.	Professor of Music
BLAIR, ALICE J., B.S.	Extension Associate Professor in Extension Service
BLISS, FRANCIS R., Ph.D.	Professor of Classics
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BROWN, MARION HUNTINGTON, M.S.	Professor of Home Economics Education
BUXTON, BEATRICE F., M.S.	Extension Associate Professor in Extension Service
CARRIGAN, JOSEPH EDWARD, A.M., LL.D.	Dean, College of Agriculture and Home Economics
CHAMBERS, ALFRED H., Ph.D.	Professor of Physiology and Biophysics
CHITTICK, RUPERT ADDISON, M.D.	Professor of Psychiatry
COLBURN, FRANCIS P., Ph.B.	Professor of Art
CROOKS, GEORGE, Ph.D.	Professor of Chemistry
CUSHING, SHIRLEY A., B.S.	Extension Assistant Professor in Extension Service
DAGGETT, MALCOLM DANIEL, Ph.D.	Professor of Romance Languages
DAVISON, ROBERT P., M.E.	Extension Professor in Extension Service
DEAN, LEON W., A.B.	Associate Professor of English
DEFORREST, JOHN BELLOWES, Ph.D.	Professor of Romance Languages
DOLL, CHARLES GEORGE, Ph.D.	Professor of Geology
DONAGHY, RAYMOND M.P., M.D.	Professor of Neurosurgery
DOREMUS, HENRY M., D.V.M.	Associate Professor of Animal Pathology
DUCHACEK, HOWARD, M.S.	Professor of Mechanical Engineering
DUNIHUE, FRED W., Ph.D.	Professor of Anatomy
DWORK, JULIUS S., Ph.D.	Associate Professor of Mathematics
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GLADSTONE, ARTHUR A., M.D.	Professor of Surgery
GOULD, NATHANIEL, M.D.	Associate Professor of Orthopaedics and Rehabilitation

- GREGG, DONALD C., Ph.D. Professor of Chemistry
 GREIF, EDWIN C., M.S. Professor of Business Administration
 HENDERSON, DONALD CEDRIC, M.S. Associate Professor of Poultry Science
 HORTON, CHESLEY P., M.E. Extension Assistant Professor In Extension Service
 HOUSTON, CHARLES S., M.D. Professor of Epidemiology and Environmental Health
 HUBER, ROBERT BRUCE, Ph.D. Edwin P. Lawrence Forensic Professor of Speech
 HUGHES, MURIEL JOY, Ph.D. Professor of English
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 LEAMY, WILLIAM P., M.S. Extension Associate Professor of Animal Sciences
 LEPESCHKIN, EUGENE, M.D. Professor of Medicine
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 LUCARINI, CARL, A.M. Assistant Professor of Chemistry
 LUSE, ELEANOR, Ph.D. Professor of Speech
 MAECK, JOHN V., M.D. Professor of Obstetrics and Gynecology
 MARTINEK, FRANK, Ph.D. Professor of Mechanical Engineering
 MAYBURY, SALLY BERRY, Ed.D. Associate Professor of Commerce and Economics
 MELVILLE, DONALD B., Ph.D. Professor of Biochemistry
 MILBANK, REGINALD VENN, M.S. Professor of Civil Engineering
 MILLER, DONALD B., M.D. Associate Professor of Thoracic and Cardiac Surgery
 MILLS, ISABEL CLARK, M.A. Associate Professor of Art
 MOODY, PAUL AMOS, Ph.D. Howard Professor of Natural History and Professor of Zoology
 MORSE, ELLEN HASTINGS, Ph.D. Professor of Nutrition
 NEWHALL, CHESTER ALBERT, M.D. Thayer Professor of Anatomy
 NEWLANDER, JOHN ALVIN, Ph.D. Professor of Animal and Dairy Science
 NICHOLSON, GEORGE HUBERT, M.A. Associate Professor of Mathematics
 NYQUIST, ELBERT A., M.S. Professor of Business Administration
 OAKLEY, LENA RAUB, M.A. Associate Professor of Nursing
 PAGANUZZI, PAUL N., Ph.D. Professor of Russian
 PAPPOUTSAKIS, IPPOCRATES, M.Mus. Professor of Music
 PARKER, MALCOLM S., D.M.L. Associate Professor of Romance Languages
 PHILLIPS, C. ALAN, M.D. Professor of Medicine
 POPE, WILLARD BISSELL, Ph.D. Professor of English
 POST, ARCHIBALD THOMSON, Ed.M. Associate Professor of Physical Education for Men
 POWELL, AGNES T., M.S. Associate Professor of Human Nutrition and Foods
 PUTNAM, HERBERT EVERETT, Ph.D. Associate Professor of History
 QUINBY, PHYLLIS MELVILLE, B.S. Associate Professor of Dental Hygiene
 RAYNOR, LOUISE ADELE, Ph.D. Associate Professor of Botany
 ROWELL, LYMAN S., M.S., L.H.D. President and Associate Professor of Zoology
 SCHULTZ, HAROLD S., Ph.D. Professor of History
 SCHUMACHER, GEORGE A., M.D. Professor of Neurology
 SIMS, ETHAN A. H., M.D. Professor of Medicine
 SLAVIN, WILLIAM J., M.D. Professor of Obstetrics and Gynecology
 SOULE, ARTHUR BRADLEY, JR., M.D. Professor of Radiology

SPROSTON, THOMAS JR., Ph.D.	Professor of Botany
STARK, ERNEST, M.D.	Professor of Pathology
STEELE, DORIS H., Ph.D.	Extension Professor in Extension Service
STEPHENSON, JOHN F., M.E. Ed.	Extension Professor in Extension Service
STONE, WILLIAM W., M.A.	Extension Professor in Extension Service
STULTZ, WALTER ALVA, Ph.D.	Professor of Anatomy
SUMNER, J. WILLIAM, B.S.	Extension Assistant Professor in Extension Service
TAYLOR, FRED H., Ph.D.	Professor of Botany
TREIAL, KARL, M.D.	Clinical Instructor of Psychiatry
TUTHILL, ARTHUR F., M.S.	Professor of Mechanical Engineering
URE, HELENA A., M.S.	Associate Professor of Professional Nursing
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YOUNG, WILLIAM GREENHILL, M.D.	Associate Professor of Psychiatry
ZIMMERLI, ELIZABETH K., Ed.D.	Associate Professor of Physical Education

FACULTY

Dates after names represent the year of appointment, either original or following a lapse of service.

ABAJIAN, JOHN C., M.D. (1974)	Assistant Professor of Anesthesiology
ABARBANEL, JACK A., D.O. (1979)	Assistant Professor of Radiology
ABBOTT, DONALD W., M.D. (1981)	Associate Professor of Family Practice
ABRAMS, JEROME S., M.D. (1969)	Professor of Surgery
ABRUSCATO, JOSEPH A., Ph.D. (1969)	Professor of Professional Education and Curriculum Development
ABSHER, P. MARLENE, Ph.D. (1979)	Research Assistant Professor in Medicine
ABSHER, RICHARD G., Ph.D. (1968)	Professor of Electrical Engineering and Associate Professor of Computer Science
ACHENBACH, THOMAS M., Ph.D. (1979)	Professor of Psychiatry and Psychology
ADAMS, DAVID L., M.D. (1981)	Clinical Assistant Professor of Medicine
ADLER, DIANE F., B.A. (1981)	Lecturer in Romance Languages
ADLER, KENNETH, Ph.D. (1979)	Research Assistant Professor of Pathology
AGNE, RUSSELL M., Ph.D. (1969)	Professor of Professional Education and Curriculum Development
AINSWORTH, JUNE H., M.A.L.S. (1978)	Lecturer in Textiles, Merchandising and Consumer Studies
AITKEN, PHIL A., M.D. (1977)	Assistant Professor of Ophthalmology
ALBARELLI, HENRY P., (1969)	Clinical Instructor in Medical Technology
ALBEE, GEORGE W., Ph.D. (1971)	Professor of Psychology

- ALBERTINI, RICHARD J., M.D., Ph.D. (1972) Professor of Medicine and Medical Microbiology
- ALBRIGHT, LEONARD O., Ph.D., (1980) Visiting Associate Professor of Vocational Education and Technology and Special Education, Social Work and Social Services
- ALDEN, PETER D., M.D. (1964) Clinical Associate Professor of Medicine
- ALEONG, JOHN, Ph.D. (1976) Research Assistant Professor, Dean's Office, College of Agriculture, Lecturer in Mathematics
- ALEXANDER, ALAN, M.D. (1980) Clinical Instructor of Obstetrics and Gynecology
- ALLARD, WILLIAM E., JR., M.D. (1974) Clinical Associate Professor of Medicine and Clinical Assistant Professor of Family Practice
- ALLEN, CHRISTOPHER W., Ph.D. (1967) Professor of Chemistry
- ALLEN, ELIZABETH F., Ph.D. (1979) Research Assistant Professor of Pathology and Lecturer in Zoology
- ALLEN, PRISCILLA W. (1981) Visiting Assistant Professor of Professional Nursing
- ALLEN, WALTER, M.D. (1980) Clinical Associate Professor of Pediatrics
- ALNASRAWI, ABBAS, Ph.D. (1963) Professor of Economics
- ALPERT, NORMAN R., Ph.D. (1966) Professor of Physiology and Biophysics
- AMBROSE, JANE P., M.A. (1965) Associate Professor of Music
- AMBROSE, Z. PHILIP, Ph.D. (1962) Professor of Classics
- AMEN, MICHAEL J., Ph.D. (1980) Visiting Assistant Professor of Political Science
- AMIDON, RICHARD W., M.D. (1949) Clinical Assistant Professor of Medicine
- ANDERSON, LARRY G., M.D. (1981) Clinical Instructor in Medicine
- ANDERSON, RICHARD A., M.D. (1981) Clinical Assistant Professor of Medicine
- ANDERSON, RICHARD L., Ph.D. (1978) Professor of Electrical Engineering
- ANDREA, ALFRED J., Ph.D. (1967) Associate Professor of History
- ANDREWS, ALLAN A., Ph.D. (1970) Associate Professor of Religion
- ANDREWS, SARA W., M.S.L.S. (1969) Library Associate Professor in Dana Medical Library
- ARANSON, ALBERT, M.D. (1981) Professor of Medicine
- ARIANO, MARJORIE A., Ph.D. (1980) Assistant Professor of Anatomy and Neurobiology
- ARMATIS, CAROL M., M.S. (1979) Assistant Professor of Professional Nursing
- ARMSTRONG, FRANK H., Ph.D. (1968) Associate Professor of Forestry
- ARNOLD, DAVID L., M.A. (1979) Assistant Professor of Military Studies
- ARNS, ROBERT G., Ph.D. (1977) Professor of Physics
- ARONSON, JEFFREY B., M.A. (1972) Lecturer in History
- ARONSON, RICHARD A., M.D. (1978) Clinical Assistant Professor of Pediatrics
- ASCHENBACH, WALTER P., (1959) Lecturer in Art
- ASHIKAGA, TAKAMARU, Ph.D. (1973) Associate Professor of Mathematics
- ASHMAN, MARGUERITE G., B.A. (1974) Extension Assistant Professor in Extension Service
- ATHERTON, HENRY V., Ph.D. (1953) Professor of Animal Sciences
- ATHERTON, JANET E., B.Mus. (1981) Instructor in Music
- ATWOOD, ELIZABETH F., M.S. (1966) Associate Professor of Textiles, Merchandising and Consumer Studies
- AUGER, NEWELL A., JR., M.D. (1981) Clinical Associate Professor of Medicine
- AULETTA, FREDERICK J., Ph.D. (1979) Associate Professor of Obstetrics and Gynecology and Biochemistry
- BABBOTT, DAVID A., M.D. (1967) Associate Professor of Medicine and Professional Nursing
- BABBOTT, FRANK L., JR., M.D. (1963) Clinical Associate Professor of Medicine
- BABONIS, THOMAS R., D.O. (1980) Clinical Instructor in Pediatrics
- BACH, MICHAEL C., M.D. (1981) Clinical Assistant Professor of Medicine
- BAKER, ROGER D., M.D. (1971) Clinical Instructor in Pediatrics

- BALCH, DONALD J., Ph.D. (1952)
 BALDWIN, ALBERT F., III, M.S. (1979)
 BALDWIN, WARREN, M.D. (1980)
- BALL, KAREN J., M.S.N. (1978)
 BANN, CHARLES A., Ph.D. (1979)
 BARASCH, ROBERT I., Ph.D. (1977)
 BARBOUR, JAMES R., Ed.D. (1974)
- BARNUM, H. GARDINER, Ph.D. (1965)
 BARRERA, RICARDO D., Ph.D. (1980)
 BARRETT, EVALINE I., M.S. (1968)
- BARRINGTON, DAVID S., Ph.D. (1974)
 BARRON, MARTIN A., M.D. (1981)
 BARTLETT, RICHMOND J., Ph.D. (1958)
 BATES, THOMAS C., M.D. (1967)
- BATES, TIMOTHY M., Ph.D. (1974)
 BATSAKIS, JOHN G., M.D. (1981)
 BATT, MICHAEL, M.D. (1981)
 BAUER, STEPHEN, M.D. (1980)
 BATTELLE, PETER E., M.B.A. (1970)
- BEATY, HARRY N. M.D. (1976)
 BEDARD, LOUISE T. (1970)
 BEEKEN, WARREN L., M.D. (1965)
 BEEKER, BARBARA A., Ed.D. (1977)
 BELINSON, JEROME L., M.D. (1977)
- BELISLE, CHARLES, M.D. (1981)
 BELL, ROSS T., Ph.D. (1955)
 BELL, ROY W., F.A.C.A. (1969)
 BELHOUSE, DOROTHY E., B.S. (1975)
 BELLINO, FRANCIS A., M.D. (1981)
 BENNETT, HARRY, M.D. (1980)
- BENNET, EBEN, M.D. (1980) *Clinical Associate Professor of Obstetrics and Gynecology*
 BERGDAHL, DALE R., Ph.D. (1977) *Assistant Professor of Forestry*
 BERGNER, ARTHUR, M.D. (1970) *Clinical Associate Professor of Medicine*
 BERGNER, RENEE S., M.D. (1970) *Clinical Professor of Pediatrics*
 BERKOVICH, SUMNER, M.D. (1980) *Clinical Associate Professor of Pediatrics*
 BERKOWITZ, STEPHEN D., Ph.D. (1980) *Assistant Professor of Sociology*
 BERNSTEIN, ELIZABETH R., B.A. (1977) *Clinical Instructor in Psychiatry*
 BERNSTEIN, RICHARD A., M.D. (1976) *Assistant Professor of Psychiatry*
 BERTOCCI, PAUL V., M.D. (1976) *Clinical Assistant Professor of Family Practice*
- BEVINS, MALCOLM I., M.S. (1956) *Extension Professor of Agricultural and Resource Economics*
 BEVINS, THOMAS M., B.S. (1979) *Lecturer in Physical Therapy*
 BIDDLE, ARTHUR W., Ph.D. (1970) *Assistant Professor of English*
 BIGALOW, CHARLES W., M.S. (1964) *Extension Associate Professor in Extension Service*
- BIGOS, S. THOMAS, M.D. (1981) *Assistant Professor of Medicine*
 BINGHAM, RICHARD L., M.S.W. (1975) *Clinical Associate Professor of Psychiatry*
- Professor of Animal Sciences*
Lecturer in Electrical Engineering
Clinical Assistant Professor of Obstetrics and Gynecology
Instructor in Technical Nursing
Assistant Professor of Political Science
Adjunct Assistant Professor of Psychology
Associate Professor of Early Childhood and Human Development
Associate Professor of Geography
Visiting Assistant Professor of Psychology
Associate Professor of Professional Nursing
Assistant Professor of Botany
Clinical Associate Professor of Pediatrics
Professor of Plant and Soil Science
Clinical Associate Professor of Pediatrics
Associate Professor of Economics
Professor of Pathology
Clinical Instructor in Medicine
Clinical Assistant Professor of Pediatrics
Assistant Professor of Business Administration
Professor of Medicine
Clinical Assistant Professor of Medicine
Professor of Medicine
Professor of Professional Nursing
Assistant Professor of Obstetrics and Gynecology
Associate Professor of Family Practice
Professor of Zoology
Associate Professor of Anesthesiology
Lecturer in Dental Hygiene
Clinical Assistant Professor of Family Practice
Clinical Associate Professor of Obstetrics and Gynecology
Clinical Associate Professor of Obstetrics and Gynecology
Assistant Professor of Forestry
Clinical Associate Professor of Medicine
Clinical Professor of Pediatrics
Clinical Associate Professor of Pediatrics
Assistant Professor of Sociology
Clinical Instructor in Psychiatry
Assistant Professor of Psychiatry
Clinical Assistant Professor of Family Practice
Extension Professor of Agricultural and Resource Economics
Lecturer in Physical Therapy
Assistant Professor of English
Extension Associate Professor in Extension Service
Assistant Professor of Medicine
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 Library Professor in Bailey/Howe
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 Professor of Medicine
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 COOKE, ROGER L., Ph.D. (1968) Professor of Mathematics
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 COSTANTE, JOSEPH F., M.S. (1976) Extension Assistant Professor in Plant and
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 COSTANZA, MICHAEL C., Ph.D. (1977) Assistant Professor in Mathematics
 COTE, LUCIEN M., B.S. (1969) Clinical Instructor in Medical Technology
 COUGHLIN, CAROL, B.S. (1980) Clinical Instructor in Medical Technology
 COUNTS, DAVID F., Ph.D. (1980) Research Assistant Professor of Biochemistry
 COVER, JENNIFER A., M.S. (1972) Associate Professor of Theatre
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CUTRONEO, KENNETH R., Ph.D. (1976)
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Clinical Instructor in Medicine
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- DRANSFIELD, DOUGLAS A., M.D. (1980) Clinical Instructor in Pediatrics
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- DUNKLEY, THOMAS C., M.Ed. (1966) Assistant Professor of Physical Education, Health, and Learning Studies
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 Obstetrics and Gynecology*
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and Foods
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- SCHMIDKE, HENRY H., M.D. (1978) Professor of Neurosurgery
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 WALD, STEVEN L., M.D. (1981)
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 WAY, WINSTON A., M.S. (1951)
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 WEBBER, PETER B., M.D. (1981)
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 WEED, LAURA B., M.D. (1969)
 WEED, LAWRENCE L., M.D. (1969)
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 WEINER, SHELDON, M.D. (1970)
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 WELLER, DAVID L., Ph.D. (1967)
 WELLS, GRANT D., Ph.D. (1974)
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 Associate Professor of Botany
 Assistant Professor of Surgery
 Assistant Professor of Professional Nursing
 Lecturer in Special Education,
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 Lecturer in Plant and Soil Science
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 Professor of Mechanical Engineering
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 Clinical Instructor in Medicine
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 Clinical Professor of Medicine
 Professor of Medicine
 Clinical Instructor in Medicine
 Assistant Professor of Neurosurgery
 Extension Associate Professor in
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 Lecturer in Plant and Soil Science
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 Curriculum Development
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 Extension Professor in Plant and Soil Science
 Associate Professor of Psychiatry
 Associate Professor of Physiology and Biophysics
 Clinical Instructor of Medicine
 Professor of Agricultural and Resource Economics
 Clinical Associate Professor of Medicine
 Professor of Medicine
 Professor of Romance Languages
 Professor of Psychiatry
 Assistant Professor of Music
 Professor of Animal Sciences
 Professor of Microbiology and Biochemistry
 Extension Assistant Professor of Vocational
 Education and Technology
 Associate Professor of Anatomy and Neurobiology
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 WHATLEY, JANET E., Ph.D. (1973)
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 WHITE, WILLIAM N., Ph.D. (1963)
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 WHITMORE, ROY A., JR., M.F. (1958)
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 WIGNESS, CLYDE, R., D.M.A. (1970)
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 WILKIS, JOSEPH, M.D. (1980)
 WILKOFF, WILLIAM G., M.D. (1980)
 WILLARD, JOHN M., M.Ed. (1980)
 WILLIAMS, RONALD W., Ph.D. (1970)
 WILLIAMS, STUART E., M.D. (1980)
 WILLIAMS, SUSAN A., M.D. (1980)
 WILLIAMS, JUDITH W., Ph.D. (1978)
 WILLIAMS, WAYNE, W., Ph.D. (1976)
 WILLMUTH, LEWIS R., M.D. (1970)
 WILSON, MARY S., Ph.D. (1969)
 WILSON, THOMAS G., Ph.D. (1979)
 WING, DELIGHT A., M.D. (1979)
 WINN, WASHINGTON C., JR., M.D. (1977)
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 Lecturer in Romance Languages
 Associate Professor of Romance Languages
 Clinical Associate Professor of Medicine
 Lecturer in Special Education,
 Social Work and Social Services
 Extension Professor in Extension Service
 Associate Professor of Romance Languages
 Lecturer in Physics
 Clinical Assistant Professor of
 Plastic Surgery
 Lecturer in Plant and Soil Science
 Clinical Assistant Professor of Pediatrics
 Professor of Chemistry
 Assistant Professor of Romance Languages
 Associate Professor of Physiology and Biophysics
 Professor of Forestry
 Lecturer in Physical Education, Health,
 and Learning Studies
 Clinical Associate Professor of Pediatrics
 Clinical Assistant Professor of Pediatrics
 Associate Professor of Special
 Education, Social Work, and Social Services
 Professor of Plant and Soil Science
 Associate Professor of Music
 Extension Assistant Professor of
 Animal Sciences
 Clinical Instructor in Pediatrics
 Clinical Assistant Professor of
 Obstetrics and Gynecology
 Clinical Assistant Professor of Pediatrics
 Lecturer in Special Education,
 Social Work and Social Services
 Professor of Electrical Engineering
 Clinical Assistant Professor of
 Family Practice
 Clinical Assistant Professor of Pediatrics
 Assistant Professor of Theatre
 Assistant Professor of Special Education,
 Social Work, and Social Services
 Associate Professor of Psychiatry
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 Clinical Assistant Professor of Medicine
 Clinical Instructor in Pediatrics
 Lecturer in Professional Education and
 Curriculum Development
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WOODRUFF, WILLIAM A., L.M.C.C. (1962)	Associate Professor of Psychiatry
WOODS, HAROLD D., M.E. (1969)	Instructor in Professional Education and Curriculum Development
WOODWORTH, ROBERT C., Ph.D. (1961)	Professor of Biochemistry
WOOLF, ARTHUR G., Ph.D. (1980)	Instructor in Economics
WOOLFSON, A. PETER, Ph.D. (1970)	Associate Professor of Anthropology
WOOLFSON, ANNE M., M.A. (1976)	Lecturer in Professional Education and Curriculum Development
WOOTTON, DOROTHY J., M.S. (1973)	Associate Professor of Dental Hygiene
WORDEN, JOHN K., Ph.D. (1970)	Associate Professor of Communication
WORLEY, IAN A., Ph.D. (1970)	Associate Professor of Botany
WRIGHT, ALICE, B.S. (1969)	Extension Assistant Professor in Human Nutrition and Foods
WRIGHT, ALICE L., M.D. (1971)	Clinical Assistant Professor of Psychiatry
WRIGHT, ROBERT K., Ph.D. (1966)	Professor of Mathematics
WRIGHT, WILLIAM C., M.D. (1974)	Clinical Assistant Professor of Pediatrics
WULFF, CLAUS A., Ph.D. (1965)	Professor of Chemistry
WYMAN, DAVID S., M.D. (1981)	Clinical Assistant Professor of Medicine
WULFF, CLAUS A., Ph.D. (1965)	Professor of Chemistry
YADAV, DHARAM P., Ph.D. (1970)	Associate Professor of Communication
YARIAN, STANLEY O., Ph.D. (1970)	Assistant Professor of Religion
YARNELL, JUDITH H., M.A. (1978)	Instructor in English
YATES, H. TAYLOR, M.D. (1978)	Clinical Instructor in Pediatrics
YATES, JEROME W., JR., M.D. (1974)	Professor of Medicine
YOUNG, BARBARA E., B.S. (1975)	Extension Instructor in Extension Service
YOUNG, PAUL C., M.D. (1972)	Associate Professor of Pediatrics
YOUNG, WILLIAM J., II, Ph.D. (1968)	Professor of Anatomy and Neurobiology
YOUNGS, DAVID, M.D. (1980)	Clinical Assistant Professor of Obstetrics and Gynecology
ZABLOTSKY, NEVIN, D.M.D. (1978)	Clinical Instructor in Dental Hygiene
ZARATE, ARMANDO E., Ph.D. (1970)	Professor of Romance Languages
ZERNER, JOHN, M.D. (1980)	Clinical Associate Professor of Obstetrics and Gynecology
ZIMMERMAN, ALLEN P., M.S. (1979)	Lecturer in Vocational Education and Technology
ZIMMY, NANCY J., M.S. (1980)	Lecturer in Physical Therapy
ZISKIN, MARVIN C., M.D. (1979)	Adjunct Professor of Physics
ZIV, MOSHE, M.D. (1978)	Assistant Professor of Otolaryngology
ZUCKER, BARBARA M., M.F.A. (1979)	Professor of Art

Associates in Research

BRANNING, MARK D., M.B.A. (1980)	Research Associate in Medicine
BRENNAN, BRIAN W., Ph.D. (1979)	Research Associate in Physics
COMLEY, JOHN C., Ph.D. (1980)	Research Associate in Pharmacology
DAVIS, LAYTON W., B.S. (1973)	Research Associate in Medicine
ECKHARDT, SHOREH B., B.A. (1976)	Research Associate in Pharmacology
HARDING, COURTENAY M., B.A. (1977)	Research Associate in Psychiatry
HERRLICH, HERMAN C., Ph.D. (1955)	Research Associate in Medicine
KILBY, ALAN E., M.D. (1980)	Research Associate in Medicine
LAGRANGE, BETTY M., Ph.D. (1975)	Research Associate in Medicine

LUCCHINA, GEORGE G., Ph.D. (1968)	<i>Research Associate in Physiology and Biophysics</i>
SANFORD, DUDLEY G., M.A. (1978)	<i>Research Associate in History</i>
SCHULTZ, JAN, M.S. (1969)	<i>Research Associate in Medicine</i>
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OFFICERS OF ADMINISTRATION

COOR, LATTIE F., Ph.D. (1976)	<i>President</i>
ARNS, ROBERT G., Ph.D. (1977)	<i>Vice President for Academic Affairs</i>
FORSYTH, BEN R., M.D. (1966)	<i>Interim Vice President for Administration</i>
SNELLING, BARBARA W., B.A. (1974)	<i>Vice President for Development and External Affairs</i>
BUSHEY, JOHN R., B.S. (1964)	<i>Director, Continuing Education</i>
ENGROFF, JOHN W., Ph.D. (1972)	<i>Director, Living and Learning Center</i>
FEITELBERG, SAMUEL B., M.A. (1971)*	<i>Director, School of Allied Health Sciences</i>
FRANCIS, GERALD P., Ph.D. (1980)	<i>Dean, Division of Engineering, Mathematics, and Business Administration, and Dean, College of Engineering and Mathematics</i>
JEWETT, JOHN G., Ph.D. (1977)	<i>Dean, College of Arts and Sciences</i>
JOHN, HUGO H., Ph.D. (1974)	<i>Director, School of Natural Resources</i>
KEBABIAN, PAUL B., B.A. (1966)	<i>Director of Libraries</i>
LAWSON, ROBERT B., Ph.D. (1966)	<i>Associate Vice President for Research and Dean, Graduate College</i>
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TESCONI, CHARLES A., JR., D.Ed. (1978)	<i>Dean, College of Education and Social Services</i>

* to June 30, 1981

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ACADEMIC CALENDAR

FALL 1981

Registration	September 8	Tuesday
Classes begin	September 9	Wednesday
Preregistration	November 18-20	Wednesday-Friday
Thanksgiving recess	November 25-29	Wednesday-Sunday
Classes end	December 16	Wednesday
Exams begin	December 17	Thursday
Exams end	December 22	Tuesday

SPRING 1982

Registration	January 12	Tuesday
Classes begin	January 13	Wednesday
Washington's Birthday holiday	February 15	Monday
Town Meeting recess	March 2	Tuesday
Spring recess	April 5-9	Monday-Friday
Honors Day	April 21	Wednesday (no classes after 3 p.m.)
Preregistration	April 28-30	Wednesday-Friday
Classes end	May 4	Tuesday
Exams begin	May 7	Friday
Exams end	May 12	Wednesday
Commencement	May 21-22	Friday-Saturday

For informational purposes, the major Jewish holidays which occur during the academic year are listed below. Classes will meet as scheduled.

Rosh Hashanah (New Year)	September 29-30	Tuesday-Wednesday
Yom Kippur (Atonement)	October 8	Thursday
Succot (Tabernacles, Beginning)	October 13-14	Tuesday-Wednesday
Sh'mini Atzeret (Tabernacles, Concluding)	October 20	Tuesday
Simchat Torah	October 21	Wednesday
Pesach (Passover)	April 8-9	Thursday-Friday
Pesach, Concluding	April 14-15	Wednesday-Thursday

CALENDAR

1981

S M T W T F S

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S M T W T F S

JANUARY

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4 5 6 7 8 9 10
18 19 20 21 22 23 24
25 26 27 28 29 30 31
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FEBRUARY

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
.....

MARCH

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31.....

APRIL

.....1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30.....

MAY

.....1 2
3 4 5 6 7 8 9
17 18 19 20 21 22 23
17 18 19 20 21 22 23
24 25 26 27 28 29 30

JUNE

....1 2 3 4 5 6
7 8 9 10 11 12 13
14 15 16 17 18 19 20
21 22 23 24 25 26 27
28 29 30.....

JULY

.....1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31
.....

AUGUST

.....1
2 3 4 5 6 7 8
9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29
30 31

SEPTEMBER

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6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
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OCTOBER

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4 5 6 7 8 9 10
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NOVEMBER

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8 9 10 11 12 13 14
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DECEMBER

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6 7 8 9 10 11 12
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1982

JANUARY

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3 4 5 6 7 8 9
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31.....

FEBRUARY

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MARCH

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APRIL

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MAY

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9 10 11 12 13 14 15
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JUNE

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6 7 8 9 10 11 12
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