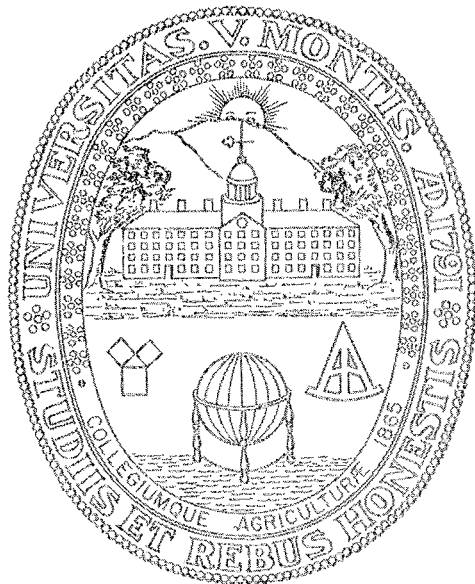


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The
University
of
Vermont

Catalogue
1992-93





Catalogue 1992-93

The University of Vermont
Burlington, Vermont 05405

Notice of Nondiscrimination

Applicants for admission and employment, students, employees, sources of referral of applicants for admission and employment, and all unions or professional organizations holding collective bargaining or professional agreements with The University of Vermont are hereby notified that The University of Vermont does not discriminate on the basis of race, sex, sexual orientation, handicap, color, religion, age, national origin, or Vietnam Veteran status in admission or access to, or treatment or employment in, its programs and activities. In addition, it is the policy of The University that sexual harassment is unacceptable and will not be tolerated.

It is therefore the intent of the University to comply with the spirit and the letter of Titles VI and VII of the Civil Rights Act of 1964; Title IX of the Education Amendments of 1972; the Equal Pay Act of 1963; the Age Discrimination Act of 1975, Section 504 of the Rehabilitation Act of 1973; the Vermont Fair Employment Practices Act; and such other federal, state, and local nondiscrimination laws as may apply.

Inquiries or complaints concerning the University's compliance with the regulations implementing the above-referenced laws, or the affirmative action policies of the University should be made to The University of Vermont, Executive Director for Affirmative Action and Equal Opportunity, Waterman Building, Burlington, Vermont 05405, telephone (802) 656-3368; or the Office of the Vermont Attorney General, Pavilion Building, Montpelier, Vermont 05602. Inquiries or complaints concerning the University's compliance with the regulations implementing Title VI of the Civil Rights Act of 1964, 34 CFR Part 100; Title IX of the Education Amendments, 34 CFR Part 106; the Age Discrimination Act of 1975, 45 CFR Part 90; or Section 504 of the Rehabilitation Act of 1973, 34 CFR Part 104, may also be made to the Assistant Secretary for Civil Rights, United States Department of Education, Washington, DC 20202, or to the Director, United States Department of Education, Office of Civil Rights, Region I, J.W. McCormack POCH, Boston, MA 02109.

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Students at The University of Vermont are responsible for knowing and complying with all requirements for their respective degrees as stated in the catalogue.

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

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, University of the Green Mountain.

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

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
The University of Vermont
194 South Prospect Street
Burlington, Vermont 05405-3596

Other correspondence may be addressed as follows:

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

The University of Vermont
Burlington, Vermont 05405

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Academic Calendar

FALL 1992

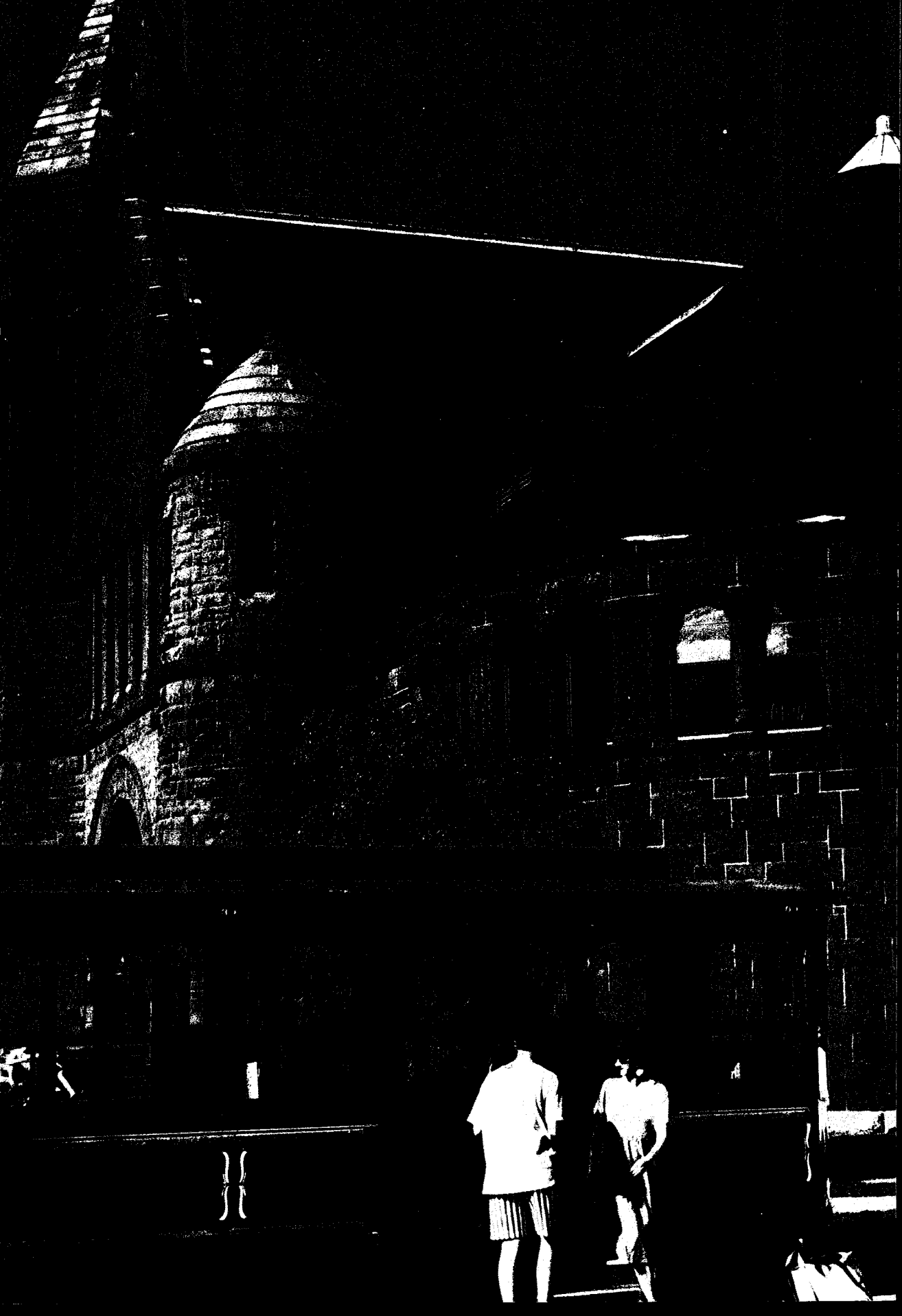
| | | |
|-------------------------|-----------------------------|------------------|
| Registration | August 31 | Monday |
| Classes begin | September 1 | Tuesday |
| Labor Day holiday | September 7 | Monday |
| Fall recess | October 16 | Friday |
| Preregistration | November 18-20 | Wednesday-Friday |
| Thanksgiving recess | November 25-27 | Wednesday-Friday |
| Classes end | December 9 | Wednesday |
| Reading and exam period | December 10-18 | |
| Reading days | December 10, 12, 13, 16 | |
| Exam days | December 11, 14, 15, 17, 18 | |

SPRING 1993

| | | |
|----------------------------|-----------------------|-------------------------------------|
| Martin Luther King holiday | January 18 | Monday |
| Registration | January 19 | Tuesday |
| Classes begin | January 20 | Wednesday |
| President's Day holiday | February 15 | Monday |
| Town Meeting recess | March 2 | Tuesday |
| Spring recess | March 22-26 | Monday-Friday |
| Preregistration | April 21-23 | Wednesday-Friday |
| Honors Day | April 26 | Monday (no classes after 3:00 p.m.) |
| Classes end | May 5 | Wednesday |
| Reading and exam period | May 6-14 | |
| Reading days | May 6, 8, 9, 12 | |
| Exam days | May 7, 10, 11, 13, 14 | |
| Commencement | May 22 | Saturday |

For informational purposes, the major Jewish holidays which occur during the academic year are listed below. Classes will meet as scheduled. Students who miss work because of religious observance will be permitted to make this work up at another time.

| | | |
|--|-----------------|-------------------|
| Rosh Hashanah (New Year) | September 28-29 | Monday-Tuesday |
| Yom Kippur (Atonement) | October 7 | Wednesday |
| Succot (Tabernacles, Beginning) | October 12-13 | Monday-Tuesday |
| Sh'mini Atzeret (Tabernacles, Concluding) | October 19 | Monday |
| Simchat Torah | October 20 | Tuesday |
| Pesach (Passover) | April 6-7 | Tuesday-Wednesday |
| Pesach, Concluding | April 12-13 | Monday-Tuesday |



Introduction

Chartered in 1791, the same year that Vermont became the fourteenth state in the union, The University of Vermont was established as the fifth college in New England. Much of the initial funding and planning for the University was undertaken by Ira Allen who is honored as UVM's founder.

The University of Vermont was the first college or university in the country to have it plainly declared in its charter that the "rules, regulations, and by-laws shall not tend to give preference to any religious sect or denomination whatsoever" — a clear assertion of Vermont's commitment to equality and enlightenment.

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

UVM 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 Emerita 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 nonmilitary 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.

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, 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.

Nearly all state universities function as departments of government, and the faculty and staff are state employees. In Vermont, the University is an "instrumentality" of the State and its Board of Trustees balances both the public and private sectors. The Board is composed of 25 members: nine self-perpetuating, nine elected by the State Legislature, three appointed by the Governor, and two members of the student body. The President of the University and the Governor of the State serve as *ex officio* members of the Board.

From the beginning, the University has relied on both public and private funding. Today, the University's appropriation from the State of Vermont is about 12 percent of the total operating budget of \$243 million. The largest single share (about 36 percent) is obtained from student tuition

and fees. 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.

During 1991–92, 8,103 students were enrolled in the eight undergraduate colleges and schools — the Colleges of Agriculture and Life Sciences, Arts and Sciences, Education and Social Services, and Engineering and Mathematics, and the Schools of Allied Health Sciences, Business Administration, Natural Resources, and Nursing — and 1,198 were enrolled in the Graduate College and 373 in the College of Medicine.

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. Burlington is located approximately 200 miles northwest of Boston, 300 miles north of New York City, and 100 miles south of Montreal.

THE UNIVERSITY MISSION

The University of Vermont and State Agricultural College blends the academic heritage of a private university with service missions in the land-grant tradition. Vermont's only university-level institution of higher education directs its resources toward the provision of excellence in instruction, innovation in research and scholarship, and public service to the citizens of the state, nation, and world. As befits a small but comprehensive university, the curricula in UVM's undergraduate, graduate, and professional programs integrate the principles of liberal education to enhance the personal, professional, and intellectual growth of its students. Through a widespread spirit of inquiry and investigative rigor, UVM's faculty, staff, and students participate in extending humankind's knowledge of self and environment. In its special partnership with the citizens of Vermont, The University of Vermont contributes analysis and definition to the human, social, technological, managerial, cultural, environmental, and educational issues of the State.

THE UNIVERSITY LIBRARIES AND MEDIA SERVICES

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 Chemistry and Physics Library is located in the Cook Physical Sciences 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. Audiovisual materials are located in the Media Library in the Pomeroy Building and in the Dana



and Bailey/Howe Libraries. Effective use of UVM's library system demands working knowledge of the on-line public catalogue, Library User Information System (LUIS). Electronic search systems to access off-campus bibliographic databases are also available in UVM's libraries.

THE GRADUATE COLLEGE

The mission of the Graduate College is to serve the needs of college graduates who desire continued professional development and a broader and more thorough knowledge of scholarship and research in their chosen fields. The College offers master's degree programs in 57 fields of study and doctoral degree programs in 19 fields. 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.

THE ROBERT HULL FLEMING MUSEUM

The Fleming Museum houses an important collection of more than 17,000 works: paintings, sculpture, graphics, costumes, and decorative arts representing the full range of world cultures. Highlights include paintings by such American and French masters as Winslow Homer and Jean Baptiste Camille Corot; 19th- and 20th-century American and European prints; American decorative arts and costumes; and outstanding ethnographic collections from the Native Americas and Africa. In addition to the permanent American and European Galleries, changing exhibitions are scheduled throughout the year.

This year's special exhibitions feature the Museum's own Ogden B. Read *Collection of Northern Plains Indian Art*; a retrospective of the work of painter Frank Hewitt; *Dreams & Shadows: Chile in the 70s and 90s* by photographer Ted Polumbaum; *Images of War*, works on paper by Josef Hahn; *Betrayal of Means*, unconventional uses of photography in contemporary art; plus Chinese robes, Navajo rugs, and modern paintings by Vermont artists. Exhibition-related lectures, free to UVM students, faculty, and staff, are held on alternating Wednesdays throughout the year. Special events include a community family day, workshops, films, performances, and exhibition openings.

Recognizing the importance of the Museum's connection with the University's academic programs, the Fleming provides access to the use of the collections and exhibitions for study and research. The Wilbur Room, which contains several thousand art volumes, operates as a noncirculation reference library open to the University and to the public on Wednesday afternoons, and by appointment with the Museum Educator. Undergraduate students have interned at the Museum in art, history, English, education, and anthropology.

Graduate and undergraduate students have curated exhibitions and have received academic credits for developing and conducting a series of art classes for children. Work-study students have opportunities in areas of art education, public relations, marketing, security, and exhibition design and construction.

Stocked with books, posters, and items related to the exhibitions, the Museum Store is an inviting resource at gift-giving time. The Fleming has more than 500 members, with a student membership category available.

UNIVERSITY EXTENSION SYSTEM

Extension System faculty and program staff throughout Vermont simplify and quickly spread the knowledge of UVM and other land-grant university resources and research directly to Vermonters so the latest findings can be put to work.

This "grassroots" approach which reaches nearly all Vermont residents has triggered rapid advances in sustainable agricultural and natural resource systems, rural citizen and community development, and enhancing Vermont's human capital through healthy youth and informed volunteers.

MORGAN HORSE FARM

The Morgan Horse Farm in Weybridge, Vermont, 35 miles south of the main campus, 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.

UNIVERSITY PROFESSORSHIPS

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, honors 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 his life.

The Marsh Professorship of Intellectual and Moral Philosophy was established in 1867 to honor James Marsh, distinguished UVM president and philosopher of the 1830's. Many alumni contributed to the fund that established this chair. Robert W. Hall, Professor of Philosophy, is the Marsh Professor of Intellectual and Moral Philosophy.

The Pomeroy Professorship of Chemistry was 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 was 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, was established in 1895 by a bequest from Edwin Flint, A.B., 1836, lawyer and judge in Wisconsin and Iowa until his death in 1891.

The Converse Professorship in Commerce and Economics was 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 was 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. Professor of Anatomy Rodney L. Parsons is the Thayer Professor.

The McCullough Professorship of Political Science was 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 was established in 1931 to honor George H. Perkins, for 64 years 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 was established in 1934 by a bequest from Dr. Elliot W. Shipman, M.D., 1885. After beginning this practice in Vergennes, Vermont, and studying ophthalmology in Berlin, Dr. Shipman practiced medicine in Richmond Hill, New York, for 35 years.

The Lyman-Roberts Professorship of Classical Languages and Literature was 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. Jean M. Davison, Professor of Classics, is the Lyman-Roberts Professor.

The Corse Professorship of English Language and Literature was 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 Petrograd (now Leningrad) for 17 years before the Russian Revolution of 1917. Ralph H. Orth, Professor of English, is the Frederick M. and Fannie C.P. Corse Professor of English Language and Literature.

The Lawrence Forensic Professorship of Speech was 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 was established in 1968 as a chair endowed by the alumni, honoring the Rev. Daniel Clarke Sanders, first president of the University. Carl H. Reidel, Professor of Natural Resources, is the Daniel Clarke Sanders Professor of Environmental Studies.

The John L. Beckley Professorship in American Business

was established in 1983 by John L. Beckley, 1934 graduate of UVM and member of the Board of Trustees from 1966 to 1970, to encourage economic education emphasizing private enterprise, the free market, and individual initiative. Ronald Savitt, Professor of Business Administration, is the Beckley Professor.

The Bishop Robert F. Joyce Distinguished University Professorship of Gerontology was established in 1983 by contributions from alumni and friends, honoring Robert F. Joyce, 1917 graduate of UVM, former member of the Board of Trustees from 1948 to 1954, and Bishop of the R. C. Diocese of Burlington for 15 years. Professor of Sociology Stephen J. Cutler is the Joyce Professor.

The Butties Professorship in Pathology was established in 1984 to honor Ernest Hiram Butties, Professor of Pathology and Bacteriology in the College of Medicine from 1921 to 1946. Roy Korson, Professor of Pathology, is the Butties Professor.

The McClure Professorship in Musculoskeletal Research was established in 1988 by J. Warren and Lois H. McClure. Malcolm H. Pope, Professor of Orthopaedics and Rehabilitation, is the McClure Professor.

The E. L. Amidon Professorship in Medicine was established in early 1989 to honor Dr. E.L. Amidon, a revered teacher of medical students and residents and former chair of the Department of Medicine. Edward S. Horton, Professor of Medicine, is the Amidon Professor.

ACCREDITATIONS

The University of Vermont is accredited by the New England Association of Schools and Colleges, Inc., a non-governmental, nationally-recognized organization whose affiliated institutes include elementary schools through collegiate institutions offering postgraduate instruction.

Accreditation of an institution by the New England Association indicates that it meets or exceeds criteria for the assessment of institutional quality periodically applied through a peer group review process. An accredited school or college is one which has available the necessary resources to achieve its stated purposes through appropriate educational programs, is substantially doing so, and gives reasonable evidence that it will continue to do so in the foreseeable future. Institutional integrity is also addressed through accreditation.

Accreditation by the New England Association is not partial but applied to the institution as a whole. As such, it is not a guarantee of the quality of every course or program offered or the competence of individual graduates. Rather, it provides reasonable assurance about the quality of opportunities available to students who attend the institution.

Inquiries regarding the status of an institution's accreditation by the New England Association should be directed to the administrative staff of the University. Individuals may also contact the New England Association of Schools and Colleges, The Sanborn House, 15 High Street, Winchester, Mass. 01890, (617) 729-6762.

Specific academic 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

ARTS AND SCIENCES

Chemistry—American Chemical Society

Speech-Language Pathology—American Speech-Language-Hearing Association

Music—National Association of Schools of Music

Clinical Psychology—American Psychological Association

BUSINESS ADMINISTRATION

American Assembly of Collegiate Schools of Business

EDUCATION

National Council for Accreditation of Teacher Education

Social Work—Council on Social Work Education

Vermont Department of Education—Teacher Education

Program Approval

ENGINEERING AND MATHEMATICS

Engineering Programs (Mechanical, Electrical, Civil)—

Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.

MEDICINE

Liaison Committee on Medical Education, American Medical Association—Association of American Medical Colleges

NATURAL RESOURCES

Forestry—Society of American Foresters

NURSING

Professional Nursing—National League for Nursing

Technical Nursing—National League for Nursing



Admission to the University

APPLICATION DEADLINES AND FEES

If you are interested in applying for admission, contact the Office of Admissions well before the deadlines noted below. The office is located at 194 South Prospect Street, Burlington, VT 05401-3596 (802) 656-3370. Vermont residents are required to pay a \$30 fee to cover the costs of reviewing the application; nonresidents and international applicants have a \$45 filing fee. Fee waivers are accepted if submitted by a student's guidance counselor. Applicants not enrolled in formal schooling may request a fee waiver if the fee would present a financial hardship.

ADMISSIONS CRITERIA FOR FIRST-YEAR STUDENTS

The University defines a first-year candidate as one who is applying for degree status directly from high school and/or who has not taken any college-level courses for credit following high school graduation.

The University of Vermont offers first-year admission to all qualified residents of Vermont. To be considered qualified, Vermont residents must present an academic record that demonstrates their ability to complete a degree program at UVM.

| AREA | REQUIRED COURSES | RECOMMENDED COURSES |
|--------------------------------------|---|---|
| ALL AREAS | 4 years of English 3 years of mathematics (2 yrs. algebra, 1 yr. geometry) 3 years of social science 2 years of natural or physical science 2 years of the same foreign language | |
| Agriculture and Life Sciences | 1 year of biology and 1 year of chemistry (for sciences majors only) | 1 year of biology 1 year of chemistry 4 years of mathematics (including trigonometry) (for all majors) 1 year of physics, and mathematics through calculus (for science majors only) |
| Allied Health Sciences | For all majors: 1 year of biology 1 year of chemistry For physical therapy majors: 1 year of physics 4 years of mathematics, including trigonometry 1 year of biology 1 year of chemistry Transfer students must show proficiency in physics, mathematics through trigonometry, biology, and chemistry. | 1 year of physics |
| Arts and Sciences | | 4 years of mathematics (including trigonometry) Continue foreign language, junior and senior years |
| Business Administration | 4 years of mathematics, including one year of college preparatory/advanced math beyond Algebra II | 1 additional year of science |
| Education and Social Services | | 1 year of biology |
| Engineering and Mathematics | For all engineering and mathematics majors: 4 years of mathematics, including trigonometry For engineering majors: 1 year of physics 1 year of chemistry | For all nonengineering majors: 1 year of physics 1 year of chemistry |
| Environmental Program | College preparatory curriculum | Additional humanities and science courses/computer use |
| Nursing | 1 year of chemistry (for professional nursing majors) 1 year of biology | 1 additional year of science in the senior year (for professional nursing majors) 1 year of chemistry (for technical nursing majors) |

The University welcomes applications from out-of-state candidates and reviews them on a space-available, competitive basis.

To reach an admissions decision, the following information is considered: overall academic performance and grades, rank in class (if available), standardized testing scores, and essays. The University's Admissions Office implements the established academic policies and requirements that define the necessary qualifications for admission.

Minimum entrance requirements to the University include:

- 4 years of English
- 3 years of college preparatory mathematics (Algebra I, II, and geometry)
- 3 years of social science
- 2 years of same foreign language
- 2 years of science, including a laboratory science

Additional courses may be required depending on the major selected (see the chart below). Admitted students frequently present more than the minimum requirements. The University reserves the right to change entrance requirements without prior notice.

Standardized Testing Scholastic Aptitude Test (SAT) and/or American College Testing Program (ACT) results are required for admission. Standardized test results are always viewed in conjunction with the high school record and are never the sole factor used to determine eligibility.

The College Board Achievement Tests in mathematics and the sciences are not required but may be useful in advising entering students about placement in courses.

For information about testing dates and locations, contact the College Board, Box CN 6200, Princeton, NJ 08541-6200, or Box 1025, Berkeley, CA 94701. The American College Testing Program (ACT) is located in Iowa City, IA. Contact the ACT Registration at P.O. Box 168, Iowa City, IA 52243.

Counselor/Teacher Letters of Recommendation Letters of recommendation provide additional information to the Admissions Office regarding the applicant's accomplishments.

Application Essays allow the Admissions Office to judge a student's ability to communicate clearly in writing. They may also describe an individual's interests or activities that add a personal dimension to the application.

Admission for First-Year Candidates

Fall Semester

| | Deadline | Notification | Payment |
|--|------------|--|---|
| Early Decision (open to all first-year) | November 1 | Mid-December | January 15 |
| Early Notification (Vermont residents only) | November 1 | Mid-December | May 1 |
| Vermont Scholars Program | November 1 | Mid-December | May 1 |
| General Admission | February 1 | Rolling for Vermont March 15 for Out-of-State | May 1 |
| International | February 1 | Rolling | May 1 or by date on Reservation Card |

Spring Semester

| | | | |
|--|------------|--|--------------------------------|
| General Admission (all categories, including international) | November 1 | Rolling for Vermont Mid-December for Out-of-State and International | Printed on Reservation Card |
|--|------------|--|--------------------------------|

Admission for Transfer Candidates

Fall Semester

| | | | |
|--|------------|---|--------------------------------|
| General Transfer Admission (all categories) | April 1 | Rolling for Vermonters By June 1 for Out-of-State and International | Printed on Reservation Card |
| Physical Therapy Applicants | February 1 | Rolling for Vermonters By May 1 for Out-of-State | (Same as above) |

Spring Semester

| | | | |
|-------------------|------------|--|--------------------------------|
| General Admission | November 1 | Rolling for Vermonters By Dec. 15 for Out-of-State and International | Printed on Reservation Card |
|-------------------|------------|--|--------------------------------|

Applicants with disabilities are encouraged to indicate they have a learning disability or physical disability on the Application for Admission. To help the Admissions Office assess the overall record, official documentation of the disability is recommended. For further information regarding appropriate documentation, contact the Office of Specialized Student Services, A-170 Living/Learning Center, Burlington, VT 05405, (802) 656-7753 (TTY 656-3865).

Candidates for Music Majors (Music Education, Bachelor of Arts in Music, Bachelor of Music) must arrange for an audition with the secretary of the Department of Music, or send an audition tape to the department if unable to come to campus. For further information, contact the Department of Music (802) 656-3040. *Any tapes sent become property of the Admissions Office and will not be returned.*

ADMISSION PROGRAMS FOR FIRST-YEAR CANDIDATES

Early Decision is a program open to first-year candidates who have identified UVM as their first choice. Applications for fall 1993 are due in the Admissions Office by November 1, 1992, and notification is in mid-December. Candidates admitted under Early Decision commit themselves to attending the University and are required to pay the Acceptance Fee and Advance Tuition Deposit by January 15, 1993. Withdrawal from the Early Decision contract is possible only if a proposed financial aid award is inadequate.

Candidates denied Early Decision may not reapply for the fall semester.

Early Notification Vermont residents who apply for fall first-year status by November 1, 1992, will learn of their admission status by mid-December. Candidates admitted under Early Notification have until May 1, 1993, to pay an Acceptance Fee and Advance Tuition Deposit and are not making a commitment to attend the University by acceptance in the Early Notification program.

Early Notification applicants are judged qualified for admission based on three years of high school performance. If a candidate's three-year record is inconclusive, the Admissions Office will defer its decision and request midyear grades.

The Vermont Scholars Program Each year the University awards 15 full-tuition scholarships to academically excellent Vermont residents entering with first-year status. To qualify, candidates must rank in the top ten percent of their graduating class at the end of the junior year and have earned a total of 1,200 points (the highest verbal score and the highest math score earned are considered) on the Scholastic Aptitude Test (SAT). Prospective candidates can sit for the November SAT and use those results to qualify.

Candidates for the competition are asked to apply for admission by the Early Notification deadline of November 1, 1992, and to check the Vermont Scholars box on the application. The Admissions Office evaluates Vermont Scholar eligibility and notifies candidates if they are eligible to compete in late December, shortly after the admissions notification.

A separate application, sent by the Admissions Office to eligible students, is due February 1. These applications are reviewed by panels of Admissions staff and faculty. Finalists are invited to campus for interviews. The evaluation process includes academic excellence, community leadership, and written and oral communication skill. Scholarship winners are notified by mid-April. The 15 winners are selected by geographic region, with three winners from each of five areas of the state.

Scholarship recipients receive full tuition and required fees, are entitled to guaranteed enrollment in classes, are given preference in residence hall selection, and are regarded as campus academic leaders. Awards are renewable up to four full years provided a 3.0 grade-point average is maintained and normal progress is maintained toward earning a degree.

New England Regional Student Program The University of Vermont participates with the other public two-and four-year institutions of higher education in the six New England states in the New England Regional Student Program, a option aimed at increasing educational opportunities for the region's students.

New England residents who enroll in UVM programs open to them under the New England Regional Student program are charged 150 percent of in-state tuition.

UVM programs offered for the 1992-93 academic year are:

Canadian Studies to residents of CT, MA, NH, RI
Dairy Foods to residents of ME, MA, NH, RI

For a full listing of programs and policies, contact the New England Board of Higher Education, 45 Temple Place, Boston, MA 02111, (617) 357-9620.

MATRICULATION STATUS FOR FIRST-YEAR STUDENTS

The Admissions Office accepts either a **secondary school diploma** or the **General Education Development Certificate (GED)** prior to entry. GED recipients should have their official score report forwarded to the Admissions Office. An official copy of any high school work completed is also required. The Admissions Office reviews the results of the subject area examinations for the GED and evaluates the overall secondary school picture. Candidates presenting the GED are subject to the minimum entrance requirements noted on page 9 of this catalogue.

In some cases, the Admissions Office offers admission to candidates who complete their high school course work in three years. **Three year graduates** are asked to meet all entrance requirements as outlined on page 9, including the four-year English requirement. The Admissions Office requests that the three-year candidate produce support from his or her high school that the school district has approved early graduation and is prepared to issue a diploma.

TRANSFER ADMISSION CRITERIA

The University welcomes applicants who have demonstrated success at other institutions of higher education and who have met all University-wide entrance requirements either in high school or in college. For the purpose of admission, a transfer candidate is one who has taken college-level courses for credit after completion of secondary school.

Residents of Vermont receive preference in transfer admission. All qualified in-state residents are admitted as long as space is available in the program requested. Out-of-state residents are admitted on a space-available, competitive basis.

In making transfer admission decisions, the Admissions Office reviews all academic information available: official transcripts of all college-level work, the high school record (or General Education Development Certificate), and Scholastic Aptitude Test (SAT) or American College Testing (ACT) scores. Standardized test results are acceptable if they appear on an official high school transcript.

Transfer candidates are subject to the minimum entrance requirements outlined for first-year candidates. Any en-



trance requirement not fulfilled in high school can be met by an equivalent semester-long college course.

For transfer candidates who have earned under 30 college-level credits, the quality of the high school record remains an important evaluation tool. After 30 earned credit hours, the college grade-point average and course selection are the most important factors in a decision. The Admissions Office still needs to see the high school record to determine if all University-wide entrance requirements (as outlined on page 9) have been met.

Although The University of Vermont does not have a minimum grade-point average required for admission, most successful transfer applicants present at least a 2.5 (C+) average on a four-point scale. Vermont residents presenting cumulative grade-point averages between a 2.25 and a 2.5 will be reviewed on a case-by-case basis. Because nonresidents compete for admission, few are admitted with averages below 2.5. Applicants with concerns about their transfer status should contact the Admissions Office to discuss their individual situation.

TRANSFER CREDIT POLICY

The Office of Transfer Affairs reviews each college-level course taken by transfer candidates accepted for admission and *notifies them, in writing, of the status of each course reviewed for provisional credit.* To receive provisional credit, a course must have been taken at an accredited college or university, it must be comparable in content, nature, and intensity to a course offered at UVM, and the grade earned must be "C" or better or an acceptable equivalent. The dean of the college or school decides how courses accepted for credit pertain to the student's major requirements at the University.

All transfer credit remains provisional until the transfer student successfully completes one semester of course work as a degree student at UVM. The UVM grade-point average reflects only course work taken at the University. Grades from other institutions do not appear on the UVM transcript.

Entering **first-year students** may be eligible for transfer credit either through the Advanced Placement Program of the College Board or, under certain conditions, through college courses taken while in high school.

Credit through the **Advanced Placement Program (AP)** of the **College Board** is granted as a specific university course or courses with scores of 4 or 5. Scores of 3 are acceptable in some areas. AP course equivalencies are determined by the department governing the subject area and are awarded by the Office of Transfer Affairs. Since AP credit is assigned as a regular university course, it can be used to fulfill major, distribution, general education, or elective requirements.

Courses taken while a student is still in high school may be eligible for University credit under the following conditions: Courses must have been taken on a college campus with students enrolled in that institution, courses must meet general UVM transfer credit guidelines (page 11), and they must be recorded on the college's official transcript.

College-level courses taken through high school cooperative programs will not transfer to the University. Students who have completed cooperative courses, however, may want to explore the possibility of sitting for the Advanced Placement exam in the appropriate area(s).

Further questions regarding transfer of credit should be addressed to the Office of Transfer Affairs, 360 Waterman Building, University of Vermont, Burlington, VT 05405.

ADMISSION OF NONTRADITIONAL CANDIDATES

The Admissions Office recognizes that candidates who have been out of formal schooling for a period of five years or more have life experiences that are different from traditional-age students.

While nontraditional candidates are expected to present strong academic credentials for admission, they can write to the Admissions Office to request waiver of the standardized test score requirement, may adjust application essays to reflect their experiences, and may substitute a letter of recommendation from an employer or friend in lieu of the guidance counselor recommendation.

As with every applicant for admission, however, nontraditional candidates are required to present official documents of all academic work, including high school transcript and/or General Education Development certificate (GED). The Admissions Office looks for previous academic performance that would predict success at the University. Entrance requirements as outlined on page 9 should be met in most cases. Nontraditional applicants who are missing one or two requirements are reviewed on a case-by-case basis; if a record is otherwise acceptable, the Admissions Office may offer admission with a clause requiring completion of missing requirements prior to enrollment or concurrent with the UVM degree program. UVM does not grant college credit for life experience.

Nontraditional learners considering a degree program at UVM are encouraged to make an appointment with an admissions counselor to discuss the chances for admission. The Admissions Office is able to advise more accurately if individuals bring all academic records with them to the appointment. These documents are used for advising only and do not need to be official.

ADMISSION OF INTERNATIONAL STUDENTS

The University welcomes the applications of international students. The Admissions Office has a separate international application form.

Academic Documents International applicants must submit official transcripts of all secondary and postsecondary education, including final examination results. If documents are not in English, certified translations are required. Information regarding certified translation services can be obtained at the applicant's embassy or through NAFSA, the Association of International Educators, 1875 Connecticut Ave., NW, Suite 100, Washington, DC 20009-5728.

Transfer Credit for International Students International students who have attended postsecondary institutions in their home country may be eligible for University of Vermont credit under the general guidelines listed on page 11 of this catalogue. Once notified of admission, international students should submit comprehensive course descriptions, which include content material, to the Office of Transfer Affairs, 360 Waterman Building, University of Vermont, Burlington, VT 05405 USA. Submission of this material as soon as possible after the letter of admission arrives helps the Office of Transfer Affairs prepare a full credit evaluation prior to enrollment at UVM. If this information is not in English, the student should translate it (or have it translated) and enclose it with the original copy.

Standardized Tests International students must present scores from either the Scholastic Aptitude Test (SAT) or the American College Testing Program (ACT). If English is

not the first language, the Test of English as a Foreign Language (TOEFL) is also required. Because The University of Vermont does not offer an extensive English as a Second Language (ESL) program, the Admissions Office requires a minimum TOEFL test score of 550.

English as a Second Language (ESL) Programs Interested students with TOEFL scores below 550 may want to consider transferring to The University of Vermont after studying at a U.S. college or university that offers extensive ESL preparation.

The ESL program located the closest to The University of Vermont is at Saint Michael's College, an accredited institution of higher learning in nearby Winooski, Vermont. For full information about Saint Michael's College, write to the Center for International Programs, Saint Michael's College, Winooski, VT 05404 (USA Telephone: 802 654-2000, extension 2300; Telex 5102990013, VT, SMC WINO).

For further information concerning available programs, contact: NAFSA: Association of International Educators, 1875 Connecticut Ave. NW, Suite 100, Washington, DC 20009-5728.

Financial Support for International Students The University of Vermont offers a few partial tuition scholarships to international students per year. Therefore, most international students pay the full cost of attending UVM. All international students attending the University on nonimmigrant student visas are charged out-of-state tuition rates. For an application for partial scholarship aid, write to the Office of International Educational Services, B 161 Living/Learning Center, University of Vermont, Burlington, VT 05405 USA.

A **Form I-20** is prepared for accepted international students by the Advisor in the Office of International Educational Services (OIES). The I-20 can only be issued when bank certification of finances has been filed with the OIES by the student's family or sponsoring institution. Candidates are encouraged to submit this documentation along with the Application for Admission.

Graduate Study at The University of Vermont International students interested in pursuing a graduate degree at The University of Vermont should contact: Graduate College Admissions Office, Waterman Building, University of Vermont, Burlington, VT 05405.

APPLYING FOR FINANCIAL AID

The University of Vermont reviews candidates for admission on a need-blind basis. The University also recognizes that many students accepted for admission cannot meet the full cost of attendance.

To be considered for financial assistance, applicants for admission need to check the appropriate section on the application form. The Office of Financial Aid also requires completion of the Financial Aid Form (FAF), available from a local high school guidance office, the Vermont Student Assistance Corporation, or the Office of Financial Aid at 330 Waterman Building, University of Vermont, Burlington, VT 05401. Preference in awarding aid is given to those who complete the FAF on or before March 1 of the semester prior to entry.

For further information regarding policies on UVM financial aid, please refer to the section on Student Expenses and Financial Aid.

ADMITTED STUDENT INFORMATION

Acceptance Fee and Advance Tuition Deposits To reserve a space in the class or semester admitted, students should send the Admissions Office an acceptance fee and advance tuition deposit for \$225 made payable to The University of Vermont.

First-year students entering in the fall have a May 1, 1993, deadline for paying the acceptance fee and advance tuition deposit, with the exception of Early Decision candidates. Students admitted under Early Decision commit to attending UVM and must pay the tuition deposit by January 15, 1993. Transfer candidates and all candidates admitted for the spring semester will have a payment deadline printed with their acceptance materials.

A full refund of the acceptance fee and advance tuition deposit can be requested up to the payment deadline. After the payment deadline and up until the first day of classes, \$100 of the payment is refundable.

Orientation All entering first-year students are required to attend a two-day orientation session in June. At orientation, new UVM students meet with a faculty advisor, select first semester classes, and learn about living options in the residence halls. Information packets are mailed to incoming students' home addresses once they pay the acceptance fee and advance tuition deposits. Transfer students may receive information about June orientation, or they may attend a session just prior to the beginning of the fall semester.

Transfer or first-year students entering in the spring semester receive information about special orientation sessions once they pay the deposit.

Housing First-year students are required to live in on-campus housing. Entering students explore living options at orientation and are allowed to list residence hall preferences. The Office of Residential Life mails room and roommate assignments in August prior to entry or before the beginning of the spring semester.

Transfer candidates are not guaranteed on-campus housing even if they enter with first- or second-year status.

Class Registration The academic advisor at Orientation helps prepare the first semester class schedule. First-year students entering fall semester are mailed a course schedule by mid-August. First-year students entering in the spring and transfer students entering either semester meet with an academic advisor at an orientation session and may need to formally register for classes at Registration.

Immunization and health forms are sent with orientation materials and are due in the Student Health Center by August 1 of the year of entry.

REAPPLYING TO THE UNIVERSITY

Applicants denied admission for a given semester may reapply for the following semester. Anyone reapplying must resubmit an application form and send the appropriate application fee. These individuals should contact the Admissions Office to discuss academic work that would improve their chances for admission.

Under certain conditions, candidates offered admission who choose not to attend in a given semester can defer entry for up to two semesters with permission of the Admissions Office. After that period or if the admitted candidate failed to request deferred admission, another application and fee must be filed for review by the Admissions Office.

Anyone who has been a degree student at The University of Vermont and withdrew for any reason must see the dean of his/her former UVM college or school to request re-entry.

The Admissions Officer does not readmit former degree students.

RESIDENCY REGULATIONS

In-State Status Regulation

The Vermont Legislature has established a lower rate of tuition for students who are Vermont residents. These regulations define eligibility requirements for in-state status classification. All students at The University of Vermont and State Agricultural College (UVM) shall be assigned an in-state or out-of-state status classification consistent with these regulations. Vermont domicile must be established for a student to be eligible for in-state status.

In-State Status Classification Rules

1. Domicile shall mean a person's true, fixed, and permanent home. It is the place at which one intends to remain indefinitely and to which one intends to return when absent.
2. As one element of domicile, a student must reside in Vermont continuously for one year prior to the semester for which in-state status is sought.
3. A residence established for the purpose of attending UVM shall not be itself constitute domicile.
4. An applicant becoming a student within one year of first moving to the state shall have created a rebuttable presumption that residency in Vermont is for the purpose of attending UVM and/or acquiring in-state status for tuition purposes.
5. A domicile or residency classification assigned by a public or private authority neither qualifies nor disqualifies a student for UVM in-state status. Such classification may be taken into consideration, however, in determining the student's status at UVM.
6. It shall be presumed that a student who has not reached the age of majority (18) holds the domicile of his/her parents or legal guardian(s).
7. Receipt of financial support by a student from his/her family shall create a rebuttable presumption that the student's domicile is with his/her family, regardless of whether the student has reached the age of 18.
8. A student who has not reached the age of 18 whose parents are legally separated or divorced shall be rebuttably presumed to hold the domicile of the parent with legal custody.
9. A student of parents legally separated or divorced may be granted in-state status if a noncustodial or joint custodial parent is domiciled in Vermont and has contributed more than 50 percent of financial support for at least one year prior to the semester for which in-state status is sought.
10. The burden of proof as to eligibility for in-state status rests with the student. Eligibility must be established by clear and convincing evidence.

In-State Status Classification Documentation

11. The student must submit with the application form all relevant information.

12. The classification decision shall be based upon information furnished by the student, information requested of the student, and other relevant information available consistent with University policies and procedures and legal guidelines.
13. Testimony, written documents, affidavits, verifications, and/or other evidence may be requested.
14. The student's failure to produce information requested may adversely affect the decision for in-state status.
15. A student or others furnishing information may request the deletion from documents of irrelevant private data.

In-State Status Classification Appeals

16. The decision of the Residency Officer must be appealed in writing to the Residency Appellate Officer within thirty (30) calendar days of the date of the Residency Officer's written decision. Appeal to the Residency Appellate Officer is the final appeal at UVM.

In-State Status Reclassification

17. A student who does not qualify for in-state status classification may reapply for such classification each subsequent semester.
18. In-state status classification becomes effective the first semester following the date of successful application.

Re-Examination of Classification Status

19. Classification status may be re-examined upon the initiative of the Residency Officer in the exercise of sound discretion. Circumstances such as periodic enrollment may be cause for re-examination.

For information on residency, contact: Residency Officer, Office of Admissions, 194 South Prospect Street, Burlington, VT 05401; (802) 656-3367.

Recommended Timelines for Applying for In-State Status

(New residents of Vermont applying to UVM or applicants for admission asked by the Residence Office to complete an Application for In-State Status are asked to review this timetable. Please refer to page 10 of this catalogue for admission application deadlines for undergraduate admission, and consult the graduate and medical catalogues for those admission application deadlines.)

Undergraduate, graduate, or medical school applicants should submit the Application for In-State Status no later than **August 1** if applying for fall semester and no later than **December 31** if applying for spring semester.

Nondegree students in Continuing Education may be asked to complete an Application for In-State Status when they register for classes. The Application for In-State Status is due in the Residency Office at the end of the add-drop period for the semester enrolled.

Currently enrolled students asked by the Residency Officer to fill out an Application for In-State Status should complete the application no later than **December 15** for the spring semester or no later than **August 1** for the fall semester.



Student Expenses and Financial Aid

The student expenses outlined in the following paragraphs are anticipated charges for the academic year 1992-93. Changing costs may require adjustment of these charges before the beginning of the fall semester.

UNDERGRADUATE TUITION AND FEES APPLICATION FEE

A nonrefundable application fee of \$30 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 \$225 in order to reserve a place in the next enrolling class. Regular first-year students accepted for the fall semester must pay the deposit by May 1. Most transfer students admitted for the fall must pay the deposit within two weeks of the offer of admission. Students admitted in January for the spring semester may have less than two weeks in which to pay the deposit. A portion of the fee is for initial advising, selection of courses, and personal orientation to the campus, a requirement for all incoming undergraduate degree students. The remainder 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 estimated expenses (excluding transportation, laundry, and spending money) based on the regular tuition for undergraduate students followed by an explanation of these charges.

| | Resident | Nonresident |
|---|----------|-------------|
| Tuition | \$5,740 | \$14,340 |
| Housing (Double Room) | 2,788 | 2,788 |
| Meals (Minimum Plan) | 1,478 | 1,478 |
| Inter-Residence Association Fee | 16 | 16 |
| Library and Athletic Bond Fees | 92 | 92 |
| Student Health Fee | 172 | 172 |
| Student Accident & Sickness Insurance (Optional) | 360* | 360* |
| Student Association Fee | 70 | 70 |
| Books and Supplies | 465* | 465* |
| Student Center Fee | 32 | 32 |
| Transportation Fee | 44 | 44 |
| Total, excluding personal and miscellaneous costs | \$11,257 | \$19,857 |

*Estimated

TUITION

Vermont Residents: \$240 per credit hour through 11.5 hours. From 12-18 credit hours — \$2,870 per semester plus \$240 per credit hour for each hour in excess of 18 hours.

Nonresidents: \$598 per credit hour through 11.5 hours. From 12-18 credit hours — \$7,170 per semester plus \$598 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 \$2,230 for triple occupancy, \$2,788 for double occupancy, and \$3,206 for a single room.

The minimum University meal plan is \$1,478 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 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 University Dining Services/Marriott, Robinson Hall, Redstone Campus.

A written request is required of any student wishing to cancel a housing agreement. Any student cancelling a housing agreement before June 15 will be assessed a \$50 penalty and from June 15 but before August 31, 1992, 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 \$16 per year (\$8 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 \$44 per year (\$22 per semester) is charged to all students enrolled for 12 or more hours. This fee is assessed 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 or more hours. This fee is assessed in accordance with the requirement of the indenture covering the construction of additions and improvements to athletic facilities.

HEALTH FEE

The health fee of \$172 per year is assessed per semester. It is mandatory for students enrolled in 12 or more credit hours and optional for other students. Payment of the health fee entitles the student to most of the services available at the Student Health Center without additional cost. An optional Summer Health Fee is available to students remaining in the area during the summer months.

Students also have the option of purchasing a Student Accident and Sickness Insurance Policy through the University. This policy provides coverage for many services not included in the health fee as well as hospitalization benefits. To participate in this program, the student must pay a modest annual premium plus the health fee for the two semesters of the academic year. Students not covered by the health insurance policy of a parent, guardian, or spouse are strongly encouraged to purchase the Student Accident and Sickness Insurance Policy.

STUDENT CENTER FEE

A student center fee of \$32 per year (\$16 per semester) is charged to all students enrolled for 12 or more credit hours. This fee is assessed in accordance with the requirement of the indenture covering the construction of the addition to the Billings Student Center.

TRANSPORTATION FEE

A \$44 per year (\$22 per semester) fee is charged to all students enrolled for 12 or more hours. This fee is assessed to fund the capital and operating costs for the all-campus shuttle.

STUDENT ASSOCIATION FEE

Undergraduate degree students enrolled in four or more credit hours are charged a fee of \$70 per year (\$35 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 \$465 is a low average. Some particular curricula may require one-time purchases which will change this amount.

Students in the College of Engineering and Mathematics and School of Business Administration should add about \$100 for computer software to their estimated yearly costs for books and supplies.

Dental Hygiene students should add \$600 for the first year that will be collected during the first week of the fall semester.

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

Technical Nursing students should add about \$100 for uni-

forms and other related expenses in the beginning of the first year. Professional Nursing students should add about \$100 for uniforms and other related expenses in the second semester of the sophomore year and about \$125 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 pro-rated 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 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

College of Engineering and Mathematics and School of Business Administration

All new first-year and transfer students entering programs in the College of Engineering and Mathematics and the School of Business Administration are required to purchase a microcomputer. Details on the costs and the machine specifications are provided to the student at the time of admission. Students eligible for financial aid can have the cost of the microcomputer acquisition and maintenance built into their financial aid package.

Credit by Examination

A fee of \$35 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 instrumental and voice lessons, group voice classes, and group beginning piano classes are available each semester. Private lessons are one-half hour or one hour (for one or two credits) over a 15-week period. Group lessons consist of two 50-minute classes per week over a 15-week period (one credit).

\$185 per credit will be charged each student (for one or two credits). 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 \$185 per credit hour for private lessons and not for additional tuition charges for the Music Performance Study course. Any other University courses(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 long distance travel expenses, special equipment, arrangements, or skilled consultants. Students will be notified of this fee through the registration process.

Late Registration Fee

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

Study Abroad

An administrative fee will be assessed for those students participating in Study Abroad programs/activities with the exception of the Buckham Overseas Studies Program.

Diagnostic Evaluation

In certain instances, students may be assessed a fee for diagnostic testing. Additional information can be obtained from the Office of Specialized Student Services.

FEES FOR PART-TIME STUDENTS

A comprehensive fee is charged to all part-time students enrolled in four but less than 12 credit hours in a semester, as follows:

| Hours Enrolled Per Semester | Fee |
|--------------------------------|------|
| 4 | \$48 |
| 5 | 54 |
| 6 | 60 |
| 7 | 67 |
| 8 | 73 |
| 9 to 11.5 | 79 |

All undergraduate degree students enrolled in four or more credit hours in a semester pay the full Student Association fee.

PAYMENT OF OBLIGATIONS

All tuition, fees, and room and board charges are payable in full upon notification. Degree students who enroll in advance for courses will receive itemized statements of applicable semester charges at their permanent addresses about a month prior to the commencement of classes, with instructions to settle in full by a specific due date (generally ten days before classes begin). Students who register in person are expected to settle in full at that time. 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 Accounts Receivable Office as soon as possible before the due date.

Students who have not satisfactorily completed financial arrangements by the announced due date may have their 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

Student who do not settle their accounts by the due date, and students who are allowed a payment postponement of all or a portion of their financial obligations, may be charged a \$50 late payment service charge.



BUDGETED PAYMENT

The University offers payment plans (administered by the Richard Knight Agency) to parents who desire to budget annual costs in monthly installments. Specific information is mailed to parents of incoming students in the spring by the Accounts Receivable Office.

BILL ADJUSTMENT AND REFUND POLICIES

ACCEPTANCE FEE AND ADVANCE TUITION PAYMENT FOR NEW STUDENTS

A newly admitted undergraduate student who decides not to attend, and who notifies the University in writing prior to the first day of classes, will receive a refund of \$100 of the \$225 payment (acceptance fee of \$100 and advance tuition payment of \$125) that was required to reserve a place in the class.

CANCELLATION, WITHDRAWAL, MEDICAL WITHDRAWAL, SUSPENSION, DISMISSAL

A student who cancels, withdraws for personal or medical reasons, is suspended, or is dismissed will receive a refund of tuition and fees in accordance with the following schedule. Medical withdrawals require the approval of the Student Health Center director.

- 100% refund before semester begins
- 80% refund prior to the end of the first two weeks of classes
- 40% refund during the third, fourth, or fifth week of classes
- No refund after the fifth week of classes

CHANGES IN CREDIT HOUR LOAD

A student who adds courses during the semester will be billed additional tuition and fees applicable to the adjusted credit hour load. A student who drops courses during the semester will receive a tuition refund (or credit adjustment) based upon the effective date as described above. A student who withdraws from a course during the semester will receive a tuition refund based upon the effective date as described above. However, the course will remain on the student's record.

REFUND OF OTHER CHARGES

Room and meal plan payments will be refunded on a prorated basis.

DEATH

In the case of a student's death, tuition, room, and fees will be fully refunded for the semester during which the death occurs. Unused meal points will be refunded.

Note: The effective date of any cancellation or withdrawal is the date the student's dean receives such notification in writing. The dean may recommend to the Registrar that an exception be made to this refund policy only in extenuating circumstances. In no case will a refund be made after the first day of classes of the following semester.

FINANCIAL AID

The University has many programs to help finance a UVM undergraduate education. In order to ensure that the financial aid application process is understandable and accessible, each applicant is assigned to a "service team" within the Financial Aid Office. Whenever a student has a question about his or her financial aid status, he or she may call upon the members of the service team who will be familiar with the the applicant's particular circumstances.

ELIGIBILITY FOR FINANCIAL AID

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 with intent to become a permanent resident. A student must also be enrolled at least half-time (six credits) in a degree program. Audited courses and Credit by Examination cannot be considered as part of the credits in determining financial aid eligibility. 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. There is limited financial aid available for international students. Inquiries about aid for international students should be made to the Office of International Educational Services.

FINANCIAL AID APPLICATION PROCEDURES

Incoming first-year and transfer students who wish to apply for aid may do so by: (1) indicating their intention to apply for financial aid on The University of Vermont Application for Undergraduate Admission form, and (2) submitting 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, Vermont 05405. Preference is given to those students who submit their applications by March 1. Applications submitted after that date will be processed in chronological order, subject to the availability of funds.

Continuing upperclass students who wish to apply for aid may do so by submitting the Financial Aid Form (FAF) to the College Scholarship Service in Princeton, N.J. FAF forms are available early in the spring semester from the Office of Financial Aid. Preference is given to those students who have submitted their applications by March 1. Applications submitted after that date will be processed in chronological order, subject to the availability of funds.

ALL STUDENTS ARE REQUESTED TO APPLY to the Pell Grant Program (check appropriate section of the FAF or FFS) and their state agency (for Vermonters: Vermont Student Assistance Corporation (VSAC), P.O. Box 2000, Champlain Mill, Winooski, Vermont 05404.)

FACTORS FOR DETERMINING FINANCIAL NEED

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

1. **STUDENT BUDGET**, includes tuition, required fees, room and board, books, supplies, and moderate personal expenses.

- 2. EXPECTED PARENTAL CONTRIBUTION of educational cost as determined by the financial information provided by parents on the financial aid application form (FAF).
- 3. STUDENT RESOURCES, usually from earnings, investments, or savings as reported on the financial aid application form (FAF).
- 4. ASSISTANCE RECEIVED FROM OTHER SOURCES, such as private scholarships/grants, state agency awards, etc.

THE FINANCIAL AID PACKAGE

The University of Vermont participates in all federal and state financial aid programs and must adhere to their requirements. Additionally, the University makes available a variety of grant and loan opportunities from its own operating and endowment funds. On the basis of the financial aid application (FAF) and the additional financial information submitted to the UVM Office of Financial Aid, applicants will be considered for all aid programs for which they are eligible. Aid is most often awarded in combinations or "packages" of the various types of aid. Almost all awards will include some student loan or a College Work Study allocation.

IMPACT OF ENROLLMENT STATUS CHANGE

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 reduction of the financial aid award. The reduction is prorated among all aid sources making up the award according to the applicable regulations. Such reduction of aid will usually require immediate repayment of the aid so reduced.

SATISFACTORY ACADEMIC PROGRESS STANDARD FOR FINANCIAL AID RECIPIENTS

In order to maintain eligibility for federal Title IV financial aid, matriculated undergraduate and graduate students must progress at a rate that ensures completion of their degree programs within a reasonable time frame. Beginning with the first semester of study in a degree program at The University of Vermont, a federal financial aid recipient is required to accumulate earned hours totaling at least 75 percent of the number of hours attempted. Each student's

progress will be measured at the end of each year of attendance to ensure adherence to this standard.

Beginning with the third academic year (after the achievement of 60 credit hours), all students must have attained at least a 2.0 overall cumulative grade-point average in order to continue to qualify for assistance.

Any student not meeting the standard described above will be placed on Financial Aid Probationary Status for a one-year period (during which aid eligibility will be maintained). Should the student not meet the required credit standard or cumulative grade-point average standard by the end of that probationary year, the student's eligibility for additional federal financial aid will be withdrawn until the required standard has been met. Institutional aid will continue to be awarded but not for any amount that would replace the student's federal aid award.

Students whose aid is withdrawn for not maintaining academic progress according to the standard outlined above may appeal their loss of aid by writing to the Director of Financial Aid. The decision to withhold aid eligibility may be overridden by the Director in conjunction with the Financial Aid Appeals Committee in circumstances which warrant special consideration. Such circumstances may include medical emergencies or family crises which resulted in the student's not meeting the stated requirements.

1992-93 IN-STATE AND OUT-OF-STATE EDUCATIONAL COSTS

Standard student budgets used for calculating financial aid eligibility for the 1992-93 academic year are shown below. Expenses for subsequent years may be higher if any of the cost components increase. PLEASE NOTE THAT THESE FIGURES INCLUDE COSTS NOT LISTED IN THE ACTUAL CHARGES SHOWN ON PAGE 17 (personal expenses, books, additional food costs, transportation, etc.). Sample costs are for a dependent single student living in campus housing and utilizing one of the University's meal options.

| | SINGLE | |
|------------------------|----------|--------------|
| | In-State | Out-Of-State |
| Tuition | \$5,740 | \$14,340 |
| Fees | 429 | 429 |
| Books/Supplies | 500 | 500 |
| Room | 2,788 | 2,788 |
| Board | 1,832 | 1,832 |
| Personal/Miscellaneous | 980 | 980 |
| Totals (Rounded) | \$12,269 | \$20,869 |

The awarding of financial aid is administered in accordance with the guidelines on nondiscrimination described on page ii.



Student Life

SERVICES

Students experience rapid personal growth while on the college campus. In addition to developing new academic skills, they are challenged to pursue new ideas, evaluate their value systems, change existing attitudes, investigate new life styles, explore future career options, and learn social and interpersonal skills.

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

The student life areas are divided into various functional departments and programs, each providing or coordinating support services and educational experiences to meet student needs.

The offices of the Division of Student Affairs are located in the Nicholson Building at 41 South Prospect Street.

COUNSELING AND TESTING CENTER

The Counseling and Testing Center provides information, skills training, and encouragement for more effective living, personal growth, and improvement of academic capability. Services for simple or complex and severe concerns include individual, personal, social, and career counseling on a voluntary and confidential basis. Groups and workshops are designed to meet student requests in areas such as life planning, career development, stress management, confidence building, improving learning effectiveness, weight control, and other topics related to the growth of the whole person. Counselors and psychologists coordinate closely with Student Health Center staff to assist students in maintaining emotional and physical well-being.

The Center also coordinates various national testing programs and provides the opportunity to take, at cost, career interest tests and personality tests in conjunction with individual counseling. The professional staff of psychologists and counselors offers services on a no-fee basis to UVM students carrying five or more credits. The Center is accredited by the International Association of Counseling Services.

The Counseling and Testing Center is located at 146 South Williams Street, (802) 656-3340.

DISABLED STUDENT SERVICES

The Office of Specialized Student Services works closely with students who have physical or learning disabilities, securing solutions to problems encountered in their university experience. This includes providing assistance with necessary tasks (e.g. readers, interpreters, mobility aides, notetakers); academic, vocational, and personal counseling to encourage optimal independence and eventual employability; educational diagnostic services; course accommodations; and a support system and structure where students can begin to effect changes in campus, community, and personal issues. Fees for educational diagnostic services may be charged.

Prospective students with disabilities may contact the staff in the Office of Specialized Student Services for assistance in making decisions and assessing their needs for future schooling. Incoming students should contact the OSSS in planning for housing, classroom, and mobility needs. Current documentation of disability should be provided. Brochures describing the services at UVM for students with physical or learning disabilities are available from the Office of Specialized Student Services, A-170, Living/Learning Center, (802) 656-7753; TTY (802) 656-3865 (telecommunications for the deaf); (802) 656-2625 (UVM Information Office TTY).

THE LEARNING COOPERATIVE

The Learning Cooperative provides academic support to students in all disciplines by offering individual tutoring in writing, reading, study skills, English as a Second Language, and many introductory courses.

Supplemental Instruction (SI) assists students in large introductory-level courses. In SI sessions, small groups of students meet after class to review course material and learn how to apply study skills to specific subjects.

Any student currently enrolled in classes at UVM is eligible to use the Co-op services. The office is centrally located at 244 Commons, Living/Learning Center. For more information, stop by or call the office at (802) 656-4075. The extended office hours are Monday to Thursday 8 a.m. to 9 p.m.; Friday 8 a.m. to 5 p.m.; Sunday 6 p.m. to 9 p.m.

TRIO Program

TRIO is a federal program providing support for those students who may be the first in their family to go on to college or who may have limited financial resources. It is also for students with physical or learning disabilities.

TRIO Program participants receive personalized attention from the professional staff of the Learning Co-op to work on the skills necessary to get the grades and satisfaction from college that they expect. All the services available through the Co-op are available to participants at no cost. Special emphasis is placed on teaching students to become better learners.

Eligible students are contacted by the Co-op at the beginning of their first year. Students interested in learning more about the TRIO Program can call the Learning Cooperative at (802) 656-4075.

CENTER FOR CAREER DEVELOPMENT

The Center for Career Development provides UVM students with comprehensive assistance in exploring and implementing their career goals. There are three major components in this effort: understanding one's own strengths and career needs, discovering related work and educational options, and pursuing a specific goal.

To learn more about oneself, the Center staff offers two options: individual counseling appointments and group workshops. The focus can be on choice of major, graduate study, or career. Assistance is available by appointment throughout the year. Students are encouraged to visit the Center to learn more.

Investigating work and/or education options, the second component, can be accomplished through a wide variety of programs. Information on part-time and summer employment opportunities is available to students attempting to

gain experience in potential careers. For students interested in more structured in-depth experiences, the Cooperative Education Program allows students to alternate full-time paid employment with periods of classroom education. Co-op students are usually computer science, mathematics, engineering, or business majors and may work as close to campus as Burlington and as far away as Boston, Minnesota, and Florida.

Students will also find the Career Resource Library helpful in developing their goals. The library contains literature on various fields, occupational trends, salary surveys, government opportunities, and literature describing current career opportunities in both large and small corporations in the public and private sector. The library also contains a complete guide to all graduate programs in the country and a selection of graduate school catalogues from other universities. This information is expanded and updated continuously.

Additionally, career center programs and staff assist students with the third component, implementing goals. Workshops are held each semester to teach students job search skills such as resume writing, interviewing, and developing a job search strategy. To provide students with access to employers, the Center has an active on-campus interviewing program which brings local, regional, and national organizational representatives to campus. The UVM Alumni Career Network and the UVM Connection are just two more of the many services offered in this area.

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

The Center for Career Development is located in E Building, Living/Learning Center, (802) 656-3450.

Preprofessional/Graduate School Advising

The Advising Program provides assistance and support to all students preparing to enter graduate programs. General counseling, advising, and referral services are available to students with academic and nonacademic questions and concerns.

The Prehealth Advisor works specifically with students interested in health fields such as medicine, dentistry, optometry, podiatry, and osteopathy. The advisor works in coordination with the Prehealth Advisory Committee in preparing student letters of evaluation (required by the majority of medical, dental, and health professional schools as part of the application process).

The Prelaw Advisor works with students considering law school and has information and expertise regarding the application and admission process.

Registration materials for the required preprofessional examinations and application services are available at the Center as is a resource library containing graduate school reference materials and professional school catalogues.

Veterans Affairs

As part of the Center for Career Development, this office provides support, coordination of services, and advising to any veteran or dependent eligible for benefits under Federal Law, Chapters 30, 31, 32, 34, 35, or 106. Students eligible for these benefits should contact the office at least one month prior to registration each semester. Students wishing to register for benefits should be prepared to present their certificates of eligibility to the Veterans Coordinator.

It is important that all veterans and dependents keep in contact with this office for the latest information regarding 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. The phone number is (802) 656-3450.

CENTER FOR SERVICE-LEARNING

The Center provides structured experiential programs and volunteer placements within the context of public service. Students may develop personal, professional, and leadership competencies in an internship or volunteer experience.

Through the **Vermont Internship Program's** service-learning internship, students get involved in the community by filling real needs and link their experience with a structured academic program. Typical placements include health and human services, law and justice, governmental, legislative, arts, environmental, and educational organizations. These experiences can be part-time, full-time, one-semester in duration or longer; in Vermont, out-of-state, or in an international setting. Students may earn academic credit through the Center or through the appropriate academic department. Information interviews are conducted to assist students in organizing a structured internship plan. Coordination and support services are provided by the Center throughout the experience.

The **Community Service Program** provides several ways for students to get involved on campus and in the community as volunteers. They may participate in a one-time event such as Hunger Clean Up or Into the Streets, work several hours per week at a local agency, or make a year-long commitment with a campus or community organization. The Center also assists the UVM Volunteers in Action (VIA), a student-run program, that coordinates volunteer projects such as Big Buddies, Adopt-a-Grandparent, Special Olympics, Vermont Children's Magazine, Volunteers for Youth, the UVM Prison Project, Habitat for Humanity, Literacy Education for Adult Reading Needs (L.E.A.R.N.), and the Food Salvage Program. The Alternative Spring Break Program allows students to increase their social awareness through service in an economically disadvantaged environment away from Vermont. Reflection and examination of the culture and circumstances are built into the program. The Center also offers a Community Service Trek, a week-long experience for incoming first-year students prior to the first week of classes.

The **Workstudy Internship/Community Service Link** provides eligible students with the opportunity to participate in a community service-learning experience while earning their work-study allocation.

The **Living/Learning Community Service Leadership Suite** offers students the opportunity to live together while becoming involved in community service projects and to study the philosophical and practical aspects of service-learning.

Making contact with the Center during the first year at UVM enables students to plan for a continuum of service-learning experiences throughout their academic career.

The Center for Service-Learning is located at 41 South Prospect Street, (802) 656-2062.

OFFICE OF MULTICULTURAL AFFAIRS

The mission of the Office of Multicultural Affairs is twofold: to meet the academic, cultural, social, and emotional needs of the students; and to provide information and facilitate

programs to promote sensitized awareness about cultural issues within the University setting. In order for a community to function collectively, a high level of sensitivity must be present among its inhabitants. The Office of Multicultural Affairs helps to educate the community to understand the cultural differences, needs, and obstacles of multiracial students.

Programs such as Supplemental Academic Advising, the Community Connection, and the Faculty/Student Network assist students academically.

The Spring Visitation Program provides an opportunity for prospective students who have been accepted for admission to live on campus for an extended weekend. Once a student decides to attend UVM, a five-week experiential program is offered during the summer prior to fall enrollment (Summer Enrichment Scholarship Program).

The facilities of the Office of Multicultural Affairs are located in the Center for Cultural Pluralism, (802) 656-3819.

Center for Cultural Pluralism

The Center develops and promotes programs to enhance cultural awareness on campus and within the local community. Student involvement in the planning and facilitation of such programs is a primary goal. Programs range from educational colloquia and cultural dinners to sponsored campus/community-wide ethnic weeks. Guest speakers, films, and cultural performances help bring campus attention to the African-American, Asian-American, Latino-American, and Native-American portions of our past and present day American society. Past programs have included dance troupes and speakers such as Reverend Ralph Abernathy, Russell Means, Spike Lee, Benjamin Hooks, Dick Gregory, and Shirley Chisholm. The Center serves as a gathering place for members of the academic community to meet and share their cultural heritage through a variety of social, cultural, and educational events. The Center for Cultural Pluralism also provides a place where students can come to relax and study. Typewriters, television, VCR, computer facilities, and even a kitchen are available for any UVM student to use. By providing special programs to increase cultural awareness and appreciation on campus and within the community, the Center serves an important mission of being "a place of sharing."

The Center for Cultural Pluralism is located on Redstone Campus, (802) 656-3819.

STUDENT HEALTH CENTER

The Student Health Center is available to all students (except those in the College of Medicine) for primary and preventive health care. A comprehensive program has been developed to meet the needs of college students and includes medical and gynecological clinics; physical therapy and sports therapy programs; a wellness promotion program; a drug and alcohol education program; and some laboratory services. Most of these services are covered by the health fee (see page 18). Students entering the University are required to furnish the Health Center with a complete medical history which includes immunization dates. A physical exam is not required.

Because the College of Medicine is located on campus, the Burlington area has a large and sophisticated medical community of which the Health Center is a part. Students requiring consultations are referred to specialists in the area.

When necessary, hospitalization is usually arranged at the Medical Center Hospital of Vermont, a teaching hospital located on the edge of the main campus. *Note:* The University Health Center (UHC) is not the UVM Student Health Center.

The University also makes available to students an optional health insurance plan that provides hospitalization and some outpatient benefits. It is strongly advised that all UVM students have adequate hospitalization insurance.

SPEECH AND HEARING CENTER

The E.M. Luse Center for Communication Disorders of the Department of Communication Science and Disorders offers diagnostic and treatment services at very nominal cost to all UVM students for communication disorders such as: hearing loss; selection and use of hearing aids; stuttering; voicing, language, and articulation disorders, etc.

The Luse Center is located in Allen House, (802) 656-3861.

ACTIVITIES

Participation in cocurricular activities is a vital part of a student's education. 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.

The Student Association, the primary student governing organization, assumes responsibility for voicing student concerns and interests in the governance activities of the University community. It recognizes and funds approximately 110 student organizations, 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.

Cocurricular life focuses on Billings-Ira Allen Campus Center which houses a number of student organizations and provides space for meetings, lectures, films, and other programs.

The Student Activities Office, the Student Association Office, and other student organizations are located in Billings Center.

INTER-RESIDENCE ASSOCIATION (IRA)

The Inter-Residence Association represents the students living in UVM 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 ensure that the residence halls meet the needs of the residents.

HONORARY AND RECOGNITION SOCIETIES

Honorary and recognition societies at The University of Vermont recognize student contributions to the UVM community and their leadership in campus life.

Honorary societies include Boulder Society, which acknowledges outstanding senior men; and TOWERR, which acknowledges outstanding senior women.

National honorary societies represented on campus are as follows:

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 UVM student in recognition of outstanding service, scholarship, and leadership, it is also a challenge for continued unselfish service in the best interests of the college campus.

The Society of the Sigma Xi, established 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; Beta Gamma Sigma, business administration; Kappa Delta Pi, education; Tau Beta Pi, engineering; Omicron Nu, home economics; Delta Sigma Rho-Tau Kappa Alpha, debating; Phi Alpha Theta, history; Eta Sigma Phi (Iota Chapter), classical studies; Alpha Kappa Delta, sociology; Sigma Phi Alpha, dental hygiene; Chi Epsilon, civil engineering; Xi Sigma Pi, natural resources; Ethan Allen Rifles, outstanding students in the Reserve Officers' Training Corps; Champlain Sabres, a military fraternity; and Phi Eta Sigma, outstanding first-year students.

ATHLETICS AND RECREATIONAL SPORTS

The University encourages and supports a variety of sports at various participatory levels. All full-time undergraduate students are eligible to try out for varsity sports and are encouraged to participate in all levels of sports activities. High student interest in athletic activities has placed a great demand on facilities. To help meet this demand, a dance studio, gymnastics/combatative sports, and multipurpose building was completed in early 1982. The hockey facility has recently been enlarged and renovated.

Athletic eligibility is determined by the Director of Athletics. All varsity athletes must comply with all appropriate rules and regulations of The University of Vermont, NCAA, and those of the playing conferences with which UVM is affiliated. Each prospective student-athlete and current student-athlete must receive an individual eligibility clearance from the Athletic Director's Office and have a physical exam. They must receive appropriate clearance from the UVM Student Health Center prior to participating in team activities including practice, preseason conditioning, and contests.

The athletic policies of the University are developed by the Athletic Council, an advisory board to the President com-

posed of faculty, students, and alumni. Athletic relations are maintained with NCAA, ECAC, NECAC, and NAC.

Opportunities exist in the traditional seasonal sports for all students who are eligible to compete. In the fall, the programs offered to men include soccer, cross-country running, golf, and tennis. The programs offered in the fall to women include field hockey, soccer, cross-country running, tennis, and volleyball. Winter programs for both men and women include basketball, skiing, swimming, gymnastics, and indoor track. A hockey program for men is also included in the winter. The spring programs for men include baseball, lacrosse, tennis, and outdoor track. Women's spring programs include softball, lacrosse, and outdoor track.

Programs range in strength from the national level, such as skiing, to the regional and New England level. All prospective students interested in obtaining information concerning a particular sport should contact the coach of that sport.

Club sports provide the opportunity for a group of students to participate in a wider variety of competitive activities. All full-time undergraduate students are eligible to participate in any club. Emphasis is placed on student leadership and, within each club, members have the opportunity to become involved in the organization, administration, and supervision of the club's activities. Active club sports include: cheerleading, crew, cycling, figure skating, gymnastics, women's ice hockey, judo, karate, men's rugby, women's rugby, tae kwon do, men's ultimate frisbee, women's ultimate frisbee, men's volleyball, and wrestling.

Competitive sports are a desirable part of a student's program of education. The recreational sports program offers over 30 intramural sports and special events throughout the academic year. All full-time students are eligible to participate in as many activities as they choose. Teams may be organized from any residence hall, fraternity, sorority, or independent source.

Recreational facilities are available every day to provide students the opportunity to drop in and participate informally in activities which interest them. Racquetball, walleyball, tennis, and squash courts are available on a reservation basis, while basketball courts are used on a first-come, first-serve basis. In addition, students are free to use the pool, rink, weight room, and track whenever these areas are open for recreational hours.

Each semester the Recreational Sports Program offers a full schedule of aerobic classes. Registration takes place during the first week of classes, and the programs run for 12 weeks. For specific program information, contact the Recreational Sports Office, (802) 656-4483.

THEATRE

The Royall Tyler Theatre is the home for the season of plays presented by the Department of Theatre.

The arts are vital to individuals as well as civilizations, and the Department presents the fruits of the artistic work of students and faculty alike. Within the context of a liberal arts college, the theatre program in the classroom and on the stage and public platform attempts to expose its audience to its theatrical heritage. A rich curriculum is enhanced by an adventurous production schedule. The Department also offers courses and activities in public speaking and debate, the excellence of which are nationally recognized. All members of the UVM community are encouraged to participate in these programs and to share the Department's commitment to vital living theatre.

DEBATE

The Lawrence Debate Union provides an opportunity for interested students to participate in intercollegiate forensics. Members of the LDU attend debate tournaments throughout the nation, each year engaging in over 250 debates at more than a dozen tournaments. Competition of this caliber teaches skills of efficient research, rigorous thought, and effective communication. The program is designed to develop the abilities of both the experienced debater and the beginner. Outstanding performers receive recognition in the form of annual awards and by election to Delta Sigma Rho-Tau Kappa Alpha, the national forensic honor society.

MUSIC

Opportunities for participation and appreciation are available for students with strong musical interests. The University Mixed Choir, Choral Union, and Women's Choir are open by audition to students seeking participation in choral ensembles. The University Band, Jazz Band, Vermont Winds, Brass, Tuba, and Percussion ensembles, Trombone Choir, and University Orchestra provide performance opportunities for instrumentalists. All perform in various public presentations during the year. On occasion, the Choir and Choral Union have been invited to perform with the Vermont Symphony Orchestra; the University Pep Band performs at athletic events, and the Band mounts a spring tour. The University Orchestra presents several varied concerts of standard orchestral literature plus concertos featuring outstanding music students or combines forces with the vocal ensembles for presentation of major choral works.

In addition to the larger ensembles, faculty and senior recitals, special departmental concerts, and guest artists are scheduled throughout the school year. Individual instruction on various orchestral instruments, piano, organ, harpsichord and voice may be arranged (contact the Music Department office for specific information).

The offices of the Music Department are located in the Music Building on Redstone Campus. An important feature of this facility is its beautiful recital hall which houses the C.B. Fisk organ, one of the finest instruments in the Northeast. The Music Department serves as a showcase for the musical talents of the music majors and the faculty, as well as for 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, the Lane Series has presented well over 800 concert and stage productions. 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 as 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 Bejart Ballet du XXIeme Siecle, 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 appearance by Arthur Rubinstein, Marcel Marceau, Beverly Sills, Lily Tomlin, and Andres Segovia.

Active not only in Burlington, the Lane Series has maintained state-wide activities over the years 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. The Lane Series led the way to the establishment of New England Presentors, the membership of which represents virtually all of the performing arts in New England. In 1980, the National Endowment for the Arts, through the Vermont Council on the Arts, awarded to the Lane Series a \$100,000 Challenge Grant for the purpose of enlarging the Series' endowment. During the 1991-92 season, the Lane Series presented 21 events including Les Ballets Africains, the Acting Company's "A Midsummer Night's Dream," Minnesota Opera's "Magic Flute," pianists Charles Rosen and Ursula Oppens, Nikolais/Murray Louis Dance, New York City Opera National Touring Company's "Tosca," jazz artists Marian McPartland and Butch Thompson with their trios, and Doc Watson.

The Lane Series serves a wide audience: students, faculty and staff, and the community at large. A certain number of tickets for most events are available at \$5 so that all students and members of the community are able to attend the Lane Series' events. The Lane Series regularly schedules master classes and workshops, open to the UVM community for free. Students can also volunteer to usher at Lane Series' events.

The Lane Series is managed by a staff of five and is advised by a 100-member Friends Council. Offices are located at 460 South Prospect Street, (802) 656-4455. The major ticket sales outlet is the Campus Ticket Store (UVM Bookstore, 656-3085) which accepts telephone/mail orders using MasterCard/Visa.

CHURCH STREET CENTER FOR COMMUNITY EDUCATION

The Center, located in the restored Ethan Allen Firehouse on Burlington's Church Street, offers over 100 noncredit minicourses and workshops each quarterly 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. The Center also offers students the opportunity for challenging work/study, internship, and practicum assignments.

SOCIAL SCIENCE RESEARCH CENTER

The Social Science Research Center provides research facilities for members of the UVM community. The SSRC is operated by the Center for Rural Studies in the College of

Agriculture and Life Sciences and the University Computing Services as a data archive, research facility, and a teaching resource. The Center is the depository of data sets made available to the University by the Inter-University Consortium for Political and Social Research. In addition, the Center holds data from other sources, including the U.S. Census Bureau, state agencies, and UVM researchers. The Center's archives are available to any UVM student or faculty member. Advanced students provide assistance for faculty and student projects. The SSRC library of data and manuals is located at 137 Hills Building. Anyone who feels the SSRC's resources might be of use is urged to drop by or call the Director at (802) 656-3021.

INTERNATIONAL STUDIES PROGRAM

The International Studies Program is an interdepartmental activity with a director and six areas, each of which has its own director. The purposes of the Program are to encourage and coordinate interdisciplinary and comparative study and research for selected foreign areas. The Program also sponsors interdisciplinary seminars and guest lectures and administers the program of concentration in international studies and offers the B.A. degree in the College of Arts and Sciences.

CENTER FOR RURAL STUDIES

The Center for Rural Studies in the College of Agriculture and Life Sciences addresses critical social, economic, and resource issues in Vermont, rural areas of the U.S., and in developing nations. Primary emphasis is on research and organizing activities which contribute solutions to rural problems. Through interdisciplinary research, the Center bridges the gap between the academy and the community, involving students, community leaders, government officials, political activists, and the private sector, as well as University faculty.

Research skills range from primary data collection and the analysis of secondary data to field work in rural economic development. The Center has developed expertise in helping communities conduct surveys, needs assessments, and social impact analyses. Internships, special studies, course work, and/or paying jobs are available to interested and motivated students. For more information, call the Center at (802) 656-3021.

HOUSING

Any student may apply to live in University residence halls but priority is given to full-time undergraduate students. All first-time, first-year students, except those living at home within commuting distance, those living with spouses or children, or those over 21 years of age, must live in University housing for four matriculated semesters. The department must be notified of such status (e.g., commuters or married) in writing by June 30. Housing is not guaranteed for upperclass students and is determined by a lottery held in the spring of each year. Second-year students who are active or pledges of a fraternity or sorority may register for UVM residence hall housing or apply for an exception by June 30.

Limited on-campus housing is available for transfer students, although it is not guaranteed. Transfer students are urged to apply for housing with the Office of Residential Life. As soon as they are accepted, they should return the wait list card sent with their acceptance letter.

RESIDENCE HALLS

The mission of the Department of Residential Life is to create an atmosphere within the UVM residence hall system which facilitates the growth and development of students. The department is committed to creating communities that are welcoming to all students regardless of race, ability, gender, age, national origin, color, religion, or sexual orientation.

The residence hall system is divided into three geographical areas: East, Main, and Redstone campuses. Each campus has specially selected undergraduate, graduate, and full-time staff to plan and implement activities intended to develop characteristics desirable in a UVM educated person. These characteristics include: developing a sense of belonging, acquiring knowledge and skills, developing critical thinking, making ethical choices, and assuming self-responsibility. In addition, each campus fosters an environment in which students are provided opportunities to understand and celebrate diversity. Student governments complement the department's mission, represent students' opinions, and provide educational and social programs for their constituents.

Students living in the residence halls must have meal plan contracts. Contracts for the room and meal plan are binding for the full 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 opening day of the residence halls. Rooms may not be occupied until the date specified. Students are expected to leave the residence halls not later than 24 hours after their last examination or by 8:00 p.m. on the last day of final examinations.

Student rooms are equipped for comfortable residence hall living. Each double room has two beds, 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, pillows, wastebaskets, desk lamps, and reading lamps. Laundry facilities are provided in residence areas. There is some storage space on East and Redstone for storage of trunks, baggage, bicycles, and skis during the academic year.

The Department of Residential Life is located in Robinson Hall, Redstone Campus, (802) 656-3434.

STUDENT FAMILY HOUSING

There are 131 University-owned apartments designated for student families 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 Complex consists 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 complex, 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 University.

Detailed rental information may be obtained from the Ethan Allen Housing Office, 1007 Ethan Allen Avenue, Fort Ethan Allen, Winooski, Vermont 05446, (802) 655-0661.

OFF-CAMPUS HOUSING

The Office of Residential Life provides a free listing service where community landlords list apartments, houses, and rooms available for students in the greater Burlington area. Students who have a living situation to share or who need a roommate may also list their needs.

The listing is available at the Office of Residential Life between 8:00 a.m. and 4:30 p.m. Monday through Friday. Listed information is not given by phone or mail.



General Information

This section offers a summary of regulations and procedures. In addition to the information presented here, the rights and responsibilities of students and University policy on these and other matters are explained in detail in the *The Cat's Tale*, a student's guide to The University of Vermont. Students are responsible for knowledge and observance of these regulations and procedures.

REGISTRATION

Students in attendance must preregister for the next semester at the designated time. Unless excused in advance by the dean 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 is required to preregister for more than 18 credit hours.

Any credits earned at The University of Vermont are transferable to another institution only at the discretion of the receiving school.

ACADEMIC ADVISING

Effective academic advising involves an established rapport between student and teacher. Accordingly, each new student is assigned 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 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 available to undergraduates.

The Learning Cooperative: represents a collaborative effort on the part of academic and student affairs offices to improve the ability of students to benefit fully from their academic experiences. The Learning Coop supplements the academic environment by providing developmental instruction in writing, reading, and study skills, works with students to develop good learning strategies for challenging courses, and maintains a campus-wide tutoring program.

Prehealth 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.

Prelaw Advising: The UVM Prelaw 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.

Preveterinary 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: An advisor to International Students is available to provide counseling and assistance to international students on personal and academic problems, and on matters relating to immigration and social and cultural adjustment. In a special pre-orientation program prior to the beginning of the fall semester, the Office of International Educational Services provides new international students with an introduction to the University and the Burlington community. An active campus International Club provides an opportunity for international students to contribute to campus life and to make friends outside the classroom. Other clubs with an international focus, such as the Overseas Development Network, are also available. American students planning to study abroad should also make their plans through the Office of International Educational Services which is located at B161, Living/Learning Center.

Multicultural Student Advising: assists students entering the University who demonstrate that additional support services are needed. Incoming first-year multicultural 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 two 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. laboratory) 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 are not required to give make-up exams, papers, or quizzes.
2. No drops will be allowed after the second week except in cases where the student is enrolled by administrative error and has not attended the course. The disposition of such cases is handled entirely by the Registrar's Office.
3. From the end of the second week to the end of the ninth week of classes, students may withdraw from courses. Students who wish to withdraw fill out the course withdrawal form, consult with their advisor, and submit the form to the instructor. The instructor signs the form and sends one copy to the Registrar to be recorded on the permanent academic record. Students give a copy to their dean for information purposes. The instructor also records the withdrawal grade (W) 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, students may withdraw from one or more courses only by demonstrating to their college or school studies committee, through a written petitionary process, that they are unable to continue in the course(s) due to circumstances beyond their control. Such petition must contain conclusive evidence, properly docu-

mented, of the illness or other situation which prevents completion of the course(s). Acceptable reasons do 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 of W 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).

Students wishing to withdraw for medical reasons must contact their dean.

5. No withdrawals are permitted after the last day of classes.
6. The grade of W will not enter into the grade-point average.

PASS/NO PASS

PASS/NO PASS course enrollments were approved by the University Senate for implementation in September 1968 to encourage students to take elective courses they might otherwise avoid for fear of a low grade, to encourage work for internal rather than external goals, and to stimulate intellectual exploration. The action was taken in two parts:

FIRST, that any degree program students, not on academic trial, be permitted to take as many as six courses (three courses for two-year students; or as many courses as they have semesters remaining for future transfer students) during their undergraduate career on a pass/no pass basis, beginning in the sophomore year (second semester of the 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 enrolled in ineligible distribution elective courses on a pass/no pass basis prior to September 1, 1974, shall not be penalized. Students must complete all work normally required in these courses to 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. The grade submitted by the instructor will not become available to the student nor to any third party.

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. A PASS/NO PASS Request Form is obtained from the Registrar's Office and the academic advisor is consulted.
2. The advisor's endorsement that the request conforms to the policy established by the University Senate is obtained. 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.
3. The request to be placed on pass/no pass status is submitted to the Registrar's Office during the first two weeks of the semester. Requests to be removed from that status must be filed during the same period.

Note: Nondegree students may not take courses on pass/no pass basis.

AUDITING COURSES

With the approval of the dean 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. A student wishing to audit a credit course must meet minimum levels of performance set by the instructor at the time of registration in order to receive an audit grade on a transcript. 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 courses audited in the Evening Division or Summer Session.

GUIDELINES FOR INDEPENDENT STUDIES

1. Independent study is an educational 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, students must obtain the approval of their 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 (extended course), 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

Students who repeat a course only receive credit once for the course. The grades for all occurrences of the course remain on the permanent academic record and all are included in computing the cumulative grade-point average.

CLASS ATTENDANCE

Students are expected to attend all regularly scheduled classes. This is a major responsibility of students toward themselves and toward the University. The primary penalty for nonattendance results in a 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.

Any student who fails to attend a scheduled course by the third instructional day of a semester or the second scheduled class session of a course, whichever comes later, without giving prior notification to the instructor, may be disenrolled. In such cases, the instructor shall notify the Registrar who will remove the student's name from the class list and the course from the student's schedule.

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: Students who believe that they have been unfairly treated in regard to absences may appeal to their academic dean.

Medical Excuses: The Student Health Center provides medical excuses by providing documentation to students who are hospitalized or who are advised by the Health Center staff to restrict their activities because of illness or injury. The student can then discuss excused class absence and

course work with the faculty member who has final authority to excuse students from classes.

HOUR TESTS

1. One or more hour tests are usually given during a semester in each course. These are scheduled by the faculty member within the class periods assigned for the class.
2. In a course which has several sections meeting at different hours, a common test for all sections may be given only by arrangement with the Registrar. A schedule of such tests is made up at the beginning of the semester. Requests should be filed as early as possible.
3. Attendance at hour tests scheduled outside the normal meeting time of the class shall not have precedence over attendance at other scheduled activities or other important commitments of the students concerned. Faculty members must be prepared to give a make-up test for those unable to be present at the time set.
4. 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

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 of the college/school on request of the chairperson of the department. No examination shall be given during the last week (the last five instructional days) 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. Students having a conflict in their final examination schedule must notify the faculty concerned of such conflict not later than the close of business one week prior to the last day of classes for the semester in which the conflict arises.
6. Students who are absent from a final examination for any reason must report that fact and the reason, in person or in writing, to their 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.
7. If the absence is not reported as provided above, or is not excused by the instructor, the examination is regarded as failed.
8. No student shall be required to take three or more final examinations in one 24-hour period.
9. Unless a mutually agreeable alternative time can be reached by the student and the instructor, the sched-

uled make-up will occur the next day after the regularly scheduled examination. These considerations are subject to the following constraints: all exams will be given in the final exam period and all conflicts must be resolved before the start of the final exam period.

10. Students will select which of the three examinations they wish to take at an alternative time. In cases where the instructors in all three sections feel it is impossible to give the examination at an alternative time, and all conflicts are in the same college or academic unit, the appropriate dean's office, in consultation with the faculty involved will establish which of the three examinations will be taken as a make-up. If the unresolved conflict involves more than one college, the deans of the units in question will resolve the matter. If agreement cannot be reached by the deans involved, then a person from the Office of the Provost will establish which of the three examinations will be taken as a make-up.
11. All final examination materials should be retained for at least one month after the final examination session in case any questions arise concerning grades and to afford students the opportunity to review their graded final examination papers if they wish to do so.

GRADES

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

| Points per Semester Hour | |
|--------------------------|------|
| A+ Excellent | 4.00 |
| A Excellent | 4.00 |
| A- Excellent | 3.67 |
| B+ Good | 3.33 |
| B Good | 3.00 |
| B- Good | 2.67 |
| C+ Fair | 2.33 |
| C Fair | 2.00 |
| C- Fair | 1.67 |
| D+ Poor | 1.33 |
| D Poor | 1.00 |
| D- Poor | 0.67 |
| F Failure | 0.00 |

This system began with grades received for courses initiated in the fall semester 1983. Grades received prior to the fall 1983 semester with "+" or "-" receive only those quality points shown on page 42 of the 1982-83 catalogue.

Other grades are:

AU Audit. See page 32 for details.

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 Student Health Center; personal tragedy; academic, such as 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. 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. It will be the responsibility of each dean's office to determine through the Registrar whether any incompletes have been awarded without prior approval. It is the student's responsibility to learn from the dean's office

whether the request has been approved, the date of completion, and, from the instructor, the nature of all outstanding requirements.

Procedure:

1. Medical. Students contact the appropriate dean's office to determine type of academic relief needed (i.e. incomplete, withdrawal). Students complete a Medical Action Request and submit it to the Student Health Center. Students and faculty will receive confirmation of eligibility for medical action from the dean's office.
2. Personal tragedy. Students contact the appropriate dean's office to discuss these matters. Confirmation of eligibility for incompletes will be provided to faculty by the dean.
3. Academic. Students contact the course instructor to request an incomplete grade. It is the instructor's responsibility to confirm to the dean eligibility for incompletes on academic grounds.

In all cases, the instructor will fill out and forward to the student's academic dean an incomplete card which will describe the reason for the incomplete and will note the completion date to which the student and instructor have agreed.

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.

W Withdrawn.

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 by the end of the first month of the following semester unless an extension is granted by the student's dean.

TRANSFER OF CREDIT

Students seeking to transfer academic credit from all institutions, national and international, may do so only for courses which are comparable in content, nature, and intensity to courses taught at The University of Vermont and are graded at the level of C or higher. To insure transferability of courses to be taken elsewhere, degree students must secure prior approval for each course in writing from Transfer Affairs. Specific questions regarding credit transfer should be directed to the Office of Transfer Affairs, 327 Waterman.

ACADEMIC REPRIEVE POLICY

An Academic Reprieve Policy for former students returning to complete their education at the undergraduate level became effective at The University of Vermont in the fall semester of 1986. This policy is designed to make it possible for former UVM students, whose academic performance when first enrolled was below standard, to resume their studies without the encumbrance of the grades previously earned.

The Academic Reprieve Policy is available to returning students who have not been enrolled at UVM or any other accredited institution of higher education for a period of at least three calendar years.

Former students returning to the University may request the application of the Academic Reprieve Policy only once in their career at UVM.

The established procedures and criteria for admission or readmission apply to all students, including those who may be eligible for the application of the Academic Reprieve Policy.

The dean of the college/school in which the student is enrolled at the time of initial eligibility for the application of the Academic Reprieve Policy shall determine all questions as to eligibility for, and application of, the "policy."

A person meeting the criteria for eligibility must file a petition with the appropriate dean requesting reprieve of all prior course work at the University, either at time of admission or readmission or before the close of the first semester of re-enrollment. The Reprieve Policy includes all previous UVM work and does not allow the students to pick and choose individual courses for reprieve. All courses with grades below passing are ignored, credit hours for courses passed are carried forward, but the grade is not figured in the new grade-point average which begins again at zero.

Any person electing the reprieve option is required to complete a minimum of 30 additional regularly graded credits at the University before a degree may be awarded (15 regularly graded credits for the associate degree); these credits are not open to the pass/fail option. Those electing the reprieve option may qualify for honors at graduation only on the same basis as any transfer student, i.e. completion of 60 or more regularly graded credits at UVM (30 or more regularly graded credits for the associate degree programs).

Persons electing the reprieve option will be required to meet degree requirements of the catalogue in effect on the date of the student's application for readmission.

The Reprieve Policy applies solely to regular undergraduate degree programs. Graduate programs are specifically excluded.

CLASS STANDING

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

| | Credit Hours |
|--------------------|---------------|
| Bachelor's degree: | |
| First-year | 0-29.9 |
| Sophomore | 30.0-59.9 |
| Junior | 60.0-89.9 |
| Senior | 90.0 and over |
| Associate degree: | |
| First-year | 0-29.9 |
| Senior | 30.0 and over |

TRANSCRIPTS

An official transcript is the reproduction of a complete, unabridged permanent 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 completion of degree requirements.

Currently enrolled as well as former undergraduate and graduate students may obtain an official transcript of their permanent academic record by writing the Office of the Registrar, 360 Waterman Building. Please allow a minimum of one week for normal processing and three weeks following the end of a semester.

Transcripts are not released when there is an indebtedness to the University.

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 is misleading, or contains information which is inaccurate, a hearing may be scheduled to seek appropriate modification. Requests for review of records should be made to the Registrar.

NAME AND ADDRESS EXCLUSION

The Family Educational Rights and Privacy Act of 1974 grants to all students the right not to have personal information contained in the records of the University released to any individual, agency, or organization. UVM feels that the following categories constitute such personal information.

- Category I Name, address, telephone number, dates of attendance
- Category II Class, previous institution(s) attended, major field of study, enrollment status, award, honors(including dean's list), degree(s) conferred (including dates)
- Category III Past and present participation in officially recognized sports and activities, physical factors (height, weight)
- Category IV Date and place of birth

Students who do not wish to have one or all of the above categories of information released should fill out an information exclusion card at the Registrar's Office.

UNIVERSITY 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 of the undergraduate colleges/schools publish at the beginning of each semester the names of those full-time students with a grade-point average of not less than 3.0 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 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:

1. Upon written application to the academic dean, a student may be granted a leave of absence by that dean when that application merits the commitment of the University to insure the student's readmission.
2. A leave must be granted for a finite period of time.
3. A leave normally may not exceed four semesters.
4. A leave normally may not be granted for the current semester after the day on which courses can be dropped without penalty.
5. A leave may not be granted to students currently on academic trial or disciplinary probation.
6. A leave is distinct from withdrawing for medical reasons and is not granted for medical reasons.
7. A leave does not guarantee housing upon the student's return.
8. A leave guarantees readmission to the student's college/school in the University if the student confirms intent to return by the closing date for a normal readmission application (October 31 and March 31 preceding the appropriate semester).
9. While on a leave, an individual's student status is temporarily terminated. A leave of absence guarantees an individual's readmission only if the appropriate action is taken.
10. 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.
11. A leave should be confirmed by the appropriate form signed by both the student and the dean of the college/school involved.

WITHDRAWAL

Students who wish to withdraw from the University must first notify their academic dean in person or writing.

READMISSION

Any degree students who have left the University for one semester or more must write to their dean'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 more stringent requirements. Students with questions regarding their academic standing should consult with their college/school dean.

1. "On Trial":
 - a. "On trial" is an intermediate status between good standing and dismissal. Students remain enrolled according to stated academic conditions of their college/school.
 - b. A student is placed "on trial" by the dean 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) Students who are readmitted after having been dismissed for low scholarship re-enter "on trial."
 - (2) Generally students are placed "on trial" if in any semester they have failed half or more of the hours of their enrollment but have been permitted to continue in college/school.
 - (3) Students whose records have been consistently below the graduating average or generally unsatisfactory in any semester may be placed "on trial" or continued "on trial" even though they do not come within the provisions of Section (2).
2. Separation:
 - a. Students are dismissed from the University if they receive grades below passing in one-half or more of the semester hours of their enrollment in any semester unless they are allowed to continue by action of the designated committee.
 - b. Students who fail to meet the condition of their trial or whose record has been unsatisfactory and consistently below the graduation average may be dismissed for low scholarship even though they do not come within the provision above.
 - c. Students dismissed for low scholarship must address their application for readmission to the college/school taking the action.
 - d. Any students dismissed for academic or disciplinary reasons must receive written approval from their previous academic dean (or the Vice President for Student Affairs 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 of the two colleges/schools concerned. In the case of veterans receiving educational benefits through the Veterans Administration, the change must be brought to the attention of the advisor to veterans in the Center for Career Development where a Change of Program or Place of Training form #22-1955 must be completed and submitted for approval to the Veterans Administration.

MEDICAL DISABILITIES

Students with disabilities may be approved to enroll for a course load of less than 12 credit hours (FTE) because of their functional or processing limitations as a result of a disability. Those students with receipt of appropriate medical certification from the Director of the Student Health Center will be approved to carry a reduced load. Such students, because of their disability, will be afforded full-time status in accordance with Section 504 of the Rehabilitation Act of 1973.

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. Beginning with the class of 1984, the minimum grade-point average for graduation is 2.00. 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 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 first or sophomore year, is required of all undergraduate students in four-year programs. The two credits earned 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 in this section.) 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 the Student Health Center. 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 at time of admission are exempt from physical education requirements.

All transfer students under the age of 25 will be required to fulfill the physical education requirement.

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 resulting in personal injury does occur, the University can assume no responsibility.

USE OF ENGLISH

Correct English usage is demanded by all departments. Written work of any kind which is unsatisfactory in manuscript form, grammar, punctuation, spelling, or effective-

ness 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 first-year course in English has been passed.

Before admission to the University, foreign students must offer evidence that they are capable of reading and writing English at 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. As responsible citizens, all students 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.

The disciplinary authority of the University is vested in the President. In such cases as the President considers proper, this authority may be delegated to the several deans and to appropriate judicial bodies. The continuance of each student, 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.

Policy on the above matters is explained in detail in *The Cat's Tale*. Each student is held responsible for knowledge and observance of these rules and regulations, including those concerned with academic honesty.

ACADEMIC HONESTY

The principal objective of the policy on academic honesty is to promote an intellectual climate and support the academic integrity of The University of Vermont. Academic dishonesty or an offense against academic honesty includes acts which may subvert or compromise the integrity of the educational process. Such acts are serious offenses which insult the integrity of the entire academic community.

Offenses against academic honesty are any acts which would have the effect of unfairly promoting or enhancing one's academic standing within the entire community of learners which includes, but is not limited to, the faculty and students of The University of Vermont. Academic dishonesty includes knowingly permitting or assisting any person in the commission of an offense of academic dishonesty.

The policy distinguishes between minor and major offenses. Offenses purely technical in nature or in which the instructor does not perceive intent to achieve advantage are deemed minor and are handled by the instructor. Major offenses are those in which intent to achieve academic advantages is perceived.

The following is a summary of the steps involved in adjudicating an alleged major offense against academic honesty:

1. A faculty member, student, or other University-related person reports in writing the specifics of an instance of alleged academic dishonesty to the Coordinator in the Office of the Provost.
2. The Coordinator will inform, in writing, the student(s) cited in the letter of initiation that charges will be presented to the University Hearing Panel. The student will meet with the Coordinator to be advised on the nature of the process, and the student's rights and responsibilities.

3. A student who has been accused of an act of academic dishonesty has the right to a formal hearing. The student may waive that right, in writing, and thus admit to the charge(s); in this event, the Coordinator will assign the appropriate sanction(s).
4. In the event a hearing is convened, the Presenter will describe the particulars of the charge to the five-member Hearing Panel consisting of three faculty members and two students. It is the responsibility of the Panel to determine whether there is sufficient and suitable evidence to determine guilt; the decision of the Panel with respect to guilt or innocence is determined by majority vote.
5. If a student is found innocent of the charge(s), he or she may drop the course in question without penalty if he or she wishes to; no record of that course will appear on the student's transcript.
6. If a student is found guilty of the charge(s), the Coordinator will assign the sanction(s) in accordance with the standards contained in Section G of the academic honesty policy. Although the sanction(s) will not appear on the student's transcript, a record will be maintained in the Provost's Office.
7. A student found guilty of committing an act of academic dishonesty may appeal, in writing, within five University business days, to the Provost, but solely on the grounds of procedure or abuse of discretion.

A full statement of the policy is in *The Cat's Tale*. Each student is responsible for knowing and observing this policy.

FREEDOM OF EXPRESSION AND DISSENT

The University of Vermont is a place to learn and to teach. It is not a cloister—it does not live in a vacuum. It is both in the world and of the world. Its mission is to educate people for leadership in society. (Board of Trustees, May 1969)

As the above quotation suggests, the University functions within the rules governing a larger society. It was created by that society for a special purpose: the facilitation of learning and teaching. It follows that the University's regulations must conform with the law as well as take into account the particular role of educational institutions.

Fundamental to our entire philosophy is our firm belief that rights guaranteed by the First and Fourteenth Amendments to the Constitution of the United States must be protected on the campus as elsewhere and that local, state, and federal laws must prevail on campus. Becoming a member of the University community in no way abrogates or compromises the rights which the Constitution of the United States guarantees to all persons.

Within the University setting as within society at large, the exercise of one's rights must be tempered by recognition of the rights of others. For example, the exercise of free speech may unreasonably infringe upon the right to learn.

The laws of society and the mission of the University establish the framework within which disagreement, dissent, demonstration, and advocacy may, indeed must, occur. For humankind to progress, the educational process must be dynamic even if fraught with controversy, for change cannot take place until the first question is raised. The discovery of new propositions or new solutions also may be followed by passionate advocacy. Such advocacy must never replace the continued pursuit of the University's essential purpose of learning and teaching.

It is within this context that the University rejects the use of, or the threat of force as a means of resolving differences.

Violence is both unnecessary and inappropriate for those who have access to reasoned discourse and is unacceptable within an institution dedicated to reason. The University officer responsible for implementing the Policy Statement on Freedom of Expression and Dissent, when students are involved, is the Chief Student Affairs Officer. In all cases, the designated officer shall attempt to resolve the situation through efforts of persuasion. The University must, if efforts at persuasion have failed, resort to the use of any legal remedy deemed necessary. Those engaged in unlawful disruption, consequently, may expect appropriate responses from either University or other law enforcement authorities or both.

A full statement of the policy is in *The Cat's Tale*. Each student is responsible for knowing and observing this policy.

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 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.

CREDIT BY EXAMINATION

A degree student may, under the following conditions, receive credit for a course by taking a special examination and paying the special examination fee charge of \$35 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, in that sequence. The student must neither have audited, previously received a grade or mark, nor have attempted a prior special examination in this course at UVM or at any other institution of higher education. Only specific University courses may be challenged using special examination. Readings and Research, Honors Research, etc., are specifically excluded. Special Topics may be challenged only if that course is offered during the semester in which the special examination is being requested. The student may not take a special examination in a course whose content is presupposed by other courses the student is currently enrolled in or 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 particular 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, 360 Waterman Building.

COLLEGE-LEVEL EXAMINATION PROGRAM (CLEP)

The University considers credit for most of the five general and 30 specific subject CLEP exams providing the student has not previously attempted a similar course of study at a college level. Scores acceptable for credit are comparable to attaining a level of accomplishment equal to a B in a graded course situation. Individual exams may earn a student three, six, or eight semester hours of credit depending on the nature and scope of the material covered.

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 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, and the Office of Transfer Affairs, 327 Waterman Building.

CREDIT FOR CALCULUS

Credit will be given for Math. 21, or Math. 21 and Math. 22, according to the following guidelines.

May receive credit for Math. 21 provided the student:

1. Has not taken the advanced placement test in mathematics, and
2. The average of the grades received in Math. 22 and Math. 121 is B or better, and
3. Received a B or better in Math. 121.

May receive credit for Math. 21 and Math. 22 provided the student:

1. Has not taken the advanced placement test in mathematics, and
2. Received a B or better in Math. 121.

CREDIT FOR MILITARY SERVICE

Veterans or current military personnel who have been accepted into a degree program at The University of Vermont may have their military service record reviewed for possible transfer credit. Veterans should present form DD 214; active duty personnel should present form DD 295. Students should be sure that military course numbers appear on the documents presented for transfer credit review. Exemption from the 2.00 semester credit physical education requirement is given for active duty service of more than one year.

Transcripts of courses and examinations sponsored by the United States Armed Forces Institute (USAFI) or the Defense Activity for Non-Traditional Educational Support (DANTES) should be sent directly from the Contractor Representative to the Office of Transfer Affairs, 327 Waterman Building, University of Vermont, Burlington, VT 05405. Records completed prior to June 30, 1974, are available at no cost from: DANTES Contractor Representative, 2318 South Park Street, Madison, WI 53713. Transcripts of courses and examinations taken after July 1, 1974, are available at a nominal charge from: DANTES Contractor Representative, Educational Testing Service, P.O. Box 2819, Princeton, NJ 08540.

Students should contact the Office of Transfer Affairs for more information.

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 subdegree level to take advantage of a course or combination of courses not available at the home institution. In order to participate in the program, state university students must:

1. Identify a course or combination of courses related to their area of academic interest and 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, students must be in good standing and have at least a 2.50 grade-point average; must be degree candidates; and must be at least first semester sophomores (application may be made as early as the second semester of the first 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 the Provost, 349 Waterman Building, University of Vermont.

TYPES OF ENROLLMENT

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

NONDEGREE 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 through Continuing Education.

Credits earned by nondegree 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. Nondegree 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 to structure further courses into a degree program.

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 Admissions Office.

Students presently enrolled and in good standing at another institution may take courses at UVM to transfer to

their institutions. Visiting students are considered nondegree students and should contact Continuing Education for information and registration material.

All nondegree students who would like assistance in planning educational programs and selecting courses should contact Continuing Education, (802) 656-2085.

Academic Options

In addition to the areas of study detailed in the following sections of the catalogue, a number of curricular options are available which provide unique opportunities for UVM students.

The Environmental Program

Environmental Studies is a University-wide undergraduate curricular option offering students several challenging academic programs. Directed by the Environmental Program in cooperation with several colleges and professional schools, this option is one of UVM's most distinctive and popular academic programs — unique nationally in its breadth and interdisciplinary nature.

Students entering UVM may apply for admission to Environmental Studies through several of the undergraduate divisions. Choice of the appropriate college or school will depend on the individual's interests, career and educational objectives, and selection of one of the program options outlined below. It is recommended that prospective students consult with the Environmental Program before making application for admission to the University.

The Environmental Program involves students and faculty from throughout the campus, as well as community professionals, recognizing that study of the environment must draw upon all academic disciplines and professional fields. The activities of the Program include undergraduate education, research, and community service programs dedicated to the study and improvement of the cultural and natural environments essential to the quality of life on earth.

While the Program serves a wide range of environmental interests, its primary mission is undergraduate education; its primary focus is the individual student. Each student plans an individualized program of studies, working closely with the faculty, which combines a broad, comprehensive understanding of the environment with depth in a specific discipline or profession.

Program offices are located in The Bittersweet, where students are encouraged to visit with the staff and faculty regarding their academic plans, to gain assistance with research or action projects, and to seek information about academic programs, internships, international study opportunities, graduate studies, and future careers.

DEGREE PROGRAMS

The Bachelor of Science in Environmental Studies is awarded through the College of Agriculture and Life Sciences, the College of Education and Social Services, and the School of Natural Resources.

The Bachelor of Arts in Environmental Studies is awarded through the College of Arts and Sciences.

DEGREE REQUIREMENTS

Students must complete the distribution and credit-hour requirements of their college or school and one of the following programs. Incoming students will be assigned an advisor in the Environmental Program who will assist in selecting a major or minor program, usually during the sophomore year.

ENVIRONMENTAL STUDIES CURRICULUM

The curriculum in Environmental Studies offers students several alternatives leading to an individualized program of studies: The Major in Environmental Studies provides a unique academic program for the student seeking an interdisciplinary major leading to the B.S. or B.A. degree, with opportunity for Honors Studies. The Minor in Environmental Studies fulfills the minor requirement for students in the College of Arts and Sciences and is available as an elective minor in other schools and colleges. For selected students, a double major offers the opportunity for combining interdisciplinary studies with a traditional major.

MAJOR IN ENVIRONMENTAL STUDIES This interdisciplinary major offers students the opportunity to combine studies in several disciplines and professional fields. In addition to a core of interdisciplinary courses, each student's program includes an individually-designed plan of studies directed toward newly-developing careers and graduate study programs. It is especially suited to the student seeking a broad liberal education with an environmental emphasis.

The Major in Environmental Studies is a highly-selective program for qualified students with well-conceived academic goals. Admission to the major (regardless of declared major at the time of admission to UVM) requires submission of an application to The Environmental Program during the sophomore year, approval of the Director, and successful completion of Environmental Studies 151. In addition to course requirements, this major includes a required senior research thesis that may qualify for college or school honors recognition.

Environmental Studies Core

| Required Courses: | Credit Hours |
|--|--------------|
| Introduction to Environmental Studies (ENVS 1) | 4 |
| International Environmental Studies (ENVS 2) | 4 |
| Environmental Theory (ENVS 100) | 3 |
| Seminar in Environmental Studies (ENVS 204) | 3 |

Environmental Studies Major

| | |
|--|-------|
| Intermediate Environmental Studies (ENVS 151) | 3 |
| Research Methods (ENVS 201) | 3 |
| Senior Project and Thesis (ENVS 202/203) | 6-15 |
| (A research project planned and designed in ENVS 201; credit arranged in consultation with senior thesis advisors) | |
| Individually-designed program of studies | 6-24* |
| (Credit requirements vary, depending on college or school)* | |
| Electives and College or School Requirements | 60+ |
| Total Credits | 120+* |

MINOR IN ENVIRONMENTAL STUDIES.* For students in several colleges and schools, this program offers a general course of studies with a traditional or professional major.

In addition to the Environmental Studies Core and at least one intermediate or advanced ENVS course, students complete a major in a related discipline or professional field.

Students in the College of Arts and Sciences may elect this minor to fulfill the minor requirements in that college. Minor programs are available on an elective basis in most other schools and colleges.

*Consult appropriate section of catalogue for the exact requirements of each college or school. See pages 55, 65, 78, 108.

TEACHING MAJOR IN EDUCATION. Secondary Education majors in the College of Education and Social Services may elect a major in Environmental Studies to fulfill the teaching major requirement (see page 78).

The Home Economics Program

The Home Economics Program is an interdisciplinary program offered by the College of Agriculture and Life Sciences that provides a unique option for students searching for a major or for those who have selected a major. A sequence of courses in personal and family issues may be chosen — nutrition, consumer management, and family systems, for example. Combined with courses taken for the major, career possibilities are expanded. Students become attractively different from other graduates which enhances career marketability.

This arrangement is formalized by co-enrollment in the Home Economics Program which means that these courses are taken within the four-year degree requirements. Upon graduation, students are identified as professional home economists. Whether nutritionist, home economics educator, merchandiser, or human service professional, the courses and academic experiences offered through co-enrollment help build a strong foundation for personal and career success.

DEGREE REQUIREMENTS

Specific degree requirements are elected by making choices from the co-enrollment selection of courses about family/individual/consumer/client issues and by satisfying departmental requirements. The majors most often select co-enrollment are:

- Dietetics
- Food and Nutrition
(through Nutritional Sciences — see page 56 for details)
- Home Economics Education
(through Vocational Education and Technology — see page 58 for details)
- Consumer Studies
- Design
- Merchandising
(through Merchandising, Consumer Studies, and Design — see page 55 for details)
- Early Childhood Development
- Human Development and Family Studies
(through Human Development Studies — see page 82 for details)

Urban Forestry and Landscape Horticulture

Urban Forestry and Landscape Horticulture provides a professional education in the use and care of trees, shrubs, lawn grasses, and other plants in the human environment. Landscape design and contracting, urban forestry, park supervision, and garden center management are some of the professions in this field.

The interdisciplinary program is jointly offered by the Forestry program in the School of Natural Resources and the Department of Plant and Soil Science within the College of Agriculture and Life Sciences. A committee of faculty from

both units coordinates the program and advises students.

Options in this program are offered by the College of Agriculture and Life Sciences (page 57) and the School of Natural Resources (page 109).

Reserve Officers' Training Corps ARMY

Army ROTC offers programs for men and women leading to a commission as a Lieutenant in the United States Army. The Department of Military Studies offers basic education and technical training in military subjects with emphasis on leadership and management. Additionally, the Department offers special courses in related fields, including courses such as rappelling, orienteering, and backpacking.

The offices of the Department are located at Fort Ethan Allen.

PROGRAMS Military Studies at UVM consists of several programs: (1) A four-year program comprised of a Basic Course is open to all first-year students and sophomores and an Advanced Course is available for qualifying juniors and seniors. This generally requires one military studies course per term during the four years of undergraduate study. Attendance at the six-week advanced summer camp at Ft. Bragg, NC, is required between the junior and senior year. (2) The Simultaneous Membership Program allows eligible 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. (3) The Veterans Program recognizes previous military service and provides commissioning opportunities for formerly enlisted veterans.

SCHOLARSHIPS Scholarships, available for four and three years, provide up to \$8,000 per year, or 80 percent, whichever is higher, for tuition, fees, a semester allowance for books and supplies, plus \$100 a month tax free during the school year.

Application for the four-year scholarships is made during the senior year in high school. The three-year scholarship applications are made through the Department of Military Studies.

SUBSISTENCE ALLOWANCE All junior and senior cadets receive \$100 a month tax free. Students also receive travel allowances to and from summer camp, plus approximately \$850 while at camp.

EXTRACURRICULAR ACTIVITIES Pershing Rifles offers membership to participating students. Sponsored by the Department of Military Studies, the Pershing Rifles is a military organization fostering a spirit of competition and cooperation among university students. Also, Army ROTC provides opportunities to participate in a Department of the Army sponsored military training.

POSTGRADUATE Upon graduation, ROTC students are normally commissioned as officers in the U.S. Army, Army National Guard, or Army Reserves. The active duty service obligation will vary from three months with a Reserve Commission to four years for scholarship commissionees, dependent upon Army needs and personal 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. Otherwise, opportunities for fully-funded graduate schooling are competitively available upon promotion to Captain (three to four years).

Typical Curriculum

| | 1st | 2nd |
|----------------|----------|----------|
| | SEMESTER | |
| FIRST YEAR | MSTD 1 | MSTD 2 |
| | MSTD 13* | MSTD 12* |
| SOPHOMORE YEAR | MSTD 3 | MSTD 4 |
| | MSTD 12* | MSTD 13* |
| JUNIOR YEAR | MSTD 201 | MSTD 202 |
| SENIOR YEAR | MSTD 203 | MSTD 204 |

*Optional

AIR FORCE ROTC AT SAINT MICHAEL'S COLLEGE

The Department of Aerospace Studies, located at Saint Michael's College in Colchester, provides preprofessional preparation for future Air Force officers. Participation is available to all UVM students in all academic majors. The curriculum is designed to develop career-oriented men and women who can apply their education and AFROTC experience to their initial active duty assignments as Air Force Commissioned Officers. In addition to the formal course of study shown on page 117, pilot candidates participate in a three-week Flight Screening Program during the summer between their junior and senior years.

Students who did not have the opportunity to take the first-year and sophomore ROTC courses or did not elect to do so may contact the Department of Aerospace Studies during the first semester of their sophomore year for details on the two-year program. For more information, call (802) 654-2551.

An additional tuition fee is charged by St. Michael's College for students enrolling in Aerospace Studies 301, 303, 401, and 403.

A reciprocal agreement between UVM and St. Michael's College exists for the first two years of Aerospace Studies. Currently UVM students must pay tuition to St. Michael's College for courses in the junior and senior years.

SCHOLARSHIPS Air Force ROTC College Scholarships provide up to full payment of tuition, laboratory fees, textbooks, and a tax-free payment of \$100 per month while the student is in school and on scholarship status. Applications for the four-year AFROTC College Scholarships must be submitted by fall of the high school senior year. Scholarships for shorter periods are available for qualified first-year and sophomore UVM students.

SUBSISTENCE PAY 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 is offered during the summer between the sophomore and junior years at selected Air Force bases throughout the U.S. Students in the four-year program participate in four weeks of field training. Students applying for entry into the two-year program must successfully complete six weeks of field training prior to enrollment in AFROTC. Students also receive travel allowances to and from summer camp, plus approximately \$500 while at camp. The major areas of study include junior officer training, aircraft and aircrew orientation, career orientation, survival training, base functions, Air Force environment, and physical training.

SUPPLEMENTAL COURSES All contract cadets must complete certain required supplemental college courses in addition to all Aerospace Studies courses. Contact the Department of Aerospace Studies for details.

Study Abroad

The Office of International Educational Services, located in Room B161 of the Living/Learning Center, is both an advising and a resource center for students interested in a year, semester, or summer overseas study experience. UVM Study Abroad Advisors maintain extensive information about overseas programs and foreign institutions. They are available to help students identify programs appropriate to their needs and arrange credit approval from UVM. All students intending to study overseas on a non-UVM program and receive transfer credit from UVM are required to visit the Office of International Educational Services and to 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. The payment of a \$100 Study Abroad fee during the academic year and \$50 for the summer is required. UVM will not accept transfer credit for any student who fails to pay the appropriate Study Abroad fee.

Only those students who complete a Study Abroad Approval Form are sanctioned to study abroad. This official approval is required for students to be guaranteed that their programs of study are eligible for transfer credit upon their return and/or that they will be able to take their financial aid overseas.

To be approved to study abroad, students must:

1. Meet the admissions criteria of a University approved study abroad program. University approved programs include those programs on the UVM Recommended Study Abroad Programs List and those approved through a petition process.
2. Have a minimum cumulative GPA of 2.5, or between 2.0 and 2.5 with a minimum GPA of 2.5 for each of the last two semesters prior to studying abroad.

Students with a GPA above 2.0 who do not qualify under point two above may petition their academic dean for permission to study abroad. Students seeking such permission should contact one of the study abroad advisors in the Office of International Educational Services for assistance.

Students who have been dismissed or are on academic trial are generally not eligible to participate in study abroad programs. Such individuals are encouraged to consult with their individual deans' offices regarding the interpretation of this policy.

Under no circumstances will a student on disciplinary suspension the semester before studying abroad receive official UVM approval for overseas study.

In addition to the opportunities for students to participate in many non-UVM overseas study programs all over the world, the following options are available which have specific relationships with The University of Vermont.

SPONSORED PROGRAMS

The Buckham Overseas Studies Program in England is a scholarship program at the University of Kent, Canterbury, administered by the College of Arts and Sciences at UVM and funded through a generous endowment from the Buckham family. The program runs for the full academic year and is designed to provide an opportunity for up to 20 exceptional English majors to spend their junior year studying English and other subjects at a modern university in an ancient British city. Living and studying in a fully integrated way with English students, the UVM students will earn up to 32 credits. The cost of participation, including tuition, transportation, room and partial board, will not normally exceed the costs incurred during a year on the UVM campus.

To apply for a Buckham Overseas Studies Scholarship, a student must be an English major with a cumulative and an English GPA of 3.0 and have earned at least 60 credit hours (including English 81 and 82) by the time the scholarship begins. For further information, contact Prof. Lee Thompson or Jennifer Huwiler, Department of English, 219 Old Mill (656-8546).

AFFILIATE PROGRAMS

Semester Program in Grenoble, France, in International Marketing: Sponsored by the six New England land-grant universities, this program provides an opportunity for students interested in international business, economics, and trade to participate in an English-speaking program while gaining exposure to France's history, language, and culture. For more information, contact Prof. William Cats-Baril, 339 Votey Hall.

Junior-Year-in-Salzburg Program: Administered by the University of Maine, this academic-year program at the University of Salzburg in Salzburg, Austria, is open to qualified UVM 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 information, contact Prof. Veronica Richel, Department of German and Russian.

College Year in Scandinavia: Scandinavian Seminar runs this one-year total cultural immersion program in Denmark, Finland, Norway, and Sweden. There is no language prerequisite. Following orientation in Denmark and intensive language programs, students are placed individually at a Scandinavian folk school according to their academic and extracurricular interests. Areas of studies include environmental studies, art, women's studies, international relations, and European area studies. For information, contact the Office of International Education Services.

Institute of European Studies and its subdivision, the Institute of Asian Studies: This nonprofit organization sponsors programs in Madrid, Spain; Mexico City, Mexico; Vienna, Austria; Freiburg, Germany; Paris and Nantes, France; London and Durham, England; Nagoya, Japan; and Singapore. Semester, year, and summer options are available. For information, contact the Office of International Educational Services.

American Collegiate Consortium for East-West Cultural and Academic Exchange: This consortium sponsors exchanges between students from its member institutions in the U.S. with students enrolled in participating institutions of higher education in the Soviet Union. Students must have a minimum of three years of Russian to qualify. For information, contact the Department of German and Russian or the Office of International Educational Services.

American Institute for Foreign Study (AIFS): A publicly owned company, AIFS, Inc., is a nationwide organization which provides comprehensive overseas study and travel programs in Europe, Africa, and Asia. For information, contact the Office of International Educational Services.

Kansai Gaidai: Students interested in Japanese language and culture may spend a semester or year studying at this university near Kyoto, Japan. UVM participants will pay tuition, fees, room, and board charged at their home institution and exchange places with students from Japan. For information, contact Prof. Allan Andrews, Department of Religion, or the Office of International Educational Services.

Intercollegiate Center for Classical Studies in Rome: Properly qualified students of classical languages or ancient art may attend one or two semesters at the Center and receive full credit. For information, contact Prof. Z. Philip Ambrose, Chairperson, Department of Classics, or the Office of International Educational Services.

International Student Exchange Program (ISEP): This program facilitates the exchange of students between academic institutions throughout the world on a one-for-one basis for a semester or academic year. UVM participants pay the tuition, fees, room, and board charged at 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. For information, contact the Office of International Educational Services.

Quebec Universities Exchange Program: UVM is a member of a New England consortium of higher education institutions which sends students to Quebec for a year or semester of university study. Students pay their UVM tuition and fees and exchange places with university students from Quebec. For information, contact the Office of International Educational Services.

The Swedish Program: Sponsored by the University of Stockholm and by a consortium of participating American colleges and universities (of which UVM is a member), this nonprofit program focuses upon organizations and public policy in every social science discipline. Its curriculum is thematically specific, interdisciplinary, and relevant to the host country (Sweden). For information, contact the Office of International Educational Services.

The Living/Learning Center

The Living/Learning Center is an academic resource whose mission is to create an environment for students to integrate their academic studies and their residential experiences. To expand the intellectual horizons of students, the Center encourages faculty, staff, and student programs that foster innovative and interdisciplinary academic experiences that bring the intellectual life of the University in close alliance with the students' lives outside the classroom. Every program sponsors educational activities to which the entire UVM community is invited, making the Living/Learning Center a focus of campus cultural and intellectual activity. An evening's activities might include a sign language workshop, conversational Russian, artistic performances, gallery exhibits, faculty lectures, or a presentation by one of the Center's programs. In addition to being an academic and student support unit, the Living/Learning Center is also a residence, housing 588 students, as well as faculty and administrative offices, including the Center for Career Development, the Learning Cooperative, and the Instructional Development Program.

The foci of the Living/Learning Center are the 30 to 35 academic programs, each of which is a year-long plan of course work, independent study, seminars, field trips, and other special activities which support a specific program theme. Recent programs include: Africa House, Geology and Ecology of the Lake Champlain Basin, La Maison Francaise, Creative Writing, The Art of Photography, and The Computer Cooperative. Programs are designed and directed by students or faculty members and reflect educational interests of the program leaders and participants. The Center provides a unique environment for each of the University schools and colleges to offer particular curricular

elements in an atmosphere which fosters broad opportunities for intellectual discourse.

The first-year, 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 living room and private bathroom facilities. This fosters close friendships and communication among the program members. Suites are located in each of the five interconnected buildings, as are classrooms, laundry rooms, common living rooms and kitchens, as well as apartments for resident faculty and their families. The Center has a reading room/reference library, microcomputer laboratory, music practice rooms, a grocery store, dining hall, preschool, an audiovisual room, U.S. Post Office, a central lounge with fireplace, and an art gallery. Through the efforts and expertise of accomplished staff artists, the Center has pottery and photography studios that provide direct program support for the Living/Learning Center community, as well as providing all members of the University community with the opportunity for informal instruction and access to the facilities and equipment.

The Living/Learning Center contributes to the University's mission in the quality of the programs it offers, in its ability to support exciting new curricular developments, and in its emphasis on the integration of the personal, professional, and intellectual growth of the student. Moreover, the Center encourages programs with interdisciplinary, international, and multicultural themes and continues to encourage and abet creative excellence. The Living/Learning Center offers the opportunity to be part of a community of people; students, faculty, and administrative staff, who share the goal, work and excitement of improving the breadth and quality of their University experience.

Continuing Education

Through evening, summer, and noncredit programs, the University provides learning opportunities to persons who have or have not previously attended college, who desire additional knowledge for their careers, or who wish to pursue previously unexplored areas of study. Concise conferences and symposia provide UVM graduates and their peers access to new knowledge developed through research at the University. Continuing Education is a primary advocate and resource for all nondegree students involved in learning opportunities at the University and is responsible for the resolution of nondegree student academic or administrative concerns.

EVENING DIVISION

The Evening Division offers undergraduate and graduate courses each semester between the hours of 4 and 10 p.m. and on weekends. The courses are instructed by UVM faculty on the Burlington campus and in communities throughout the state.

SUMMER SESSION

Beginning in May and continuing to mid-August, Summer Session courses of varying length allow maximum flexibility for a variety of students. Summer Session is an integral part of the total academic program with special consideration given to students accelerating a degree program as well as the professional education needs of teachers and school administrators, engineers, managers, and human services

professionals. Evening courses and statewide offerings continue throughout the summer.

Note: Regularly enrolled undergraduate students should verify with their advisor and dean that any evening or summer course would be appropriate to the degree for which they are working. Students not officially admitted to the Graduate College who wish to enroll for more than six graduate credits in one semester must receive permission from the Graduate Dean.

SATELLITE OFFICES

In response to the changing needs of many Vermonters, Continuing Education maintains several satellite programs.

The Church Street Center in downtown Burlington sponsors a diversity of noncredit programs. Classes range from the thoroughly intellectual to recreational and include several career-oriented certificate programs.

The Computer Lab in the Colchester Business Park is the site of a variety of computer applications workshops as well as highly specialized training programs for Geographic Information Systems.

In both the UVM Central Vermont Education Center in Berlin and the UVM Southern Vermont Education Center in Brattleboro, Continuing Education and the Extension System share facilities. At both sites the Continuing Education coordinator works with organizations and individuals to match specific needs with resources from the University presented through both credit courses and noncredit programs.

CUSTOMIZED TRAINING PROGRAMS

Working with organizations throughout the state, the Designing Excellence Program draws on UVM's faculty and staff to offer individually designed educational and training programs for private and public sector employees.

CONFERENCE PLANNING SERVICES

Conferences and Institutes, through Continuing Education, provides comprehensive planning and support services for professional and academic conferences as well as meetings of local, regional, and national organizations.

INFORMATION AND ADVISING

Seasonal catalogues and detailed information describing all of Continuing Education's courses and programs are available through any of its offices: Director's Office/Evening Division/Summer Session/Designing Excellence: 322 South Prospect Street, Burlington, VT 05405 (802) 656-2085 (toll-free (800) 639-3210); Conference Planning Services: 460 South Prospect Street, Burlington, VT 05405 (802) 656-2088; Church Street Center: 135 Church Street, Burlington, VT 05405 (802) 863-0202; Southern Vermont Education Center: 422 Western Avenue, West Brattleboro, VT 05303 (802) 257-7967; Central Vermont Education Center, Comstock Road in Berlin, RR #4, Box 2298, Montpelier, VT 05602 (802) 223-0388.

Advisors are available for current and prospective Continuing Education students to discuss educational plans, give information on current courses and workshops, help resolve an administrative problem, or answer questions about University policies. Call (802) 656-2085 for an appointment.



The College of Agriculture and Life Sciences

The College of Agriculture and Life Sciences performs four public functions: teaching, conducting research, disseminating information to the public, and performing related services. These four areas of work are performed by the resident instruction division, the research division (Agricultural Experiment Station), the extension division (University of Vermont Extension System), and the Related Services Division.

The curricula of the instructional division prepare students for professional careers in business, management, specialized services, sales, education, government service, and research.

The evolution of society is characterized by continual progress and change. The challenge of preparing students to excel now, yet adjust to future changes, is met through programs which give a foundation in the social sciences and the humanities as well as provide a fundamental technical education.

Certain courses are prescribed in each area of study with an allowance made for the election of additional courses. This provides a well-balanced and integrated educational program and insures reasonable concentration. Faculty advisors counsel students in selecting elective courses and solving educational problems. The normal semester program includes 15 to 18 credit hours of courses.

The College of Agriculture and Life Sciences welcomes applications from international students. The specific procedures and requirements are listed on page 13. Students who need to increase their proficiency in English can apply to Saint Michael's College in Winooski for admission to their English As a Second Language Programs. Students enrolled in Saint Michael's College have access to advising by faculty in the College of Agriculture and Life Sciences.

The offices of the Dean of the College are located in Morrill Hall.

ORGANIZATION

The College's resident instruction division consists of nine departments: Agricultural Biochemistry; Agricultural and Resource Economics; Animal Sciences; Botany; Nutritional Sciences; Merchandising, Consumer Studies, and Design; Microbiology and Molecular Genetics; Plant and Soil Sciences; and Vocational Education and Technology; and one interdepartmental program in Biological Sciences.

DEGREE PROGRAMS

The Bachelor of Science degree is awarded for the programs listed below:

Agricultural Economics—concentration in:

- Small Business Management
- Food Marketing and Agribusiness
- Farm Business Management
- International Agriculture
- Rural Economy

Animal Sciences—concentration in:

- Dairy Production

- Equine Studies
- General
- Preprofessional Science
- Biochemical Science
- Biological Science
- Botany
- Consumer Studies
- Dairy Foods—concentration in:
 - Dairy and Food Science
 - Dairy Production and Foods
 - Preprofessional Science
- Design
- Dietetics
- Environmental Studies
- Home Economics Education
- Merchandising
- Microbiology and Molecular Genetics
- Nutritional Sciences
- Occupational and Extension Education—concentration in:
 - Agriculture and Natural Resources Education
 - Extension Education
 - Industrial Education
- Plant and Soil Science—concentration in:
 - Agroecology/Sustainable Agriculture
 - Landscape Design
 - Horticulture
 - Environmental Soil Science
 - Soils
- Self-Designed Major
- Urban Forestry and Landscape Horticulture
- Undecided

DEGREE REQUIREMENTS

All programs in the College of Agriculture and Life Sciences 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. Completion of the following:

| | Hours |
|--|-------|
| 1. Communication skills | 6 |
| a. One course in writing | |
| b. One course in oral communication | |
| 2. Analytical skills | 6 |
| a. One course in mathematics or statistics (Math. 9 or equivalent) | |
| b. One course in computers (Computer Science 2 or Vocational Education and Technology 85) or demonstrated equivalent computer skills | |
| 3. Biological and physical sciences | 6-8 |
| Two courses | |
| 4. Social sciences | 6 |
| Two courses | |
| 5. Humanities and Fine Arts | 6 |
| Two courses | |

- D. College of Agriculture and Life Sciences "Beginnings" course. Required of all first semester first-year students.
- E. "Race and Culture" course required of all first-year students.

F. Courses as specified in individual programs.

The applicability of courses to specific areas is based on content and not departmental label. Courses taught in the College of Agriculture and Life Sciences can be used to fulfill requirements under "C" above; however, they must be taken outside the department in which the student's program of study is located. Applicability of courses to fulfill requirements rests with the student's advisor and, if necessary, concurrence of the Dean of the College.

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 page 78).

Students in the College of Agriculture and Life Sciences may not take more than 25 percent of their course credits in the School of Business Administration.

COLLEGE HONORS PROGRAM

The College Honors Committee promotes and encourages independent study by recognizing those students who especially excel in their creative, innovative, responsible, and independent pursuit of study.

Independent study can be an important aspect of a student's education. Undergraduate research, independent projects, and internships or field practicums are examples of independent study which benefit students as they pursue graduate study or seek employment. Over the years a number of undergraduate research projects have been published in well-known scientific journals; and manuals, videotapes, and other products of special projects have been incorporated into classes and have enhanced the learning environment in the College.

The completed study, in a form appropriate to the area of study, is evaluated first by a departmental review committee. The best project reports in each department which are judged worth of honors consideration are forwarded to the Honors Committee with the department's evaluation.

Independent Studies of the highest quality will be chosen for College Honors by the Honors Committee. The student is recognized at College Honors Day and the award is added to the student's transcript.

PREPROFESSIONAL PREPARATION

Students 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 and Life Sciences. Upon admission, each student will be assigned an upperclass peer advisor and a faculty advisor knowledgeable in preprofessional preparation. Students preparing for careers in human medicine should contact the University Prehealth Advisor at the Center for Career Development in E building at the Living/Learning Center. Competition for admission to professional schools is very keen, and a superior academic record throughout an undergraduate program is necessary to receive consideration for admission. Due to the intense competition, only a small percentage of those first-year students declaring an interest in professional schools actually enter one after completion of the baccalaureate. Consequently, students must select a major, in an area of their choice, to prepare them for a career other than medical sciences. The preprofessional

requirements will be met concurrently with the major requirements for the B.S. degree. Students interested in human medical sciences often enroll in either biochemical science, biological science, nutritional sciences, or microbiology. Those interested in veterinary medicine usually enroll in animal sciences, biological sciences, or microbiology.

Each student prepares a four-year program of courses, with the guidance of their faculty advisor, to meet requirements for a B.S. degree in their major. It is recommended that students complete the following courses to meet minimum requirements of most professional schools. It is the responsibility of each student to contact the professional schools of choice to determine the exact entrance requirements of those schools.

Human Medical and Dental Schools:

| | |
|--------------------------------------|--------------------|
| Biology with laboratory | Biology 1, 2 |
| Chemistry with laboratory: inorganic | Chemistry 1, 2 |
| organic | Chemistry 141, 142 |

| | |
|--------------------------|----------------------|
| Physics with laboratory: | |
| with math | Physics 11/21, 12/31 |
| with calculus | Physics 31/21, 42/31 |

| | |
|----------------------------------|--------------|
| Mathematics (requirement varies) | Math. 19, 20 |
|----------------------------------|--------------|

Humanities, Social Sciences, Languages

Students must complete the minimum College requirements in this area that includes English composition and speech. Advanced composition and additional courses in this area are encouraged as time allows.

Veterinary Medical Schools: All of the courses listed above under Human Medical Schools plus:

| | |
|-----------------|---------------------------|
| Biochemistry | Ag. Biochemistry 201/202 |
| Written English | English 50 or 53 |
| Genetics | Botany 132 or Biology 101 |
| Microbiology | Microbiology 65 or 66 |
| Nutrition | Animal Sciences 43 |

Several schools require a course in introductory animal sciences, feeds and feeding, and livestock production.

Finally, both human and animal medical schools want to see a history of interest in medicine. It is important for students to work with physicians or veterinarians and gain first-hand knowledge of their chosen profession. Volunteer or paid work in hospitals, nursing homes, or emergency centers is important. Commercial farm experience is valuable for preveterinary students also.

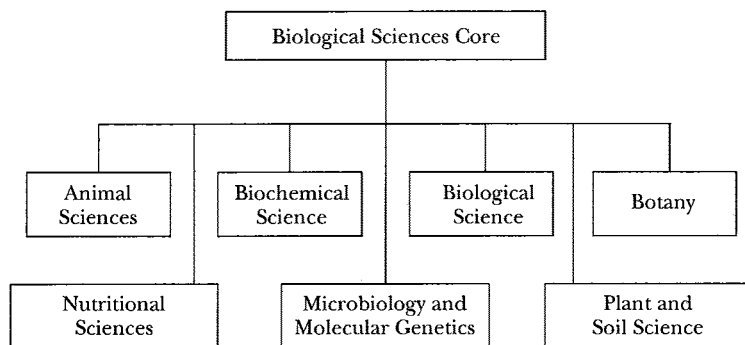
Students applying to the College of Agriculture and Life Sciences who express an interest in medicine or preveterinary medicine should present evidence of high performance in high school level science and mathematics courses, plus additional supporting documentation such as high SAT scores, strong letters of recommendation, and a motivational summary statement.

BIOLOGICAL SCIENCES CORE

Students who have strong academic ability in the sciences and are excited about the future, concerned with contemporary issues, and want a challenging, dynamic career should consider the Biological Sciences major. This program is designed to provide flexibility in developing a strong background in the biosciences. Students can take advantage of the entire University course offerings by selecting basic and applied biology courses from departments within the College (Agricultural Biochemistry, Animal Sciences, Botany, Nutritional Sciences, Microbiology and Molecular Genetics, and Plant and Soil Science) and across the campus (Anatomy and Neurobiology, Forestry, Natural Resources, Pathology, Pharmacology, Physiology and Biophysics, Wildlife and Fisheries Biology, and Zool-

Year

Program

First-year
SophomoreJunior
Senior

ogy). Selection of courses is not limited by academic regulations or tradition.

The Biological Sciences program is interdisciplinary and draws on the expertise of faculty from many different departments within the College. Each student is assigned a faculty advisor from the committee who helps the student select courses. The core program is rigorous and designed to provide a broad exposure to different aspects of biology in the first and second years. Then students have the opportunity to focus in the area of their choice. This may mean changing majors to one of the traditional departments or continuing in Biological Sciences to graduation.

In addition to the general College requirements listed previously, the Biological Sciences core requires satisfactory completion of: Biology 1, 2; Math. 19, 20 or Math 21; Chemistry 3, 42 or Chemistry 1, 2 and 141, 142; Botany 132 or Biology 101 or Animal Sciences 212 (genetics); Animal Sciences/Nutritional Sciences 43 (nutrition); and Microbiology 65 or 66. Course descriptions are presented under the appropriate departments.

Programs in the College, available upon completion of the core curriculum, are shown above. Students should select courses from these programs during the first two years to gain exposure to different aspects of biology. Students will be advised by a peer advisor and a faculty academic advisor.

MAJORS: DEPARTMENTAL REQUIREMENTS

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 Life Sciences and Resource Economics in the School of Natural Resources.

AGRICULTURAL ECONOMICS Options in the agricultural economics program provide students with basic work in small business and 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 a broad range of farm and business problems or prepare them for graduate study. Students elect one of five options:

Small Business Management: Prepares students to establish and operate a small, family, or rural business, or to work with organizations serving small businesses.

Farm Business Management: Prepares the student to manage

a farm business or to work in the many service or educational fields related to agricultural production and finance. Programs available in dairy, forage and field crops, and horticulture management.

Food Marketing and Agribusiness: Prepares the student for managerial, sales, or market analysis positions in the food industry, especially those that supply agricultural inputs or market agricultural products. Students might also work in government statistical or market analysis programs.

International Development: An option designed to simultaneously expose students to general aspects of international development (education, anthropology, sociology, geography, nutrition, environment, politics) as well as to the specific agricultural, economic, and rural sector problems. Available for students interested in global issues of agricultural/economic development, or who may wish to work abroad in the agricultural sector or in rural development. Students may work for governmental, bilateral, multilateral, and nongovernmental organizations; or continue their education in graduate school.

The Rural Economy: A multidisciplinary study of rural economics in general and the Vermont rural economy in particular. A holistic approach to the economics, political, social and physical environment.

I. General Education Requirements for All Options:

A. Communication Skills.

| | |
|-----------|--------------------|
| English 1 | Written Expression |
| Speech 11 | Effective Speaking |

B. Quantitative Skills.

| | |
|---|---|
| Math. 19 | Fundamentals of Calculus I or equivalent |
| Statistics 111 | Elements of Statistics or |
| Statistics 141 | Basic Statistical Methods or |
| Economics 100 | Statistical Methods for Economists |
| Vocational Education and Technology 85 | Microcomputer Applications in Agriculture and Life Sciences |

C. Science.

Two courses in physical or biological sciences.

D. Arts and Humanities.

| | |
|---------------------------|--|
| Philosophy 1 | Introduction to the Problems of Philosophy or |
| Philosophy 13 | Introduction to Logic |
| One communications course | |

E. Social Science.

| | |
|------------------------------------|---------------------------|
| Political Science 21 | American Political System |
| One other course in social science | |

- F. Physical Education.
Two semesters
- G. College of Agriculture and Life Sciences Orientation.
Agriculture 99 Beginnings
- H. Cultural Diversity.
Agriculture 95 Race and Culture
- II. Option Requirements:
- A. *Small Business Management*
Economics:
11, 12, Principles of Economics
101, Macroeconomic Theory
Agricultural and Resource Economics:
166, Small Business Management
167, Small Business Finance
168, Small Business Marketing
254, Advanced Agricultural Economics
264, Price Analysis and Forecasting
266, Small Business Decision Making
267, Small Business Planning
Business Administration:
17 or 18, Business Law
A minimum of an additional 18 hours from a list of restricted electives.
- B. *Farm Business Management*
1. Dairy Option Requirements
Agricultural and Resource Economics:
61, Principles of Agricultural and Resource Economics
166, Small Business Management
167, Small Business Finance
201, Farm Business Management
207, Markets, Food, and Consumers
208, Agricultural and Food Policy
254, Advanced Agricultural Economics
Animal Sciences:
43, Fundamentals of Nutrition I,II
110, Principles of Animal Feeding
213, 214, Dairy Herd Management
Plant and Soil Science:
11, Principles of Plant Science
141, Forage Crops
144, Field Crops
161, Introductory Soil Science
Farm Management Practicum
2. Forage and Field Crops Option Requirements
Agricultural and Resource Economics:
61, Principles of Agricultural and Resource Economics
166, Small Business Management
167, Small Business Finance
201, Farm Business Management
207, Markets, Food, and Consumers
208, Agricultural and Food Policy
254, Advanced Agricultural Economics
Plant and Soil Science:
106, Insect Pest Management
141, Forage Crops
144, Field Crops
161, Introductory Soil Science
162, Soil Fertility and Management
210, Soil Erosion and Conservation
215, Weed/Crop Ecology
217, Pasture Production and Management
261, Soil Classification and Land Use
Vocational Education and Technology:
121, Drainage and Irrigation Systems
Farm Management Practicum
3. Horticulture Option Requirements
Agricultural and Resource Economics:
61, Principles of Agricultural and Resource Economics
166, Small Business Management
167, Small Business Finance
168, Small Business Marketing
201, Farm Business Management
207, Markets, Food, and Consumers
208, Agricultural and Food Policy
254, Advanced Agricultural Economics
Plant and Soil Science:
106, Insect Pest Management
161, Introductory Soil Science
162, Soil Fertility and Management
Vocational Education and Technology:
121, Drainage and Irrigation Systems
Farm Management Practicum
A minimum of an additional 12 hours from a list of restricted electives for each option.
- C. *Food Marketing and Agribusiness*
Economics:
11, 12, Principles of Economics
101, Macroeconomic Theory
Agricultural and Resource Economics:
166, Small Business Management
167, Small Business Finance
168, Small Business Marketing
207, Markets, Food, and Consumers
208, Agricultural and Food Policy
210, Marketing Institutions
254, Advanced Agricultural Economics
264, Price Analysis and Forecasting
Business Administration:
17 or 18, Business Law
A minimum of an additional 15 hours from a list of restricted electives.
- D. *International Development*
Economics:
11, 12, Principles of Economics
101, Macroeconomic Theory
185, Comparative Economic Systems
Agricultural and Resource Economics:
2, World Food, Population, and Development
171, Agriculture in Economic Development
254, Advanced Agricultural Economics
272, Seminar on World Food Problems and Policies
273, Agricultural Planning and Project Development
Anthropology:
21, Human Cultures
101, Anthropology of Third World Development
Geography:
2, World Natural Environments
A minimum of an additional 12 hours from a list of restricted electives.
Each student will specialize in a particular geographic area, such as Africa, Latin America, Asia, or Europe, and will complete a six-credit, two-semester independent study project on the area.
- E. *The Rural Economy*
Economics:
11, 12, Principles of Economics
101, Macroeconomic Theory
Geography:
3, Introduction to Economic Geography
17, Introduction to Urban and Regional Planning

Political Science:

- 123, The Vermont Political System
- 128, Issues of Public Policy, or
- 134, Public Policy Analysis

Agricultural and Resource Economics:

- 121, Resource Economics
- 162, Land Economics Issues
- 191, 192, Practicum
- 205, Rural Communities in Modern Society
- 218, Community Organization and Development
- 222, Natural Resources Evaluation
- 233, Rural Planning

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

Animal Sciences

The mission of the Department of Animal Sciences is to provide a broad-based education emphasizing the science of domestic animals and their products. Our graduates have opportunities to develop careers in the agrifood industry, enter graduate or professional schools, or to use their degree as a first stage for a career in commerce and industry. To provide this diversity of opportunity there are several program options. Students work closely with a faculty advisor to utilize this flexibility to build the program most appropriate to their needs and career goals.

Departmental majors are in Animal Sciences or Dairy Foods. Students are encouraged in their junior and senior years to participate in courses for undergraduate research with members of the faculty or to develop internships in an animal or food science related enterprise. A particularly exciting option is the CREAM program in which students operate their own dairy herd and are responsible for the work, the management, and financial decisions. By this combination of classroom, laboratory, and hands-on experience students can maximize their performance and achievements in a positive and friendly environment and place themselves in a favorable position for subsequent career development.

ANIMAL SCIENCES The program deals with a range of options from basic sciences to farm management. Although programs are highly individualized by students working with the advisors, there are four basic options:

Preprofessional Science: This is the option for students most interested in the basic sciences who probably intend to enter graduate, veterinary, medical, dental, or pharmacy school. They will gain the necessary background in science but have the opportunity for advanced study related to production and companion animals.

Equine Studies: The Department offers specialized courses on the care, management, breeding, and health of horses. The world-famous Morgan Horse Farm at Middlebury, about 45 minutes from campus, is also part of the Department and offers opportunities for study and research. Students may also enroll in equine courses at the Miner Agricultural Research Institute in Chazy, New York, and more specialized equitation courses at the University of New Hampshire via the New England Student Exchange Program.

Dairy Production: The student selecting this option will concentrate on courses relating to the feeding, breeding, health, and management of dairy cattle. These will be supported by appropriate courses in financial management and by basic science courses. An important aspect of the

option is the CREAM program, which will provide a two-semester, hands-on experience unique in the Northeast. This option is appropriate for students seeking a career in dairy farming as well as those who seek employment in allied industries.

General Animal Science: Under this option, students can tailor a program to suit their needs, or alternatively keep a broader-based program if there are no specific career goals in mind. Students may select a combination of the basic science, production, or companion animal courses that best suit them and balance these with courses available elsewhere in the College or University.

The core courses for all Animal Sciences majors are:

Animal Sciences:

- 1, Introduction
- 43, Fundamentals of Nutrition
- 120, General Physiology
- 122, Animals in Society/Animal Welfare
- 212, Animal Genetics and Breeding
- 281, Senior Seminar

Two additional Animal Sciences courses
(one at 100 level or above)

Biology 2

A semester of inorganic chemistry
(Chemistry 1 or 3)

A semester of organic chemistry
(Chemistry 4, 42 or 141)

A computer course (Computer Science 2 or 11 or
Vocational Education and Technology 85)

Math. 2 and 9, or 10 or 19

A statistics course (Statistics 111 or 141 or 211)

Additional courses are selected with the help of the advisor.

In addition, each student must complete all College and University requirements for graduation.

A Possible Curriculum in Preprofessional Science

| First Year | Hours |
|----------------------------|-------|
| Agricultural Orientation | 1 |
| Cultural Diversity | 1 |
| Inorganic Chemistry | 8 |
| Math. through Calculus | 6 |
| Intro. Animal Sciences | 4 |
| Microcomputer Applications | 3 |
| Written English | 3 |
| Electives* | 4-10 |

| Sophomore Year | Hours |
|-------------------|-------|
| Organic Chemistry | 8 |
| Biology | 8 |
| Statistics | 3 |
| Animal Feeding | 4 |
| Animal Nutrition | 3 |
| Electives* | 4-10 |

| Junior Year | Hours |
|-------------------|-------|
| Animal Anatomy | 4 |
| Biochemistry | 4 |
| Animal Physiology | 4 |
| Microbiology | 4 |
| Physics | 8 |
| Speech | 3 |
| Electives* | 3-9 |

| Senior Year | Hours |
|--|-------|
| Animal Health | 4 |
| Physiology of Reproduction and/or Endocrinology | 4 |
| Biochemistry | 4 |
| Animal Genetics and Breeding | 4 |
| Electives* | 10-16 |

*Includes courses to meet college requirements and advanced courses for specific options. Many of the electives are normally taken in advanced science options.

A Possible Curriculum in Dairy Production

| First Year | Hours |
|-----------------------------------|-------|
| Agricultural Orientation | 1 |
| Cultural Diversity | 1 |
| Intro. Animal Sciences | 4 |
| Organic Chemistry | 4 |
| Inorganic Chemistry | 4 |
| Mathematics | 3 |
| Principles of Agr. and Res. Econ. | 3 |
| Microcomputer Applications | 3 |
| Written English | 3 |
| Electives* | 4-10 |

| Sophomore Year | Hours |
|-----------------------------|-------|
| Animal Anatomy | 4 |
| Animal Feeding | 4 |
| Animal Nutrition | 3 |
| CREAM | 4 |
| Biology | 4-8 |
| Principles of Plant Science | 3 |
| Small Business Management | 3 |
| Statistics | 3 |
| Electives* | 2-8 |

| Junior Year | Hours |
|-------------------------|-------|
| Animal Physiology | 4 |
| Dairy Cattle Judging | 2 |
| Intro. Soil Science | 4 |
| Forage Crops | 3 |
| Soil Fertility and Mgt. | 3 |
| Animal Health | 4 |
| Genetics and Breeding | 4 |
| CREAM | 4 |
| Electives* | 2-8 |

| Senior Year | Hours |
|----------------------------|-------|
| Seminar | 1 |
| Physiology of Reproduction | 3 |
| Dairy Herd Management | 4 |
| Farm Business Management | 3 |
| Pasture Management | 3 |
| Small Business Finance | |
| Electives* | 13-19 |

A Possible Curriculum in Equine Studies

| First Year | Hours |
|------------------------------------|-------|
| Agricultural Orientation | 1 |
| Cultural Diversity | 1 |
| An. Sci. 1, Intro. Animal Sciences | 4 |
| Inorganic Chemistry 3 | 4 |
| English 1 | 3 |
| Biology 2 | 4 |
| Organic Chemistry 42 | 4 |
| Mathematics | 3 |
| Voc. Ed. & Tech. 85 | 3 |
| Electives* | 3-6 |

| Sophomore Year | Hours |
|--|-------|
| Anatomy/Physiology | 8 |
| Nutrition 43 | 3 |
| An. Sci. 115, Horse Production and Management | 4 |
| Educ./EDPE 23, Emergency First Aid | 2 |
| An. Sci. 110, Feeds | 4 |
| Ag. & Res. Ec. 61, Princ. Economics | 3 |
| Ag. & Res. Ec. 166, Small Business | 3 |
| Electives* | 3-6 |

| Junior Year | Hours |
|---|-------|
| An. Sci. 215, Repro. and Physiology | 4 |
| Micro. & Mol. Gen. 65, Microbiology | 4 |
| Plant & Soil Sci. 11, Intro. Plant Sci. | 3 |
| An. Sci. 116, Horse Breeding | 4 |
| Speech 11 | 3 |
| An. Sci. 122, Animals in Society | 3 |
| Statistics 111 | 3 |
| Electives* | 6-10 |
| (Summer Internship Recommended) | |

| Senior Year | Hours |
|--|-------|
| An. Sci. 131, Practical Equine Management | 3 |
| Plant & Soil Sci. 141, Forage Crops | 3 |
| An. Sci. 117, Horse and Disease | 3 |
| An. Sci. 281, Seminar | 1 |
| An. Sci. 212, Genetics | 4 |
| An. Sci. 298, Equine Training | 4 |
| Electives* | 12-17 |

*Includes courses to meet college requirements and advanced courses for specific options.

DAIRY FOODS Vermont has the only Dairy Foods program in New England and this qualifies students for the New England Regional Student Program that offers New England residents tuition privileges (see page 11). This comprehensive program deals with the handling, processing, and manufacture of fluid milk and milk products and also with the basic elements of food science such as microbiology, food engineering, and food chemistry. The Department collaborates with Cornell University as the Vermont part of the Northeast Dairy Foods Research Center and has extensive ties with industry. The Center is involved in research on food safety, functional properties of food, new product research and development, and in the market testing of products. Many undergraduates have the opportunity to take part in the research program in their junior and senior year. There is considerable flexibility in the program and opportunities for undergraduates to build the program that suits their career goals with the help of a specialist faculty advisor. Our links with industry allow the development of internships and provide excellent job opportunities in the food industry. The options commonly available are:

Preprofessional Science: This program is designed for the student wishing to specialize in dairy foods and attain the academic requirements for entry to a graduate or professional school.

Dairy Production and Foods: In this option, the student will combine courses required for the dairy foods major with courses related to dairy production and farm management.

Dairy and Food Science: Under this option, dairy foods courses are combined with other food science courses and with offerings from other departments, such as Nutritional

Sciences or Agricultural and Resource Economics. The core courses which all Dairy Foods majors must take are:

Animal Sciences:

- 1, Introduction
- 43, Fundamentals of Nutrition
- 104, Sensory Evaluation
- 106, Processing Frozen and Fluid Dairy Foods
- 201, Fermented Dairy Foods
- 203, Food Microbiology
- 206, Principles of Food Engineering
- 281, Senior Seminar

A semester of inorganic chemistry

A semester of organic chemistry

Math. 19 or 21 or 22

A computer course (Computer Science 2, 11 or Vocational Education and Technology 85)

A statistics course (Statistics 111, 141, or 211)

An example of a four-year curriculum for the Dairy and Food Science option is shown below:

| First Year | Hours |
|---|--------------|
| Agricultural Orientation | 1 |
| Cultural Diversity | 1 |
| Introduction | 4 |
| Inorganic Chemistry | 8 |
| Economics | 3 |
| Mathematics | 3-6 |
| Microcomputer Applications | 3 |
| Electives* | 7-13 |
| Sophomore Year | Hours |
| Fundamentals of Nutrition | 3 |
| Microbiology | 4 |
| Statistics | 3 |
| Sensory Evaluation | 3 |
| Processing Frozen and Fluid Dairy Foods | 3 |
| Organic Chemistry | 4-8 |
| Economics | 3 |
| Electives* | 6-12 |
| Junior Year | Hours |
| Food Microbiology | 4 |
| Fermented Dairy Foods | 4 |
| Physics | 4 |
| Business courses | 8 |
| Food Safety and Regulation | 3 |
| Electives* | 7-13 |
| Senior Year | Hours |
| Business courses | 6 |
| Internship or Undergraduate Research | 4-8 |
| Food Engineering | 4 |
| Senior seminar | 1 |
| Industrial Microbiology | 3 |
| Electives* | 12-18 |

*Includes courses to satisfy College and University requirements and advanced courses for specific options.

Biochemical Science

The Department of Agricultural Biochemistry is the only department at UVM that offers a program of undergraduate study leading to the Bachelor of Science degree in Biochemical Science. The program provides a coordinated sequence of study in biochemistry, biology, and chemistry and all majors meet or exceed the undergraduate require-

ments needed for admission to professional colleges, such as medicine, dentistry, veterinary medicine, and graduate school in biochemistry or any related biological sciences.

The department faculty believes that excellence in teaching and student advising are a priority and all department courses are taught by faculty regardless of professional rank. In addition, the faculty is deeply committed to generating new knowledge through research and discovery and demonstrating to students the relevance of this research to our understanding of biochemistry and to the improvement of the quality of life for individuals in our society. Undergraduate majors in biochemical science are encouraged to enroll in undergraduate research (AGBI 197,198) and to join the department faculty as part of an active, productive research team.

The study of biochemistry is critical to an understanding of modern medical, biological, and agricultural sciences and students interested in careers in these areas are well advised to major in biochemistry during their undergraduate years. Depending on interest and future plans, students elect one of three possible options or custom design their own option in consultation with their faculty advisor:

Cellular Biochemistry emphasizes the biochemical, physiological, and metabolic reactions of organisms.

Molecular Biology focuses on the structure and function of chromosomes and proteins, the control of gene expression, and the methods of analysis of recombination of DNA.

Mammalian Biochemistry emphasizes the hormonal and nutritional control of biochemical pathways in mammals and the related metabolic and endocrine adaptations.

Required Courses in Biochemical Science

I. General Education Requirements for All Majors:

A. Communication Skills:

- | | |
|---------------------------|--------------------|
| English 1 | Written Expression |
| Speech 11 (or equivalent) | Effective Speaking |

B. Analytical skills (See below section II, D):

C. Humanities and Fine Arts:

Two unspecified courses (six credits)

D. Social Science:

Two unspecified courses (six credits)

E. College of Agriculture and Life Sciences Orientation:

Agriculture 99 Beginnings

F. Cultural Diversity

G. Physical Education:

Two credits

II. Biochemical Science Core Requirements for All Majors:

A. Biochemical Science:

- | | |
|-------------------------|---|
| Ag. Biochem. 10 | Introductory Biochemistry |
| Ag. Biochem. 201, 202 | General Biochemistry plus laboratory |
| Ag. Biochem. 220, 221 | Molecular Biology plus laboratory |
| Ag. Biochem. 230, 231 | Advanced Biochemistry plus laboratory |
| One additional elective | Ag. Biochem. course: |
| Ag. Biochem. 191 | Biochemistry of Nucleic Acids <i>or</i> |
| Ag. Biochem. 210 | Quantitative Biochemistry |
| Ag. Biochem. 250 | Plant Biochemistry |

B. Chemical Science:

- | | |
|--------------------|------------------------|
| Chemistry 1, 2 | Introductory Chemistry |
| Chemistry 141, 142 | Organic Chemistry |

- C. Biological Science:
 Biology 1, 2 Principles of Biology
 Micro. & Mol. Gen. Introductory Microbiology
 65 or 66
 A genetics course:
 Biology 101 Genetics *or*
 Botany 132 Elementary Genetics
- D. Physics and Mathematical Science:
 Physics 31, 42 Intro. Physics and
 Electromagnetism and
 Modern Physics (recom-
 mended for premedical
 programs) *or*
 Physics 11, 12 Elementary Physics
 (advisor's permission
 required)
 Math. 19, 20 Fundamentals of Calculus
 I, II *or*
 Math. 21, 22 Calculus I, II
 Voc. Ed. & Tech. 85 Microcomputer
 Applications in
 Agricultural and Life
 Sciences *or*
 Computer Sci. 2 Computers and Their
 Application

III. Biochemical Science Option Requirements:

Successful completion of three courses numbered at or above the 100 level are required in one of the following options:

- A. Cellular Biochemistry:
 Suggested courses: Ag. Biochemistry 191, Biochemistry of Nucleic Acids; Botany 257, Physiology of Plant Cell; Biology 103, Cell Structure and Function; Zoology 223, Developmental Biology.
- B. Molecular Biology:
 Suggested courses: Ag. Biochemistry 191, Biochemistry of Nucleic Acids; Botany 252, Molecular Genetics II; Regulation of Gene Expression in Eukaryotes; Microbiology and Molecular Genetics 211, Molecular Genetics II; Zoology 216, Human Genetics.
- C. Mammalian Biochemistry:
 Suggested courses: Ag. Biochemistry 191, Biochemistry of Nucleic Acids; Biochemistry 212, Biochemistry of Human Disease; Zoology 223, Developmental Biology; Animal Sciences 120, General Physiology; Animal Sciences 216, Endocrinology; Microbiology and Molecular Genetics 203, Lab II: Mammalian Cell and Molecular Biology; Pharmacology 272, Toxicology, Nutritional Sciences 242, Advanced Nutrition, Nutritional Sciences 245, Nutritional Biochemistry.
- D. Student Designed Biochemistry Option (in consultation with faculty advisor):
 Three 100-level science courses.

Biological Sciences

Some of the most exciting and controversial developments in our society are in the biological sciences. Biotechnology is providing the opportunity for *in vitro* fertilization, embryo transfer, embryo sexing, synthesis of hormones to regulate body processes, and gene transfer to increase growth.

The Biological Sciences major starts with the Core Program discussed previously (page 48). In conjunction with a personal faculty advisor, each student will plan a curriculum appropriate for the individual's career goal. Specific

courses will be selected from a current UVM catalogue and include the major requirements. Students are urged to participate in undergraduate research and to work directly with a faculty scientist on the cutting edge of research. This unusual opportunity has resulted in several students publishing results in major scientific journals. While each program of study is personalized, all graduates must complete the College requirements and the following major requirements: Biological Sciences Core, one semester each of anatomy, biochemistry, ecology, physiology, statistics, and two semesters of physics. In addition, each student must satisfactorily complete an undergraduate research project or two advanced biological science courses at the 200 level or above. These courses may be selected from the diverse offerings from departments throughout the University. This program requires the successful completion of 122 credit hours of courses to earn the Bachelor of Science degree.

Recent graduates have gone to some of the best medical, dental, and veterinary schools in the country after earning their degree. A larger proportion of students have gone on to graduate studies leading to the Ph.D. degree in microbiology, biochemistry, nutrition, physiology, reproduction, endocrinology, genetics, and molecular biology. Other students go into university or industrial positions as research laboratory technicians or sales and management jobs requiring a scientific background. Hence, our graduates are well prepared with many career-oriented, marketable skills.

Possible Four-Year Curriculum

| | 1st | 2nd |
|----------------------------|-----------------|------|
| FIRST YEAR | SEMESTER | |
| Beginnings 99 | 1 | — |
| Race and Culture 95 | 1 | — |
| Calculus 19, 20 | 3 | 3 |
| Chemistry 1, 2 | 4 | 4 |
| English 1 | 3 | or 3 |
| Nutrition 43 | 3 | or 3 |
| Microcomputer Applications | 3 | or 3 |
| Elective* | 0-3 | 0-3 |
| SOPHOMORE YEAR | SEMESTER | |
| Organic 141, 142 | 4 | 4 |
| Biology 1, 2 | 4 | 4 |
| Botany 132 | 3 | 3 |
| Anatomy | 4 | — |
| Speech | — | 3 |
| Elective* | 2-4 | 2-5 |
| JUNIOR YEAR | SEMESTER | |
| Physics 11, 12 | 3 | 3 |
| Physics Lab 21, 22 | 1 | or 1 |
| Microbiology 65 or 66 | 4 | or 4 |
| Physiology | 4 | or 4 |
| Advanced Biology | 4 | or 4 |
| Elective* | 3-6 | 3-6 |
| SENIOR YEAR | SEMESTER | |
| Biochemistry | 3 | — |
| Lab 202 | 1 | or 1 |
| Ecology - Botany 160 | — | 4 |
| Advanced Biology | 4 | or 4 |
| Undergraduate Research | 4 | 4 |
| Elective* | 4-7 | 8-11 |

*Electives include courses to meet the College requirements for communications, social sciences, and the humanities and fine arts as well as advanced science courses for specific concentrations or general interest.

Botany

Students in the Colleges of Agriculture and Life Sciences or Arts and Sciences may major in Botany. Each undergraduate plans a program in consultation with a personal departmental 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. Others 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 each 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. 19, 20 or equivalent, Statistics 141 or 211; one year of physics with laboratory; Chemistry 42 or preferably 141, 142; Biology 1, 2; Botany 104, 132, 160, one course in plant diversity and evolution (Botany 107, 108, or 109), and three additional courses in Botany, one of which must be at the 200 level. Students may petition to substitute similar courses for 104, 132, and 160.

Six hours of modern foreign language are strongly recommended.

Environmental Studies

The Environmental Program is a University-wide response to the need for a better understanding of the cultural and biophysical environments which determine the quality of life on earth. Aware of its special location in Vermont, the Program seeks a truly integrated balance of education, research, and community service. While the Environmental Program attempts to respond to a wide array of environmental interests, its primary focus is the individual undergraduate student, as reflected in its Environmental Studies major curriculum.

The Major in Environmental Studies is an individually-designed interdisciplinary program available to qualified students upon approval of the Director of the Environmental Program. The major requires completion of six Environmental Studies core courses (ENVS 1, 2, 100, 151, 201, and 204), a senior thesis (ENVS 202) of six or more credits, and at least 24 credit hours of intermediate or advanced environmentally-related courses approved by the student's advisor. A total of 122 credit hours of courses, including two physical education credits and the college distribution requirements, are required to earn the Bachelor of Science degree.

Students in other majors may also elect a Coordinate Major in Environmental Studies. Those desiring to do so must complete all the requirements in their major, Environmental Studies 1, 2, 100, and 204, and at least three other intermediate or advanced environmentally-related courses chosen in consultation with an advisor from the Environmental Program.

Merchandising, Consumer Studies, and Design

The Department of Merchandising, Consumer Studies, and Design prepares students for careers in business and industry, education, and public service, or for pursuing graduate study. Applied as well as theoretical approaches are presented and examined in the three majors: consumer studies, merchandising, and design. The majors are similar in their concern and relationship with consumer needs and behaviors. Business, aesthetic, social, and scientific approaches are taken to analyze product areas of the textile and clothing fields. Consumer orientations are described and analyzed with these and other products and services.

Consumer Studies: This major addresses the interaction of economic, social, and political conditions as they affect the consumer. An understanding of the relationship of management and motivation to consumer problems, and the impact of public and private sector institutions, forms the basis of a flexible program of study. Majors select their courses to provide a career orientation in business, public service, or human services.

Required Courses: College requirements including these specific courses: English 1, Speech 11, communications elective, Economics 11 and 12, Psychology 1, Sociology 1, Political Science 21, and Statistics 111 or 141. Professional courses including: Merchandising, Consumer Studies, and Design 56, 58, 127, 150, 155, 157, 158, 159, 190, 296; and two product-related, one business-related, and one human development courses chosen from a specified list. Two three-course emphases, one in a basic area (economics, political science, psychology, or sociology) and one in an applied area (Agricultural and Resource Economics; Business Administration; Environmental Studies; Human Development Studies; Merchandising, Consumer Studies, and Design; Nutritional Sciences; Social Work; or Occupational and Extension Education).

Merchandising: The Merchandising major is an interdisciplinary approach to the buying and selling of products and services in retail and wholesale markets. It combines product knowledge, consumer issues, business principles, and design with a broad liberal arts background in the study of the marketplace, especially as related to apparel and textile products. Career possibilities include executive positions in retail and wholesale buying and sales management, marketing, and promotion of consumer goods, particularly in the apparel and textile industries.

Required Courses: College requirements including the specific courses: English 1, Speech 11, communications elective, Economics 11 and 12, Psychology 1, Sociology 1, Art 6, Statistics 111 or 141, and Chemistry 3. Professional courses including: Merchandising, Consumer Studies, and Design 15, 20, 22, 56 or 58, 117, 120 or 121, 125, 126, 127, 128, 157, 190, 296; and Agricultural and Resource Economics 167 and 168 or Business Administration 60 and 150, and six credits from a specified list of courses.

Design: This major offers preparation in apparel and textile design. Students apply the elements and principles of design in weaving, dyeing and printing fabric, and creating apparel by draping and flat pattern techniques. Alternative needs and end uses are evaluated during the design process, utilizing supporting courses in history and the social and physical sciences. Students are prepared for a variety of executive positions in the textile and apparel industries including design, sales and educational representatives, apparel and textile production, and management.

Required Courses: College requirements including these specific courses: English 1, Speech 11, communications elective, Economics 11, Psychology 1, Sociology 1, Art 5 and

6, Chemistry 3. Professional courses including: Merchandising, Consumer Studies, and Design 15, 16, 20, 22, 56 or 58, 107, 115, 117, 120, 121, 122, 127, 190, 222, 231, and 296.

Students may co-enroll in the Home Economics Program with any of the three majors. This requires completion of professional course requirements as well as home economics core requirements and two seminars focusing on theoretical and applied implementations of the home economics field. (See page 42 for complete description.) Specific degree requirements are available in the department office, Terrill 211.

Microbiology and Molecular Genetics

The Department of Microbiology and Molecular Genetics prepares students for careers in biotechnology, medicine, teaching, and research through formal courses, academic programs, and undergraduate research opportunities. Undergraduates who undertake studies in the Department receive instruction in the classroom and in state-of-the-art teaching and research laboratories. The Department offers courses in the areas of molecular genetics, general, clinical, and environmental microbiology, virology, and immunology. These courses can be elected by students who are enrolled as microbiology majors or minors and are frequently selected by students who are majors in other programs within the biological sciences. Numerous research opportunities provide undergraduates with close interactions with faculty at the cutting edge of molecular genetics. The laboratory apprenticeships are invaluable learning experiences and frequently provide an important boost towards careers in academic laboratories, medicine, or in the rapidly expanding biotechnology industry.

Students who complete the microbiology major are well prepared to accept laboratory positions in biotechnology, biomedical research, or other areas of microbiology and molecular biology. They are also ready to move on for further training in medical school or numerous graduate programs in molecular biology, microbiology, biochemistry, cell biology, and biotechnology. The microbiology major builds on a solid foundation of courses in the biological and physical sciences, including introductory biology and chemistry, genetics, organic chemistry, calculus, and physics. Students intending to major in microbiology typically select MMG 66 (Microbiology and Molecular Genetics I) during their sophomore year. The major requirements are completed during the junior or senior years through the selection of courses from among the following: Environmental Microbiology; Clinical Microbiology; Virology; Immunology; Molecular Cloning Laboratory; Mammalian Cell and Molecular Biology Laboratory; Prokaryotic Molecular Genetics; Industrial Microbiology; Food Microbiology; Plant Cell Culture; Yeast Genetics; Macromolecular Processing; Biochemistry; Undergraduate Research.

Depending on the interest of the student, the major can be designed in such a way that a concentration in one or more of the following areas is obtained: Molecular Genetics, Applied Microbiology, Clinical Microbiology, or General Microbiology. Specific requirements for the undergraduate major and minor may be obtained from the Department office.

Nutritional Sciences

The Department of Nutritional Sciences prepares students to enter the rapidly expanding field of diet, nutrition, health, and disease and is the only academic unit in the state that is approved by the American Dietetics Association. Nutrition, a unique field of study, is rooted in the

physical, biological, and biochemical sciences but is comprehensive in scope since it integrates knowledge learned in the social and psychological sciences. The faculty in the department believe that excellence in teaching, research, and undergraduate student advisement are critical components of their responsibility to undergraduate education. Through formal course work, field experience, and independent research, students will prepare themselves in the biochemical and socioeconomic aspects of diet, nutrition, and foods. Thus, department majors will be able to meet the current and future needs in nutritional sciences and assume innovative, leadership roles in society.

The course credits earned in Nutritional Sciences provide background in preventive and therapeutic nutrition as well as nutrient requirements for growth, development, health, and fitness throughout the life cycle. Other courses focus on physical, chemical, and nutritional properties of food, food safety, and consumer aspects of food related to socioeconomic status, lifestyle, cultural beliefs, and health. Although a series of courses providing knowledge in these areas is required of all majors, each student has a generous choice of electives to pursue personal interests.

It is possible for students to meet the requirements for more than one program option or to combine a major in this department with another area of study. In addition, department majors may elect to meet the undergraduate requirements needed for admission to medical school or graduate school in nutrition, nutritional biochemistry, or any related biological science.

Depending on current interests and future plans, students may select one of two departmental majors.

Dietetics: Dietetics is the study of the science of nutrition as it relates to the attitudes, beliefs, and behaviors that people have toward food. This didactic program in dietetics is designed to meet or exceed the Plan V academic requirements needed for certification by the American Dietetic Association. The curriculum provides a solid background in basic science, preventive and therapeutic nutrition, food safety, and quantity food management. To become a registered dietitian, the academic requirements and a post-baccalaureate American Dietetic Association approved, supervised practice experience must be completed. Career opportunities include private practice, hospital dietetics, community nutrition programs, quantity food management, corporate wellness programs, as well as graduate or medical school.

Nutritional Sciences: This major is designed to provide a strong background in preventive nutrition, nutritional biochemistry, and basic science with an opportunity to elect further course work in biological, biochemical, psychological and social science or business. Graduates may continue their education in medical or graduate school or find career opportunities in the food industry, pharmaceutical companies, medical research laboratories, community nutrition programs, government agencies, and the Extension Service.

Course Requirements:

I. General Education Studies for all Majors:

- A. Communication Skills (six credits):
English 1 (or equivalent)
Speech 11
- B. Fine Arts and Humanities (six credits):
Two unspecified courses
- C. Social Sciences (nine credits):
Psychology 1
Economics 11

Sociology 1 or 109 *or*
Social Work 47

- D. Basic Sciences* (24 credits):
Chemistry 3 (or equivalent)
Chemistry 42 (or equivalent)
Anatomy and Physiology 19–20 (or equivalent)
Microbiology and Molecular Genetics 65 *or* 66
or Animal Sciences 203
Biochemistry 201 and 202
- E. Analytical Sciences* (six credits):
Statistics 111 (or equivalent)
Computer Science 2 *or* 3 *or*
Vocational Education and Technology 85
(or equivalent)
- F. Agriculture and Life Sciences Orientation (two credits):
Agriculture 99, Beginnings
Agriculture 95, Race and Culture
- G. Physical Education (two credits):
Two unspecified courses

*Students planning to attend medical or graduate school should have biology (one year), chemistry (two years), and physics (one year); plus calculus (one year) is recommended.

II. Department Core Requirements for all Majors (17 credits):

Nutritional Sciences:
37, Basic Concepts of Food
38, Basic Concepts of Food Lab
43, Fundamentals of Nutrition
44, Survey of the Field
144, Nutrition in the Life Cycle
237, Food Safety and Regulation
242, Advanced Nutrition

III. Department Major Requirements

A. Dietetics (23 credits):

Nutritional Sciences:
138, Quantity Food Production and Services
238, Food Service Systems Management
240, Methods in Nutrition Education
245, Nutritional Biochemistry *or*
Biochemistry 212, Biochemistry of Human Disease
246, Diet and Disease
248, Community Nutrition
Business Administration 120, Prin. Management and Organ. Behavior
Electives (27–49 credits)

B. Nutritional Sciences, choose one:

- Nutritional Biochemistry (11 credits):
Nutritional Sciences:
245, Nutritional Biochemistry
290, Research Methods in Nutritional Sciences
Biochemistry:
212, Biochemistry of Human Disease
213, Biomedical Biochemistry Laboratory
Electives (39–61 credits)
- Applied Nutrition (10 credits):
Nutritional Sciences:
240, Methods in Nutrition Education
246, Diet and Disease
248, Community Nutrition
Electives (40–62 credits)

Plant and Soil Science

The Plant and Soil Science program has specialized options designed for students interested in the production and use of plants in agriculture and the landscape; and to understanding of soils in the environment, the effects of pollution, and remedial action. The program is flexible and allows students to advance their interest in science, plant production, landscape design, or environmental issues related to plants and soils. Options prepare students for careers in a variety of professions or graduate schools related to the production or use of plants; and to understanding and management of soils in the environment. Specific course selections, in addition to the required courses, are determined by the student and the advisor.

Horticulture: This option provides students with the basic knowledge needed for a wide variety of careers related to horticultural crops including flowers, shrubs and trees for ornamental use, and fruit or vegetables for food. Students integrate courses in science, business, and liberal arts to prepare for the numerous professional opportunities in horticulture or for graduate school.

Landscape Design: This option prepares students for a professional career as a landscape designer or for graduate studies in landscape architecture. The focus is on planning of outdoor spaces and small scale site planning for private, commercial, or public benefit.

Environmental Soil Science: This option provides technical training with a wide breadth of knowledge and skills in soil science related disciplines enabling graduates to think critically and solve problems. Students prepare for environmental consulting or graduate school and focus on the integration of soils with plants, water, geology, and ecosystem. Students will learn how pollutants impact, move, and can be managed in natural and agricultural systems.

Agroecology/Sustainable Agriculture: This option focuses on ecologically sound agricultural practices that reduce dependence on pesticides and fertilizers to decrease pollution of water and the environment, while maximizing profitability. Environmental sciences are integrated with business management and agricultural practices to provide the expertise for critical decision making for a sustainable agriculture.

Required Core Courses:

| | Hours |
|---|-------|
| Plant and Soil Science: | |
| 11, Principles of Plant Science | 3 |
| 106, Insect Pest Management | 4 |
| 16, Introductory Soil Science | 4 |
| 162, Soil Fertility and Management | 3 |
| 281, Seminar | 1 |
| Botany: | |
| 104, Plant Physiology | 4 |
| 117, Plant Pathology | 4 |
| Chemistry 3 | 4 |
| Chemistry 42 or 4 | 4 |
| Six additional Plant and Soil Science courses at or above the 100 level | 18-20 |

Urban Forestry and Landscape Horticulture

Urban Forestry and Landscape Horticulture provides a professional education in the use and care of trees, shrubs, lawn grasses, and other plants in the human environment. Landscape design and contracting, urban forestry, park supervision, and garden center management are some of the professions in this expanding field.

The program integrates professional training in landscape design and the plant sciences with courses in business and the liberal arts. The emphasis is on the preparation of students for the changing future and a variety of careers in the expanding field of Urban Forestry and Landscape Horticulture.

Students are encouraged to participate in internships related to their studies which provide valuable work experience and professional contacts.

| | 1st | 2nd |
|---|----------|-----|
| FIRST YEAR | SEMESTER | |
| Agric. 95, Race and Culture | 1 | — |
| Plant and Soil Sci. 7, Orientation to Urban For. and Landscape Hort. | 1 | — |
| Math. 10, Precalculus <i>or</i> Statistics ¹ | 3 | — |
| Forestry 3, No. American Trees | 3 | — |
| English 1, Written Expression | 3 | — |
| Plant and Soil Sci. 11, Princ. Plant Sci. | 3 | — |
| Chemistry 3, Gen'l Chem. | — | 4 |
| Speech 11, Effective Speaking | — | 3 |
| Computer Sci. 2 or 11 <i>or</i> | | |
| Voc. Ed. & Tech. 85 | — | 3 |
| Physical Education | 1 | 1 |
| Other courses ² | — | 4 |
| | 16 | 15 |

| | 1st | 2nd |
|---|----------|-----|
| SOPHOMORE YEAR | SEMESTER | |
| Plant and Soil Sci. 161, Intro. Soil Science | 4 | — |
| Voc. Ed. & Tech. 25, Measurements & Mapping | 4 | — |
| Ag. & Res. Ec. 61, Princ. Agr. Res. Econ. | 3 | — |
| Plant & Soil Sci. 125, Woody Landscape Plants | 4 | — |
| Plant & Soil Sci. 162, Soil Fert. and Mgmt. | — | 3 |
| Botany 104, Plant Physiology <i>or</i> Forestry 225 ³ | — | 4 |
| Forestry 120, Forest Ecology | — | 4 |
| Other Courses ² | — | 4 |
| | 15 | 15 |

| | 1st | 2nd |
|---|----------|-----|
| JUNIOR YEAR | SEMESTER | |
| Plant & Soil Sci. 145, Turfgrasses | 3 | — |
| Plant & Soil Sci. 133, Forest Entomology | 3 | — |
| Plant & Soil Sci. 131, Landscape Design I | 3 | — |
| Plant & Soil Sci. 132, Landscape Design II | — | 3 |
| Ag. & Res. Ec. 166, Small Bus. Mgmt. <i>or</i> Bus. Admin. 120, Prin. of Mgmt. | — | 3 |
| Forestry 134, Forest Pathology | — | 4 |
| Other Courses ² | 3 | 6 |
| | 16 | 16 |

| | 1st | 2nd |
|--|----------|-----|
| SENIOR YEAR | SEMESTER | |
| Plant & Soil Sci. 123, Garden Flowers and Indoor Plants | 3 | — |
| Forestry 176, Urban Forestry | — | 3 |
| Co-op Program <i>or</i> Other Courses ² | 12 | 11 |
| | 15 | 14 |

¹Students not having trigonometry in high school should also take Math. 2.

²Select two three-credit courses from anthropology, economics, geography, political science, psychology, or sociology.

³Select two three-credit courses from arts and humanities: art, classics, English, foreign language, general literature, history, music, philosophy, religion, or theatre.

The Self-Designed Major

The Self-Designed Major is an individualized program in the College of Agriculture and Life Sciences providing students with the opportunity to create a unique academic major under the guidance of a faculty advisor. It offers students the chance to combine various areas from within the College or may elect to focus on one or two. Participants are encouraged to complement their core design with relevant courses selected from all areas of the University. Off-campus experiences and internships may be incorporated into the Self-Design Major. First-year students interested in pursuing a Self-Designed Major are encouraged to explore the College for at least two semesters prior to making an official application to the program.

Students interested in becoming a Self-Designed Major must:

- Have accumulated no more than 65 credit hours at the time they begin the program; if this requirement prevents a student from pursuing a valid program, the student and faculty advisor may discuss the proposal with the Dean's Office of the College of Agriculture and Life Sciences.
- Fulfill all College distribution requirements.
- Complete 40 credits in courses offered by the College of Agriculture and Life Sciences; 20 of the 40 must be 100-level or higher.
- Discuss the proposed major with and receive the approval from a designed faculty advisor.
- Present the faculty-approved proposal to the Dean's Office for final approval.

Vocational Education and Technology

The VOTEC department offers two major programs: (1) Occupational and Extension Education, (2) Home Economics Education. These programs are flexible and provide several areas of professional concentration. Certain concentrations may be completed either as a major in this department, or as a teacher certification option combined with another program at the University. The requirements of some VOTEC programs can be met without having to attend the University campus on a full-time basis. Courses of general interest are available to all students in the University.

OCCUPATIONAL AND EXTENSION EDUCATION Two occupational areas of concentration (Agriculture and Natural Resources and Industry) prepare students for teaching certification. Extension Education prepares students for adult education responsibilities in governmental agencies, private organizations, business, and industry. Students desiring teacher certification must apply for admission to teacher education, and students choosing the Extension Education concentration must declare their intent prior to the beginning of their junior year. 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 Program Approval Plan and have reciprocity certification in selected states. Courses in the College of Education and Social Services will be included in teacher certification concentrations.

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) a teacher certification option in combination with another major for students in the College of Agriculture and Life Sciences or the School of Natural Resources.

The teacher certification option for students in the College of Agriculture and Life Sciences or the School of Natural Resources provides courses selected to meet specific state and national certification requirements.

Elective courses in the subject to be taught, including specific state and national requirements for certification, are selected with the approval of advisor.

Industrial Education: This program prepares students 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.

Several 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 in-service programs. Qualified individuals may start as nondegree 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 nondegree students seeking teacher certification will complete professional Vocational Education and Technology courses plus selected courses in the College of Education and Social Services.

Extension Education: Preparation for adult educational responsibilities in government agencies, private organizations, business, and 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 182, 183, 184, 283.

Home Economics Education

Because of the comprehensive scope of Home Economics Education, graduates with this major have a variety of career alternatives in business, social agencies, and different types of educational programs for youth and adults. Graduates are prepared to teach in public schools in consumer and home economics fields such as family living, child development, consumer education, food and nutrition, housing and interiors, clothing and textiles, and management found in middle, junior, and high school home economics programs. Home Economics Education graduates can be certified to teach in occupational home economics programs, including human service education and culinary arts. Experience in business or industry is needed to teach in an occupational program.

Students are enrolled in the interdisciplinary Home Economics Program (see page 42).

Typical Curriculum

| | 1st | 2nd |
|-------------------------------------|-----------------|-----------|
| FIRST YEAR | SEMESTER | |
| Voc. Ed. & Tech. 52 | 3 | — |
| Psychology 1 | — | 3 |
| Early Childhd. & Hum. Dev. 80 | 3 | — |
| English 1 | 3 | — |
| Math. 9 | — | 3 |
| Home Economics Seminar | — | 1 |
| Chemistry 3 | 4 | — |
| Chemistry 4 | — | 4 |
| Mdsng., Cons. Stds., & Design 15 | — | 3 |
| Nutritional Sciences | 3 | — |
| Phys. Ed. | — | 1 |
| | <u>16</u> | <u>15</u> |
| SOPHOMORE YEAR | SEMESTER | |
| Economics 11 or Ag. and Res. Ec. 61 | — | 3 |
| Speech 11 | 3 | — |
| Humanities Electives | 3 | 3 |
| Science Elective | 4 | — |
| Nutritional Sciences | 3 | — |
| Mdsng., Cons. Stds., & Design 56 | — | 3 |
| Mdsng., Cons. Stds., & Design 22 | — | 3 |
| Educ./Gen'l. 1 or 2 | — | 3 |
| Early Childhd. & Hum. Dev. 81 | 3 | — |
| Phys. Ed. | — | 1 |
| | <u>16</u> | <u>16</u> |

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.

MINORS

SPECIFIC MINOR REQUIREMENTS

Any student in the College or in the School of Natural Resources interested in enrolling in one of the following minors should contact the department administering the program. If accepted, the student will be assigned a "minor advisor" from that department who must approve all program plans and course selections.

Students in the College may enroll, on a space available basis, in minors listed under the School of Natural Resources.

Agricultural and Resource Economics: Agricultural and Resource Economics 61 and 166; and at least three of the following: 201, 207, 208, 254, 264.

Animal Sciences: Animal Sciences 1, 43, 122, 212, and select any one of Animal Sciences 2, 5, 115, 211, or 213.

Biological Sciences: Biology 1 and 2 plus a sequence of three semester courses (nine to 12 credits) in the biological sciences selected with advice of the faculty advisor and approved by the program chair. The courses are selected to provide a relevant extension of the student's major program into the biological sciences.

Consumer Studies: Eighteen credit hours including three core courses Merchandising, Consumer Studies, and Design 58, 157, 159; a choice of emphasis (either Merchandising, Consumer Studies, and Design 56 or 158 and either Merchandising, Consumer Studies, and Design 127 or 155); and one elective course chosen from Merchandising, Consumer Studies, and Design 56, 127, 128, 150, 151, 155, 158, 291, or 296.

Dairy Foods: Animal Sciences 1, 43, 106, 201, 203.

Design: Eighteen credit hours including five core courses: Merchandising, Consumer Studies, and Design 15, 20, 22, 107, 122; and one elective course chosen from: 115, 117, 120, 121, 222, 296.

Environmental Studies: Seventeen hours in Environmental Studies consisting of 1, 2, 100, 204, and three additional credits at the 100 level or above.

Merchandising: Eighteen credit hours including five core courses: Merchandising, Consumer Studies, and Design 125, 126, 127, 20, 22; and one elective course chosen from 107, 117, 120, 121, 128, 155, 157, 159, 296.

Nutritional Sciences: Fifteen credit hours in Nutritional Sciences including at least six credits at the 200 level. Independent study or field experience cannot be counted in this total.

Plant and Soil Science: Plant and Soil Science 11, 161, plus any three additional Plant and Soil Science courses at the 100 level or above.

Small Business Management: Agricultural and Resource Economics 61, 166, 167, 168, 266.

The College of Arts and Sciences

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, the College seeks to instill in students a spirit of reasoned inquiry and those habits of intellectual discipline that are required for the critical thinking expected of free men and women. The College further seeks to acquaint students with their intellectual, cultural, and aesthetic heritage, and to provide them the skills necessary to cope with the complex human, societal, and technological problems of modern society. Finally, the College seeks to prepare students for 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 form the undergraduate curricula of the College. Through satisfaction of the general and distributive requirements, students acquaint themselves with the diversity of approaches whereby people have come to understand themselves and their environment. As well, through satisfaction of the major and minor requirements, students can attain baccalaureate level mastery of a particular discipline or interdisciplinary area and significant depth of study in a second discipline or interdisciplinary area.

The offices of the Dean of the College are located in Waterman Building.

ORGANIZATION AND DEGREE PROGRAMS

The Bachelor of Arts degree program may be completed with an approved major in one of the following fields:

| | |
|-------------------------------------|-----------------------------|
| Anthropology | History |
| Art History | International Studies |
| Art - Studio | Latin |
| Biology | Mathematics |
| Botany | Music |
| Chemistry | Philosophy |
| Classical Civilization | Physics |
| Communication Science and Disorders | Political Science |
| Economics | Psychology |
| English | Religion |
| Environmental Studies | Russian |
| French | Sociology |
| Geography | Spanish |
| Geology | Theatre |
| German | Zoology |
| Greek | Individually Designed Major |

The Bachelor of Science degree program may be completed with an approved major in one of the following fields.

| | |
|-----------|---------|
| Biology | Physics |
| Chemistry | Zoology |
| Geology | |

The Bachelor of Music degree program may be completed with an approved major in one of the following fields.

| | |
|-------------------|--------------|
| Music Performance | Music Theory |
|-------------------|--------------|

DEGREE REQUIREMENTS

Students must comply with the degree requirements as stated in the catalogue applicable when they enter the University. However, students who do not complete the degree within seven years must comply with the requirements in the catalogue current at the date of readmission. Disputed rulings may be appealed to the Committee on Academic Standing.

REQUIREMENTS FOR THE BACHELOR OF ARTS DEGREE

- A. A Student must earn a cumulative grade-point average of 2.0 in a program comprised of a minimum of 122 semester hours. Of the 122 hours of credit, 96 hours must be taken in courses offered by departments and programs in the College of Arts and Sciences and two hours must be associated with physical education activities. (Students 25 years of age or older at the time of admission or students with a documented medical condition which precludes participation in such activities are exempt from the physical education requirement and must present a total of 120 hours of academic hours.) The remaining 24 hours of credit may be taken in courses offered by any academic unit of The University of Vermont, although no more than eight credits of Military Studies may apply toward the degree. Courses taken on a pass/no pass basis may not be used toward completion of any requirement.
- B. A student must be matriculated in the College of Arts and Sciences and in residence at The University of Vermont during the period in which he or she earns 30 of the last 45 hours of academic credit applied toward the degree.
- C. A student must complete the following courses which comprise the general and distributive requirements for the Bachelor of Arts degree. All courses used to satisfy these requirements must carry at least three hours of credit and may not be taken on a pass/no pass basis.

General Requirement

1. **Foreign Language:** One course numbered 52, or in Latin, 51 and 52, or one course numbered 100 or above (except Spanish 105). A student who has achieved a score of 4 or better on an appropriate Advanced Placement Test will be exempted from this requirement.¹ Exemption will also be granted to those students who achieve a score of 650 or better on the appropriate CEEB Achievement Test and who pass oral and written tests administered by the appropriate foreign language department.

Note: Course substitutions may be granted by the Dean's Office to students with comprehensive documentation of diagnosed disabilities which impede foreign language acquisition. Documentation should be submitted to the Office of Specialized Student Services.

2. **Mathematics:** One course numbered 17 or above. A student who has achieved a score of 3 or better on

¹See page 13 for information concerning academic credit for Advanced Placement Testing.

the Calculus AB or a score of 2 or better on the Calculus BC Advanced Placement Tests will be exempted from this requirement.¹ Statistics courses will not satisfy the mathematics requirement.

3. **Non-European Cultures:** One course, other than a foreign language, which deals with non-European cultural traditions.² The course selected to satisfy this requirement may also be used as one of the courses used for the distributive requirement.

4. **Race Relations and Ethnic Diversity in the United States:** One course selected from a list which addresses centrally the question of race relations and ethnic diversity in the U.S. The course selected to satisfy this requirement may also be used to fulfill the distributive requirement.³

Note: A list of approved courses is available in the Dean's Office, 304 Waterman Building.

Distributive Requirement

Eight courses, selected from the five areas listed below. No more than two courses from the same department may be used to satisfy the distributive requirement. Courses which satisfy major and minor requirements may also be used to satisfy this requirement.

- a. **Fine Arts:** One course in Studio Art or Art History, Music,⁴ Theatre,⁴ or in Film.
- b. **Literature:** One course selected from a list of approved offerings in Classics, English, French, German, General Literature, Greek, Latin, Russian, and Spanish.⁵
- c. **Humanities:** Two courses selected from a list of approved offerings in Classics, Greek, History, Latin, Philosophy, Political Science, and Religion.⁶
- d. **Social Sciences:** Two courses selected from a list of approved offerings in Anthropology, Communication Science and Disorders, Economics, Geography, Political Science, Psychology, and

Sociology. International Studies 91A and 91B may also be used to satisfy this requirement.⁷

- e. **Natural Sciences:** Two courses, one of which must include laboratory experience, from among the offerings in Biology, Botany, Chemistry, Geology, Physics, and Zoology.

- D. A student must complete an approved Major in the College of Arts and Sciences by satisfying the requirements specified by the department or program supervising the major (see page 64), and by maintaining a cumulative grade-point average of 2.0 in the major field. No more than 45 hours of credit in the major field may be used toward completion of the 122 hours of credit required for graduation. At least one-half of the credit hours used toward the major requirements must be taken at The University of Vermont. Of these, at least 12 credits must be at or above the 100 level. Application of credits earned elsewhere to completion of the major is subject to approval by the appropriate department chairperson or program director. No courses applied toward satisfaction of major requirements may be taken on a pass/no pass basis.

- E. A student must complete an approved Minor in the College of Arts and Sciences in a field other than the major by satisfying the requirements specified by the department or program supervising the minor (see page 70).⁸ Also, a student must maintain a cumulative grade-point average of 2.0 in the minor field.⁹ Completion of a second major will satisfy the minor requirement. As with the major, at least one-half of the credit hours used toward completion of the minor requirements must be taken at The University of Vermont, and application of credits earned elsewhere to completion of the minor is subject to approval by the appropriate department chairperson or program director. No courses applied toward satisfaction of the minor requirements may be taken on a pass/no pass basis.

REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE

- A. A student must earn a cumulative grade-point average of 2.0 in a program comprised of a minimum of 122 semester hours of academic credit. Of the 122 hours of credit, 96 hours must be taken in courses offered by departments and programs with approved majors in the College of Arts and Sciences and two hours must be associated with physical education activities. The remaining 24 hours of credit may be taken in courses offered by any academic unit of The University of Vermont, although no more than eight credits of Military Studies may apply toward the degree. Courses taken on a pass/no pass basis may **not** be used toward the completion of any requirement listed below under sections C and D and E.
- B. A student must be matriculated in the College of Arts and Sciences and in residence at UVM during the period in which he or she earns 30 of the last 45 hours of academic credit applied toward the degree.

⁸Only one course may be applied toward completion of both a major and a minor requirement.

⁹The minor grade-point average will be calculated from the first set of courses which satisfy the minor requirements. However, if a student's grade-point average in these courses falls below 2.0, and there are additional courses which are approved for inclusion in the minor, a student may elect to drop for purposes of the grade-point average calculation, one course graded below C and to replace this course with an approved alternate.

¹See page 13 for information concerning academic credit for Advanced Placement Testing.

²The following courses have been approved for this category for the 1992-93 academic year: Anthropology 21, 24, 60, 128, 160, 161, 162, 163, 165, 166, 170, 172, 175, 177, 179, 180, 185; Art 8, 146, 185, 187, 188, 285; Geography 1, 51, 56, 58; History 9, 10, 40, 45, 50, 51, 61, 91, 140, 145, 146, 149, 150, 151, 161, 162, 245, 246, 250, 252, 293, 294; Music 15; Philosophy 3, 121, 122, 221; Political Science 174, 175, 176, 177, 178; Religion 20, 21, 131, 132, 141, 145.

³Music Performance courses (one and two credit hours each) may be used to satisfy the Fine Arts requirement if their cumulative credit hour total is equal to or greater than three.

⁴Speech courses will not satisfy the Fine Arts requirement.

⁵The following courses have been approved for this category for the 1992-93 academic year: Classics 42, 153, 155, 156; all English courses except: 1, 4, 30, 50, 53, 101, 102, 110, 172, 173, 177, 178, 179; all French courses numbered 155 or above except 201, 209, 210, 215, 216, 291, 292, 293; all German courses numbered above 100 except: 121, 122, 201, 221, 232; all General Literature courses; all Greek courses numbered above 200; all Latin courses numbered above 100 except 111, 112, 255; all Russian courses numbered above 100 except: 101, 121, 122, 141, 142, 161; all Spanish courses numbered 155 or above except: 202, 210, 291, 293.

⁶The following courses have been approved for this category for the 1992-93 academic year: all History, Philosophy, Religion courses; Classics 154; Greek 203, 205; Latin 255; Political Science 41, 141, 142, 143, 144, 241, 242.

⁷The following courses have been approved for this category for the 1992-93 academic year: all Anthropology, Economics, Geography, Psychology, and Sociology courses; all Political Science courses except: 41, 141, 142, 143, 144, 241, 242; International Studies 91A, 91B; Communication Science and Disorders 20, 80, 94, Women's Studies 73.

- C. A student must complete the **Distributive Requirement** for the Bachelor of Science degree by completing six courses selected from at least two of the following areas: Foreign Language, Fine Arts, Literature, Humanities, and Social Sciences (see this page for a detailed description of the courses included in these areas). No courses applied toward satisfaction of the distributive requirements may be taken on a pass/no pass basis.
- D. A student must complete an approved **Major** in the College of Arts and Sciences by satisfying the requirements specified by the department or program supervising the major (see page 64), and by maintaining a cumulative grade-point average of 2.0 in the major field. No more than 50 hours of credit in the major field may be used toward completion of the 122 hours of credit required for graduation. At least one-half of the credit hours used toward the major requirements must be taken at UVM. Of these at least 12 credits must be at or above the 100 level. Application of credits earned elsewhere to completion of the major is subject to approval by the appropriate department chairperson or program director. No courses applied toward satisfaction of major requirements may be taken on a pass/no pass basis.

Bachelor of Science (with minor) degree. A student electing this degree program must satisfy all of the requirements specified in sections A, B, C, and D (above), as well as:

- E. A student must complete an approved minor in a field other than the major by satisfying the requirements specified by the department or program supervising the minor (see page 70) and by maintaining a cumulative grade-point average of 2.0 in the minor field. No more than two of the courses from section C distribution requirements may be applied toward the completion of the minor requirements.

REQUIREMENTS FOR THE BACHELOR OF MUSIC DEGREE

- A. A student must earn a cumulative grade-point average of 2.0 in a program consisting of a minimum of 122 semester hours of academic credit for a Music Theory Concentration, or 125 semester hours of academic credit for Music Performance Concentration. Of these hours of required credit, **two** hours must be associated with physical education activities. Courses taken on a pass/no pass basis may not be used toward the completion of any requirement listed below under sections C and D.
- B. A student must be matriculated in the College of Arts and Sciences and in residence at UVM during the period in which he or she earns 30 of the last 45 hours of academic credit applied toward the degree.
- C. A student must complete a Distributive Requirement which is identical to that required for the Bachelor of Arts degree (see page 61 for a detailed description of the Distributive Requirement).
- D. A student must complete a Major with a concentration in either theory or performance by satisfying the requirements specified by the department (see page 64), and by maintaining a cumulative grade-point average of 2.0 in the major field. An admission audition, junior standing jury examination, and senior recital are also required for the performance concentration. At least one-half of the credit hours used toward the major requirements must be taken at The University of Vermont. Of these, at least 12 credits must be at or above

the 100 level. Application of credits earned elsewhere to completion of the major is subject to approval by the appropriate department chairperson or program director. No courses applied toward satisfaction of major requirements may be taken on a pass/no pass basis.

Bachelor of Music (with minor) degree. A student electing this degree program must satisfy all of the requirements specified in sections A, B, C, and D (above) as well as:

- E. A student must complete an approved minor in a field other than the major by satisfying the requirements specified by the department or program supervising the minor (see page 70) and by maintaining a cumulative grade-point average of 2.0 in the minor field.

INTEGRATED HUMANITIES PROGRAM

The Integrated Humanities Program is a coordinated first-year program that presents the development of the Western cultural tradition through the perspectives of literature, history, religion, and philosophy. Most students in the program are housed in the Living/Learning Center. English 27, 28, History 13, 14, and Religion 27, 28 are the core courses for the program.

REGULATIONS GOVERNING INDEPENDENT STUDY

A student may receive credit for a project or program of independent study which is supervised by an academic department or program within the University. Such independent study projects may be carried out under registration in courses entitled Readings and Research or Internship. All such projects must conform to University guidelines for independent study (see page 32). There is no limit on the number of independent study credits which may be earned, but prior approval by the Committee on Honors and Individual Studies is required if a student wishes to elect nine or more such credits in a single semester.

REGULATIONS GOVERNING HONORS PROGRAMS

- A. The **College Honors** program, designed for the superior student with unusual initiative and intellectual curiosity, provides an opportunity for the pursuit of a two-semester, six-credit (3-3) independent research, scholarly, or creative project under the direction of a faculty sponsor. A student in the College of Arts and Sciences may apply for College Honors in a particular subject if, at the end of the junior year, he or she has a grade-point average of at least 3.20 and has been on the Dean's List for three semesters. The program must have been approved by the sponsoring department and by the Committee on Honors and Individual Studies one week after the first day of classes of the candidate's senior year. Students must present a satisfactory written report and pass an oral examination upon completion of the honors project. Students who wish to consider undertaking a College Honors project during the junior year should contact the Office of the Dean for information concerning the circumstances in which such an exceptional arrangement is possible.
- B. Some departments in the College, including Economics, English, Mathematics, Political Science, and Sociology, sponsor **Departmental Honors** programs. Par-

ticipation in these programs is limited to those students who are specifically recommended by their department. Each department will define what is required to earn Departmental Honors. A student who successfully completes this program is granted a degree with Departmental Honors. These programs are administered directly by the sponsoring department and information concerning them may be obtained from faculty advisors.

REGULATIONS GOVERNING STUDY ABROAD

Students should refer to page 43 for the general University regulations and procedures pertaining to Study Abroad. For Arts and Sciences students the following additional policies pertain to the application of credit earned in a Study Abroad program:

- A. Regardless of the number of credits accepted in transfer by the University, a maximum of 16 credits earned in a one-semester Study Abroad program will be applied toward satisfaction of degree requirements. For year-long programs, a maximum of 32 credits will be applied toward the degree.
- B. Students must complete 30 of the last 45 hours of degree credit in residence at UVM and must complete one-half of the hours applied toward the satisfaction of major requirements, including 12 hours at the 100 level or above, at The University of Vermont.
- C. Under no circumstances will a student in the College of Arts and Sciences be permitted to enroll in a University-sanctioned Study Abroad program while on trial.

REGULATIONS GOVERNING TRANSFER INTO THE COLLEGE

A student who wishes to transfer into 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, must have completed two semesters as a degree candidate at the University, and must have taken the secondary school course work or subsequent college-level courses in those subjects required for admission to the University (see page 9). Applications for internal transfer may be submitted to the Office of the Dean at any time, but they will be reviewed only at the end of each semester.

REGULATIONS GOVERNING ACADEMIC STANDARDS

The following criteria for academic trial and dismissal, while making allowances for the student in the first semester, are designed to encourage academic work of quality at least equal to the minimum which is required for graduation.

- A. A student who earns a semester grade-point average higher than that which merits dismissal but below 2.00 (1.67 for first semester first-year students) is placed *on trial*. In order to avoid dismissal from the University, a student who has been placed on trial must earn a 2.00 semester average, enroll in all courses for a letter grade, and maintain a program of 12 or more credit hours during the following semester. A student who is on trial may not enroll in a University-sanctioned study abroad program.

- B. A student who does not satisfy the conditions of trial, or who earns a semester grade-point average of 1.00 or lower, or who earns failing grades in one-half of the semester credit hours attempted (excluding courses in physical education and military studies) will be *dismissed for low scholarship*. The period of dismissal is one year. Dismissed students must receive written approval from the Arts and Sciences Dean's Office before enrolling in any University course.
- C. A dismissed student who presents evidence of his/her ability to perform satisfactorily may be considered for readmission on trial. A student who has been dismissed for a second time will not be considered for readmission on trial until at least three years have elapsed. Further information regarding readmission may be obtained from the Office of the Dean.

MAJORS: DEPARTMENT REQUIREMENTS

Bachelor of Arts, Bachelor of Science, and Bachelor of Music requirements are found under the appropriate department headings.

INDIVIDUAL DESIGN MAJOR The IDM is a nondepartmental, interdisciplinary major for those Bachelor of Arts candidates whose academic interests are not met by the major programs currently offered by the College. An IDM may not be a program of narrow professional training. Rather, it must lead to an intensive investigation of some broad area of human knowledge which is not covered by a single departmental discipline. During the senior year, IDM majors engage in a three-credit tutorial for which they complete a paper or an equivalent project which demonstrates the essential coherence of the major. A College Honors project (six credits) may be substituted for the tutorial requirement. Application to pursue an IDM must be approved by the Committee on Honors and Individual Studies before the beginning of the candidate's junior year. Additional information about the IDM program is available in the Office of the Dean.

ANTHROPOLOGY Thirty hours in Anthropology including 21, 24, 26, and 128; 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.

ART Students may major in one of the following:

Studio Art: Thirty hours in Studio Art, including nine hours in foundation courses (to include Art 3 and two from 1, 2, 4) with three different instructors; 15 hours at the 100 level (only three of which may be 197; only three of which may be 195) with two different instructors, including courses in the areas of two-dimensional study (drawing, painting, printmaking, photography, film, and video) and of three-dimensional study (sculpture, ceramics, fine metals); and six hours at the 200 level, three of them in the senior year; nine hours of Art History, including two of the following: 5, 6, or 8; and one of the following: 140, 172, 174, 176, 179, 181.

Art History: Thirty hours in Art History, including 5, 6; 12 hours to include three hours from each of four different categories (196 courses in these categories also qualify): Ancient (146, 148, 149), Medieval (150, 153, 154), Renaissance (158, 161, 164), Baroque (167, 168, 171), Modern/American (140, 172, 173, 174, 175, 176, 179, 181, 184) Asian (185, 187, 188); six additional Art History hours; two seminars (six hours) from 207 or above, one in the senior year; six hours of Studio Art; French or German through 52. In cases where a language other than French or Ger-

man is appropriate to the student's area of interest, the Student's advisor must approve the substitution and send a letter to the Dean's Office recording the approval of the substitution.

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

For Art Education, see College of Education and Social Services.

BIOLOGY Students may select either of two degree programs:

Bachelor of Arts: Chemistry 1, 2 or 11, 12, 13, 14, to be taken the first year if possible; Physics 21, 22 in combination with 11, 12 or preferably 31, 42; Math. 19, 20; or 21. 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 approved offerings of the several biologically-oriented departments. For a detailed list of these courses, please consult the Zoology Department office.

Bachelor of Science: Chemistry 1, 2 or 11, 12, 13, 14, to be taken the first year if possible; Chemistry 141, 142; Physics 21, 31, and 22, 42; Math. 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 Zoology undergraduate research or honors may be counted toward the total of the 46 required credits.

BOTANY Math. 21, 22; or Math. 21 and Statistics 141 or 211; or Math. 19, 20 and Statistics 141 or 211; Physics 21, 22; and 11, 12 or preferably 31, 42; Chemistry 42 or preferably 141, 142; Biology 1, 2; Botany 101 or 132, 104, 107, 108, and 109 or 160; 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), 141 or 143, 144, 145, 146, 162, 163, 201, 202, 221, and 231; Math. 21, 22, 121 (or equivalent); Physics 21, 31 and 22, 42 (or 125).

Bachelor of Science: Chemistry 11, 12, 13, 14 (or 1, 2, 121 or 1, 12, 14), 141 or 143, 144, 145, 146, 162, 163, 201, 202, 221, 231, 232, 282; nine hours of advanced chemistry or biochemistry electives, which may include Chemistry 291; Physics 21, 31 and 22, 42 (or 125); Math. 21, 22, 121, 271 (or equivalent); proficiency in German equivalent to the completion of German 1, 2, or 21, 22.

CLASSICS Student may major in:

Latin: Thirty hours in courses above 100, among which 111, 112 and History 122 are required and one course in literature in translation above 100 and one course in Greek above 100 are applicable; a second foreign language, at least through the intermediate level, is recommended.

Greek: Thirty hours in courses above 50, among which 111, 112 and History 121 are required and one course in literature in translation above 100 and one course in Latin above 100 are applicable; a second foreign language, at least through the intermediate level, is recommended.

Classical Civilization: Thirty-six hours consisting of 30 in the major discipline and six 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 (21, 22, 121, 122, 149) and the following language study are required: three hours of Latin or Greek at the 200 level OR six hours of Latin and six hours of Greek above 50; OR three hours of Latin or Greek at the 100 level and three hours of a modern foreign language at the level of 50 or above. (The three hours of the modern foreign language are not to be counted as part of the major discipline but as a related course if numbered above 100.) 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 121 and 122. *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 SCIENCE AND DISORDERS Thirty-two hours in Communication Science and Disorders including 80, 90, 94, 101, 105, 251, 261, 262, 271; course from Computer Science 2, 3, 11, Psychology 161, Statistics 111 or 141.

ECONOMICS Thirty hours in Economics including 11, 12, 101, 102, three courses at the 100 level, and three courses at or above the 200 level; Statistics 141. Additional courses in other social sciences are strongly recommended. Note that Statistics 141 has a prerequisite of Math. 19.

ENGLISH Thirty hours (ten three-credit courses) including 81 and 82; at least seven courses at or above the 100 level (one of which may be in General Literature) and one numbered 201-262. Of the eight total courses above 100, four must be in British literature prior to 1900, literary criticism, and/or study of the language (101-129, 171, 201-222) or in General Literature prior to 1900. No more than six hours of English 177, 178 (Advanced Writing), and/or 179 (Writers' Workshop) will count toward fulfillment of major requirements.

ENVIRONMENTAL STUDIES Thirty-two hours in Environmental Studies, including 1, 2, 100, 151, 201, 204, six hours of 202 and/or 203, plus six hours at or above the 100 level (not to include 191, 202, or 203).

GEOGRAPHY Thirty hours in Geography including 81, six hours in courses numbered 51 to 61, nine hours at the 100 level, and six hours at the 200 level.

GEOLOGY Students may select either of two degree programs:

Bachelor of Arts: Geology 1 or 41, 101, 110, 112, 121, 131, 153, 260, plus two courses in Geology or approved sciences at the 100 level or higher, selected in consultation with an advisor; Math. 19, 20 or 21, 22; Chemistry 3 or Chemistry 1, 2 (the latter greatly preferred); Physics 11, 21 (Physics 12, 22 also strongly recommended). Field experience (Geology 201 or equivalent) highly advisable.

Bachelor of Science: Student selecting this degree program are encouraged to develop a strong minor field of specialization in one of the ancillary science or engineering programs.

Geology Requirements:

Geology 1 or 41, 101, 110, 112, 121, 131, 153, 201,* 260,

*201 can also be taken as an independent field project or transfer credit from an accredited field program.

**One additional approved science, engineering, or mathematics course may be substituted.



plus three additional courses in Geology, two of which must be at the 200 level.**

Ancillary Science Requirements:

Chemistry 1 and 2 (or 11/13 and 12/14), Physics 21, 31 and 22, 42 (or 21, 31, and 125), Math. 21 and 22 (or 19, 20, and 22), Computer Science 11, Statistics 141, plus one approved science, engineering, or mathematics course.

GERMAN Thirty hours of German courses at the 100 level or above, including 155, 156; 281 or 282; two courses of general literature or English; and two courses of European or German history.

HISTORY Thirty-three hours in History including History 9 and 10, at least nine hours at the advanced intermediate (100) level, and at least three hours at the seminar (200) level. Within the major, six hours in each of the department's three area concentrations (Europe, Western Hemisphere, and Africa/Asia/Latin America), and nine additional hours in one concentration. These nine hours must include one advanced intermediate course and a seminar. The Western Hemisphere concentration must include three hours in Canadian or Latin American history.

INTERNATIONAL STUDIES PROGRAM Entering students are invited to consider the option of concentrating in 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 International Studies usually accumulate sufficient credit to enable them also to fulfill department requirements in one of the social sciences, humanities, or foreign languages.

Major programs are available in the following five areas: Asia, Canada, Latin America, Russia/East Europe, Europe (Western, Northern, Mediterranean). Minor programs are also available in these areas, as well as in Africa. For specific requirements, see page 71.

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

Students interested in concentrating in International Studies are urged to contact the Director.

Specific requirements of the individual programs follow:

Asian Studies

In selecting courses from the Asian Studies listing, students must consult with an appropriate Asian Studies advisor and demonstrate in their choices thematic and/or geographic coherence.

The Asian Studies major consists of at least 33 credit hours in courses from the Asian Studies listing (see Courses of Instruction; Asian Studies) to include the following:

- A. Completion of two years' (normally 16 hours) study of a language of the geographic subarea of concentration. No more than 16 hours of language study may be counted toward the major.
- B. The remaining three hours must include at least six hours at the 100 level and three hours at the 200 level.

These hours must be selected from at least three academic disciplines. Language courses may not be used to fulfill this requirement.

Note: Courses significantly but not entirely on Asia may be counted toward a student's major requirements only if papers or projects relevant to their Asian subarea or their Asian thematic focus have been completed. The Dean's Office must receive written approval from the advisor in order for these courses to be counted toward the major.

Canadian Studies

- A. Eighteen hours representing at least four different disciplines selected from the courses of 100 percent Canadian content.

International Studies 91; 195, 196, 197, 198; 295, 296; Anthropology 167, Art 173; Business Administration 134; English 135, 136; French 285, 286; 293; Geography 52, 210; Geology 272 (when this field course goes to Canada); History 65, 66, 165, 265; Political Science 173; Sociology 167.

- B. French language through the intermediate level.
- C. An additional two courses (six hours) from the above list and/or courses listed below.

1. Those in which 25 percent or more content on Canada is a regular part of the course and assignments.

Anthropology 128, 168, 178; Geography 146 (when taught by Meeks), 196; Geology 241 (when taught by Mehrtens), 273; History 173 (when taught by Stoler); Political Science 71, 273, 279 (when taught by Canadian Studies Program faculty); Psychology 237.

2. Those in which a term paper, worth 25 percent or more of the grade, can be written on Canada. It is the student's responsibility to check this with the professor and the advisor.

Anthropology 160; Art 175, 176; Economics 150, 185; Education (EDFS) 206; English 13, 42 (when taught by Thompson); Geography 162, 173, 174, 175, 177, 270; History 174, 175, 176; Linguistics 101; Political Science 152, 153, 161, 252, 253; Sociology 204, 207, 254, 255.

- D. An additional four courses (12 hours) from a related field chosen in conjunction with advisor. If duplication is avoided, a student's minor or a second major will probably provide this second field. (The same courses may not be counted in two categories.)

Latin American Studies

- A. Twelve hours as follows: Anthropology 161; History 61; Geography 56; Political Science 174.

Two additional semester courses selected from International Studies, 193, 194, 195, 196, 197, 198; or 297, 298; Economics 254; History 161, 162; or from courses recommended by the Program of Latin American Studies.

- B. Plus six hours of advanced Spanish (Spanish 185, 186, 281, 285, 286, 293).
- C. An additional 12 hours from related courses chosen in consultation with advisor.

Russian/East European Studies

- | A. Required Courses: | Hours |
|---|-------|
| Russian 52, and two courses at the advanced level | 10 |
| Two courses from History 27, 137, 138 | 6 |
| Geography 53 | 3 |
| Economics 11, 12; and 185 or 281 | 9 |
| Political Science; three hours and 172 | 6 |

Three additional courses from the following list: 9
 Economics 185, 277, 281
 Political Science 146
 General Literature 181, 182
 Philosophy 133
 History 237, 238

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B. Recommended Courses:
 Int'l Studies 91

The program also offers an interdisciplinary individual design major in Russian/East European Studies and Economics. The program of study must be planned with a member of the Russian/East European Studies faculty.

| Required courses: | Hours |
|--|----------|
| Two courses in Russian or another Slavic language at the intermediate level. | |
| Example: Russian 51, 52 | 8 |
| Four courses in Economics including 185, 277, 281 | 12 |
| Two Russian/East European Area Studies courses other than those in Economics | 6 |
| Two courses in Business Administration | 6 |
| Two approved electives at the 100 level or above | 6 |
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European Studies (Northern, Western, Mediterranean)

A total of 33 hours in approved European Studies courses to include nine hours at the 200 level. No more than 12 hours may be taken from any one discipline. Only 15 hours of transfer credit may be applied toward the major. Students must consult closely with their European Studies advisor in the development of a coherent program of courses.

A. European Studies seminar: All seniors must take the European Studies seminar, IS 291. Students should expect to use their competency in a European language (other than English) for research purposes in this seminar. The European Studies subcommittee may approve substitute seminars upon request.

B. European culture and thought: Twelve hours from the approved list to include six hours at the 100 level or above.

Art: 5, 6, 148, 149, 150, 153, 154, 158, 161, 164, 167, 168, 171, 172, 174, 175, 176; **Classics:** 42, 153–156; **English:** 21, 22, 25–28, 81, 82, 102, 106, 108, 110, 111, 112, 115, 116, 118–121, 123–128, 131, 132, 134, 211, 212, 221, 222, 231, 232; **Film:** 5, 6, 107, 161; **French:** 155, 156, 225, 226, 235, 245, 246, 247, 255, 256, 265, 266, 275–277, 290, 291, 292; **General Literature:** 72, 131, 141, 153–156, 161, 162, 173, 181; **German:** 121, 122, 155, 156, 201, 213, 214, 225, 226, 237, 238, 247, 248, 251, 252, 263, 264, 273, 275, 276, 278, 281, 282; **Greek:** 111, 112, 201–206; **Italian:** 121, 122, 155, 156; **Latin:** 101, 102, 111, 112, 203, 204, 227, 251–253, 255, 256, 271; **Music:** 11, 12, 111–114; **Philosophy:** 101, 102, 105, 107, 133, 140, 151, 160, 260, 262; **Political Science:** 141, 142, 146; **Religion:** 22, 111, 116, 122, 124, 155, 173, 224, 226, 228, 280; **Spanish:** 155, 156, 235, 236, 245, 246, 265, 276, 277, 291, 292; **Theatre:** 136, 137, 138.

C. European history and society: Twelve hours from the approved list to include six hours at the 100 level or above.

Economics: 170, 275, 281; **Geography:** 55, 155, 158; **History:** 13, 14, 21–27, 85, 86, 90, 120–126, 128–136, 139, 185, 186, 191, 221, 222, 224–228, 285; **Political Science:** 171, 257, 276, 287.

D. European language: Six hours of a European language

other than English at or above the 100 level. Students who fulfill nine or more hours of their "Culture and Thought" requirement through the study of any one such language must fulfill this requirement in a second European language other than English.

Note: Other equivalent courses within each area may be accepted with permission of the Director of European Studies.

Economics: 170, 275, 281; **Geography:** 55, 155, 158; **History:** 13, 14, 21–27, 85, 86, 90, 120–126, 128–136, 139, 185, 186, 191, 221, 222, 224–228, 285; **Political Science:** 171, 257, 276, 287.

MATHEMATICS Thirty-six semester hours of courses numbered 21 or higher including 102 or 104, 124, 241 or 251, and at least 12 additional hours in mathematics or statistics courses numbered 200 or above; plus Computer Science 11 or Math. 101. Students interested in specializing in statistics must have Statistics 241 instead of Math. 241 or 251 and should contact the Statistics Program.

MUSIC Students must take a placement audition upon entering the Bachelor of Arts and Bachelor of Music programs. Thereafter they may elect either of two degree programs:

Bachelor of Arts: Forty hours in Music. Majors will take the following core courses: 11, 12 (history); 31, 32, 131, 132 (theory); and 133, 134 (theory lab); plus eight hours of performance study and ensemble in any combination.

Music majors must attain intermediate level on a single instrument.

All students will elect nine additional hours — at least three at the 200 level — in one of the following three categories, plus three hours in a category different from that of the chief concentration.

- (a) Theory 231-235
- (b) History: 111-114, 211-214
- (c) Performance: 251-254, 256

A mixture of categories may be possible in consultation with a departmental advisor.

Concentration in category (c) requires appearance at least once a semester in departmental noon-time recitals, and a solo recital in the senior year.

Majors must have, or acquire, piano skills sufficient to pass the functional piano exam, in addition to the eight hours of performance and ensemble study.

One foreign language through the intermediate level is required of all students.

Bachelor of Music: This degree, with a concentration in performance or theory, is the initial preprofessional collegiate music degree, designed for highly talented students who wish to pursue a career in music as performers, scholars, or private teachers. 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 with a strong sense of commitment 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. In the second semester of the sophomore year, all majors are required to pass a junior-standing examination to determine whether they will be permitted to continue as majors. Students transferring into the music major programs that require a senior recital will be expected to pass the junior standing jury before junior status can be achieved. The final graduation requirement is a senior recital. All students approaching a senior recital must pass a faculty audition covering all of the music to be in-

cluded on the recital six weeks prior to the date of the recital. Admission to the Theory major requires successful completion of a comprehensive theory examination at the end of the sophomore year. Transfer students with advanced standing must also pass this examination before they can be accepted as Theory majors. The curriculum consists of the following courses:

| Performance Major | Hours |
|--|-----------|
| (a) Major instrument, 151, 152, 153, 154, 251, 252, 253, 256 | 28 |
| (b) Theory, 31, 32, 131, 132, 133, 134, 231, 232, 233, 259 | 26 |
| (c) History, 11, 12 | 6 |
| (d) Ensemble | 14 |
| (e) Keyboard, 5, 6, 7, 8(if necessary) | 4 |
| (f) Music electives | 9 |
| (g) Nonmusic electives | 36 |
| (h) Physical education | 2 |
| | <hr/> 125 |

| Theory Major | Hours |
|--|-----------|
| (a) Major instrument, 151, 152, 153, 154, 251, 252, 253, 254 | 12 |
| (b) Theory, 31, 32, 131, 132, 133, 134, 231, 232, 233, 234, 235, 237, 238, 240, 241, 259 | 43 |
| (c) History, 11, 12 | 6 |
| (d) Ensemble | 6 |
| (e) Keyboard 5, 6, 7, 8 | 4 |
| (f) Instrumental choirs | 4 |
| (g) Music genre electives | 9 |
| (h) Nonmusic electives | 36 |
| (i) Physical education | 2 |
| | <hr/> 122 |

PHILOSOPHY Thirty hours including: (a) 13 or 113; (b) 101 and 102; (c) at least two of 201 or 202 or 240; (d) at least one of 4, 140, 142, 143, 144, or 152; and (e) a total of at least four 200-level courses in Philosophy. Students considering graduate work are urged to study a foreign language.

PHYSICS Students may select either of two degree programs:

Bachelor of Arts: Thirty hours in Physics, including 31 with 21, 42 with 22 (or 125), 128, 201 or 202, 211 and 213; mathematics through 121. An additional laboratory science and computer science are strongly recommended.

Bachelor of Science: Physics 31 with 21, 125 (or 42 with 22), 128, 201, 202, 211, 213, 214 (or 255), 265 (or equivalent), 273, 12 hours of approved Physics electives; 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

A. Thirty hours in Political Science.

B. Four (12 hours) of the five core courses (21, 41, 51, 71, 81).

C. Fifteen hours at the advanced (100 or 200) level, three hours of which must be at the 200 level, subject to the following restrictions:

- Students must complete at least one advanced (100 or 200) course in three different subfields.
- Of these 15 hours at the advanced (100 or 200) level, students must complete at least 12 of those hours, including three hours at the 200 level, in regular UVM political science courses (e.g., excluding study abroad, transfer credit, readings and research).

PSYCHOLOGY Thirty-five hours including: (1) 1, 109, 110, 119; (2) three of the following: 121, 130, 152, 161; (3) one course from each of the following categories A, B, and C: (A) 205, 206, 207, 220, 221, 222, 223; (B) 230, 231, 233, 234, 236, 237, 240, 254, 261, 262, 263, 264, 266; (C) 250, 251, 253, 254, 255, 257, 263, 264; (4) one additional course at/above 100 level.

RELIGION Thirty-six hours in Religion, including 100 and 201; one course chosen from the 20-27 range; one course from the 101-109 range (comparative); one course from the 110-129 range (Judeo-Christian traditions); one course from the 130-149 range (Asian traditions); an additional course at the 200 level.

ROMANCE LANGUAGES Students may major in French or Spanish.

French: A minimum of 33 hours of courses numbered above 100, of which at least 12 hours must be in literature and at least 18 in courses numbered above 200. Required courses: 155, 156, 291, 292. History 135 may be substituted for 291, and History 136 may be substituted for 292. (History 135 and/or 136 will not count in the 33 required hours.)

Spanish: A minimum of 33 hours of courses numbered above 100, of which at least 12 must be in literature and at least 18 in courses numbered above 200. Required courses: 155, either 185 or 186, and one from among History 61, Spanish 291, 293, 293. (History 61 will not count in the 33 required hours.)

RUSSIAN Thirty hours of courses in Russian at the 100 level or above among which at least one course must be Russian literature in translation (GLIT 181, 182, 183); one additional course in English literature or general literature; one Russian history course; and two additional courses chosen from among the listings of the Russian and East European Area Studies Program. All course work to be chosen in consultation with the student's major advisor.

SOCIOLOGY Thirty-one hours in Sociology to include 1, 100, 178; nine hours in an approved concentration, three hours of which must be at the 200 level; and at least nine additional hours at the 200 level to include three hours from 241, 274, 275, or 279. Approved sociology concentrations include: * Gender Roles and Society: 29, 122, 213, 229, 239; International/Comparative Sociology: 11, 31, 102, 207, 213; Social Gerontology: 20, 120, 154, 220, 221, 222, 254; Work and Leisure: 25, 43, 63, 161, 237, 243; Communication and Culture: 25, 43, 109, 141, 150, 151, 209, 243, 250; Crime, Law, and Justice: 14, 19, 57, 115, 132, 214, 216, 217, 258; Social Structures and Forces: 105, 126, 151, 207, 209, 211, 225, 228, 237, 240; Health and Society: 11, 20, 57, 102, 120, 154, 222, 254, 255; Social Inequality: 19, 31, 119, 132, 205, 206, 211, 219, 232, 237, 240; Urban and Rural Studies: 19, 102, 105, 119, 132, 204, 205, 206, 207, 219, 232; Self-Design. With the approval of both her/his advisor and the Committee on Undergraduate Policy, a student may design a special concentration. Self-designed concentrations must be approved at least two semesters in advance of graduation.

No more than six hours in 288-289 may be counted toward the major. It is recommended that 100 be completed by the beginning of the junior year.

*Courses numbered 195, 196, 281, 282, 295, or 296 may qualify to fulfill concentration requirements with approval of the student's advisor.

THEATRE Forty-two hours of general Theatre courses including 1, 10, 15, 40; 115 or 140; 135, 136, 137, 138; 250, 251, plus nine additional hours in selected area of specialization. *Production:* 115, 120, 140, 141, 142, 143, 144, 215. *Performance:* 11, 12, 110, 111, 112, 210, including both voice and movement courses. *History, Theory, and Criticism:* En-

glish 115, 131, Classics 153, or other appropriate courses by permission.

ZOOLOGY Students may select either of two degree programs:

Bachelor of Arts: Chemistry 1, 2 or 11, 12, 13, 14 to be taken the first year if possible; Math. 19, 20 or 21; Physics 21, 22 in combination with 11, 12 or preferably 31, 42. Thirty hours of Biology and Zoology including Biology 1, 2, 101, 102, 103, Zoology 104, plus seven hours chosen from Biology 203, 205, and 200-level Zoology courses.

Bachelor of Science: Chemistry 1, 2 or 11, 12, 13, 14 to be taken the first year if possible; Chemistry 141, 142; Physics 21 with 31 and 22 with 42; Math. 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 Biology 203, 205, and 200-level Zoology courses. Three hours of Zoology undergraduate research or honors may be counted toward the total of the 43 required credits.

MINOR REQUIREMENTS

The following minors are an integral part of the Bachelor of Arts program and, as such, will not be certified for students in other degree programs.

ANTHROPOLOGY

Social Anthropology: 21; two 100-level topical courses plus one 100-level "peoples" course, or one topical and two "peoples" courses; and one course from 225, 228, 283, or 290.

Archaeology: 24; two from the following: 160, 161, History 149; 200 or the equivalent; 210.

Sociolinguistics: 128; 178; two "peoples" courses from 160, 161, 162, 163, 165, 166, or 168; 284 or Psychology 237.

ART

Studio Art: Eighteen hours, including six hours at introductory level of which at least three hours must be in 1, 2, 3, or 4. Twelve hours at the 100 level or above including three hours from two-dimensional studies and three hours from three-dimensional studies.

Art History: Eighteen hours, including 5 and 6; 12 hours of 100-level courses or above.

BIOLOGY

A. Biology 1, 2

B. One of the following: Biology 101, 102, 103, Zoology 104, Botany 108.

C. Two additional courses in two different departments chosen from (B) above, 200-level Botany, or 200-level Zoology; other biologically-oriented courses only by approval of the Zoology Department.

BOTANY At least 15 hours of course work to include Botany 4 or Biology 1 or Biology 2; plus three additional courses in Botany, at least one at the 200 level.

CHEMISTRY

A. Chemistry 1,2*

B. One of the two following sequence:

1. Chemistry 141, 142+ and one of the following: 121++, 160, 162, 163
2. Chemistry 162, 163 and one of the following: 42, 141, 121++

*11, 12, 13, 14 can be used in place of Chemistry 1, 2.

+143, 144 can be used in place of 141, 142. Students enrolled in 143, 144 may waive the requirements of concurrent enrollment in 145-146.

++Not available for credit for students taking 11, 12, 13, 14.

CLASSICS

Latin Language and Literature: Fifteen hours of Latin at 51

or above, to which three hours from the following are applicable: History 122; Classics 153, 154, 155, 156.

Greek Language and Literature: Fifteen hours of Greek at 51 or above, to which three hours from the following are applicable: History 121; Classics 153, 154, 155, 156.

Classical Civilization: Eighteen hours, including six hours of Greek or six hours of Latin at the level of 5 or above, and 12 hours from the following (of which at least nine hours must be above 100): History 21, 22, 121, 122, 149; Classics 42, 153, 154, 155, 156; Art 51, 146, 148, 149; all special topics courses (95, 96, 195, 196, 295, 296) in Classics, Latin, or Greek.

COMMUNICATION SCIENCE AND DISORDERS 80; 90; 94; 101; 105.

ECONOMICS Economics 11 and 12; 101 or 102; two additional 100-level Economics courses numbered 111-196.

ENGLISH

A. **American Literature:** 23 or 24 or 82, plus four of these courses: 135, 136, 140-159. May elect an additional three credits in a seminar: 241, 242, 251, 252.

B. **British Literature:** The Modern Tradition: 22 or 82, plus four of these courses: 124-140. May elect an additional three credits in a seminar: 221, 222, 231, 232.

C. **British Literature:** The Early Tradition: 21 or 81, plus four of these courses: 111-123. May elect an additional three credits in a seminar: 211, 212, 221, 222.

ENVIRONMENTAL STUDIES Seventeen hours in Environmental Studies consisting of 1, 2, 100, 204, and three additional credits at the 100 level or above.

GEOGRAPHY

Human Geography: Fifteen hours including one course from Geography 1, 3, and 16; one course from those numbered 51 to 74; and three courses from Geography 99, 155, 158, 162, 170, 171, 172, 173, 174, 175, 177, 179, 183, 201, 233, 261, 270, 287.

Physical Geography: Fifteen hours including Geography 2 or 43; one course from those numbered 51 to 61; and three courses from Geography 99, 142, 143, 144, 146, 201, 216, 242, 261, and 285.

GEOLOGY 1, 101; 110; plus six additional hours at the 100 level or above.

GERMAN AND RUSSIAN

German: Five courses at the 100 or 200 level, one of which must be 155 or 156.

Russian: Russian 51, 52; four courses in Russian at the 100 or 200 level.

HISTORY Eighteen hours of history, including History 9 or 10, nine hours at or above the 100 level, and six hours at any level in at least two of the department's three area concentrations.

INTERNATIONAL STUDIES See Interdisciplinary Minors.

MATHEMATICS

Pure Mathematics: 21, 22, 121, 102, 124, and either 241 or 251.

Applied Mathematics: 21, 22, 121, 124, 230, and one of 237, 240, 264, or 272.

MUSIC Twenty hours including six in Music History (11, 12), six in Basic Musicianship (31, 32), two in Performance Study (151, 152) or Ensemble (161-166, 171-179) in any combination, plus six in History, Theory, or Performance/Ensemble at the 100 level or above.

PHILOSOPHY One course from 1, 3, or 4; one course from 101, 102, 140; one course from 201, 202, 240; and nine additional hours at the intermediate level or above. An upper-level course may be substituted for the introductory course with departmental permission.

PHYSICS Eighteen hours including 21, 31, 125 (or 21, 31 and 22, 42); 128; three additional hours in Physics courses numbered 100 or above excluding 193-198; and three hours numbered above 200. No more than three hours in Physics 201 or 202 will count. *Note:* Mathematics through 121 is needed for Physics 128.

POLITICAL SCIENCE Eighteen hours in political science, including nine hours from the "core" courses (21, 41, 51, 71, 81), and nine hours at the level of 100 or above.

PSYCHOLOGY Eighteen hours including 1, 101 (or 109 and 110), plus 12 hours at the 100 level or above, including at least three hours at the 200 level.

RELIGION Eighteen hours in Religion including: one introductory course from the 20-27 range; 100; one course from 101-109 range; one intermediate level course on a particular religious tradition (from 110-149); one course at the 200 level; an additional Religion course.

ROMANCE LANGUAGES

French: Eighteen hours in French above 100, as follows: Three hours of either 101 or 102; 201; six hours of literature courses; and six additional hours in courses numbered above 201.

Italian Studies: A total of 18 credit hours (six courses) as follows: (A) a minimum of two courses chosen from Italian 121, 122, 155, 156; (B) a minimum of two courses having significant Italian content chosen from Art* 149, 161, 164; History 122, 125; English 108; Latin 51, 52, 101, 102, 111, 112, 195, 196, 200-level courses in Latin literature; (C) a maximum of one course having partial Italian content chosen from* Art 6, 150, 154, 167; Classics 155, 156; English 112; Film 107, 161; Geography 55, 155, 158; Political Science 141; Music 11, 12.

*Other courses with either significant (category B) or partial (category C) Italian content may be applied. Approval of the Italian Studies advisor must be obtained in order to include these courses in the minor. Approval will be granted only if the course materials are appropriate.

Spanish: Eighteen hours in Spanish above 100, including six hours of language courses, chosen from 101, 102, 201, 202, of which at least three hours must be at the 200 level; six hours of literature courses; and six additional hours in courses numbered above 202.

SOCIOLOGY Eighteen hours of Sociology to include 1, 178; nine hours in an approved concentration, three hours of which must be at the 200 level; and at least three additional hours at the 200 level. (See Sociology major requirements for list of approved concentration options.)

GERONTOLOGY The minor in Gerontology consists of 18 hours, including:

Required courses (12 hours): Sociology 20, 120, 220, and 221 or 222. Electives (six hours): Sociology 154, 254; Early Childhood and Human Development 185, 266, 282, 283, 284; Nutritional Sciences 241.

Courses used to meet the requirement of the minor should constitute a coherent program and will be selected in consultation with the student's minor advisor. A list of current course offerings suitable for inclusion in the minor is available from the Department of Sociology or the Multidisciplinary Committee on Aging.

Note: The Minor in Gerontology is not available to students majoring in Sociology. Sociology majors interested in Gerontology should, instead, take the Social Gerontology Concentration to fulfill the concentration requirement for the Sociology major.

STATISTICS

- A. The student must have a minor advisor from the Statistics Program.
- B. Students are required to complete 15 credits of courses

offered by the Statistics Program and one course in calculus. The statistics courses are selected in consultation with the student's minor advisor to represent a cohesive set of courses usually related to the student's background in mathematics and computer science. Specific requirements are as follows:

1. One course in calculus, e.g. 19, 20, 21, or 22, is required.
2. Three credits of introductory methods. 141 or 211 is recommended.
3. Three credits in courses in probability. 151 or 251 is recommended; 51 is acceptable for students who have not had two semesters of calculus.
4. Nine credits of other statistics courses. For students who have taken a calculus-based probability course, statistical inference (241) or theory (261/262) is recommended. The nine hours may include independent project work such as Statistics Practicum (281) or Special Projects (191).
- C. Experience in computing through relevant course work is required. This may be satisfied through computer experience gained in Statistics 201 (Statistical Analysis via Computer) or other courses approved by the minor advisor.

THEATRE 1; 5 or 10; 15 or 40; 135; one chosen from 136, 137, 138; 250.

ZOOLOGY Biology 1 and 2; three courses at the level of 100 or above, chosen from courses acceptable for the Zoology major, at least one of which must include a laboratory.

INTERDISCIPLINARY MINORS

INTERNATIONAL STUDIES

African Studies: A total of 18 credit hours (six courses), at least nine of which must be at the 100 level or above, and which must include the following:

- A. Anthropology 162
Geography 51
History 40
- B. Two courses chosen from among the following:
Agr. and Resource Economics 2, 272
*Anthropology 170, 177, 179, 283
*Economics 255, 256
*Education (EDFS) 206
French 289
*Geography 177
History 140

or appropriate Special Topics or seminar courses, chosen in consultation with the African Studies Program advisor.

*Students may count these courses towards fulfillment of the minor requirements only if individual projects, relevant to the African area, have been arranged in consultation with the African Studies advisor.

- C. International Studies 197 (Readings and Research on an African Topic under the direction of participating faculty members — to be arranged in consultation with the African Studies advisor) or International Studies 195 (Special Topics Seminars, taught by participating faculty members).

Asian Studies:

In selecting courses from the Asian Studies listing, students must consult with an appropriate Asian Studies advisor and demonstrate in their choices thematic and/or geographic coherence. Such courses must also accord with the following requirements:

Eighteen hours in courses from the Asian Studies listing (see Courses of Instruction; Asian Studies) to include at least six hours at the 100 level or above. These courses must

be selected from at least three academic disciplines and no more than two semesters (normally eight credit hours) of language can be counted toward the minor.

Note: Courses significantly but not entirely on Asia may be counted toward a student's minor requirements only if papers or projects relevant to their Asian subarea or to their Asian thematic focus have been completed. The Dean's Office must receive written approval from the advisor in order for these courses to be counted toward the minor.

Canadian Studies: French through the intermediate level. Five courses (15 hours), representing at least three disciplines, chosen from among courses with exclusively Canadian content. At least nine hours must be at the 100 level or above. Currently available:

| | |
|----------------------------|-----------------------|
| Int'l Studies 91, 195, 196 | Geology 272 |
| Anthropology 167 | History 65, 66, 165, |
| Art 173 | 265 |
| Bus. Admin. 134 | Political Science 173 |
| English 135, 136 | Sociology 167 |
| French 285, 286, 293 | |
| Geography 52, 210 | |

Latin American Studies:

- A. Students who are not Spanish majors: 18 hours (six courses)
 1. Completion of Spanish 52 or above (three hours).
 2. Completion of five of the following courses: Anthropology 161, Economics 255, History 61, History 161 or 162, Geography 56, Political Science 174, Spanish 185, 186, International Studies 195 or 196.
- B. Students who are Spanish majors: 18 hours (six courses)
 1. Completion of one of the following three courses: Spanish 285, 286, 293.
 2. Completion of five of the following courses: Anthropology 161, Economics 255, History 61, History 161 or 162, Geography 56, Political Science 174, Area Studies 195 or 196.

Russian/East European Studies: Twenty hours to include Russian 51, 52 or its equivalent, and four courses from the following:

History 27
Political Science 172
Economics 185, 277, 290
Geography 53
General Literature 181, 182

EUROPEAN STUDIES Eighteen hours to include three hours at the 200 level from both European culture and thought and European history and society areas; and six hours at the 100 level or above from the European language area.

Note: See the European Studies major requirements for list of approved courses.

FILM STUDIES Eighteen hours, including Art 140; Film 5 or 6; six credits from Film courses at the 100 level to include 107; three credits from English 131, 152, 171, Psychology 163, Sociology 43, Theatre 135; three credits from Film courses at the 200 level.

INDIVIDUAL DESIGN MINOR The ID Minor must consist of at least 18 hours of course work, of which at least nine hours must be at the 100 level or above. No more than two courses completed prior to application for the ID Minor may be applied to the 18 hours required for the minor. No courses in the student's major department may be applied to the 18 hours required for the minor. An application must be submitted to the Committee on Honors and Individual Studies for approval. Applications may be found in the Dean's Office, College of Arts and Sciences.

SPEECH Eighteen hours to include 12 hours from Speech

11, 111, 112, 283-4 or Theatre 5; and six hours from Speech 214 or 283-4, or Sociology 141.

WOMEN'S STUDIES Eighteen hours of course work to include WST 73, 273 and six hours at the 100 level or above to be chosen with the approval of the Women's Studies Committee or the consent of a Women's Studies advisor. Students may take a maximum of nine hours in any one discipline toward the minor. Not all sections of a multisection course will necessarily meet Women's Studies approval for the minor. (Students should consult the course listings each semester for further details.)

In addition to the minor, Women's Studies students are encouraged to explore the possibilities of an independently designed major and should consult with the Director of the Women's Studies program and the Committee on Honors and Individual Studies.

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 to direct their four-year undergraduate courses 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 pre-medical and pre dental programs. Majors may pursue either the B.A. or the B.S. degree. For specific requirements for these degrees, please see pages 61-62.

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 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 Prelaw Advisory Committee aids students in planning their academic programs and in making application to law schools. For more information, contact the Dean's Office, 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 sociology.

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 11) Vermont residents may prepare for pharmacy school at Connecticut or Rhode Island. This is a five-year undergraduate program concentrating in pharmacy, which includes two years of preprofessional work in English, mathematics, botany, chemistry, zoology, physics, soil science, and fine arts.

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. During their sophomore year, students desiring to enter medical school should consult catalogues of colleges to which they expect to apply and arranged to include in their program courses required by those schools. They should also keep informed of events and deadlines relating to the application process by contacting the Office of Career Development.

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:

Math. 21,22 (recommended for able students)

Math. 19,20 (adequate)

Math. 9, 2; 21 or 19, 20 (suggested for student not immediately prepared to enter calculus)

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*

Physics 21, 31 and 22, 42 (recommended for students with calculus background)

Physics 21,31 and 125 (recommended for students concentrating in the physical sciences or engineering)

Physics 11, 21 and 12,22 (acceptable for students without calculus background, or taking calculus concurrently)

Biology, one year minimum, *with laboratory*

Biology 1,2

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. Students should consult catalogues of the dental colleges to which they expect 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 who are interested in becoming eligible for a license to teach in secondary education (grades 7-12) are required to complete the teacher education application process. The application is available in 533 Waterman and should be completed early in the second semester of the applicant's sophomore year. Specific program requirements are available in 528 Waterman and should be reviewed for prerequisites prior to applying to the teacher education course sequence. The prescribed courses in education, up to 24 credit hours, can count as electives towards the Bachelor of Arts degree.



The College of Education and Social Services

The College of Education and Social Services offers programs that lead to: a Bachelor of Science degree, a Vermont teaching license, or both. It is extremely important for prospective and current students in the College to distinguish among these goals and to understand which programs lead to which of the above outcomes. The College and its programs are accredited by the National Council for the Accreditation of Teacher Education (NCATE), the Vermont State Department of Education (SDE), and the Council on Social Work Education (CSWE).

The Dean's Office is located in 309 Waterman Building. When referred to the Dean's Office, students should first visit the CESS Office for Student Services in 528 Waterman Building. Student issues such as advisor assignments, and major declaration are handled here.

ORGANIZATION

The College has five departments:

- Human Development Studies (HDS);
- Organizational, Counseling, and Foundational Studies (OCFS);
- Professional Education and Curriculum Development (PECD);
- Social Work (SWSS); and
- Special Education (SP. ED.).

All undergraduate programs are housed in HDS, PECD, and SWSS.

DEGREE PROGRAMS

Programs in the College of Education and Social Services lead to four different bachelor's degrees. Most degree programs cross departmental lines. The degrees and programs are listed below:

Bachelor of Science in Education. Unless stated otherwise, the programs listed below lead to this degree as well as to licensure.

Elementary Education (K-6). Elementary education is housed in PECD. Beginning with the class of 1995, elementary education students are required to select through consultation with their academic advisors an approved academic major consisting of 30 hours of study. A list of College-approved content majors is available from the Office for Student Services, 528 Waterman.

Secondary Education (7-12). Secondary education is housed in PECD. Students in secondary education are required to have both a teaching major (at least 30 credits) and a teaching minor (at least 18 credits).

Majors are offered in the following areas:

- | | |
|---------------------|------------------|
| Biological Sciences | History |
| Chemistry | Latin |
| Earth Science | Mathematics |
| English | Physical Science |
| French | Physics |
| Geography | Spanish |
| German | |

Students with one of the above majors also must select a minor. In addition to the offerings for a major (except Physical Science), options for a *minor* include:

- | | |
|------------------|-------------------|
| Anthropology | Political Science |
| Coaching | Psychology |
| Computer Science | Religion |
| Economics | Russian |
| Health Education | Sociology |

Broad Field Majors combine the teaching major and minor (at least 48-50 credits) and are available in the following areas:

- Environmental Studies (7-12)
- Natural Science (7-12)
- Social Studies (7-12)

The College of Education and Social Services works cooperatively with the Vocational Education and Technology Department in the College of Agriculture and Life Sciences to offer the following:

- Agricultural and Resource Education
- Home Economics
- Industrial Arts/Technology Education
- Trades and Industry Education

Health Education (K-12). Health Education is housed in the Department of Human Development Studies.

Physical Education (K-12). The Physical Education program is located in the Department of Human Development Studies. Students who pursue the teacher education program may focus on teaching grades K-6, 7-12, or K-12.

Individually Designed Major. Receive degree not licensure.

Interdisciplinary Program. Receive degree not licensure.

Bachelor of Science. The programs listed below lead to this degree. Only the program in Early Childhood leads to licensure.

Early Childhood Development. Located in Human Development Studies, the early childhood program offers licensure through grade K. Students may combine this program with elementary education to secure a K-6 teaching license with an emphasis on early childhood education.

Human Development and Family Studies. This program is in Human Development Studies.

Social Work. This program is located in the Department of Social Work. The principal educational objective of the program is to prepare students for beginning social work practice.

Bachelor of Science in Art Education. The College works cooperatively with the Art Department in the College of Arts and Sciences to offer a program in **Art Education** which leads to both degree and licensure for grades K-12.

Bachelor of Science in Music Education. The College works cooperatively with the Music Department in the College of Arts and Sciences to offer a program in **Music Education** which leads to both degree and licensure for grades K-12.

In addition to the undergraduate degree programs, the College offers the **Postbaccalaureate Teacher Preparation Program**. This program is for individuals who have earned a B.S. or B.A. and now desire to be licensed to teach.

DEGREE REQUIREMENTS

All candidates for bachelor's degrees in the College of Education and Social Services must meet College and program requirements. First-year students enrolled in the College are required to complete the first-year CESS courses listed for their specific major during their first two semesters on campus. Many students admitted to the College have an intended major, but some enter as undecided. Students may be undecided about a major for their first year only. Students who remain undecided beyond the first year will be disenrolled from the College. All students, even those who have a declared major, must file a formal application to enter the professional sequence of their program, usually at the end of sophomore year. Students who do not have a grade-point average of 2.5 at the end of their sophomore year will not be accepted into the licensure program and will be disenrolled from the College. An additional application is required of students in teacher preparation programs prior to student teaching. Consult the appropriate section in the catalogue for program-specific requirements. Students must meet program- and College-specific requirements to graduate. Requirements for Professional Education and/or Major and Elective components are program specific. The total credit hours also vary by program. Note that although the University requires a 2.0 grade-point average for graduation, a 2.5 overall grade-point average is required for licensure. Also, some program requirements expect students to have a 3.0 in education and major courses.

Note: Individual courses may require a lab fee.

General Education

Candidates for a bachelor's degree in the College are required to select a minimum of 60 credit hours from the following six general areas. At least one course must be selected from each area. Each course selected must be taken for a letter grade (P/NP is not acceptable). Programs prescribe general education courses including several from one or more of the areas below. These program-determined courses contribute to fulfilling this distributive requirement. The University requirement of two semester hours of physical education activities count toward this 60-hour requirement. Students may also apply required courses in a major to meet these general educational requirements.

| | |
|-----------------------|---------------------|
| Arts and Letters: | Social Sciences: |
| Art | Anthropology |
| Classics | Economics |
| Speech and Theatre | Geography |
| English | History |
| Music | Political Science |
| | Psychology |
| Mathematics: | Sociology |
| Computer Science | |
| Mathematics | Humanities: |
| Statistics | Foreign Language |
| | Philosophy |
| Science: | Religion |
| Biology | |
| Botany | Health and Physical |
| Chemistry | Education: |
| Environmental Studies | Health Education |

Geology
Physics
Zoology

P.E. Methods
Selected Activities

Disciplinary Action Related To Academic Performance

The criteria for disciplinary actions, such as placement on trial, disenrollment, or dismissal are designed to encourage high level academic work from students. The CESS guidelines are more stringent than those for the University and students can be dismissed without first being placed on trial. This includes first-year students.

A student is subject to disciplinary action if (a) his or her semester or cumulative average is below 2.0; OR (b) if he or she has failed six or more credit hours of course work in a given semester.

A student who has a cumulative grade-point average of 2.0 or higher, but which is too low to meet specific program requirements, will be warned of pending disenrollment. If at the end of two subsequent semesters the student has failed to meet the GPA requirements of his/her program, he/she will be disenrolled from the College. Also, students who do not follow the course requirements of their program will also be warned of pending disenrollment. Disenrollment will then occur after the two subsequent semesters.

Students placed on trial rather than dismissed that don't meet the conditions of trial will be dismissed.

Students on trial status will not be allowed to participate in their senior internship.

REQUIREMENTS FOR TEACHING LICENSE

For students seeking a teaching license, special admissions requirements, program requirements, and exit requirements are mandated by the College of Education and Social Services based on program approval guidelines from the Vermont State Department of Education (SDE). As the SDE guidelines change, students may be required to modify their program to meet the most current competency requirements for licensure. The current set of requirements is available from program coordinators or the Office for Student Services, 528 Waterman. Professional licensure requires successful program completion which includes demonstration of a set of teaching competencies required by the Vermont SDE and other states with reciprocal requirements. All students need a 2.5 overall grade-point average, or above, a minimum grade of B in student teaching, and the recommendation of the program faculty to be eligible for licensure.

Every student seeking licensure in the College of Education and Social Services must complete an eight-credit Multicultural Education component including Race and Culture (one credit). Students will fulfill the additional credits through University courses from a CESS approved list.

Academic Major

Candidates for licensure in the College are required to select 30 credit hours of course work in a single academic discipline. Courses in these disciplines constitute the academic major required by the College. The selection of the academic major is guided by student interest as well as the grade level and subject areas in which the candidate plans to teach. Copies of the academic major requirements are available through the Office for Student Services, 528 Waterman.

Portfolio Development and Professional Licensure

In accordance with the *Standards for Vermont Educators* (Vermont State Board of Education, 1991), students seeking a license to teach must develop documentation that they can perform in ways that address State standards in five areas. Each candidate must assemble that documentation in a preprofessional portfolio. At the preprofessional level, those standards may be summarized as follows:

Subject area knowledge: general knowledge in the arts and sciences with a specialty in one discipline.

Professional skills and knowledge: knowledge of teaching in public school settings.

Advocacy: commitment to supporting the growth and educational well-being of young people.

Colleagueship: commitment to working with others in schools to create a positive environment for learning and growth.

Accountability: recognition that professional growth is a responsibility of the individual teacher (as documented in the individual's portfolio).

Candidates for a teaching license may use any part of their experience as a source of documentation for these standards. Transcripts, lesson plans, videotapes, photographs, letters of endorsement, and academic papers may all be used to document skills and knowledge. Courses in the licensing programs offer students a chance to develop and test elements of the professional portfolios. At three points during the teacher preparation sequence — (1) initial application, (2) request for teaching internship, and (3) application for teaching license — students will be asked to present either all or part of their portfolio to the teaching faculty in order to continue. Specific criteria for each review are available from program offices.

Language Proficiency

A Language Proficiency Test is required for the Secondary Education Foreign Language majors.

REQUIREMENTS FOR TEACHER PREPARATION PROGRAMS

Candidacy

The professional programs begin with the student enrolling in the College of Education and Social Services as a candidate for licensure. Candidacy status is the stage prior to acceptance into the professional education sequence and also may be available to students in good standing from other colleges at UVM. Candidates enroll in Teacher Education CORE Curriculum during their first year and sophomore year in the College. During CORE, candidates are introduced to the developmental and social foundations of education, and have a first experience in a public school.

Application to Teacher Education

Candidates who want to pursue teaching as a career apply to the Teacher Education Program of their choice early in the second semester of their sophomore year. The Application to Teacher Education is available in 533 Waterman. Students enrolled in another college at UVM who are in good standing may apply to teacher education. Students who **transfer** into the University also are required to complete the application to teacher education before enrolling in the professional education portion of their program. Prior to February of their sophomore year, all students who apply for major status in teacher education must complete the following procedures: (1) complete or be concurrently

enrolled in the CESS Teacher Education CORE requirements (or their equivalent) and (2) submit an application for candidacy to the department chair of the Department of Professional Education and Curriculum Development, 533 Waterman. The application available in 533 Waterman lists the current set of criteria that permit a student to qualify for consideration in this screening process. These criteria were also provided at orientation. Once the candidate's application is complete, the faculty of the desired program will review the materials which include a record of academic performance at UVM, recommendations from CORE faculty, evidence of superior course work, and other pertinent sources of information. The screening of applications at this point is competitive and the number of persons admitted to the various majors varies with the availability of college resources and practicum sites in the public schools. Students enrolled in the College of Education and Social Services receive priority consideration. Students not admitted to Teacher Education will receive a warning of pending disenrollment letter and, after two additional semesters, will be cancelled as a degree student in the College. Students who have not been accepted into the program or transferred to another college may appeal through the College Studies Committee.

Application to Student Teaching

If a candidate's application to a teacher education program is approved, the candidate completes a sequence of methods courses and applies during the junior year to intern as a student teacher as a senior. The candidate submits his/her portfolio and applies to student teach with the Program Coordinator. The application, available in 533 Waterman, lists the current set of criteria that permit a candidate to qualify for student teaching. Included among the criteria are a record of strong academic performance in program and University courses, recommendations from methods faculty, and evidence of superior course work. If admitted to student teaching, the candidate will carry out an internship under the guidance of an approved cooperating teacher and department supervisor. Students not admitted to student teaching may appeal through the College Studies Committee. Student teachers will be placed in schools across Vermont. Although many students remain in the Burlington area, not all can be placed close to campus. Effort is made to accommodate student preference regarding placement site and the semester during which student teaching will occur. All students should be prepared to student teach in either the fall or spring semester of their senior year. Candidates must meet specific requirements to be recommended for licensure. These requirements are available in the Office for Student Services, 528 Waterman.

AREAS OF STUDY

Elementary Education (Kindergarten through Six)

The elementary education program prepares teachers for assignments in grades kindergarten through six. The Bachelor of Science in Education is awarded upon satisfactory completion of the approved program which includes a planned sequence of professional courses and an internship experience.

The elementary education curriculum includes a general education component of 60 credits from the academic areas outlined earlier. Included in the 60 hours must be two semester hours of physical education activities. Electives are used to pursue an approved academic major consisting of 30 hours of study. Specific information about academic majors and general education requirements may be ob-

tained from advisors or from the Office for Student Services, 528 Waterman. In addition to the academic major and professional education requirements, certain courses are recommended to meet specific state and national requirements in elementary education. These are specified in the typical program.

Full-time students enroll in 12 to 18 credits. Elementary education students will enroll in the required courses each semester along with several of the additional required courses listed below. These required courses are part of the general education requirement and should be completed by the end of the spring semester of the sophomore year.

Speech 11 or Theatre 5
Art 1, 2 or 3
History 11 or 12
Political Science 21
Geography 1 or 2 OR Anthropology 21 or 26
Social Science
Science
Humanities (Philosophy, Religion, Foreign Language)
Education/Health 46
Physical Education Activities

A typical program is as follows:

| | 1st SEMESTER | 2nd |
|-------------------------|-----------------|-----|
| FIRST YEAR | | |
| EDFS 2 | 3 | — |
| ECHD 80 or EDSS 24 | 3 or | 3 |
| English Composition | 3 or | 3 |
| General Educ. Electives | | |

| | 1st SEMESTER | 2nd |
|-------------------------|-----------------|-----|
| SOPHOMORE YEAR | | |
| EDSS 56 | 3 or | 3 |
| Math. 15, 16 | 3 | 3 |
| English | 3 or | 3 |
| General Educ. Electives | | |

During the sophomore year, students must complete an Application to Teacher Education form available in 533 Waterman Building. Students will follow requirements specified in the Application to Teacher Education. Students will not be permitted to enroll in advanced education courses until they have been accepted to teacher education. The advanced courses include:

| | 1st SEMESTER | 2nd |
|--------------------|-----------------|-----|
| JUNIOR YEAR | | |
| EDEL 121 | 3 or | 3 |
| EDEL 122* | — | 3 |
| EDEL 134 | 3 or | 3 |
| EDEL 144 | 3 | — |
| EDEL 160 | — | 3 |
| EDPE 100 | 3 or | 3 |
| Music 181 | 3 or | 3 |

*Or in fall semester senior year.

Students are required to complete a student teaching internship application in their junior year before being assigned a placement as seniors. Students will be notified by the Professional Education Office of a general meeting and are expected to attend to initiate this process. Students will follow requirements specified in the Application to Student Teaching. The course work for this stage of the program follows:

| | 1st SEMESTER | 2nd |
|--------------------|-----------------|-----|
| SENIOR YEAR | | |
| EDFS 190 | 3 or | 3 |
| EDEL 181 | 12 or | 12 |
| EDEL 186 | 3 or | 3 |

Courses leading to an academic major will be determined in cooperation with the academic advisor and guidelines determined by the College. A minimum of 127 approved semester hours is required for the degree.

Early Childhood Licensing (ages 0-5) may be obtained by enrolling in the Early Childhood Development major in the Department of Human Development Studies.

Secondary Education (Seven through Twelve)

The secondary education program is intended to prepare teachers for middle and high schools in Vermont and other states. The Bachelor of Science in Education degree is awarded upon satisfactory completion of an approved program. Graduates who successfully complete the program are eligible for a Vermont teaching license.

The secondary education curriculum includes a general component of a minimum of 60 credits selected from the academic areas outlined earlier. Included in the 60 hours must be two semester hours of physical education activities. The student must develop major and minor fields of study or a broad field major. Students who successfully complete their programs are recommended for licensure in the area of their major and apply to the State Department of Education for an endorsement to also teach their minor. Academic major and general education requirements may be obtained from the Office for Student Services, 528 Waterman.

Teaching Fields for Secondary Education

All teacher education candidates must have completed, prior to their student teaching, at least 30 credit hours in an approved teaching major and 18 hours in an approved teaching minor, or at least 48 to 50 hours in an approved broad field major. The following are current approved majors, minors, and broad field majors.

Majors Biological science, chemistry, earth science, English, French, geography, German, history, Latin, mathematics, physical science, physics, Spanish.

Minors Anthropology, biology, chemistry, coaching, computer science, 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. Persons interested in Agricultural and Natural Resources, Home Economics, Industrial Arts/Technology, and Trades and Industry Education programs will find additional information on page 58.

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 most of the four-year curriculum. Students observe and participate as teacher assistants in local middle and high schools. If accepted, students devote 15 continuous weeks during their senior year to full-time teaching in public secondary schools. In some cases, students must arrange to live off-campus during the student teaching assignment.

Applications for all field experiences must be made in the junior year and the student must assume responsibility for meeting deadlines. Information about application and assignment procedures may be obtained from the Office of

Professional Education and Curriculum Development, 533 Waterman Building.

Full-time students enroll in 12 to 18 credits. Secondary education students will enroll in the required courses each semester along with several of the additional required courses listed below. Students will also begin fulfilling credits towards a major and a minor. Requirements for the majors are available in the Office for Student Services, 528 Waterman.

General education requirements must include:

Speech 11 or Theatre 5
Science
Mathematics
History 11 or 12
Political Science 21
Psychology 1
Humanities (Philosophy, Religion, Foreign Language)
Physical Educ. Activities

| | 1st | 2nd |
|-------------------------|-----------------|------|
| FIRST YEAR | SEMESTER | |
| EDFS 2 | 3 | — |
| ECHD 62 or EDSS 24 | 3 | or 3 |
| English | 3 | 3 |
| General Educ. Electives | | |

| | 1st | 2nd |
|-------------------------|-----------------|------|
| SOPHOMORE YEAR | SEMESTER | |
| EDSS 56 | 3 | or 3 |
| General Educ. Electives | | |

During the sophomore year, students must complete an Application to Teacher Education form available in 533 Waterman. Students will follow requirements specified in the Application to Teacher Education. Students will not be permitted to enroll in the methods courses until they have been accepted to teacher education. The methods courses include:

| | 1st | 2nd |
|---|-----------------|-----|
| JUNIOR YEAR | SEMESTER | |
| EDSC 137 | 3 | — |
| EDSC 178 | 3 | — |
| EDSC 179 (English 282 for English majors) | — | 3 |

Students are required to complete a student teaching internship application in their junior year before being assigned a placement as seniors. Students will be notified by the Professional Education Office of a general meeting and are expected to attend to initiate this process. Students will follow requirements specified in the Application to Student Teaching. The course work for senior year is as follows:

| | 1st | 2nd |
|--------------------|-----------------|-------|
| SENIOR YEAR | SEMESTER | |
| EDSC 138 | 3 | or 3 |
| EDSC 181 | 12 | or 12 |
| EDFS 190 | 3 | or 3 |

A minimum of 124 approved semester hours is required for the degree.

Students are responsible for obtaining information regarding teacher licensure and degree requirements from the Office for Student Services, 528 Waterman.

Health Education (Kindergarten Through Twelve)

The Health Education program prepares candidates for teaching assignments in health in grades K-12. Graduates

are awarded a Bachelor of Science in Education upon successful 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 to be eligible for Vermont teaching license. Field placement assignments depend upon satisfactorily meeting program and College criteria.

A typical program is as follows:

| | 1st | 2nd |
|------------------------|-----------------|-----|
| FIRST YEAR | SEMESTER | |
| EDFS 2 | — | 3 |
| English | 3 | 3 |
| EDHE 46 | 3 | — |
| Speech 11 or Theatre 5 | 3 | — |
| Humanities | — | 3 |
| Science Elective | 3 | — |
| Mathematics Elective | — | 3 |
| Social Science | 3 | 3 |
| PE Activities | 1 | 1 |

| | 1st | 2nd |
|---------------------------|-----------------|-----|
| SOPHOMORE YEAR | SEMESTER | |
| Anatomy and Physiology | 4 | 4 |
| EDSS 24, EDSS 56 | 3 | 3 |
| Nutritional Sci. 43 or 46 | 3 | — |
| ECHD 65 | — | 3 |
| Psychology 1 | 3 | — |
| Teaching Reading | 3 | 3 |
| EDPE 23 | — | 3 |

| | 1st | 2nd |
|--------------------|-----------------|-----|
| JUNIOR YEAR | SEMESTER | |
| EDHE 220 | — | 3 |
| EDHE 208 | 3 | — |
| EDHE 182 | — | 3 |
| EDHE 211 | 3 | — |
| EDHE Elective | — | 3 |
| Courses in Minor | 9 | 9 |

Students are required to complete a student teaching application before being assigned a placement.

| | 1st | 2nd |
|--|-----------------|-----|
| SENIOR YEAR* | SEMESTER | |
| EDFS 190 | 3 | — |
| EDHE Electives | 6 | — |
| Electives | 3 | 3 |
| EDHE 181 | — | 12 |
| Sociology 57, 58 or EDHE Alcohol, Drug Abuse | 3 | — |

*Fourth-year fall and spring semesters are interchangeable.

Physical Education (Kindergarten through Twelve)

The physical education curriculum includes a selection of courses within the broad areas of general education, professional education, specific professional education, and electives. Graduates are awarded a degree of Bachelor of Science in Education upon the completion of a 130 semester hour program.

The *Teacher Education* option qualifies candidates to teach physical education in grades K-6, 7-12, or K-12. Those who

elect the 30-credit focus upon either grades K-6 or 7-12 must also select an 18-credit minor. Students who prefer a broader teacher preparation focus may select the 48-credit hour comprehensive program that leads to licensure for grades K-12; no minor is required.

All Physical Education majors must meet teacher licensing criteria before being approved for assignment to a major field placement.

A typical program of study follows:

Teacher Education K-12

| | 1st | 2nd |
|-------------------------|----------|-----|
| FIRST YEAR | SEMESTER | |
| EDFS 2 | 3 | — |
| English Composition | 3 | — |
| English Lit. | — | 3 |
| EDPE 21 | 3 | — |
| EDHE 46 | — | 3 |
| Humanities | — | 3 |
| Science Elective | 3 | — |
| Mathematics Elective | — | 3 |
| Speech 11 or Theatre 5 | 3 | — |
| Activities | 2 | 2 |
| EDSS 24 (or equivalent) | — | 3 |

| | 1st | 2nd |
|------------------------------|----------|-----|
| SOPHOMORE YEAR | SEMESTER | |
| History 11 or 12 | 3 | — |
| Political Sci. 21 | — | 3 |
| Psychology 1 | — | 3 |
| EDSS 56 | 3 or | 3 |
| Anatomy and Physiology 19-20 | 4 | 4 |
| EDPE 157 | 2 | — |
| Electives/Activities | 5 | 5 |

| | 1st | 2nd |
|------------------|----------|-----|
| JUNIOR YEAR | SEMESTER | |
| EDPE 104 | 5 | — |
| EDPE 105 | — | 5 |
| EDPE 166 | 3 | — |
| EDPE 167 | — | 3 |
| EDPE 155 | — | 3 |
| EDPE Elective | 2 | 3 |
| Teaching Reading | 3 | — |
| Elective | 3 | 3 |

Students are required to complete a student teaching application before being assigned a placement.

| | 1st | 2nd |
|----------------|----------|-----|
| SENIOR YEAR* | SEMESTER | |
| EDFS 190 | 3 | — |
| EDPE 260 | 3 | — |
| EDPE Electives | 5 | — |
| Elective | 6 | — |
| EDPE 181 | — | 12 |

* Fourth-year fall and spring semesters are interchangeable.

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

Physical Education majors will present a minimum of 130 approved semester hours for the degree, including three semester hours of teaching reading courses for those in the Teacher Education Concentration.

Students are responsible for obtaining specific information

regarding degree requirements and teacher licensure from the Office of Student Services, 528 Waterman.

Athletic training is part of a concentration within the Physical Education and Health curriculum and is an approved National Athletic Trainer's Association undergraduate curriculum program. In addition to academic requirements, students must fulfill 950 hours in the athletic training facility. Requirements are fulfilled at the sports therapy facility located at the Patrick Gymnasium. Students must apply for and pass the National Athletic Trainers exam.

Art Education (Kindergarten through Twelve)

The program in Art Education qualifies candidates to teach art in grades K through 12. Students fulfill course requirements in general education, professional art education, professional education courses, studio art, art history, and related subjects. Graduates satisfy College of Education and Social Services requirements for teacher licensure 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 admission to graduate school.

Students must be enrolled in the College of Education and Social Services. Those admitted as first-year students 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 the second semester of the sophomore year.

A typical program is as follows:

Art Education Major

| | 1st | 2nd |
|------------------------|----------|-----|
| FIRST YEAR | SEMESTER | |
| English Composition | 3 or | 3 |
| Speech 11 or Theatre 5 | 3 or | 3 |
| History 11 or 12 | 3 or | 3 |
| EDFS 2 | 3 or | 3 |
| EDSS 24 or | | |
| ECHD 62 or 80 | 3 or | 3 |
| Science and Math. | 3 | 3 |
| Humanities | 3 or | 3 |
| Physical Education | 1 or | 1 |
| Art 1, 2 or 3 | 3 or | 3 |
| Art 5, 6 | 3 | 3 |

| | 1st | 2nd |
|-------------------|----------|-----|
| SOPHOMORE YEAR | SEMESTER | |
| English Lit. | 3 or | 3 |
| Political Sci. 21 | 3 or | 3 |
| EDSS 56 | 3 or | 3 |
| Studio Electives | | |
| Related Electives | | |

Students apply to the Art Education Majors during the second semester of their sophomore year. Students must first be accepted before being permitted to enroll in required methods courses.

| | 1st | 2nd |
|---------------------------|----------|-----|
| JUNIOR YEAR | SEMESTER | |
| EDAR 177 | 4 | — |
| EDAR 154 | 1-6 or | 1-6 |
| Art History | 3 or | 3 |
| Studio Electives | | |
| Related Electives | | |
| Teaching Reading/EDSC 137 | 3 or | 3 |

Students are required to complete a student teaching internship application before being assigned a placement.

| | 1st | 2nd |
|-------------------|----------|-----|
| SENIOR YEAR | SEMESTER | |
| EDAR 178 | 4 or | 4 |
| EDAR 283 | — | 3 |
| Art 281 or 197 | 3 or | 3 |
| EDAR 292 | 2-6 or | 2-6 |
| EDSC 181 | 12 or | 12 |
| Studio Electives | | |
| Related Electives | | |
| EDFS 190 | 3 or | 3 |

A minimum of 124 approved semester hours is required for the degree including three semester hours of teaching reading for teacher licensure. All students must also fulfill the University requirement of two hours of physical education activities.

Students are responsible for obtaining information regarding teacher licensure and degree requirements from the Office for Student Services, 528 Waterman.

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. Prospective students must audition before entering the program. Graduates are qualified for positions as instructors and supervisors of music in public schools.

The program includes a general education component of 60 credits from the academic areas outlined earlier. Students may apply required courses in music to meet the general education requirements.

A typical program is as follows:

Music Education Major

| | 1st | 2nd |
|-----------------------------|----------|-----|
| FIRST YEAR | SEMESTER | |
| Major Instrument (151, 152) | 1 | 1 |
| Ensemble | 1 | 1 |
| Keyboard (5, 6) | 1 | 1 |
| Basic Musicianship (31, 32) | 3 | 3 |
| String Class (83, 84) | 1 | 1 |
| Speech 11 or Theatre 5 | 3 or | 3 |
| EDFS 2 | 3 | — |
| EDSS 24 or | | |
| ECHD 62 or 80 | — | 3 |
| Physical Education | 1 | 1 |
| Electives | 3 or | 3 |

| | 1st | 2nd |
|--------------------------------|----------|-----|
| SOPHOMORE YEAR | SEMESTER | |
| Major Instrument (153, 154) | 2 | 2 |
| Ensemble | 1 | 1 |
| Keyboard (7, 8) | 1 | 1 |
| Intermediate Theory (131, 132) | 3 | 3 |
| Theory Lab (133, 134) | 1 | 1 |
| Music History (11, 12) | 3 | 3 |
| Woodwind Class (87, 88) | 1 | 1 |
| Voice Class (5, 85) | 1 | 1 |
| Electives | 3 | 3 |

During sophomore year, students apply to the teacher licensure component of the program. Students must be

accepted before being permitted to enroll in required methods courses.

| | 1st | 2nd |
|-----------------------------|----------|-----|
| JUNIOR YEAR | SEMESTER | |
| Major Instrument (251, 252) | 2 | 2 |
| Ensemble | 1 | 1 |
| Arranging (233) | 3 | — |
| Conducting (259) | — | 3 |
| EDMU 281 | 3 | — |
| EDMU 282 | — | 3 |
| Brass Class (81, 82) | 1 | 1 |
| Percussion Class (89) | — | 3 |
| Electives | 6 | 6 |

Students are required to complete a student teaching internship application before being assigned a placement.

| | 1st | 2nd |
|--------------------------------|----------|-----|
| SENIOR YEAR | SEMESTER | |
| Major Instrument Recital (256) | — | 2 |
| Ensemble | — | 1 |
| Teaching Reading (EDSC 137) | — | 3 |
| Electives | — | 9 |
| Student Teaching (EDSC 181) | 12 | — |
| Senior Seminar (EDFS 190) | 3 | — |

A minimum of 128 approved semester hours is required for the degree including three semester hours of teaching reading for teaching licensure. Students must pass the piano proficiency examination prior to student teaching. Students are responsible for obtaining information regarding teaching licensure and degree requirements from the Office for Student Services, 528 Waterman.

Early Childhood and Human Development

The Early Childhood and Human Development (ECHD) Program focuses on individual and family development across the life span. 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 acquire skills in working with normal individuals and families of different ages and backgrounds in a variety of settings. Field experience is required of all students.

Students major in one of two areas:

Early Childhood Development provides the student with academic and practical experiences in working with young children and their families. In addition to classroom instruction, majors spend part of several semesters working in the ECHD program's infant and toddler center and the preschool center — both located on campus.

Students interested in working with infants and young children and their families through educational settings may elect the *early childhood education licensure option*. Students enrolled in the licensure option who wish to work with both exceptional and nonexceptional children may be eligible to continue their training for an additional year through the master's program in Early Essential Education. The requirements of the graduate program are coordinated with those of the undergraduate program, allowing eligible students the opportunity to pursue a five-year integrated sequence leading to both graduate and undergraduate degrees and licensure in early childhood development and early essential education. Students in the early childhood education licensure option have pursued careers in preschool and day care settings, in movement education, in parent-child centers, in sex education programs, and in kindergarten settings.

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| FIRST YEAR | SEMESTER | |
| ECHD 3, 4 | 3 | 3 |
| ECHD 80, 81 | 3 | 3 |
| ECHD 82, 83 | 3 | 3 |
| General ed. requirements, electives | 6 | 6 |

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| SOPHOMORE YEAR | SEMESTER | |
| ECHD 7 | 1 | — |
| ECHD 60, 61 | 3 | 3 |
| ECHD 164 | 3 | — |
| ECHD 65 | — | 3 |
| ECHD 184 | — | 3 |
| General ed. requirements, electives | 9 | 6 |

Early Childhood Education Licensure Option

| | 1st | 2nd |
|--------------------------------|----------|-----|
| JUNIOR YEAR | SEMESTER | |
| EDPE 23 | 3 | — |
| Prepracticum experience | 3 | — |
| Curriculum course I | 3 | — |
| Advanced childhood development | 3 | — |
| Practicum experience | — | 15 |
| Elective | 3 | — |

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| SENIOR YEAR | SEMESTER | |
| Field experience | 8 | — |
| Curriculum course II | 3 | — |
| Adv. seminar: infancy | 3 | — |
| Adv. seminar elective | 3 | — |
| General ed. requirements, electives | 4 | 8 |
| Senior paper | — | 1 |

Child Development Specialist Option

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| JUNIOR YEAR | SEMESTER | |
| Adv. child development | 3 | — |
| Adv. seminar: infancy | — | 3 |
| Specialization courses | 6 | 6 |
| General ed. requirements, electives | 6 | 6 |

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| SENIOR YEAR | SEMESTER | |
| Field Experience I, II | 5 | 8 |
| Specialization courses | 6 | 3 |
| General ed. requirements, electives | 5 | 3 |

Human Development and Family Studies Students in Human Development and Family Studies enroll in a sequence of courses and field experiences designed to provide a comprehensive understanding of individual and family development across the life span. These courses are arranged in two blocks: the introductory core and the advanced core.

The introductory core in Human Development and Family Studies involves three course sequences. The first, Introduction to Early Childhood and Human Development I, II and Introduction to Field Experiences, provides students an introduction to the topics pursued in the major, how they relate to everyday life settings, how knowledge in the discipline is gained, and the types of skills necessary to both acquire and use this knowledge. The second sequence in the introductory core is a two-semester course covering individual development across the entire life span. Students learn what is typical of individuals at different points in their lives and the various factors, such as gender and social class, that account for these differences. The third sequence in the introductory core is a two-semester course dealing with the impact of families and other social institu-

tions such as the school system on individual development. A course on Human Relations and Sexuality completes the introductory core.

The advanced core in Human Development and Family Studies consists of a series of advanced seminars and a field experience. All majors take seminars in Developmental Theory and Family Ecosystems. Three additional advanced seminars must be selected in consultation with an advisor. The field experience requires 15 to 20 hours per week. Students choose a placement from a variety of public and private local agencies. Over the past few years, field placement sites have included museums, affirmative action agencies, the court system, battered women's shelters, centers for abused and neglected children, city and state government agencies, local business and industry, child-care settings, hospitals, senior-citizen centers, and human service agencies.

A typical course sequence for a Human Development and Family Studies major is:

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| FIRST YEAR | SEMESTER | |
| ECHD 3, 4 | 3 | 3 |
| ECHD 80, 81 | 3 | 3 |
| General ed. requirements, electives | 9 | 9 |

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| SOPHOMORE YEAR | SEMESTER | |
| ECHD 7 | 1 | — |
| ECHD 60, 61 | 3 | 3 |
| ECHD 65 | — | 3 |
| General ed. requirements, electives | 12 | 9 |

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| JUNIOR YEAR | SEMESTER | |
| Adv. seminar I, II | 3 | 3 |
| Family ecosystems | 3 | — |
| Development theory | — | 3 |
| General ed. requirements, electives | 9 | 12 |

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| SENIOR YEAR | SEMESTER | |
| Field experience | 6 | — |
| Adv. seminar III | — | 3 |
| General ed. requirements, electives | 9 | 12 |

Students in any of the two majors may co-enroll in the Home Economics program. This requires completion of the professional concentration course requirements as well as Home Economic requirements.

Social Work Program

The Social Work Program provides education for social work practice based on a liberal arts education in the social sciences and humanities. The undergraduate Social Work Program is fully accredited by the Council on Social Work Education. The principal educational objective of the program is to prepare students for beginning professional social work practice. Career opportunities in the profession 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.

The Bachelor of Science degree in Social Work requires a minimum of 122 approved credit hours (60 credits of which are general education components from the six approved academic areas, including two credits for physical

education activities) and one credit for Race and Culture. Acceptance as a major includes: completion of the required liberal arts courses with a C- or better; the social work requirements with a minimum grade of C and an overall GPA in these of 2.5; and an overall GPA of 2.0.

Usual sequence of courses:

| | 1st | 2nd |
|-------------------------------|----------|------|
| FIRST YEAR | SEMESTER | |
| Professional Courses: | | |
| SWSS 2 | 3 | or 3 |
| SWSS 51 | — | 3 |
| Political Science 21 | 3 | or 3 |
| Psychology 1 | 3 | or 3 |
| Sociology 1 | 3 | or 3 |
| Biology 3 (or sophomore year) | 3 | — |
| Race and Culture | 1 | or 1 |

| | 1st | 2nd |
|------------------------------------|----------|------|
| SOPHOMORE YEAR | SEMESTER | |
| Professional Courses: | | |
| SWSS 47 | 3 | or 3 |
| SWSS 48 | — | 3 |
| SWSS 167 | 3 | or 3 |
| Biology 3 (or first year) | 3 | — |
| Economics 11 | 3 | or 3 |
| Psychology 152 (or junior year) | 3 | or 3 |

Students are accepted into the College of Education and Social Services as a **pre-major**. **Students must apply for status as a social work major prior to their junior year.** Application for the major requires consultation with an advisor to determine that all introductory professional and required liberal arts courses have been successfully completed. The application process includes a written statement by students that describes their interest and qualifications for a social work major and a projection of their future work in the field. Applications are received on either October 15 or February 15 of each academic year. A committee of Social Work faculty review and act on each application. Notification of the faculty review is presented to the student in a letter from the Coordinator of the undergraduate program.

| | 1st | 2nd |
|---------------------------------------|----------|------|
| JUNIOR YEAR | SEMESTER | |
| Professional Courses: | | |
| SWSS 165 | 3 | — |
| SWSS 166 | — | 3 |
| SWSS 168 | 3 | — |
| SWSS 169 | — | 3 |
| SWSS 194 | 3 | — |
| Psychology 152 (or sophomore year) | 3 | or 3 |

| | 1st | 2nd |
|-----------------------|----------|-------|
| SENIOR YEAR | SEMESTER | |
| Professional Courses: | | |
| SWSS 170 | 12 | or 12 |
| SWSS 171 | 3 | or 3 |
| SWSS 291 | — | 3 |

Successful completion of SWSS 170 and 171 are required for the completion of the Social Work major.

Recommended Electives: Additional courses in economics, education, political science, psychology, sociology, statistics, special education, and women's studies.

Postbaccalaureate Teacher Preparation Program

The Postbaccalaureate Teacher Preparation Program is designed for individuals who have a bachelor's degree from an accredited four-year institution and who want to become licensed to teach in Vermont. The basic program fulfills the professional education requirements for state licensure. Areas and levels of licensure include: Grades K-12 — art, health education, music, physical education; Grades K-6 (elementary) — general elementary education, physical education; Grades 7-12 (secondary) — English, foreign language, mathematics, physical education, science, social studies.

Applicants to the Postbaccalaureate (Postbac) Teacher Preparation Program must meet the following entrance criteria.

1. Hold a bachelor's degree from an accredited institution of higher education.
2. Possess a general education background based on those studies known as liberal arts which embrace the broad areas of social and behavioral sciences, mathematics, biological and physical sciences, the humanities, and the arts.
3. Demonstrate a commitment to the teaching profession.
4. Have obtained an overall GPA of 2.5 in undergraduate course work.
5. For secondary candidates: Previous course work must include 30 semester hours in one of the academic areas listed below to meet Vermont state licensure requirements for the major academic concentration.

Majors: Biological science, chemistry, earth science, English, French, geography, German, history, Latin, mathematics, physical science, physics, Spanish.

Broad Field Majors: Natural science, social studies, environmental studies.

6. For secondary candidates: Have obtained a GPA of 2.5 in the academic area in which licensure is desired.

The Postbac curriculum includes both undergraduate and graduate courses. Nine to 12 graduate credits may apply toward the M.Ed. degree at UVM, contingent on acceptance into the Graduate College.

The deadline for applications is April 15 for the next academic year. Course work begins during the summer or fall, depending upon the area of licensure. Applications are accepted and considered only once each year with updated informational materials and application forms available in January. Requests for further information about the PBTP Program and application forms may be obtained by contacting the PBTP Coordinator, Department of Professional Education and Curriculum Development, 533 Waterman Building.



The Division of Engineering, Mathematics, and Business Administration

The Division of Engineering, Mathematics, and Business Administration includes the College of Engineering and Mathematics and the School of Business Administration.

The Division offers professional undergraduate programs for either professional practice or further study. Because graduates of professional schools are expected to be able to plan and direct in many work situations, as well as to effect and manage change, the primary objective of professional education is to develop skills in problem solving.

Professional graduates must have the ability, confidence, and self-discipline to identify and define a problem; break it down into operable components; gather the necessary resources from the natural and social sciences, mathematics, and the humanities; and employ these resources to solve the problem. The Division promotes these qualities in students by emphasizing a balance between concept and skill in all curricula.

The Division is also committed to learning as a life-long endeavor and, therefore, provides a base for students to build on as their careers and personal interests broaden.

The offices of the Dean of the Division are located in Kalkin Hall.

DEGREE PROGRAMS

The Bachelor of Science degree is awarded for the following majors:

- Business Administration
- Civil Engineering
- Computer Science
- Electrical Engineering
- Engineering Management
- Mathematics
- Mechanical Engineering

HONORS PROGRAMS FOR EMBA STUDENTS

Individually Designed Major

A student matriculating in the Division who, at the time of application, has completed at least three semesters of full-time study with a cumulative grade-point average of 3.0 or above may propose an individually designed major which builds on an appropriate core program of the division. The program is designed for the superior student with exceptional initiative and must contain a breadth and depth of courses consistent with regular professional programs or options. The program must be sponsored by a faculty member who will serve as the student's advisor. The program requires prior approval by the appropriate curriculum committee.

Honors Thesis Program

The undergraduate thesis program — designed for the superior student with unusual initiative and intellectual curiosity — provides an opportunity to pursue a special program without the restrictions of classroom routine. The student must be matriculated in the Division at the time of

application and have a cumulative grade-point average of at least 3.0 for sophomore and junior work. The honors thesis program is a program of reading, research, design, or creation under the direction of the school, department, or program of the student's choices (not necessarily within the Division). For example, a student might do a special honors thesis in physics. The unit establishes the mechanism for thesis review, and the proposal must be approved by the Division Dean's Office not later than the end of the junior year. The thesis, in the form of a written report, must be approved by the participating unit. The student may also be required to pass an oral or written examination at the discretion of the unit as part of the mechanism for review. At the time of graduation, the student's transcript and the graduation program will appropriately be denoted with "Honors Thesis" and the title of the thesis.

Some programs within the Division require senior projects as part of the prescribed curriculum. For the superior student, these projects may offer opportunities similar to the honors thesis program.

Cooperative Education Program

The Division offers a cooperative education (CO-OP) program to students with cumulative grade-point averages placing them in the upper half of their class. Before acceptance, each candidate must be interviewed and approved by the program coordinator and the prospective employer. The program lets students apply their learning to a full-time, paid position in a business, industrial, or government setting. It is designed to fit into a normal four-year academic program. In each curriculum area, there is a faculty member responsible for CO-OP students, serving also as the students' advisor and coordinating on-site visits to work assignments. Participants must submit learning objectives and an end-of-work report at the end of each assignment. Although the Division attempts to place all qualified students admitted to the program, it cannot guarantee the availability of positions.

The CO-OP office is located in the Center for Career Development in E Building of the Living/Learning Center.

DEGREE REQUIREMENTS AND ACADEMIC REGULATIONS

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 three successive semesters in which their cumulative grade-point average falls below 2.0, are eligible for dismissal.

To receive a degree in a major, students must have a minimum cumulative average of 2.0. Students must complete 30 of the last 45 hours of credit in residence at UVM as matriculated students in the Division of Engineering, Mathematics, and Business Administration. Additional degree requirements are specified for each major.

Credit for Military Service

The Division 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 appropriate Studies Committee.

Credit for Calculus

Refer to page 39 in the section on General Information.

Physical Education

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

Research and Special Projects

Opportunities for undergraduate research and work on special projects are offered by the School, 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 UVM grade-point average. Students who wish transfer credits to satisfy specific requirements in their major in the Division must obtain approval from their department in the College of Engineering and Mathematics or the School of Business Administration.

School of Business Administration

The School of Business Administration offers a challenging and rigorous education to prepare its students for promising careers in industry, government, and nonprofit organizations. The graduates from this program will be equipped with the broad knowledge and analytical tools needed to operate effectively as line and staff managers in the rapidly changing management environment.

The program is designed to cultivate the student's capacity to recognize, define, and solve problems in the most efficient manner possible. To this end, it is required that the student be exposed to a wide range of courses in the arts, humanities, and the social and physical sciences.

The first two years establish the broad intellectual base upon which the arts and science of management are built and are devoted to partial completion of distribution requirements and to acquisition of the technical skills on which Upper Level management courses rely.

The junior year completes the business core. Seven required courses develop the framework for organizing information and structuring analysis in the context of an operating enterprise. Course work is offered in finance, human resource management, production and operations analysis, information systems, marketing, and other related areas. The School believes that a broad but demanding program is in the best interest of the student's career opportunities.

The final year is devoted to senior business electives, the required business policy course, and free electives.

The School of Business Administration cooperates with the College of Engineering and Mathematics in offering a B.S. in Engineering Management. The course offerings are described on page 146.

The undergraduate and master's business programs offered by the School of Business Administration are accredited by the American Assembly of Collegiate Schools of Business (AACSB).

The offices of the School of Business Administration are located in Kalkin Hall.

DEGREE REQUIREMENTS

A minimum of 122 approved semester hours is required for the degree of Bachelor of Science in Business Administration, including two required hours in physical education and a minimum of 55 hours in areas other than business administration and upper-level economics.

Physical education courses in excess of the required two credits will not count toward the 122 credits required for graduation.

The 55 hours includes Lower Level Core courses and Distribution courses.

Lower Level Core

- Math. 19 and 20
- or Math. 21 and 22 (six or eight hours)
- Economics 11 and 12 (six hours)
- Computer Science 11 (three hours)
- Statistics 141 (three hours)
- Business Administration 60 and 61 (eight hours)
- Business Administration 72 (three hours)

Distribution Courses

- A. Language and Literature:
 1. English 1 (three hours)
 2. Any two of the following: English 11-26, or 50 (six hours)
 3. At least three hours from the following:

| | |
|--------------------|-----------------------|
| Chinese | Hebrew |
| Classics | International Studies |
| English | Italian |
| Film | Latin |
| French | Linguistics 101, 102 |
| General Literature | Russian |
| German | Spanish |
| Greek | Speech |
- B. Social Sciences, Fine Arts, and Philosophy:
 1. History 11, or 12, or Political Science 21 (three hours)
 2. Psychology 1 or Sociology 1 (three hours)
 3. At least three hours from the following:

| | |
|--------------|-------------------|
| Anthropology | Philosophy |
| Art | Political Science |
| Classics 42 | Psychology |
| History | Religion |
| Geography | Sociology |
| Music | Theatre |
- C. Mathematics, Sciences, and Professional:
 1. Two lab sciences* (eight hours)
 2. At least three more hours from the following:

| | |
|------------------|---------------------|
| Biology | Mathematics |
| Botany | Natural Resources 1 |
| Chemistry | Physics |
| Computer Science | Statistics |
| Engineering | Zoology |
| Geology | |

*Note: Either the History of Science or Philosophy of Science may substitute for *one* lab science. The lab science courses typically would be selected from among the biology, botany, chemistry, geology, microbiology, physics, and zoology offerings. Computer science courses cannot be used to fulfill this requirement.

- D. One additional course taken from areas A, B, or C above.
- E. The remainder of the 55 hours may be selected from areas A, B, or C above or from other approved course offerings.

ADMISSION TO UPPER LEVEL BUSINESS PROGRAM

In order to be admitted to the Upper Level program of the School and therefore to continue as a major in the School of Business Administration, an undergraduate must have both:

- A. Completed at least 60 credits with an average of 2.0 or better, and
- B. Obtained a minimum GPA in the Lower Level Core of:
1. 2.25 with the Math. 19-20 sequence *or*
 2. 2.10 with the Math. 21-22 sequence

COURSE OF STUDY

Here is an illustrative schedule for the first two years. The student may rearrange the sequencing of courses as desired.

| | 1st SEMESTER | 2nd SEMESTER |
|-----------------------------|-----------------|-----------------|
| FIRST YEAR | | |
| *Math. 19 or 21 | 3 or 4 | — |
| English 1 | 3 | — |
| Psychology 1 or Sociology 1 | 3 | — |
| *Economics 11, 12 | 3 | 3 |
| *Math. 20 or 22 | — | 3 or 4 |
| *Computer Science 11 | — | 3 |
| One of English 11-26 | — | 3 |
| Other Distribution Course | <u>3 or 4</u> | <u>3 or 4</u> |
| | 15-16 | 15-17 |
| SOPHOMORE YEAR | | |
| *BSAD 60, 61 | 4 | 4 |
| English 11-26 or 50 | 3 | — |
| Distribution Courses | 6 or 7 | 9 or 10 |
| *BSAD 72 | 3 | — |
| *Statistics 141 | — | 3 |
| | <u>16-17</u> | <u>16-17</u> |
| JUNIOR YEAR | | |
| Junior Business Core | 12 | 9 |
| Elective | <u>3</u> | <u>6</u> |
| | 15 | 15 |
| SENIOR YEAR | | |
| Senior Business Electives | 6 | 6 |
| Electives | 9 | 6 |
| BSAD 191, Business Policy | <u>—</u> | <u>3</u> |
| | 15 | 15 |

*Denotes Lower Level Core

Upper Level Core

During the junior year, the student will take courses in all of the functional areas of management and will do addi-

tional work in economics, quantitative methods, and the sociopolitical environment in which business functions. These Core courses are:

| | | |
|----------|--|---|
| BSAD 120 | Principles of Management and Organizational Behavior | 3 |
| BSAD 132 | Legal and Political Environment of Business | 3 |
| BSAD 141 | Management Information Systems | 3 |
| BSAD 150 | Marketing Management | 3 |
| BSAD 173 | Production and Operations Analysis | 3 |
| BSAD 180 | Managerial Finance | 3 |
| | Quantitative Methods* | 3 |

*The three hours required in quantitative methods may be satisfied by selecting a course from among Statistics 151, 201, 221, 225, 229, 231, 233, or Business Administration 170, 177, 178, or 179.

Concentrations

In the senior year, the student must complete at least 12 additional hours in Upper Level elective business courses beyond those required in the Upper Level Core. These courses must be selected in such a way that they build upon prior work and upon each other and point toward the analysis of a coherent subset of managerial problems. An acceptable approach is to concentrate these courses in one of the areas of Accounting, Finance, Human Resource Management, Management Information Systems, Marketing, International Management, or Production and Operations Management. However, the student may also complete a cross-functional program. In either case, the specific set of Upper Level business electives must be approved by the student's advisor. See page 86 for a detailed listing and description of courses in the various functional areas.

Additional course work needed to meet the 122 hour requirement for graduation are free electives and may be satisfied by any UVM course subject to three restrictions:

1. No more than two hours in physical education may be counted toward the 122.
2. No credit will be granted for a course if credit has been received previously in a more advanced course in the same general discipline.
3. No credit will be granted for a course which substantially duplicates material in courses offered in EMBA.

In order to graduate, students must maintain a cumulative GPA of 2.0 in the courses comprising the Upper Level Core and a minimum of 12 hours of approved Upper Level business electives.

In the event that a student does not have a 2.0 GPA in the Upper Level Core and 12 hours of approved Upper Level business electives, the student will not be allowed to attempt to raise their Upper Level GPA by repeating courses. That GPA may be raised only by completing additional approved Upper Level business credits.

Professional Accounting Program

Students planning to sit for the CPA examination should complete the Professional Accounting Program outlined below. Completion of the Professional Accounting Program satisfies the Upper Level elective business course requirement.

| | | |
|---------------|----------------------------------|---|
| BSAD 17 | Business Law | 3 |
| BSAD 161, 162 | Intermediate Accounting | 6 |
| BSAD 164 | Introduction to Federal Taxation | 3 |
| BSAD 168 | Cost Accounting | 3 |

| | | |
|----------|---------------------|---|
| BSAD 166 | Advanced Accounting | 3 |
| BSAD 167 | Auditing | 3 |

Additionally, a second Business Law course (BSAD 18) and a second Finance course (beyond BSAD 180) are recommended. These two additional courses are required for students who plan to sit for the CPA examination in New York.

International Management

The program in international management is open to all Business Administration majors.

The University has formal arrangements with the University of Grenoble, France, to provide students with the opportunity to spend the spring semester at the University of Grenoble. The program consists of 14 credit hours in international business, French culture and society, and the French language. All courses are taught in English; however, students are advised that some background in French is desirable.

It is also possible for students to spend a year at Japanese, European, and other international universities.

Overseas students need to complete BSAD 120, 150, and 180 before going abroad. BSAD 132 is also recommended.

For further information, contact Professor Len Tashman at (802) 656-0516.

The College of Engineering and Mathematics

The College of Engineering and Mathematics offers undergraduate curricula leading to the Bachelor of Science degree in Civil Engineering, Computer Science, Electrical Engineering, Engineering Management, Mathematics, and Mechanical Engineering.

The offices of the Dean of the College are located in the Votey Building.

ORGANIZATION

The College of Engineering and Mathematics consists of three departments: Computer Science and Electrical Engineering, Civil Engineering and Mechanical Engineering, and Mathematics and Statistics; and two programs: Materials Science and Statistics.

ACADEMIC STANDARDS

In order to continue as a major in the College of Engineering and Mathematics, a student must achieve a 2.0 cumulative grade-point average at the end of the semester in which 60 cumulative credit hours have been completed. No more than three repeated course enrollments are allowed during this 60-credit period. In the case of transfer students, applicable transfer credits will be included in determining the 60 credit hours, but grades in these courses will not be included in the grade-point average.

No more than three grades of D, D+, or D- in the courses normally taken as part of the junior and senior curriculum in the student's major program will be acceptable. Requirements in each department are specified by the respective program curriculum committees.

A course may not be taken for credit if it is a prerequisite to one for which credit has already been granted, except by permission of the student's advisor.

AREAS OF STUDY

Computer Science Curriculum

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.

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 students develop an appreciation for the applicability of their knowledge of computer science.

Requirements for the degree of Bachelor of Science in Computer Science are as follows:

Computer Science: 11, 12, 101, 102, 103, 104, plus four 200-level courses. One of these must be 224 or 243. Two are to be chosen from 201, 203, 222.

Mathematics: 21, 22, 104, 121, 124, 173

Electrical Engineering: 100, 131

Physics: 31 with 21; 42 with 22, or 125

Statistics: 151

Other: English 1, Speech 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, mathematics, statistics, or engineering.

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

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:

| | |
|------------|------------|
| Art | Music |
| Drama | Philosophy |
| Language | Religion |
| Literature | Speech |

Courses used to fulfill the other requirements may not be used to fulfill the distribution requirement.

A typical program in Computer Science is as follows:

| | 1st | 2nd |
|-------------------------|----------|-----|
| FIRST YEAR | SEMESTER | |
| CS 11, Comp. Prog. I | 3 | — |
| Math. 21, Calculus I | 4 | — |
| English 1, Written Exp. | 3 | — |
| Electives | 6 | 6 |
| CS 12, Comp. Prog. II | — | 3 |
| Math. 22, Calculus II | — | 4 |
| Speech 11 | — | 3 |
| | 16 | 16 |

| SOPHOMORE YEAR | 1st SEMESTER | 2nd SEMESTER |
|----------------------------|--------------|--------------|
| CS 101, Intro. | 3 | — |
| Math. 121, Calculus III | 4 | — |
| Math. 104, Computation | 3 | — |
| Physics 31 with 21 | 4 | — |
| Elective | 3 | 3 |
| CS 102, Software | — | 3 |
| Math. 124, Linear Algebra | — | 3 |
| Physics 42 with 22 | — | 4 |
| Statistics 151, App. Prob. | — | 3 |
| | <u>17</u> | <u>16</u> |

| JUNIOR YEAR | 1st SEMESTER | 2nd SEMESTER |
|------------------------------|--------------|--------------|
| CS 103, Prog. Language | 3 | — |
| EE 100, EE Concepts | 4 | — |
| EE 131, Digital Comp. Design | 3 | — |
| Electives | 6 | 6 |
| CS 104, Data Structures | — | 3 |
| CS 222 or 243 | — | 3 |
| Math. 173, Comb.Theory | — | 3 |
| | <u>16</u> | <u>15</u> |

| SENIOR YEAR | 1st SEMESTER | 2nd SEMESTER |
|----------------------|--------------|--------------|
| CS 200-level courses | 6 | 3 |
| Electives | <u>9</u> | <u>9</u> |
| | 15 | 12 |

A minimum of 123 semester hours is required, plus two credits of physical education activities.

Engineering Curricula

The College of Engineering and Mathematics offers professional programs in Civil, Electrical, and Mechanical Engineering accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). Interdisciplinary engineering programs offered by the College include Engineering Management offered in cooperation with the School of Business Administration, and a curriculum in Engineering Physics in cooperation with the Department of Physics. The latter leads to the degree of Bachelor of Science.

Engineering education at UVM combines the study of mathematics and the physical, life, and engineering sciences with application to the analysis and design of equipment, processes, and complete systems.

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 and science, and for further professional study in such fields as business, law, or medicine.

Courses in the humanities and social sciences (HSS) are required in engineering programs to broaden the student's understanding of humankind and relationships in human society. HSS electives **may not** be taken on a pass/fail basis. At least 18 credit hours must be selected from the list presented here. The courses are divided into three categories: (A) language and literature; (B) fine arts, philosophy, and religion; and (C) social sciences. At least nine credit hours must be in one category, and at least six credit hours must be in one department area.

| Category | Approved Humanities Courses |
|----------|--|
| C | Agricultural and Resource Economics: 2, 61, 162, 205, 208, 254 |
| C | ² Air Force Studies at St. Michael's: 401-403 |
| C | Anthropology: all courses* <i>except</i> 200, 290 |
| B | Art: all Art History courses* |
| C | Botany: 6 |
| A | ³ Chinese: all courses* |
| A | ³ Classics: all courses* |
| C | Economics: all courses* <i>except</i> 100, 200 |
| C | Education/Early Childhood and Human Development: 60, 61, 62, 63, 64, 65, 260 |
| A | English: all courses* <i>except</i> 1, 4, 50, 177, 178 and Film courses |
| C | Environmental Studies: 1, 2, 95**, 100 |
| A | General Literature: all courses |
| C | Geography: 1-7, 51-62, 146-171, 175-179 |
| A | ³ German: all courses* |
| A | ³ Hebrew: all courses* |
| C | History: all courses* |
| C | ⁴ Military Studies: 2, 4 |
| B | Music 3, all History and Literature courses* |
| C | Natural Resources: 40 |
| C | Nursing: 15, 20, 140 |
| B | Philosophy: all courses* |
| C | Political Science: all courses* <i>except</i> 181 |
| C | Psychology 1, 119, 130, 132, 150, 152, 161, 162, 205, 206, 233, 234, 237 |
| B | Religion: all courses* |
| C | Resource Economics: 121 |
| A | ³ Romance Languages: all courses* |
| A | ³ Russian: all courses* |
| C | Social Work: 2, 47, 48, 51, 165, 166, 167, 168, 169 |
| C | Sociology: all courses* <i>except</i> 100, 274, 275, 285, 286, 288, 289 |
| B | Theatre: 1, 136, 137, 138 |

*Special topics, seminars, honors, reading and research, or internships are not normally considered appropriate humanistic Social Study electives.

**Only ENVS 95 Special Topics: Race and Culture is accepted.

¹The Dean's Office and the Curriculum Committee review courses that are offered intermittently, and an updated list of these offered courses is available in the Dean's Office.

²Air Force Studies 401-403 are three-credit hour courses. Upon completion of the sequence, four credit hours toward the HSS requirements in the engineering curriculum at UVM will be granted. Since most of the other HSS electives are three-credit hour courses, 401 and 403 together usually constitute one HSS course.

³Grammar and conversational courses in a student's native language(s) are not acceptable for HSS credit. Elementary level language courses are not acceptable for HSS credit in areas where they duplicate credit received in high school, or as determined by UVM language instructors.

⁴Military Studies 2 and 4 are two-credit hour courses. Since most of the other HSS electives are three-credit hour courses, 2 and 4 together usually constitute one HSS course.

It is possible for engineering students to extend their undergraduate curriculum beyond the typical four-year schedules outlined on the following pages. Those who would like to complete requirements over a longer time period must meet with their faculty advisor to plan how this can be done.

Engineering students can 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. Each of these organizations has an

authorized student chapter at UVM. 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. In addition, all engineering students may become affiliated with the student chapter of the Society of Women Engineers. These student organizations present opportunities for students to conduct activities similar to those of the national societies.

FIRST-YEAR CURRICULUM FOR ENGINEERING STUDENTS

| | 1st | 2nd |
|--|----------|----------|
| FIRST YEAR | SEMESTER | |
| CS 11, Comp. Prog. I | 3 | — |
| English 1, Written Exp.* | 3 | — |
| Chemistry 1, Intro. | 4 | — |
| Math. 21, 22, Calculus I & II | 4 | 4 |
| HSS Elective* | 3 | 3 |
| Physics 31 with 21, Fund. of Physics** | — | 4 |
| Math. 31, Numerical Meth. | — | 3 |
| ME 2, Graph.Comm.** | — | 2 |
| Phys. Ed. | <u>1</u> | <u>1</u> |
| | 18 | 17 |

*Some students will be asked to take English 1 in the second semester. These students should take two HSS courses in the first semester.

**In Mechanical Engineering first semester HSS elective is replaced by ME 1; in second semester Physics 31/21 is replaced by an HSS elective. In the Electrical Engineering Options 3 and 4, Physics 31 with 21 is replaced by Chemistry 42 for Option 3, and Chemistry 2 for Option 4. In Electrical Engineering Options 3 and 4, ME 2 is not required. Two HSS electives should be taken in the spring semester for Option 3.

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.

There are two options leading to the degree of Bachelor of Science in Civil Engineering: General Civil Engineering and Environmental Engineering. The degree requires a minimum of 129 semester hours, plus two credits of physical education activities.

OPTIONS 1 and 2: General Civil Engineering and Environmental Engineering

| | 1st | 2nd |
|-----------------------------------|----------|----------|
| SOPHOMORE YEAR | SEMESTER | |
| Math. 121, Calculus III | 4 | — |
| Physics 125, Electromag. & Optics | 4 | — |
| CE 1, Statics | 3 | — |
| CE 10, Surveying | 4 | — |
| Statistics 141, Basic Meth. | 3 | — |
| Math. 271, App. Math. for Eng. | — | 3 |
| Science Elective or Chem. 2** | — | 4 |
| ME 12, Dynamics | — | 3 |
| Option Course* | — | 3-4 |
| HSS Elective | <u>—</u> | <u>3</u> |
| | 18 | 16-17 |

*General civil engineering option students take CE 11; environmental engineering option students take Biology 2.

**Option 2 students take Chemistry 2.

| | 1st | 2nd |
|----------------------------|----------|----------|
| JUNIOR YEAR | SEMESTER | |
| CE 100, Mech. of Materials | 3 | — |
| CE 150, Env. Eng. | 3 | — |
| CE 160, Hydraulics | 4 | — |
| EE 100, Concepts I | 4 | — |
| ME 41, Thermo. | 4 | — |
| CE 101, Materials Testing | — | 2 |
| CE 140, Trans. Engineering | — | 3 |
| CE 151, Waste Water Eng. | — | 3 |
| CE 170, Struct. Analysis I | — | 4 |
| HSS Elective | <u>—</u> | <u>3</u> |
| | 18 | 15 |

OPTION 1: General Civil Engineering

| | 1st | 2nd |
|-----------------------------|----------|------------|
| SENIOR YEAR | SEMESTER | |
| CE 125, Eng.Economy | 3 | — |
| CE 171, Struc. Analysis II | 3 | — |
| CE 172, Struc. Steel Design | 3 | — |
| CE 180, Soil Mech. | 4 | — |
| HSS Elective | 3 | 3 |
| CE 130, Eng. Planning | — | 3 |
| CE 173, Reinforced Conc. | — | 3 |
| Professional Elective* | — | 3 |
| Design Elective** | <u>—</u> | <u>3-4</u> |
| | 16 | 15-16 |

*Professional electives are the following: any 200-level CE course and CE 141, 142, 181, 191, and 192: other courses by permission of advisor.

**Option I Design electives are the following CE courses: 141, 142, 161, 181, 230, 232, 250, 251, 261, 280.

OPTION 2: Environmental Engineering

| | 1st | 2nd |
|-----------------------------|----------|------------|
| SENIOR YEAR | SEMESTER | |
| CE 125, Eng.Economy | 3 | — |
| Professional Elective*** | 3 | — |
| CE 172, Struc. Steel Design | 3 | — |
| CE 180, Soil Mech. | 4 | — |
| HSS Elective | 3 | 3 |
| CE 173, Reinforced Conc. | — | 3 |
| Design Elective* | — | 3 |
| Science Elective** | <u>—</u> | <u>3-4</u> |
| | 16 | 12-13 |

*Design electives for Option 2 are the following CE courses: 161, 250, 251, 253, 256, 258, 261.

**Science electives are one of the following: Chemistry 42, Chemistry 141, CE 254, Plant and Soil Science 264, Natural Resources 276, Biology 1.

***Professional electives are the following: all courses listed as Professional Electives in Option 1 and CE 130, 171, 191, 192; advanced courses in Natural Resources with permission of advisor.

Electrical Engineering

The curriculum in Electrical Engineering leading to the degree of Bachelor of Science in Electrical Engineering offers instruction in electrical and electronic circuits, semiconductor devices, signal and system analysis, digital systems, control systems and design, as well as in engineering, physical and life sciences, humanities, and social sciences.

There are four options leading to an ABET accredited degree of Bachelor of Science in Electrical Engineering: General Electrical Engineering, Computer Engineering, Biomedical Engineering, and Premedical Engineering. The degree requires a minimum of 129 semester hours for Options 1, 2 and 3, and 128 credit hours for Option 4. In addition, two credits of physical education activities are required.

No more than three grades of D, D+, or D- will be acceptable in all required courses in engineering, basic science, and computer science including all technical electives as stated in the catalogue for the junior and senior years.

OPTION 1: General Electrical Engineering

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| SOPHOMORE YEAR | SEMESTER | |
| Math. 121, Calculus III | 4 | — |
| Physics 125, Electromag. & Optics | 4 | — |
| EE 3, 4, Engr. Anal. I & II | 3 | 3 |
| EE 81, 82, Sophomore Lab | 2 | 2 |
| HSS Electives | 3 | 3 |
| Math. 271/124/Statistics 151 | — | 3 |
| Physics 128, Modern Physics | — | 4 |
| EE 141, Electromag. Field Theory I* | — | 3 |
| | 16 | 18 |

| | 1st | 2nd |
|---------------------------------------|----------|-----|
| JUNIOR YEAR | SEMESTER | |
| EE 120, 121, Electronics I & II | 3 | 3 |
| EE 142, Electromag. Field Theory II | 3 | — |
| EE 163, 164, Solid State Phys. I & II | 3 | 3 |
| EE 171, Signals & Sys. | 4 | — |
| EE 174, Intro. to Comm. Systems | — | 3 |
| EE 183, 184, Junior Lab | 2 | 2 |
| EE 134, Micro Based Sys. | — | 4 |
| | 15 | 15 |

| | 1st | 2nd |
|-----------------------------|----------|-----|
| SENIOR YEAR | SEMESTER | |
| EE 113, Elec. Energy Dis. | 3 | — |
| Non-EE Engr. Sci. Elective* | 3 | — |
| Tech. Elective**** | 3 | — |
| HSS Electives | 3 | 3 |
| EE Design Tech. Electives** | 3 | 3 |
| EE 185, 186, Senior Lab | 1 | 1 |
| EE Tech. Elective | — | 3 |
| Approved Elective | — | 3 |
| EE Eng. Sci. Elective*** | — | 3 |
| | 16 | 16 |

*Non-EE Engr. Sci. Electives: CE 1, 10, 150; ME 12, 41, 111.

**EE Design Tech. Elective: EE 131, 132, 187, 221, 222, 231, 232, 233, 266, 275, 276.

***EE Engr. Sci. Elective: EE 110, 114, 201, 209, 241, 245, 261, 262, 270.

****Tech. Electives: EE 110, 113, 114, 164, 201, 209, 221, 222, 231, 232, 233, 241, 245, 261, 262, 266, 270, 275, 276; CS 12, 101, 102, 103, 201, 222; Phys. 170, 201, 202; ME 12, 14, 150; CE 125; Chem. 162, 163; Math. 104, 124, 173; Statistics 141, 151. All 200-level Math. and Statistics courses except for practicum, seminar, and special topics.

*No credit may be received for both EE 140 (offered in prior years) and the current EE 141.

OPTION 2: Computer Engineering

| | 1st | 2nd |
|------------------------------------|----------|-----|
| SOPHOMORE YEAR | SEMESTER | |
| Math. 121, Calculus III | 4 | — |
| Physics 125, Electromag. & Optics | 4 | — |
| EE 3, 4, Engr. Analysis I & II | 3 | 3 |
| EE 81, 82, Soph. Lab | 2 | 2 |
| EE 131, 132, Digital Design | 3 | 3 |
| Math. 104/271/Statistics 151 | — | 3 |
| Physics 128, Intro. Modern Physics | — | 4 |
| HSS Elective | — | 3 |
| | 16 | 18 |

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| JUNIOR YEAR | SEMESTER | |
| EE 163, Solid State Phys. I | 3 | — |
| CS 12, Comp. Prog. II | 3 | — |
| EE 120, 121, Elect. I & II | 3 | 3 |
| EE 171, Signals and Sys. | 4 | — |
| EE 174, Intro. to Comm. Sys. | — | 3 |
| EE 183, 184, Junior Lab | 2 | 2 |
| EE 134, Micro Based Sys. | — | 4 |
| EE 141, Electromag. Field Theory I* | — | 3 |
| | 15 | 15 |

| | 1st | 2nd |
|-----------------------------|----------|-----|
| SENIOR YEAR | SEMESTER | |
| EE 142, Field Theory II | 3 | — |
| EE 187, Senior Project | 3 | — |
| HSS Elective | 3 | — |
| CS 101, Intro. | 3 | — |
| Non-EE Engr. Sci. Elective* | 3 | — |
| EE 185, 186, Senior Lab | 1 | 1 |
| CS 102, Software | — | 3 |
| Technical Elective** | — | 3 |
| EE Eng. Sci. Elective*** | — | 3 |
| HSS Electives | — | 6 |
| | 16 | 16 |

*Non-EE Engr. Sci. Electives: See Option 1.

**Tech. Electives: EE 110, 113, 114, 164, 201, 209, 221, 222, 231, 232, 233, 241, 245, 261, 262, 266, 270, 275, 276; CS 103, 201, 222; Physics 170, 201, 202; ME 12, 14, 150; CE 125; Chemistry 162, 163; Math. 104, 124, 173; Statistics 141, 151; and all 200-level Math. and Statistics courses except for practicum, seminar, and special topics.

***EE Engr. Sci. Elective: EE 110, 113, 114, 164, 201, 209, 241, 245, 261, 262, 270.

*No credit may be received for both EE 140 (offered in prior years) and the current EE 141.

OPTION 3: Biomedical Engineering

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| SOPHOMORE YEAR | SEMESTER | |
| Math. 121, Calculus III | 4 | — |
| Physics 31 with 21, Intro. Phys. | 4 | — |
| HSS Elective | 3 | — |
| EE 3, 4, Eng. Analysis I & II | 3 | 3 |
| EE 81, 82, Soph. Lab I & II | 2 | 2 |
| Math. 271/124/Statistics 141 | — | 3 |
| Physics 42 with 22, EM & Mod. Phys. | — | 4 |
| EE 141, Electromag. Field Theory I* | — | 3 |
| | 16 | 15 |

| | 1st | 2nd |
|-------------------------------------|----------|-----|
| JUNIOR YEAR | SEMESTER | |
| Biology 1, Prin. of Biol. | 4 | — |
| EE 142, Electromag. Field Theory II | 3 | — |
| EE 163, Solid St. Phys. I | 3 | — |
| EE 120, 121, Electronics I & II | 3 | 3 |
| EE 183, 184, Junior Lab I & II | 2 | 2 |
| Physiol. & Biophys. 101 | — | 4 |
| EE 134, Micro Based Sys. | — | 4 |
| HSS Elective | — | 3 |
| | 15 | 16 |

| | 1st | 2nd |
|------------------------------|----------|-----|
| SENIOR YEAR | SEMESTER | |
| CE 1, Statics | 3 | — |
| Physiol. & Biophys. 102 | 4 | — |
| ME 41, Thermo. | 4 | — |
| EE 171, Signals & Sys. | 4 | — |
| EE 174, Intro. to Comm. Sys. | — | 3 |

| | | |
|--------------------------------|----------|----------|
| EE 185, 186, Senior Lab I & II | 1 | 1 |
| EE Elective | — | 3 |
| EE Design Elective** | — | 3 |
| EE 187, Senior Project | — | 3 |
| HSS Elective | <u>—</u> | <u>3</u> |
| | 16 | 17 |

**EE Design Elective: See Option 1.

*No credit may be received for both EE 140 (offered in prior years) and the current EE 141.

OPTION 4: Premedical Engineering

| | 1st | 2nd |
|-------------------------------------|----------|----------|
| SOPHOMORE YEAR | SEMESTER | |
| Math. 121, Calculus III | 4 | — |
| Physics 31 with 21, Intro. Phys. | 4 | — |
| Biology 1, 2, Prin. of Biology | 4 | 4 |
| EE 3, 4, Engr. Analysis I & II | 3 | 3 |
| EE 81, 82, Sophomore Lab I & II | 2 | 2 |
| Physics 42 with 22, EM & Mod. Phys. | — | 4 |
| Math. 271/124/Statistics. 141 | <u>—</u> | <u>3</u> |
| | 17 | 16 |

| | 1st | 2nd |
|-------------------------------------|----------|----------|
| JUNIOR YEAR | SEMESTER | |
| HSS Elective | 3 | — |
| EE 163, Solid St. Phys.I | 3 | — |
| EE 120, 121, Electronics I & II | 3 | 3 |
| EE 183, 184, Junior Lab I & II | 2 | 2 |
| Chemistry 141, 142, Organic Chem. | 4 | 4 |
| EE 134, Micro Based Sys. | — | 4 |
| EE 141, Electromag. Field Theory I* | <u>—</u> | <u>3</u> |
| | 15 | 16 |

| | 1st | 2nd |
|-------------------------------------|----------|----------|
| SENIOR YEAR | SEMESTER | |
| Non-EE Eng. Sci. Elective | 3 | — |
| EE 142, Electromag. Field Theory II | 3 | — |
| EE 113, Elect. Energy Dis. | 3 | — |
| EE 171, Signals & Sys. | 4 | — |
| EE 174, Intro. to Comm. Sys. | — | 3 |
| EE 185, 186, Senior Lab I & II | 1 | 1 |
| HSS Electives | 3 | 6 |
| EE Design Elective** | — | 3 |
| EE Eng. Sci. Elective*** | <u>—</u> | <u>3</u> |
| | 17 | 16 |

*Non-EE Eng. Sci. Elective: See Option 1.

**EE Design Elective: See Option 1.

***EE Eng. Sci. Elective: See Option 1.

*No credit may be received for both EE 140 (offered in prior years) and the current EE 141.

Engineering Management

A curriculum in Engineering Management leading to the degree of Bachelor of Science in Engineering Management is offered in cooperation with the School of Business Administration. Engineering management is a broad discipline concerned with the art and science of planning, organizing, directing, and controlling activities that have a technical component. Designing, producing, selling, and servicing products in the marketplace require managers who possess both an ability to apply engineering principles and a skill in managing technical projects and people in technical jobs. The curriculum is designed to provide a basic education in an engineering discipline with the study of management concepts and techniques. The curriculum incorporates the equivalent of one-half year of study in the area of the humanities and social sciences. Candidates for this degree must earn a minimum of 126 semester hours, depending upon the engineering option selected, plus two credits of physical education activities.

OPTION 1: Civil Engineering (128-129 hours)

| | 1st | 2nd |
|--------------------------------------|----------|----------|
| SOPHOMORE YEAR | SEMESTER | |
| CE 1, Statics | 3 | — |
| CE 10, Surveying | 4 | — |
| Economics 11, Prin. of Economics | 3 | — |
| Math. 121, Calculus III | 4 | — |
| Bus. Ad. 60, Financial Acctng. | 4 | — |
| Math. 271, Applied Math. | — | 3 |
| Bus. Ad. 61, Managerial Acctng. | — | 4 |
| Physics 42, with 22, EM & Mod. Phys. | — | 4 |
| ME 12, Dynamics | — | 3 |
| ME 14, Mechanics of Solids | <u>—</u> | <u>3</u> |
| | 18 | 17 |

| | 1st | 2nd |
|-------------------------------------|----------|----------|
| JUNIOR YEAR | SEMESTER | |
| Statistics 211, Stat. Methods I | 3 | — |
| EE 100, Elect. Engr. Concepts I | 4 | — |
| Economics 12, Prin. of Economics | 3 | — |
| CE 160, Hydraulics | 4 | — |
| Bus. Ad. 120, Mgmt. & Organ. Behav. | 3 | — |
| CE 140, Trans. Engineering | — | 3 |
| Bus. Ad. 141, Mgmt. Info. Systems | — | 3 |
| CE 170, Structural Analysis | — | 4 |
| Bus. Ad. 173, Prod. & Oper. Analy. | — | 3 |
| HSS Elective | <u>—</u> | <u>3</u> |
| | 17 | 16 |

| | 1st | 2nd |
|-----------------------------------|----------|----------|
| SENIOR YEAR | SEMESTER | |
| CE 125, Engr. Economy | 3 | — |
| CE 150, Environmental Engr. | 3 | — |
| EMgt. 185, Senior Project | 3 | — |
| HSS Elective | 3 | — |
| Bus. Ad. 178, Quality Control | 3 | — |
| Bus. Ad. 179, Operations Research | — | 3 |
| CE Conc. Elective* | — | 3-4 |
| EMgt. 175, Managing Tech. Envrn. | — | 3 |
| Engr. Mgmt. Elective** | <u>—</u> | <u>3</u> |
| | 15 | 12-13 |

*CE Concentration electives: CE 11, 141, 151, 180, 195 (Construction or Facilities Engineering), and ME 41.

**Engineering Management electives: Bus. Ad. 143, 144, 145, 170, 174, 177, 272; and Statistics 221, 224, 225, 229, 231.

OPTION 2: Electrical Engineering (125-128 hours)

| | 1st | 2nd |
|-------------------------------------|----------|----------|
| SOPHOMORE YEAR | SEMESTER | |
| Economics 11, Prin. of Economics | 3 | — |
| Math. 121, Calculus III | 4 | — |
| Bus. Ad. 60, Financial Acctng. | 4 | — |
| EE 3, 4, Engr. Analysis I, II | 3 | 3 |
| EE 81, 82, Sophomore Lab I, II | 2 | 2 |
| Math. 271, Applied Math. | — | 3 |
| Bus. Ad. 61, Managerial Acctng. | — | 4 |
| Physics 42 with 22, EM & Mod. Phys. | <u>—</u> | <u>4</u> |
| | 16 | 16 |

| | 1st | 2nd |
|---------------------------------------|----------|-----|
| JUNIOR YEAR | SEMESTER | |
| Statistics 211, Stat. Methods I | 3 | — |
| Economics 12, Prin. of Economics | 3 | — |
| EE 163/171, Solid State/Sign.Sys. | 3-4 | — |
| Bus. Ad. 120, Mgmt. & Organ. Behavior | 3 | — |
| EE 120, 121, Electronics I, II | 3 | 3 |
| Bus. Ad. 141, Mgmt. Info. Systems | — | 3 |

| | | |
|--------------------------------------|--------------|--------------|
| EE 134/174, Micro. Syst./Comm. Syst. | — | 3-4 |
| Bus. Ad. 173, Prod. & Oper. Anal. | — | 3 |
| HSS Elective | — | 3 |
| | <u>15-16</u> | <u>15-16</u> |

| | 1st | 2nd |
|-----------------------------------|-----------|--------------|
| SENIOR YEAR | SEMESTER | |
| CE 125, Engr. Economy | 3 | — |
| EMgt. 185, Senior Project | 3 | — |
| Bus. Ad. 178, Quality Control | 3 | — |
| HSS Elective | 3 | — |
| EE 131, 132, Dgtl. Comp. Design | 3 | 3 |
| Bus. Ad. 179, Operations Research | — | 3 |
| EE Conc. Elective* | — | 3-4 |
| EMgt. 175, Managing Tech. Envrn. | — | 3 |
| Engr. Mgmt. Elective** | — | 3 |
| | <u>15</u> | <u>15-16</u> |

*EE Conc. Electives: EE 110, 113, 114, 134 (if not used to fulfill another requirement), 140, 163 (if not used to fulfill another requirement), 171 (if not used to fulfill another requirement), 174, and EE 183-184 (both courses are needed to meet this requirement).

**Engineering Management electives: Bus. Ad. 143, 144, 145, 170, 174, 177, 272; and Statistics 221, 224, 225, 229, 231.

OPTION 3: Mechanical Engineering (127-129 hours)

| | 1st | 2nd |
|-------------------------------------|-----------|-----------|
| SOPHOMORE YEAR | SEMESTER | |
| CE 1, Statics | 3 | — |
| ME 41, Heat Transfer | 4 | — |
| Economics 11, Prin. of Economics | 3 | — |
| Math. 121, Calculus III | 4 | — |
| Bus. Ad. 60, Financial Acctng. | 4 | — |
| Math. 271, Applied Math. | — | 3 |
| Bus. Ad. 61, Managerial Acctng. | — | 4 |
| Physics 42 with 22, EM & Mod. Phys. | — | 4 |
| ME 12, Dynamics | — | 3 |
| ME 14, Mechanics of Solids | — | 3 |
| | <u>18</u> | <u>17</u> |

| | 1st | 2nd |
|-------------------------------------|-----------|--------------|
| JUNIOR YEAR | SEMESTER | |
| Statistics 211, Stat. Methods I | 3 | — |
| EE 100, Elect. Engr. Concepts I | 4 | — |
| Economics 12, Prin. Of Economics | 3 | — |
| ME 101, Engr. Materials | 3 | — |
| Bus. Ad. 120, Mgmt. & Organ. Behav. | 3 | — |
| ME 170, Mechanical Design | — | 4 |
| Bus. Ad. 141, Mgmt. Info. Systems | — | 3 |
| EE 101/ME 102, EE Concepts/Mtls. | — | 3-4 |
| Bus. Ad. 173, Prod. & Oper. Anal. | — | 3 |
| HSS Elective | — | 3 |
| | <u>16</u> | <u>16-17</u> |

| | 1st | 2nd |
|-----------------------------------|-----------|--------------|
| SENIOR YEAR | SEMESTER | |
| CE 125, Engr. Economy | 3 | — |
| ME 143, Fluid Mechanics | 3 | — |
| EMgt. 185, Senior Project | 3 | — |
| HSS Elective | 3 | — |
| Bus. Ad. 178, Quality Control | 3 | — |
| Bus. Ad. 179, Operations Research | — | 3 |
| ME Conc. Elective* | — | 3-4 |
| EMgt. 175, Managing Tech. Envrn. | — | 3 |
| Engr. Mgmt. Elective** | — | 3 |
| | <u>15</u> | <u>12-13</u> |

*ME concentration electives: ME 42, 144, 161, 162, 171; and EE 131, 134.

**Engineering Management electives: Bus. Ad. 143, 144, 145, 170, 174, 177, 272; and Statistics 221, 224, 225, 229, 231.

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, biomechanics, and energy systems, as well as in engineering, life and physical sciences, humanities, and social sciences, including aspects of professional engineering such as law, safety, and economics.

There are four options leading to the degree of Bachelor of Science in Mechanical Engineering: (1) General Mechanical Engineering (128 semester hours); (2) Biomedical Engineering (132 semester hours); (3) Manufacturing Engineering (128 semester hours); (4) Premedical Engineering (130 semester hours). In addition, all options require two credits of physical education activities.

First-Year Curriculum for All Options

| | 1st | 2nd |
|--------------------------|-----------|-----------|
| FIRST YEAR | SEMESTER | |
| CS11, Comp. Prog. I | 3 | — |
| English 2, Written Exp. | 3 | — |
| Chemistry 1, Intro. | 4 | — |
| ME 1, Intro. to Engr. | 3 | — |
| Math. 21, 22, Calc. I&II | 4 | 4 |
| Math. 31, Num. Meth. | — | 3 |
| ME 2, Graph. Comm. | — | 2 |
| HSS Electives | — | 6 |
| Phys. Ed. | <u>1</u> | <u>1</u> |
| | <u>18</u> | <u>16</u> |

Sophomore-Year Curriculum Common to Options 1, 2, 3

| | 1st | 2nd |
|-------------------------------|-----------|-----------|
| Math. 121, Calculus III | 4 | — |
| Physics 31/21, Intro. Phys. | 4 | — |
| CE 1, Statics | 3 | — |
| ME 40, Thermo. | 3 | — |
| HSS Elective | 3 | — |
| Math. 271, Appl. Math. Engrs. | — | 3 |
| Physics 42/22, EM&Mod. Phys. | — | 4 |
| ME 12, Dynamics | — | 3 |
| ME 14, Mech. of Solids | — | 3 |
| ME 42, Engr. Thermo. | — | 3 |
| | <u>17</u> | <u>16</u> |

Junior-Year Common to Options 1, 3

| | 1st | 2nd |
|-----------------------------|-----------|-----------|
| ME 101, Mat'ls. I | 3 | — |
| ME 111, Syst. Dynamics | 3 | — |
| ME 143, Fluid Mech. | 3 | — |
| HSS Elective | 3 | — |
| EE 100, 101, Concepts I&II | 4 | 4 |
| ME 123, 124, Jr. Lab | 1 | 1 |
| ME 102, Mat'ls. II | — | 3 |
| ME 144, Heat & Mass Transf. | — | 4 |
| ME 170, Mech. Des. I | — | 4 |
| | <u>17</u> | <u>16</u> |

Senior-Year Option 1

| | 1st | 2nd |
|---------------------------|-----|-----|
| ME 161, Manufacturing I | 3 | — |
| ME 171, Mech. Des. II | 4 | — |
| ME 183, Sr. Lab | 1 | — |
| ME 185, Sr. Proj. | 2 | — |
| ME Elect. ¹ | 3 | — |
| Tech. Elect. ² | 3 | 3 |

| | | |
|------------------------|----------|----------|
| ME Elect. ³ | — | 4 |
| ME 186, Sr. Proj. | — | 1 |
| HSS Electives | <u>—</u> | <u>6</u> |
| | 16 | 14 |

¹ME course 200 level or higher.²Any 100-level or higher courses in EMBA (except Statistics 111) or courses in natural sciences, with advisor's approval.³ME 162 and 164, or ME 172 and 174.**Senior-Year Option 3**

| | | |
|---------------------------------|----------|----------|
| ME 161, Manufacturing I | 3 | — |
| ME 171, Mech. Des. II | 4 | — |
| ME 183, Senior Lab | 1 | — |
| ME 185, Senior Project | 2 | — |
| Tech. Elect. ¹ | 3 | — |
| Tech. Elect. ² | 3 | 3 |
| ME 162/164, Manuf. II & Project | — | 4 |
| ME 186, Senior Project | — | 1 |
| HSS Electives | <u>—</u> | <u>6</u> |
| | 16 | 14 |

¹Courses in manufacturing, management or related area, with approval of advisor.**Junior Year Option 2**

| | | |
|---|----------|----------|
| ME 101, Materials I | 3 | — |
| ME 111, Syst. Dynamics | 3 | — |
| ME 143, Fluid Mech. | 3 | — |
| HSS Elective | 3 | — |
| ME 123, 124, Junior Lab | 1 | 1 |
| Anat. & Physiol. 19/20, Human Anat. & Physiol. ¹ | 4 | 4 |
| ME 102, Eng. Mat'ls. II | — | 3 |
| ME 144, Heat & Mass Transf. | — | 4 |
| ME 170, Mech. Des. I | <u>—</u> | <u>4</u> |
| | 17 | 16 |

¹Physiol. & Biophys. 101, 102 may be substituted for Anat. & Physiol. 19, 20.**Senior Year Option 2**

| | | |
|----------------------------------|----------|----------|
| ME 207, Biomechanics I | 3 | — |
| ME 171, Mech. Des. II | 4 | — |
| ME 183, Sr. Lab | 1 | — |
| ME 185, Sr. Project | 2 | — |
| EE 100, 101, Elec. Concepts I&II | 4 | 4 |
| Tech. Elective ² | 3 | 3 |
| ME 186, Sr. Project | — | 1 |
| ME 208, Biomechanics II | — | 3 |
| HSS Electives | <u>—</u> | <u>6</u> |
| | 17 | 17 |

²Any 100-level or higher courses in EMBA (except Statistics 111) or courses in natural sciences, with advisor's approval.**Sophomore Year Option 4**

| | | |
|--------------------------------|----------|----------|
| Math. 121, Calc. III | 4 | — |
| Physics 31/21, Intro. Physics | 4 | — |
| CE 1, Statics | 3 | — |
| ME 40, Thermo. | 3 | — |
| Biology 1, 2, Princ. Biol. | 4 | 4 |
| Math. 271, Appl. Math. Engrs. | — | 3 |
| Physics 42/22, EM & Mod. Phys. | — | 4 |
| ME 12, Dynamics | — | 3 |
| ME 14, Mach. of Solids | <u>—</u> | <u>3</u> |
| | 18 | 17 |

Junior Year Option 4

| | | |
|-----------------------------------|----------|----------|
| ME 101, Mat'ls. I | 3 | — |
| ME 111, Syst. Dynamics | 3 | — |
| ME 143, Fluid Mech. | 3 | — |
| Chemistry 141, 142, Organic Chem. | 4 | 4 |
| ME 123, 124, Junior Lab | 1 | 1 |
| HSS Elective | 3 | 3 |
| ME 144, Heat & Mass Transf. | — | 4 |
| ME 170, Mech. Design I | <u>—</u> | <u>4</u> |
| | 17 | 16 |

Senior Year Option 4

| | | |
|-----------------------------|----------|----------|
| ME 171, Mech. Design II | 4 | — |
| ME 183, Senior Lab | 1 | — |
| ME 185, Senior Project | 2 | — |
| EE 100, Concepts I | 4 | — |
| ME Elective ¹ | 3 | 3 |
| Tech. Elective ² | 3 | 3 |
| ME 186, Senior Project | — | 1 |
| HSS Electives | <u>—</u> | <u>6</u> |
| | 17 | 13 |

¹ME course 200 level or higher.²Any 100-level or higher courses in EMBA (except Statistics 111) or courses in natural sciences, with advisor's approval.**Mathematics and Statistics Curricula**

The College of Engineering and Mathematics offers programs in several areas of the mathematical sciences and their applications. The curriculum leads to the Bachelor of Science degree in Mathematics. The Statistics Programs offers a major in Statistics within this degree.

Basic Curriculum

Math. 21, 22, 121, Math. 101 or Comp. Sci. 11, Math. 102 and 124.

Mathematics majors: Math. 241 or 251

Statistics majors: Stat. 241 or 261

In addition to the Basic Curriculum above, candidates for the degree of Bachelor of Science in Mathematics must complete the following requirements A, B, C, and D.

A. Major Courses. A minimum of 24 additional hours in Mathematics, Statistics, or Computer Science courses numbered 100 or above. At least 18 hours must be in courses numbered 200 or above and no more than 12 hours may be chosen from Computer Science. Statistics majors must include 21 hours of Statistics including 141 or 211, 151 or 251, 201, 221 or 227, and 281 or 293.

B. Allied Field Courses. (Courses used to satisfy requirement A above may not be used to satisfy this requirement.)

Twenty-four hours selected from the following Allied Fields:

- | | |
|-------------------------|-----------------------------|
| (1) Physical Sciences | (6) Agricultural Sciences |
| (2) Biological Sciences | (7) Business Administration |
| (3) Medical Sciences | (8) Psychology |
| (4) Engineering | (9) Economics |
| (5) Computer Science | |
- (12 or higher)

Of these 24 hours, at least six hours must be in courses numbered 100 or above and at least six hours must be taken in fields (1) to (5). Each student in consultation with his or her advisor must plan a sequence of Allied Field courses consistent with his or her professional and personal goals. A student interested in pursuing intensive studies in an area not specifically listed is encouraged to

plan a program with his or her advisor and submit it to the appropriate departmental committee for review and approval. Statistics majors must include one laboratory experience in science or engineering.

- C. **Humanities and Social Science Courses.** (Courses used to satisfy requirement B above may not be used to satisfy this requirement.)

English 1, and 21 hours of courses selected from categories I, II, and III listed below. These 21 hours must be distributed over at least two categories, and at least six hours must be taken in each of the two categories chosen. Statistics majors must include Speech 11.

I. **Language and Literature**

| | |
|--------------------|-------------|
| Chinese | Greek |
| Classics | Hebrew |
| English | Linguistics |
| French | Russian |
| General Literature | Spanish |
| German | |

II. **Fine Arts, Philosophy, and Religion**

| | |
|------------|----------|
| Art | Religion |
| Film | Speech |
| Music | Theatre |
| Philosophy | |

III. **Social Sciences**

| | |
|-----------------------|-------------------|
| Anthropology | History |
| Communication | Political Science |
| Science and Disorders | Psychology |
| Economics | Sociology |
| Geography | |

- D. **Total Hours.** A minimum of 120 semester hours is required, plus two hours in physical education activities. First year students must include the one-hour Race and Culture course, Allied Health 95.

- E. **Grades.** No more than three grades of D, D+, or D- in the 200/300 level Mathematics and Statistics courses used to satisfy the "Core Curriculum" and "Major Courses" requirements will be acceptable.

Mathematics

Perhaps no discipline is more central to the modern world than mathematics. Since ancient times, mathematics has been a cornerstone of the educational process, exhibiting both theoretical and logical underpinnings as well as practical applications in the real world. In this century, fueled by the power of the computer (which, in large part, was invented by mathematicians), mathematics has emerged as central and crucial to the fabric of a technological society. In essence, mathematics is a *foundational* discipline unlike any other, and the ability to reason mathematically is the gatekeeper for a technologically literate workforce. Students who find mathematics interesting and wish to study it further, irrespective of career plans, are encouraged to consider majoring in mathematics.

The mathematics curriculum is quite flexible. It is designed to provide a sound basic training in mathematics that allows a student to experience the broad sweep of mathematical ideas and techniques to utilize the computer in mathematics, and to develop an area of special interest in the mathematical sciences. Mathematics majors are well prepared for jobs in business, industry, government, or teaching; or for advanced study in graduate school. As examples, UVM mathematics graduates are often employed in the computer, information, and communications industries, in en-

gineering, in the insurance business as actuaries, in government agencies, and in a variety of other occupations. Some go on to graduate school in the mathematical sciences, business, or the sciences and social sciences, or to medical, dental, or law school.

In addition to the Bachelor of Science degree described here, the Department of Mathematics and Statistics also offers a Bachelor of Arts degree in the College of Arts and Sciences. A faculty advisor from Mathematics will assist students in determining which degree program best suits their individual needs and plans. A Handbook for Mathematics and Statistics Majors, available from the Mathematics and Statistics department office or the Undergraduate Mathematics Student Organization, provides additional information on the mathematics and statistics degree programs, honors in mathematics and statistics, mathematics and statistics courses, advising and other support for students, extracurricular activities, career options, and other material of interest to potential majors. Some of the career plans for which a well-designed major in mathematics can provide ideal preparation are highlighted below. These are examples of the type of considerations which the Handbook discusses in more detail.

Teaching of Mathematics. The centrality of mathematics in a technological world requires high quality mathematics teaching in our schools. The Department of Mathematics and Statistics and the College of Education and Social Services maintain close cooperation in the area of mathematics education. A student seeking a career as a mathematics teacher in a middle or secondary school should take a rich array of mathematics courses from the areas of interest listed below. Suggested courses for prospective teachers include Math. 161, 173, 230, 251, 255, 260, 273, Statistics 151 and 211. Consult the Coordinator of Secondary School Education in the College of Education and Social Services for admission to the Secondary Education Program in CESS and for courses required for certification.

Pregraduate Training. A student intending to pursue advanced degrees in the mathematical sciences is urged to obtain a solid foundation in mathematics and include as many as possible for the courses of particular importance marked with an asterisk below, and should also consider enrolling in the junior-senior seminar (Math. 283) and writing an honors thesis (Math. 293).

Premedical Training. The mathematics major provides excellent credentials for a student who plans to apply to medical school. It is suggested that the student follow the recommendations for a special interest in Area (1), (2), or (7) below. During the first or second year, a premedical student should review catalogues of those institutions to which he or she anticipates applying. In addition, the Office of Career Development should be contacted during the student's junior year regarding the specifics of the medical school application process. Premedical students wishing to specialize more exclusively in statistics may prefer the Premedical Concentration in Statistics described below.

Areas of Special Interest within the Mathematics Major

Because of the enormous spread of mathematics, the courses offered are grouped in the following areas of special interest to assist students in planning their mathematics program. Since mathematics also has an inner unity, there is a great deal of overlap among these areas, and the boundaries among these areas are at best blurred. Selecting courses from different areas helps a student achieve breadth in the major, while focusing several courses in the same area assures a depth of concentration in the major. Courses of particular importance in an area are marked with an asterisk(*).

Recommendations for Major Courses. In consultation with their advisor, students should choose an area of interest within the mathematics major and plan a coherent program that addresses their interests in mathematics. This area might be one of those listed below, or it might be another area suggested by the student. As a guide, students interested in one of the areas would typically take at least three courses in that area, including all of the courses marked with an asterisk. In addition, students should take courses from at least two other areas. Because of its centrality in mathematics, students should make sure that they take at least one course listed under Classical Mathematics. In following these recommendations, a course listed in more than one area is meant to be counted only once.

1. **Classical Mathematics.** Classical mathematics encompasses those areas having their roots in the great traditions of mathematical thought, such as geometry and topology, mathematical analysis, algebra and number theory, and discrete mathematics, as well as the history of mathematics. Courses in this area include the following: *Math. 173, 236, 240, 241**, *242, 251**, *252, 255, 257, 260, 264, 273, 331, 353*.
2. **Applied Mathematics.** Applied Mathematics involves the use of mathematical methods to investigate problems originating in the physical, biological, and social sciences, and engineering. Mathematical modeling, coupled with the development of mathematical and computational solution techniques, illuminates mechanisms which govern the problem and allows predictions to be made about the actual physical situation. Current research interests of the faculty include biomedical mathematics, fluid mechanics and hydrodynamic stability, asymptotics, and singular perturbation theory. Courses in this area include the following: *Math. 230**, *236, 237**, *238, 240, 272, 274*.
3. **Computational Mathematics.** Computational mathematics involves both the development of new computational techniques and the innovative modification and application of existing computational strategies to new contexts where they have not been previously employed. Intensive computation is central to the solution of many problems in areas such as applied mathematics, number theory, engineering, and the physical, biological and natural sciences. Computational mathematics is often interdisciplinary in nature, with algorithm development and implementation forming a bridge between underlying mathematical results and solution of the physical problem of interest. Courses in this area include the following: *Math. 173, 230, 237**, *238, 274, Statistics 201*.
4. **Theory of Computing.** The mathematical theory of computing deals with the mathematical underpinnings allowing effective use of the computer as a tool in problem solving. Aspects of the theory of computing include: designing parallel computing strategies (graph theory), analyzing strengths and effectiveness of competing algorithms (analysis of algorithms), examining conditions which ensure that a problem can be solved by computational means (automata theory and computability), and rigorous analysis of run times (complexity theory). Courses in this area include the following: *Math. 173, 223, 224**, *243, 273, 325, Computer Science 346, 353*.
5. **Mathematics of Management.** Mathematics of Management involves the quantitative description and study of problems particularly concerned with the making of decisions in an organization. Problems are usually encountered in business, government, service industries, etc., and typically involve the allocation of resources, inventory control, product transportation, traffic control, assignment of personnel, and investment diversification. Courses in this area include the following: *Math. 173, 221**, *222, 230, 236, 273, Statistics 141 or 211, Statistics 151 or Math. 207, Statistics 224, 241, 253*.

6. **Actuarial Mathematics:** Actuaries use quantitative skills to address a variety of problems within business environments, and especially within the life insurance industry. Two professional organizations sponsor qualifying examinations and grant recognition to actuaries in the U.S. and Canada. A unique feature of the actuarial profession is that formal training is typically completed after graduation "on-the-job."

Students planning an actuarial career can prepare for and complete some actuarial examinations prior to graduation. Several departmental courses serve as preparation for the examinations: *Math. 21, 22, 121, and 124 for the first examination; Statistics 141 or 211, (Statistics 151 or Math. 207)*, and (Statistics 241 or 261)* for the second examination; Statistics 221 or 231, 225, and 253 for the third examination; Math. 221, 222, and Statistics 252b for the fourth examination; and Math. 237 for the fifth examination.*

7. **Probability and Statistical Theory.** Probabilistic reasoning is often a critical component of practical mathematical analysis or risk analysis and can usefully extend classical deterministic analysis to provide stochastic models. It also provides a basis for statistical theory, which is concerned with how inference can be drawn from real data in any of the social or physical sciences. Courses in this area include the following: *Math. 222, 241, 242, (Statistics 151 or Math. 207)*, Statistics 241*, 252a, 252b, 261, 262, 270*.

Recommendations for Allied Field Courses

Students should discuss Allied Field courses with their advisor and choose ones which complement their mathematical interests. Students with certain mathematical interests are advised to emphasize an appropriate Allied Field as indicated below and take at least six hours in courses numbered 100 or above in that field.

Applied Mathematics: Allied Field (1), (2), (3), (4), (6), or (9).

Computational Mathematics: Allied Field (4) or (5)

Mathematics of Management: Allied Field (7). Students interested in Mathematics of Management are advised to include Economics 11 and 12 in their choice of Humanities and Social Sciences courses, and to include Business Administration 60 and 61 in their choice of Allied Field courses. Those wishing to minor in Business Administration should contact the School of Business Administration and also take Business Administration 173 and two other courses chosen from Business Administration 168, 170, 174, 177, 178, 179 and 272.

Statistics

Students receiving the B.S. 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 designing surveys and experimental plans, constructing and interpreting descriptive statistics, developing and applying statistical inference procedures, and developing and investigating stochastic models or computer simulations. 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 curriculum is designed for students who plan to enter business, industry, or government as statisticians; to become professional actuaries; or to continue on to graduate school in statistics/biostatistics or another field where a quantita-

tive ability can prove valuable (business, operations research, demography, psychology, etc.). The courses and curricula are administered through the Statistics Program Steering Committee which includes faculty from Statistics, College of Medicine Biometry Facility, Physiology and Biophysics, Psychology, Natural Resources, and the Agricultural Experiment Station. Students are encouraged to undertake special projects to gain experience in data analysis, design, and statistical computing. Also, experience can be gained with local industry and other organizations for those interested in quality control, industrial statistics, survey and market research or forecasting, for example.

Further details on the Statistics major and minor curricula may be obtained from the Director of the Statistics Program.

The Handbook for Mathematics and Statistics majors, available from the Mathematics and Statistics department office, also provides a wealth of useful information.

Premedical Concentration in Statistics. Each student electing the Premedical Concentration in Statistics will fulfill the general requirements for the Statistics major. In addition, the premedical concentration should include as a minimum Chemistry 1, 2, or 11, 12, 13, 14, and 141, 142, at least one year of physics with laboratory (Physics 31 with 21, 42 with 22), and at least one year of biology with laboratory (Biology 1,2). Exposure to medical research problems will be provided through supervised experiences in the College of Medicine Biometry Facility.



The Division of Health Sciences

The Division of Health Sciences brings together several related programs: the School of Allied Health Sciences, the School of Nursing, and the College of Medicine.

The School of Allied Health Sciences

The School of Allied Health Sciences offers a variety of programs in response to social and health care needs of the community. It encourages interaction among students and faculty in meeting these needs. All programs offer clinical education experiences in a variety of appropriately approved hospitals and health facilities in Vermont and throughout the country. The academic programs are nationally accredited by the responsible agencies. Criteria for academic standards will be given to students at registration time and also are available upon request from the Dean's and departmental offices.

The Dean of the School's office is located in Rowell Building, Room 301.

ORGANIZATION

The School consists of four departments: Dental Hygiene, Medical Technology, Physical Therapy, and Radiologic Technology.

DEGREE PROGRAMS

The Bachelor of Science degree is awarded for the following programs:

Medical Technology
Physical Therapy

The Associate in Science degree is awarded for programs in:

Dental Hygiene
Nuclear Medicine Technology
Radiation Therapy Technology

DEGREE REQUIREMENTS

Requirements for admission and requirements for the degrees offered in the School are detailed under the specific areas of study which follow. All students are required to take a one-credit course in Race and Culture. The School of Allied Health Sciences reserves the right to require the withdrawal of any student from the School whose health, academic record, or performance and behavior in the professional programs is judged to be unsatisfactory.

AREAS OF STUDY

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. 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.

The dental hygiene curriculum is highly structured and the semester course loads are heavy. Students who have the opportunity and the desire to complete liberal arts and/or basic science courses prior to entering the program are encouraged to do so. Further guidance can be obtained by calling or writing to the departmental office.

| | 1st | 2nd |
|-----------------------------|----------|----------|
| FIRST YEAR | SEMESTER | |
| Dental Hygiene 1, 2 | 4 | 2 |
| Dental Hygiene 11, 12 | 3 | 3 |
| Dental Hygiene 61 | — | 2 |
| Nutritional Sci. 43 | 3 | — |
| Anatomy & Physiology 9-10 | 4 | 4 |
| Chemistry 3 | — | 4 |
| English 1 (or higher level) | 3 | — |
| Psychology 1 | — | 3 |
| Physical Education | <u>1</u> | <u>—</u> |
| | 18 | 18 |

| | 1st | 2nd |
|---------------------------|----------|----------|
| SECOND YEAR | SEMESTER | |
| Dental Hygiene 62 | — | 3 |
| Dental Hygiene 91 | 2 | — |
| Dental Hygiene 141 | 3 | — |
| Dental Hygiene 143 | 3 | — |
| Dental Hygiene 146 | — | 2 |
| Dental Hygiene 181-182 | 4 | 4 |
| Microbiology 65 | 4 | — |
| Sociology or Anthropology | — | 3 |
| Speech 11 | — | 3 |
| Elective | — | 3 |
| Allied Health 95 | <u>1</u> | <u>—</u> |
| | 17 | 18 |

A minimum of 71 approved semester hours and a grade-point average of 2.0 is required for the Associate in Science degree in this curriculum. A grade of C or better is required for all professional courses.

Medical Technology

The Department of Medical Technology offers a four-year curriculum leading to the baccalaureate degree. The program is accredited by the National Accrediting Agency for Clinical Laboratory Sciences and the Committee on Allied Health Education and Accreditation of the American Medical Association.

Requirements for admission are the same as the general University requirements, with the addition that applicants must have taken high school biology and chemistry; physics is highly recommended.

This program prepares students for careers in Clinical Laboratory Science. The primary role of the clinical laboratory scientist involves the development, performance, and evaluation of laboratory tests on body fluids. These tests are used to assess the health status of individuals and to help diagnose and treat diseases. The majority of graduates seek employment in hospital laboratories. There are numerous other career opportunities in research, biotechnology and related industries, physician and health clinics, the Armed Forces, and the Peace Corps. The curriculum provides a preparation for studies at the master's or doctoral level in the biological and medical fields. Courses in the humanities and basic sciences are taken in departments throughout the University, including the College of Medicine. The clinical laboratory experience is obtained at the Medical Center Hospital of Vermont, the VT-NH Red Cross Blood Center, and the Vermont State Laboratories.

On completion of the baccalaureate program, graduates are eligible for national certification.

Upon consultation with an advisor, students may follow an individualized curriculum that can lead to certification in one of the clinical laboratory specialties (Microbiology, Chemistry, Hematology, Immunology, or Blood Banking).

| | 1st SEMESTER | 2nd |
|-----------------------|-----------------|----------|
| FIRST YEAR | | |
| Chemistry 1-2 | 4 | 4 |
| Medical Technology 1 | 1 | — |
| Medical Technology 3 | 1 | — |
| English | 3 | — |
| Math. (by placement) | 3 | — |
| Computer Science | — | 3 |
| Medical Technology 34 | — | 3 |
| Electives | 3 | 6 |
| Physical Education | 1 | 1 |
| Allied Health 95 | <u>1</u> | <u>—</u> |
| | 17 | 17 |

| | 1st SEMESTER | 2nd |
|----------------------------|-----------------|------------|
| SECOND YEAR | | |
| Anatomy & Physiology 19-20 | 4 | 4 |
| Medical Technology 23 | 4 | — |
| Medical Technology 61 | 2 | — |
| Medical Technology 54 | — | 4 |
| Chemistry 42 | — | 4 |
| Electives | <u>6</u> | <u>3-6</u> |
| | 16 | 15-18 |

| | 1st SEMESTER | 2nd |
|-------------------|-----------------|-----|
| THIRD YEAR | | |
| Biochemistry 201 | 3 | — |
| Biochemistry 202 | 1 | — |

| | | |
|------------------------|----------|----------|
| Biochemistry 212 | — | 3 |
| Biochemistry 213 | — | 1 |
| Medical Technology 102 | — | 2 |
| Medical Technology 242 | — | 4 |
| Microbiology 222 | 4 | — |
| Pathology 101 | 3 | — |
| Statistics 111 or 141 | — | 3 |
| Electives | <u>6</u> | <u>3</u> |
| | 17 | 16 |

| | 1st SEMESTER | 2nd |
|------------------------------------|-----------------|----------|
| FOURTH YEAR | | |
| Medical Technology 220,230,250,260 | 2.5-4 | 2.5-4 |
| Medical Technology 231 | 3 | — |
| Medical Technology 255 | 3 | — |
| Medical Technology 222 | — | 3.5 |
| Medical Technology 262 | — | 3 |
| Medical Technology 295 | 3 | — |
| Medical Technology 296 | — | 2 |
| Medical Technology 293 | 1 | — |
| Elective | <u>3</u> | <u>3</u> |
| | 15.5-17 | 14-15.5 |

A minimum of 127 semester credit hours including two credit hours of physical education, an overall grade-point average of 2.0, and a 2.0 GPA in professional courses are required for graduation.

Departmental Honors. A student of at least junior standing whose minimum grade-point average is 3.0 in professional and basic science courses and who demonstrates a keen interest in Medical Technology is eligible for invitation by the faculty to participate in the departmental honors program. Students who accept the invitation will select a course of work from one of these possible options: participation in at least two senior level specialty seminars with a comprehensive exam, completion of an independent research project, or completion of an independent reading thesis. Excellent and committed work will be required for a student to be granted Departmental Honors.

Option: Cytotechnology The Department of Medical Technology, in cooperation with the School of Cytotechnology at the Medical Center Hospital of Vermont, offers a baccalaureate curriculum with specialization in Cytotechnology. Cytotechnology involves the diagnosis of human disease through microscopic study of cells. The primary function of a cytotechnologist is to prepare and evaluate a variety of cellular samples for the presence of cancer and precancerous lesions. The program is accredited by the Committee on Allied Health Education and Accreditation of the American Medical Association.

Requirements for admission are the same as those for the medical technology curriculum. Admission to the University does not guarantee acceptance into the MCHV School of Cytotechnology. A separate application process for the senior year is required during the junior year. On completion of the baccalaureate program, graduates are eligible to take the national certification exam.

The minimum requirements for the first three years at the University include 20 semester hours of biological science, eight semester hours of chemistry, and three semester hours of mathematics. Students may follow the medical technology curriculum with appropriate substitutions or may satisfy the requirements through other majors. Recommended biological science courses include a combination of the following: general biology, anatomy-physiology, genetics, microbiology, histology, parasitology, cell biology, and embryology.

| | 1st | 2nd |
|-------------------------------|----------|-----|
| FOURTH YEAR | SEMESTER | |
| Medical Cytology I-II Lecture | 4 | 4 |
| Medical Cytology I-II Lab | 3 | 3 |
| Cytology Seminar | 2 | 1 |
| Cytology Term Project | 2 | 1 |
| Laboratory Techniques | 3 | — |
| Cytology Practicum | — | 10 |
| | 14 | 19 |

A minimum of 33 credit hours in the senior year and a total of 127 credit hours are required for the B.S. degree.

Physical Therapy

The Department of Physical Therapy offers a four-year curriculum leading to a Bachelor of Science degree. The program is accredited by the Commission on Accreditation in Physical Therapy Education, American Physical Therapy Association.

In the first and sophomore years of the Physical Therapy program, students will concentrate on the necessary prerequisite courses 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.

| | 1st | 2nd |
|--------------------------|----------|-------|
| FIRST YEAR | SEMESTER | |
| Psychology 1 + | 3 | — |
| Biology 1 or 2 + | 4 | — |
| Chemistry | 4 | 4 |
| Math. (by placement) | 3 | — |
| English (by placement) + | — | 3 |
| Psych. 152 or elective | — | 3 |
| Elective (required) + | 3 | — |
| Physical Education | 1 | 1 |
| Elective (optional) + | — | — |
| Allied Health 95 | — | 1 |
| | 15/18 | 15/18 |

*Optional/Advisor

‡If Psych. 1 is taken in the first semester.

+First or second semester.

| | 1st | 2nd |
|----------------------|----------|-----|
| SECOND YEAR | SEMESTER | |
| Physics 11 | 4 | — |
| Physics 12 | — | 4 |
| Anatomy 201 | 5 | — |
| Physiology 101 | — | 4 |
| Physical Therapy 41 | 3 | — |
| Physical Therapy 120 | — | 6 |
| Elective* | — | — |
| Education/ECHD 80-81 | 3 | 3 |
| | 15 | 17 |

*Optional/Advisor

| | 1st | 2nd |
|--------------------------|----------|-----|
| THIRD YEAR | SEMESTER | |
| Anatomy 202 | 3 | — |
| Physiology 102 | 4 | — |
| Pathology 101 | 3 | — |
| Physical Therapy 121-122 | 3 | 3 |
| Physical Therapy 124 | — | 5 |
| Physical Therapy 126 | — | 2 |

| | | |
|--------------------------|----|----|
| Physical Therapy 131-132 | 2 | 2 |
| Physical Therapy 175* | — | — |
| Physical Therapy 143-144 | 1 | 2 |
| Statistics III | — | 3 |
| | 16 | 17 |

*Optional/Advisor

THIRD-YEAR SUMMER PROGRAM (Mid-May-June)

| | | |
|---------------------------------------|---|--|
| Physical Therapy 156 (Clinical Educ.) | 3 | |
|---------------------------------------|---|--|

| | 1st | 2nd |
|-----------------------------|----------|-----|
| FOURTH YEAR | SEMESTER | |
| Physical Therapy 127 | 5 | — |
| Psychology 152† or elective | 3 | — |
| Physical Therapy 133 | 3 | — |
| Pharmacology 190 | — | 2 |
| Physical Therapy 158 | — | 6 |
| Physical Therapy 145-146 | 2 | 2 |
| Physical Therapy 176 | — | 3 |
| Electives* | — | — |
| | 13 | 13 |

*Optional/Advisor

†If not previously taken.

A minimum of 124 credits are required for graduation, to include six credits in the humanities and 21 credits in behavioral and social sciences (including statistics and research methodology).

A minimum grade-point average of 2.0 is required for the baccalaureate degree in this curriculum. The minimum grade required in a professional course is C-. 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 (PT 156, PT 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 U.S. but focused in the Northeast. 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. All students in the program are required to carry professional liability insurance prior to enrolling in clinical education experience. 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.

Radiologic Technology

The Department of Radiologic Technology offers two 24-month programs leading to the Associate in Science degree.

Nuclear Medicine Technology Program: Preparation for a career in working with radioactive drugs and complex equipment for diagnosing patient problems.

Radiation Therapy Technology Program: Preparation for a career in operating high energy radiation machines for treating cancer patients.

During the semester, students obtain direct patient care experiences 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.

Both programs are accredited by the American Medical Association and graduates are eligible to write the national registry and certification examination.

Interested persons should write directly to the Radiologic Technology Department in the Rowell Building for additional information, interview, and tour of clinical facilities.

Nuclear Medicine Technology

| | 1st | 2nd |
|--|----------|-----|
| FIRST YEAR | SEMESTER | |
| Anatomy & Physiology 9-10 | 4 | 4 |
| Math. 9 (or higher) | 3 | — |
| Physical Education | 1 | — |
| Radiologic Tech. 6 | 2 | — |
| Radiologic Tech. 31, 32 | 1 | 3 |
| Radiologic Tech. 33, 34 | 1 | 1 |
| English | — | 3 |
| Radiologic Tech. 4 | 3 | — |
| Computer Science 2, 3, or 11 or Statistics 11 or Voc. Ed. & Tech. 85 | — | 3 |
| Distribution | — | 3 |
| | 15 | 17 |

SUMMER SESSION

| | |
|---------------------|---|
| Radiologic Tech. 77 | 3 |
|---------------------|---|

| | 1st | 2nd |
|---------------------------|----------|-----|
| SECOND YEAR | SEMESTER | |
| Chemistry 3 | 4 | — |
| Distribution | — | 3 |
| Radiologic Tech. 131, 132 | 5 | 3 |
| Radiologic Tech. 133, 134 | 3 | 3 |
| Speech 11 | 3 | — |
| Radiologic Tech. 142 | — | 2 |
| Electives | — | 2 |
| Allied Health 95 | 1 | — |
| | 16 | 13 |

SUMMER SESSION

| | |
|----------------------|---|
| Radiologic Tech. 177 | 3 |
|----------------------|---|

Radiation Therapy Technology

| | 1st | 2nd |
|--|----------|-----|
| FIRST YEAR | SEMESTER | |
| Anatomy & Physiology 9-10 | 4 | 4 |
| Math. 9 or higher | 3 | — |
| Physical Education | — | 1 |
| Radiologic Tech. 6 | 2 | — |
| Radiologic Tech. 21, 22 | 2 | 2 |
| Radiologic Tech. 23, 24 | 1 | 1 |
| English | — | 3 |
| Radiologic Tech. 4 | 3 | — |
| Radiologic Tech. 26 | — | 1 |
| Computer Science 2, 3, or 11 or Statistics 11 or Voc. Ed. & Tech. 85 | — | 3 |
| | 15 | 15 |

SUMMER SESSION

| | |
|---------------------|---|
| Radiologic Tech. 77 | 3 |
|---------------------|---|

| | 1st | 2nd |
|---------------------------|----------|-----|
| SECOND YEAR | SEMESTER | |
| Speech 11 | 3 | — |
| Radiologic Tech. 121, 122 | 3 | 4 |
| Radiologic Tech. 123, 124 | 3 | 3 |
| Radiologic Tech. 125 | 3 | — |
| Electives | 2 | 1 |
| Distribution | 3 | 3 |
| Allied Health 95 | — | 1 |
| Radiologic Tech. 142 | — | 2 |
| | 17 | 14 |

SUMMER SESSION

| | |
|----------------------|---|
| Radiologic Tech. 177 | 3 |
|----------------------|---|

DISTRIBUTION (at least one three-credit course from two of the following categories).

- A. Art, film, music, theatre
- B. Classics, French, German, Greek, Latin, Russian, Spanish
- C. History, philosophy, political science, religion
- D. Anthropology, economics, geography, psychology, sociology
- E. Business Administration, education, environmental studies, forestry, human nutrition, military studies, social work

A minimum of 61 approved semester hours (not including RT 77) 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 in Science degree in this curriculum. An average grade of C- is required for Anatomy and Physiology 9-10.

CLINICAL AFFILIATIONS

NUCLEAR MEDICINE TECHNOLOGY

Hartford Hospital, Hartford, CT
Maine Medical Center, Portland, ME
Mary Hitchcock Medical Center, Hanover, NH
Medical Center Hospital of Vermont, Burlington, VT
Winchester Memorial Hospital, Winchester, MA

RADIATION THERAPY TECHNOLOGY

Elliot Hospital, Manchester, NH
Mary Hitchcock Medical Center, Hanover, NH
Massachusetts General Hospital, Boston, MA
Medical Center Hospital of Vermont, Burlington, VT

Note: The above list of clinical affiliations is subject to change.

The School of Nursing

The School of Nursing offers two undergraduate educational programs and a graduate program 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 two-year Technical Nursing program 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., the national accrediting agency for schools of nursing. Graduates of both programs are eligible to apply for registered nurse licensure.

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 year's course in chemistry and one in biology are required and one additional year of science in the senior year is highly recommended. For the Associate in Science degree program, a high school course in biology is required and chemistry is highly recommended.

Hepatitis B immunization is strongly recommended at the beginning of the clinical experience. It will be available through the Student Health Center for a fee.

Financial Aid is available in the form of scholarships, loans, prizes, and employment (see section on Financial Aid).

The offices of the School of Nursing are located in the Rowell Building.

ORGANIZATION

The School has two undergraduate departments: Professional Nursing and Technical Nursing. The graduate program in nursing is administered by the Department of Professional Nursing.

DEGREE PROGRAMS

The Bachelor of Science degree is awarded in Professional Nursing (four-year program). (See Graduate College Catalogue for information on the Master of Science Degree.)

The Associate in Science degree is awarded in Technical Nursing (two-year program).

DEGREE REQUIREMENTS

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; the Burlington Visiting Nurse Association, Inc.; Vermont State Hospital in Waterbury; and other selected agencies in the Burlington, Middlebury, and St. Albans areas. Seniors in the baccalaureate program are responsible for providing transportation which may be required during their participation in community health nursing experiences in the senior year.

AREAS OF STUDY

Professional Nursing

The curriculum leading to the baccalaureate degree is designed to prepare qualified students to provide quality nursing care to individuals of all ages in a variety of settings including hospitals, extended care facilities, and community health agencies such as schools, home health agencies, or occupational health services. The required courses in the humanities and social sciences complement the preparation for nursing as well as contribute to a well-rounded

education. Graduates are eligible to apply for licensure as registered nurses and have the foundation for continued formal study in nursing, at the master's and doctoral levels.

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 127 approved semester hours is required for the Bachelor of Science degree. A grade of C or better is required in Professional Nursing 25, 26, 125-126, 128, 225, 226, 251, and 252.

Students are encouraged to become certified in cardiopulmonary resuscitation (CPR) prior to admission. They are required to present evidence of current CPR certification prior to the clinical component of PRNU 26 and to maintain certification through the remainder of the program.

A typical program of studies follows:

| | 1st | 2nd |
|--------------------|----------|----------|
| FIRST YEAR | SEMESTER | |
| English | 3 | 3 |
| Psychology 1 | — | 3 |
| Chemistry 3, 4 | 4 | 4 |
| Sociology 1 or 11 | 3 | — |
| Speech 11 | 3 | — |
| Electives | 3 | 6 |
| Physical Education | <u>1</u> | <u>1</u> |
| | 17 | 17 |

| | 1st | 2nd |
|-------------------------------|----------|----------|
| SECOND YEAR | SEMESTER | |
| Education/ECHD 80, 81 | 3 | 3 |
| Microbiology/Microgenetics 65 | 4 | — |
| Anatomy & Physiology 19-20 | 4 | 4 |
| Professional Nursing 25 | — | 2 |
| Professional Nursing 26 | — | 4 |
| Nutritional Sci. 43 | 3 | — |
| Electives | <u>3</u> | <u>3</u> |
| | 17 | 16 |

| | 1st | 2nd |
|--------------------------|----------|----------|
| THIRD YEAR | SEMESTER | |
| Professional Nursing 125 | 9 | — |
| Professional Nursing 126 | — | 9 |
| Professional Nursing 128 | 3 | — |
| Electives | <u>3</u> | <u>6</u> |
| | 15 | 15 |

| | 1st | 2nd |
|--------------------------|----------|----------|
| FOURTH YEAR | SEMESTER | |
| Professional Nursing 225 | 9 | — |
| Professional Nursing 226 | — | 9 |
| Professional Nursing 251 | 3 | — |
| Professional Nursing 252 | — | 6 |
| Elective | <u>3</u> | <u>—</u> |
| | 15 | 15 |

In addition to the general education courses found in the curriculum outline, specific courses in general education are required and additional courses are elected in accordance with individual needs and interest in consultation with the faculty advisor. These are:

Social Sciences — 15 credits, to include:

Psychology 1 and Sociology 1 or 11

Humanities and Languages — 15 credits, to include:

English — six credits

Philosophy or Religion — three credits

Speech 11 — three credits

Humanities Elective – three credits
 General Electives – 12 credits
 Physical Education – two 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 first year.

Technical Nursing

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 who have common well-defined health problems, such as an illness or injury, and to promote development of the individual as a responsible member of society. The graduates of the 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 64 approved semester hours is required for the Associate in Science degree. A grade of C– or better is required in Anatomy and Physiology 19-20, and a grade of C or better in Technical Nursing 15-16, 123-124, and 130.

At the beginning of the second year, students are required to present proof of current CPR certification.

A typical program of studies follows:

| | 1st | 2nd |
|-------------------------------|----------|-----|
| FIRST YEAR | SEMESTER | |
| English 1 or English Elective | – | 3 |
| Human Development/ECHD 80, 81 | 3 | 3 |
| Anatomy & Physiology 19-20 | 4 | 4 |
| Nutritional Sci. 43 | 3 | – |
| Technical Nursing 15-16 | 6 | 6 |
| Physical Education* | – | 1 |
| | 16 | 17 |
| | 1st | 2nd |
| SECOND YEAR | SEMESTER | |
| Sociology (Intro. Level) *** | 3 | – |
| Approved Elective** | 3 | – |
| Free Elective | – | 3 |
| Technical Nursing 123-124 | 10 | 10 |
| Technical Nursing 130 | – | 2 |
| | 16 | 15 |

*Physical Education: One credit during the two years.

**Any social science, mathematics, or humanities course.

***Any Sociology under 100.

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 UVM. In accord with University policy, the student may apply for transfer credits or credits by examination in general education, sciences, 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 LICENSED PRACTICAL NURSES

Students who are licensed practical nurses are eligible for advanced standing in nursing. Students who have successfully challenged TENU 15-16 will complete the remaining credits (three) in the first-year nursing course during the summer. Advanced standing may be earned in nine of the twelve credits in TENU 15-16.

OPPORTUNITIES FOR REGISTERED NURSES

The advanced standing policies outlined 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 program. The alternate track allows the registered nurse student the opportunity to complete the program on a part-time basis and requires completion of the program within six years of admission.

College of Medicine

Information on admission and curriculum may be obtained in the catalogue of the College of Medicine which is available in the offices of the Dean in the Given Medical Building.



The School of Natural Resources

The School of Natural Resources is actively committed to diversity: biodiversity in natural communities and cultural diversity in human communities. A major goal of the School is to develop men and women as leaders in the stewardship of renewable natural resources — our forests, wildlife, fish, water, and land. Academic programs provide the scientific and philosophical bases for addressing critical issues in the use of these resources for commerce, recreation, and conservation. All areas of study require a foundation in communications; arts and humanities; social and natural sciences; and mathematics, statistics, and computer science.

An Honors Program is open to qualified juniors and seniors. Honors students undertake advanced studies in an environment that encourages original thought and creativity. Their projects provide valuable experience in designing, implementing, and reporting results of research.

Individual and professional responsibility, as well as scholastic excellence, are emphasized within the School's supportive atmosphere. The relationship of students and advisors is of central importance to this atmosphere. Faculty members are conscientious academic advisors and students communicate frequently with them for guidance in clarifying educational, career, and personal goals.

The School's academic programs and course scheduling are designed to accommodate transfer students and those undecided about an undergraduate major. While the School's academic programs prepare students for professional positions in natural resources, graduates are also well prepared to pursue careers or advanced study in other professions.

Classes are held in the George D. Aiken Center for Natural Resources. The Center houses innovative teaching facilities, as well as modern laboratories equipped for research in tree physiology and genetics, wildlife and fisheries biology, water resources, forest pathology, remote sensing, natural resource planning, and outdoor recreation and tourism. The School's computer facilities support sophisticated geographic mapping and information systems. Many courses in the School incorporate extensive outdoor laboratory experiences. Students also have the opportunity to participate in faculty research or independent study.

The Office of the Dean of the School is located in the George D. Aiken Center for Natural Resources.

ORGANIZATION

The School includes academic programs in Environmental Studies, Forestry, Natural Resources, Natural Resources Planning, Recreation Management, Resource Economics, Water Resources, and Wildlife and Fisheries Biology. In addition, the Vermont Water Resources and Lake Studies Center, the Natural Resources Extension Unit, and the Vermont Cooperative Research Unit of the U.S. Fish and Wildlife Service are housed within the School.

DEGREE PROGRAMS AND OPTIONS

The Bachelor of Science degree is awarded for the following programs:

Environmental Studies — Natural Resources
Natural Resources
Aquatic Resources

Integrated Natural Resources
Terrestrial Ecology
Forestry
Forest Biology
Forest Management
Urban Forestry and Landscape Horticulture
Recreation Management
Private Outdoor Recreation and Tourism
Public Outdoor Recreation
Resource Economics
Wildlife and Fisheries Biology
Wildlife Biology
Fisheries Biology

Students interested in studying natural resources, but who wish to postpone their decision on a specific major, enroll in *Undecided-NR*.

DEGREE REQUIREMENTS

- A. University-wide: 120 credit hours, including two credits of physical education activities, with a cumulative grade-point average of 2.0 or above.
- B. School-wide: SNR core, including eight courses in natural resources; ten courses in distribution requirements; and one course in Race and Culture.
- C. Program or Major: Further requirements as specified in the following sections.

SNR CORE CURRICULUM

The SNR core curriculum is a four-year sequence which provides a common experience for all SNR students. Its dual focus on the biological and social sciences reflects the faculty's conviction that integration and interaction of disciplines will be a key characteristic of future developments in the field of natural resources.

| | |
|---|----|
| Nat. Res. 1, Ecological Aspects of Nat. Res. Conservation | 4 |
| Nat. Res. 40, The American Wilderness | 3 |
| Nat. Res. 25, Elementary Nat. Res. Measurements and Mapping | 4 |
| Forestry 120, Forest Ecology | 3 |
| Nat. Res. 102, Water as a Nat. Res. | 3 |
| Wildlife & Fish. Biol. 174, Principles of Wildlife Mgmt. | 3 |
| Env. Studies 290, Environmental Policy | 3 |
| Nat. Res. 272, Assessing Env. Impact | 4 |
| Total Credit hours | 27 |

Notes: Environmental Studies-SNR majors select a minimum of nine credits from the SNR core curriculum. Urban Forestry and Landscape Horticulture majors may substitute Nat. Res. 235 for Env. Studies 290.

DISTRIBUTION REQUIREMENTS

To extend the student's general background, 11 elective courses are required in six areas:

1. Arts and Humanities (two courses)

| | |
|--------------------|------------------|
| Art | Foreign language |
| Classics | Philosophy |
| English literature | Music |
| History | Religion |
| Theatre | |

2. Communications (two courses, including one in English composition and one emphasizing oral communication)
3. Mathematics, Statistics, or Computer Science (two courses)
4. Natural Sciences (two courses, one of which must be a lab science)

| | |
|------------------|------------------------|
| Biology | Plant and Soil Science |
| Botany | 125 or 161 |
| Chemistry | Physics |
| Forestry 3 or 21 | Zoology |
| Geology | |
5. Social Sciences (two courses, including *either* Economics 12 or Agricultural and Resource Economics 61)

| | |
|-------------------|--------------------|
| Anthropology | Sociology |
| Economics | Resource Economics |
| Geography | Psychology |
| Political Science | |
6. A one-credit course in Race and Culture.

Except for the Race and Culture requirement, distribution electives must be three- or four-credit hour courses.

Environmental Studies

The major in Environmental Studies is an individually-designed interdisciplinary program. Continuation in the major (regardless of declared major at the time of admission to UVM) requires submission of an application to the Environmental Program, approval of the Director, and successful completion of Environmental Studies 151. The major requires completion of 120 credit hours, including seven required courses in Environmental Studies, three courses selected from the SNR core curriculum, 11 elected distribution courses, and at least 24 credit hours of intermediate or advanced environmentally-related courses approved by the student's advisor. For additional information, see page 41.

Environmental Studies Major

| | Credit Hours |
|--|--------------|
| ENVS 1, Introduction to Environmental Studies | 4 |
| ENVS 2, International Environmental Studies | 4 |
| ENVS 100, Environmental Theory | 3 |
| *ENVS 151, Intermediate Environ. Studies | 3 |
| ENVS 201, Research Methods | 3 |
| ENVS 204, Seminar in Environmental Studies | 3 |
| Individually-Designed Program (24 hours of intermediate or advanced environmentally-related courses.) | 24+ |
| ENVS 202, Senior Project and Thesis (Research or action project planned in Environmental Studies 201. Actual credit arranged in consultation with thesis advisors.) | 6+ |
| Electives, distribution requirements, and three courses selected from SNR core | 60+ |
| Physical Education Activities | 2 |
| Total Credit Hours | 120+ |

*Requires application to Director for evaluation of qualifications to continue as a major in Environmental Studies. If not approved, the student must seek another major.

Environmental Studies Minor The minor in Environmental Studies requires completion of 17 semester hours:

- ENVS 1, Introduction to Environmental Studies
 ENVS 2, International Environmental Studies
 ENVS 100, Environmental Theory
 ENVS 204, Seminar in Environmental Studies

An additional course in Environmental Studies (ENVS) numbered above 100 (except ENVS 191).

Forestry

The Forestry Program provides a challenging, and personalized educational experience that leads to a Bachelor of Science degree and is designed for students interested in the study, wise use, and protection of forests and related resources. Program objectives are: (1) to provide a stimulating and sound basic education in natural resources that prepares individuals to contribute in a diverse global society; (2) to allow specialization in the areas of forest biology, forest management, or urban forestry; and (3) to provide a general forestry education for students enrolled in other curricula and for the community at large. To meet these objectives, the Forestry Program offers three academic options plus a minor. The three options are: Forest Biology, Forest Resource Management, and Urban Forestry and Landscape Horticulture.

The **Forest Biology** option provides a basic understanding of the structure, function, dynamics, and conservation of forest ecosystems and an appreciation for the possible impacts of environmental pollutants on long-term forest health. Based on a strong foundation in the biological sciences coupled with curricular flexibility, the Forest Biology option permits students to concentrate advanced course work in specialized areas such as environmental biology, forest and wildlife ecology, or molecular biology. Students may earn academic credit or receive payment for research in modern laboratories equipped for sophisticated studies of forest genetics, pathology, tree physiology, and water quality. They also may conduct field research on the ecology of plants and animals in nearby forests and wetlands. Opportunities for summer employment are readily available. This curriculum is excellent preparation for a diversity of careers. Graduates may work as natural resource professionals in government agencies, municipalities, and private enterprises; others may choose occupations outside natural resources, such as secondary school educators in both biological and natural sciences, or computer scientists; still others may continue their education to the master's or Ph.D. level. A minimum of 126 credit hours in core and elective courses is required for the Bachelor of Science degree.

| | 1st SEMESTER | 2nd SEMESTER |
|--|--------------|--------------|
| FIRST YEAR | | |
| Nat. Res. 1, Ecol. Aspects of Nat. Res. Conservation | 4 | — |
| Chemistry 3, General Chemistry | 4 | — |
| Chemistry 42, Organic Chemistry | — | 4 |
| Geology 1, Intro. Geology | — | 4 |
| English 1, 50 or 53, Writing | 3 | — |
| Math. 19, Calculus I | 3 | — |
| Nat. Res. 40, American Wilderness | — | 3 |
| Speech 11, 96, or Theatre 5 | — | 3 |
| Race and Culture course | 1 | — |
| Physical Education Activity | 1 | 1 |
| | 16 | 15 |
| SOPHOMORE YEAR | | |
| Nat. Res. 25, Measurement & Mapping | 4 | — |
| Biology 1, 2, Principles of Biol. | 4 | 4 |
| Forestry 21, Dendrology | 4 | — |
| Forestry 120, Forest Ecology | — | 3 |
| Forestry 121, Forest Ecology Lab | — | 1 |
| Nat. Res. 140, Nat. Res. Biostat. | — | 4 |
| Electives ^{1,2,3} | 3 | 3 |
| | 15 | 15 |

SUMMER FIELD PROGRAM

| | | |
|---|----------|----------|
| Forestry 122, Forest Ecosystem Analysis | 4 | |
| | 1st | 2nd |
| | SEMESTER | |
| JUNIOR YEAR | | |
| Wildlife & Fish. Biol. 174., Prin. of Wildlife Mgmt. | 3 | — |
| Physics 11, Elem. Physics | 3 | — |
| Physics 21, Intro. Lab | 1 | — |
| Econ. 12 or Ag. and Res. Ec. 61 | — | 3 |
| Biology 102, Environmental Biol. | 4 | — |
| Nat. Res. 102, Water as a Nat. Res. | — | 3 |
| Forestry 225, Tree Structure and Function | — | 3 |
| Electives ^{1,2,3} | <u>4</u> | <u>7</u> |
| | 15 | 16 |

SENIOR YEAR

| | | |
|--------------------------------------|----------|-----------|
| Forestry 123, Silviculture | 4 | — |
| Env. Studies 290, Env. Policy | 3 | — |
| Nat. Res. 272, Assessing Env. Impact | — | 4 |
| Electives ^{1,2,3} | <u>9</u> | <u>10</u> |
| | 16 | 14 |

¹Select either Computer Science 2, 3, or 11 or Voc. Ed. and Tech. 85, Microcomputer Applications.

²Must complete two courses in the arts and humanities, and one other course in the social sciences.

³Must complete a minimum of 15 credit hours selected from courses listed below; with permission, other courses may be substituted; in consultation with their advisors, students should carefully select courses to develop strengths in their particular field(s) of interest: Forestry 124, 126, 133, 134, 205, 221, 229, 231; Wildlife & Fish. Biol. 130, 131, 271, 273, 275; Biology 101, 103, 203; Botany 108, 109, 132, 152, 205, 213, 241, 256, 257; Ag. Biochem. 201, 202, 206, 220, 221, 230, 250; Zoology 202, 270; Microbiol. 220.

The **Forest Resource Management** option, accredited by the Society of American Foresters, emphasizes the application of basic ecological, economic, and management principles to the wise use of forest resources. The curriculum encompasses forest biology and ecology, economics, policy, management, and business. There is extensive field instruction on forest land near the University. Students also take advantage of Vermont's entire system of public forests and parks, including the Green Mountain National Forest. Forest Resource Management students readily find seasonal employment with the Forest Service, private consultants, or forest industry. Graduates are employed as federal or state foresters, in industrial forestry, in consulting forestry, or in education. Many obtain graduate degrees in forestry, business, or other closely aligned fields. A minimum of 126 credit hours in core and elective courses is required for the Bachelor of Science degree.

| | | |
|--|----------|----------|
| | 1st | 2nd |
| | SEMESTER | |
| FIRST YEAR | | |
| Nat. Res. 1, Ecol. Aspects of Nat. Res. Conservatiuon | 4 | — |
| Geology 1, Intro. Geology | — | 4 |
| English 1, 50 or 53, Writing | 3 | — |
| Math. 19, Calculus 1 | 3 | — |
| Chemistry 3, General Chemistry | 4 | — |
| Nat. Res. 40, American Wilderness | — | 3 |
| Speech 11, 96, or Theatre 5 | — | 3 |
| Physical Education Activity | 1 | 1 |
| Race and Culture course | 1 | — |
| Electives ^{1,2,3} | <u>—</u> | <u>4</u> |
| | 16 | 15 |

SOPHOMORE YEAR

| | | |
|--|----------|----------|
| | 1st | 2nd |
| | SEMESTER | |
| Nat. Res. 25, Measurement & Mapping | 4 | — |
| Forestry 21, Dendrology | 4 | — |
| Biology 1, 2, Principles of Biol. | 4 | 4 |
| Economics 11 and either Economics 12 or Ag. and Res. Ec. 61 | 3 | 3 |
| Forestry 120, Forest Ecology | — | 3 |
| Forestry 121, Forest Ecology Lab | — | 1 |
| Nat. Res. 140, Nat. Res. Biostat. | <u>—</u> | <u>4</u> |
| | 15 | 15 |

SUMMER FIELD PROGRAM

| | | |
|---|----------|-----------|
| Forestry 122, Forest Ecosystem Analysis | 4 | |
| | 1st | 2nd |
| | SEMESTER | |
| JUNIOR YEAR | | |
| Forestry 123, Silviculture | 4 | — |
| Forestry 153, Forest Finance | 1 | — |
| Wildlife & Fish. Biol. 174, Principles of Wildlife Mgmt. | 3 | — |
| Forestry 146, Remote Sensing of Forest Resources | — | 3 |
| Nat. Res. 102, Water as a Nat. Res. | — | 3 |
| Electives ^{1,2,3} | <u>8</u> | <u>10</u> |
| | 16 | 16 |

SENIOR YEAR

| | | |
|--------------------------------------|----------|-----------|
| | 1st | 2nd |
| | SEMESTER | |
| Env. Studies 290, Env. Policy | 3 | — |
| Forestry 272, Forest Mgmt. | 4 | — |
| Nat. Res. 272, Assessing Env. Impact | — | 4 |
| Electives ^{1,2,3} | <u>8</u> | <u>10</u> |
| | 15 | 14 |

¹Select either Computer Science 2, 3, or 11 or Voc. Ed. and Tech. 85, Microcomputer Applications.

²Must complete two courses in the arts and humanities.

³Must complete a minimum of 16 credit hours from the courses listed below, including:

- One course in forest protection: Forestry 133, 134, or 231.
- One course in forest utilization: Forestry 162 or 163.
- One course in business management: Bus. Admin. 17, 60, 120, 150, 166, 167, 168; Ag. and Res. Ec. 166, 167 or 168.
- One course in economic and policy science: Ag. and Res. Ec. 162; Economics 101, 102, 116; ENVS 293; Forestry 155, 157, 252, 254; Nat. Res. 235, 275; Political Sci. 141, 161; Res. Ec. 121 or 222.
- One course in Forestry at the 100-level or above, with a minimum of two credits, not used to meet any other requirement.

The **Urban Forestry and Landscape Horticulture** option integrates landscape design, plant sciences, business, and liberal arts to produce professionals qualified to design for and manage plants in the urban environment. The program is administered jointly by the School of Natural Resources and the College of Agriculture and Life Sciences. Students are encouraged to participate in internships which provide valuable work experience and professional contacts. Graduates have excellent career opportunities as landscape designers, landscape contractors, nursery managers, arborists, garden center managers, nursery plant sales personnel, park superintendents, public grounds supervisors, city foresters, or city horticulturists. This option is excellent for students wishing to pursue graduate education in landscape architecture. A minimum of 122 credit hours in core and elective courses is required for the Bachelor of Science degree.



| | 1st SEMESTER | 2nd SEMESTER |
|---|-----------------|-----------------|
| FIRST YEAR | | |
| Nat. Res. 1, Ecol. Aspects of Nat. Res. Conservation | 4 | — |
| Plant & Soil Sci. 7, Intro. to Urban Forestry & Landscape Horticulture | 1 | — |
| English 1, 50 or 53, Writing | 3 | — |
| Nat. Res. 40, American Wilderness | — | 3 |
| Botany 4, Intro. to Botany | — | 4 |
| Chemistry 3, General Chemistry | — | 4 |
| Speech 11, 96, or Theatre 5 | 3 | — |
| Physical Education Activity | 1 | 1 |
| Race and Culture course | 1 | — |
| Electives ^{1,2,4} | <u>3</u> | <u>3</u> |
| | 16 | 15 |

| | 1st SEMESTER | 2nd SEMESTER |
|---|-----------------|-----------------|
| SOPHOMORE YEAR | | |
| Nat. Res. 25, Measurement & Mapping | 4 | — |
| Plant & Soil Sci. 161, Intro. Soil Sci. | 4 | — |
| Forestry 3, North American Trees or Forestry 21, Dendrology | 3(4) | — |
| Forestry 120, Forestry Ecology | — | 3 |
| Forestry 121, Forest Ecology Lab | — | 1 |
| Plant & Soil Sci. 162, Soil Fertility & Mgmt. | — | 3 |
| Botany 104, Plant Physiology or Forestry 225, Tree Structure and Function | — | 3(4) |
| Electives ^{1,2,3,4} | <u>3(4)</u> | <u>4-5</u> |
| | 15 | 15 |

| | 1st SEMESTER | 2nd SEMESTER |
|--|-----------------|-----------------|
| JUNIOR YEAR | | |
| Forestry 133, Forest Entomology | 3 | — |
| Plant & Soil Sci. 145, Turfgrasses | 3 | — |
| Plant & Soil Sci. 131, Landscape Design I | 3 | — |
| Nat. Res. 102, Water as a Nat. Res. | — | 3 |
| Plant & Soil Sci. 125, Woody Landscape Plants | 4 | — |
| Plant & Soil Sci. 132, Landscape Design II | — | 3 |
| Forestry 134, Forest Pathology | — | 4 |
| Ag. and Res. Ec. 61, Princ. of Ag. and Res. Ec. | — | 3 |
| Electives ^{2,3,4} | <u>3</u> | <u>3</u> |
| | 16 | 16 |

| | 1st SEMESTER | 2nd SEMESTER |
|--|-----------------|-----------------|
| SENIOR YEAR | | |
| Wildlife & Fish. Biol. 174, Prin. of Wildlife Mgmt. | 3 | — |
| Nat. Res. 235, Legal Aspects of Planning and Zoning | 3 | — |
| Forestry 176, Urban Forestry | 3 | — |
| Voc. Ed. & Tech. 2, General Shop | 3 | — |
| Nat. Res. 272, Assessing Env. Impact | — | 4 |
| Electives ^{2,3,4} | <u>3</u> | <u>10</u> |
| | 15 | 14 |

¹Select either Math. 10, 19 or 21, or a course in Statistics. Students not having Trigonometry in high school should also take Math. 2.

²Select either Computer Science 2, 3, or 11, or Voc. Ed. & Tech. 85.

³Select either Ag. and Res. Ec. 166, or Bus. Admin. 120.

⁴Must complete two courses in the arts and humanities and one other course in the social sciences.

Forestry Minor This minor is designed to provide a basic understanding of forest resources for students not majoring

in Forestry. Applications are available from the Forestry program office and must be filed no later than June 1 of the year preceding the student's graduation. A minimum of 18 credit hours, selected from the list below, is required:

1. Required courses: Forestry 3 or 21, 120 and 123.
2. Select a minimum of three additional Forestry courses (but not both 1 and 73).

Natural Resources

The Natural Resources curriculum provides a strong basic education that draws from the traditional disciplines. It provides a contemporary, holistic framework that complements traditional natural resources curricula. Students may concentrate studies in *Aquatic Resources*, *Terrestrial Ecology*, or *Integrated Natural Resources*.

All students who enroll in the Natural Resources curriculum must meet the following requirements for graduation:

1. Completion of the SNR core curriculum courses.
2. Completion of the SNR distribution course requirements.
3. Completion of a minimum of 122 semester hours of courses, including two credits of physical education activities, with a cumulative grade-point average of 2.0 or above.
4. Completion of option requirements for *Aquatic Resources*, *Terrestrial Ecology*, or *Integrated Natural Resources*.

Aquatic Resources This option provides a strong fundamental education in the basic sciences with an emphasis on water. With careful selection of option electives, the student can develop expertise in areas such as watershed management, lake studies, or water pollution.

Required courses* (40–41 credits):

| | Credit Hours |
|--|--------------|
| Biology 1, 2, Principles of Biol. | 8 |
| Chemistry 3, General Chemistry | 4 |
| Chemistry 4, Organic and Biochem. or Chemistry 42, Intro. Organic Chem. | 4 |
| Computer Sci. 2, Microcomputer Appl. Software or Computer Sci. 11, Computer Programming, or Voc. Ed. & Tech. 85, Microcomputer Appl., or Computer Sci. 3 | 3 |
| Geology 1, Intro. Geology or Plant & Soil Sci. 161, Intro. Soil Science | 4 |
| Math. 19, 20, Calculus I, II | 6 |
| Physics 11, Elem. Physics | 3 |
| Statistics 141, Basic Statistical Methods or Nat. Res. 140, Nat. Res. Biostat. | 3 or 4 |

*These courses also count toward fulfilling areas 3 and 4 of the SNR distribution requirements.

Option electives (24 credits):

In consultation with an academic advisor, students choose a minimum of 24 additional credits from an approved list of courses available in the Dean's Office.

Terrestrial Ecology This option offers natural resources education with a focus on ecology. Emphasis is placed on the biology and ecology of both plants and animals. Students can concentrate their studies on areas such as ecosystem analysis, environmental quality, or evolutionary biology.

Required courses:* (29–30 credits):

| | Credit Hours |
|---|--------------|
| Biology 1, 2, Principles of Biol. | 8 |
| Chemistry 3, General Chemistry | 4 |
| Chemistry 4, Organic and Biochem. or Chemistry 42, Intro. Organic Chem. | 4 |
| Geology 1, Intro. Geology or Plant & Soil Sci. 161, Intro. Soil Science | 4 |
| Math. 19, Calculus I | 3 |
| Physics 11, Elem. Physics | 3 |
| Statistics 141, Basic Statistical Methods or Nat. Res. 140, Nat. Res. Biostat. | 3 or 4 |

*These courses also count toward fulfilling areas 3 and 4 of the SNR distribution requirements.

Option electives (24 credits):

In consultation with an academic advisor, students choose a minimum of 24 additional credits from an approved list of courses available in the Dean's Office.

Integrated Natural Resources This option is designed to provide a broad natural resources education giving students considerable flexibility in selecting courses. The Integrated Natural Resources option is for students who have strong interests in natural resources and the environment, clear academic direction, and the motivation to develop a well-focused, personally meaningful course of study. Most students in INR pursue social/environmental issues such as conservation, resource planning, or environmental education. Students who want a more scientific emphasis should select instead one of the three organism-specific options (Forest Biology, Fisheries Biology, Wildlife Biology) or one of the system options (Terrestrial Ecology or Aquatic Resources).

Required courses (minimum of nine credits):

Students elect at least one course in each of three areas from a list of approved courses. The areas are: (1) biology/ecology; (2) natural resources social sciences and communication; (3) information systems (computer science, statistics, mathematics).

Individualized Program of Study: The student develops an individualized program of study which establishes objectives and defines course selection for the last four semesters. The plan stipulates which courses will be included as Option Electives (see below). All programs of study must be endorsed by the advisor, then approved by the faculty. If not approved, the student may not continue in the INR option and must seek another major. The program of study is to be completed by the end of the sophomore year (60 credits). Transfer students with more than 60 credits must have a program of study approved as part of the transfer application. It is expected that these students will be active in the program for at least two years (four semesters) after transferring into the INR option.

Option electives (minimum of 30 credits):

Students choose courses with an ENVS, FOR, NR, RM, RSEC, or WFB prefix that are at the level of 100 or above and are consistent with objectives established in the program of study.

Recreation Management

All majors in Recreation Management are required to successfully complete a series of core courses during the first and sophomore years. Upon completion of the sophomore year, students elect to concentrate in one of two options: public outdoor recreation or private outdoor recreation and tourism.

These options are designed to prepare students for professional careers in the management of outdoor recreation resources. Public recreation resources include parks, forests, wilderness areas, and other outdoor recreation environments at the local, regional, state, and federal governmental levels. Private resources include ski areas, campgrounds, resorts, and other natural resource-based recreation facilities.

Public Outdoor Recreation The Recreation Management program's option 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 option is designed to prepare students for careers in natural resource-based private outdoor recreation and tourism enterprises. The program permits specialization in several types of private recreation businesses, including ski resorts. Course work is concentrated in natural resource management and business administration.

A minimum of 128 semester hours of required and elective courses is required for the Bachelor of Science degree. A Recreation Management minor is also available.

| | 1st SEMESTER | 2nd |
|--|-----------------|----------|
| FIRST YEAR | | |
| Nat. Res. 1, Ecological Aspects of Nat. Res. Conservation | 4 | — |
| Math. elective | 3 | — |
| Computer Science elective | — | 3 |
| English 1, Written Expression | 3 | — |
| Laboratory science elective | — | 4 |
| Nat. Res. 40, American Wilderness | — | 3 |
| Sociology or Psychology | 3 | — |
| Electives ¹ | 3 | 5 |
| Race and Culture course | 1 | — |
| Physical Education Activity | <u>1</u> | <u>1</u> |
| | 18 | 16 |

| | 1st SEMESTER | 2nd |
|---|-----------------|----------|
| SOPHOMORE YEAR | | |
| Rec. Mgmt. 138, Park and Recreation Design | 4 | — |
| Political Sci. 21, American Pol. Systems | — | 3 |
| Economics 11, 12, Principles of Econ. | 3 | 3 |
| Rec. Mgmt. 50, Tourism Planning | — | 3 |
| Forestry 120, Forest Ecology | — | 3 |
| Nat. Res. 25, Measurements & Mapping | 4 | — |
| Oral communications elective | 3 | — |
| Statistics elective | 3 | — |
| Electives ¹ | <u>—</u> | <u>4</u> |
| | 17 | 16 |

| | 1st SEMESTER | 2nd |
|--|-----------------|----------|
| JUNIOR YEAR | | |
| Rec. Mgmt. 153, Admin. and Operations | 3 | — |
| Rec. Mgmt. 235, Outdoor Rec. Planning | 4 | — |
| Rec. Mgmt. 157, Ski Area Mgmt. | — | 3 |
| Nat. Res. 102, Water as a Nat. Res. | — | 3 |
| Wildlife & Fish. Biol. 174, Principles of Wildlife Mgmt. | 3 | — |
| Electives and concentration require- ments ^{1,2} | <u>6</u> | <u>9</u> |
| | 16 | 15 |

| | 1st SEMESTER | 2nd |
|-------------------------------------|-----------------|-----|
| SENIOR YEAR | | |
| Rec. Mgmt. 255, Env. Interpretation | 4 | — |
| Rec. Mgmt. 191, Practicum | 3 | — |

| | | |
|---|----------|----------|
| Rec. Mgmt. 225, Economics of Outdoor Recreation and Tourism | - | 3 |
| Env. Studies 290, Env. Policy | 3 | - |
| Rec. Mgmt. 182, Senior Seminar | - | 2 |
| Nat. Res. 272, Assessing Env. Impact | - | 4 |
| Electives and concentration requirements ^{1,2} | <u>6</u> | <u>5</u> |
| | 16 | 14 |

Total Credit Hours 128

¹To meet School and program distribution requirements, students must complete at least two courses in arts and humanities and one other course in the sciences.

²Students take additional specified course work in either the public outdoor option or in the private outdoor recreation and tourism option.

Students selecting the public option must complete 15 additional credit hours consisting of (a) *at least* six hours from an approved list of courses emphasizing the management of public agencies, and (b) *at least* three hours in additional natural resource courses.

Students selecting the private option must complete:

- Rec. Mgmt. 151, Food and Lodging Management, or Ag. and Res. Ec. 166, Small Business Management
- Rec. Mgmt. 158, Resort Management and Marketing
- Bus. Admin. 60, Financial Accounting
- Bus. Admin. 120, Principles of Management
- Bus. Admin. 150, Foundations of Marketing, or Ag. and Res. Ec. 168, Small Business Marketing

Students in the School of Natural Resources may not take more than 25 percent of their course work in the School of Business Administration.

Part of the Recreation Management curriculum includes training in the use of selected computer software that students are expected to purchase during their four-year stay at the University. The faculty have carefully chosen software that enhances students' skills in writing, mathematics, graphics, and cartography. Because the required software is used for educational purposes and is purchased in quantity, cost per student is kept as low as possible.

Recreation Management Minor The minor in Recreation Management requires a planned course of study which will provide a substantive introduction into the field of recreation management. Applications may be obtained from the Recreation Management program office. Space in the minor is limited so acceptance will be on a competitive, space-available basis. A minimum of 15 semester hours of course work is required.

A minimum of nine semester hours are to be selected from the following:

- Nat. Res. 40, The American Wilderness
- Rec. Mgmt. 50, Tourism Planning
- Rec. Mgmt. 138, Park Design
- Rec. Mgmt. 150, Recreation Management
- Rec. Mgmt. 153, Recreation Administration and Operations
- Rec. Mgmt. 157, Ski Area Management
- Rec. Mgmt. 158, Resort Management and Marketing

A minimum of six semester hours are to be selected from the following:

- Rec. Mgmt. 225, Economics of Outdoor Recreation and Tourism
- Rec. Mgmt. 235, Outdoor Recreation Planning
- Rec. Mgmt. 255, Environmental Interpretation

Resource Economics

This program deals with the application of economic theory to natural resources 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 resources management and administration.

A minimum of 124 semester hours of required and elective courses is required for the Bachelor of Science degree. A Resource Economics minor is also available.

| | 1st SEMESTER | 2nd SEMESTER |
|---|--------------|--------------|
| FIRST YEAR | | |
| Nat. Res. 1, Ecological Aspects of Nat. Res. Conservation | 4 | - |
| Math. 19, Calculus I | 3 | - |
| Math. 20, Calculus II | - | 3 |
| Nat. Res. 40, American Wilderness | - | 3 |
| English 1 or 50, Written Expression | 3 | - |
| Speech 11, 96, or Theatre 5 | - | 3 |
| Physical Education Activity | 1 | 1 |
| Race and Culture course | 1 | - |
| Electives* | <u>5</u> | <u>6</u> |
| | 17 | 16 |

| | 1st SEMESTER | 2nd SEMESTER |
|--|--------------|--------------|
| SOPHOMORE YEAR | | |
| Economics 11/12, Principles of Econ. Statistics elective | 3 | 3 |
| Geology 1, Intro. Geology | 4 | - |
| Forestry 120, Forest Ecology | - | 3 |
| Nat. Res. 25, Measurement & Mapping | 4 | - |
| Computer Science elective | 3 | - |
| Electives* | <u>1</u> | <u>7</u> |
| | 15 | 16 |

| | 1st SEMESTER | 2nd SEMESTER |
|--|--------------|--------------|
| JUNIOR YEAR | | |
| Res. Ec. 121, Resource Economics | - | 3 |
| Economics 101, Macroeconomics | 3 | - |
| Economics 102, Microeconomics | - | 3 |
| Nat. Res. 102, Water as a Nat. Res. Wildlife & Fish. Biol. 174, Principles of Wildlife Mgmt. | 3 | - |
| Nat. Res. 143, Geobased Info. Sys. | - | 3 |
| Forestry 153, Forest Finance | 1 | - |
| Forestry 155, Forest Taxation | 1 | - |
| Elective* | <u>6</u> | <u>3</u> |
| | 14 | 15 |

| | 1st SEMESTER | 2nd SEMESTER |
|---|--------------|--------------|
| SENIOR YEAR | | |
| Res. Ec. 222, Nat. Res. Evaluation | - | 3 |
| Rec. Mgmt. 225, Econ. of Outdoor Recreation and Tourism | - | 3 |
| Env. Studies 290, Env. Policy | 3 | - |
| Economics 265, Urban and Regional Ec. or Economics 268, Econ. of Energy | - | 3 |
| Nat. Res. 272, Assessing Env. Impact | - | 4 |
| Nat. Res. 254, Advanced Nat. Res. Policy | 3 | - |
| Nat. Res. 235, Legal Aspects of Planning and Zoning or Env. St. 293, Env. Law | 3 | - |
| Civil Engr. 125, Engr. Economy | 3 | - |
| Electives* | <u>3</u> | <u>3</u> |
| | 15 | 16 |

Total Credit Hours 124

*To meet School and program distribution requirements, students must complete two courses in the arts and humanities, one course in political science, sociology, psychology, or geography, and one other course in science.

Resource Economics Minor The minor in Resource Economics is designed to provide students with a basic understand-

ing of the role of economics in the allocation and use of natural resources. This minor is appropriate for anyone concerned with natural resources, especially those pursuing careers in fields that use large quantities of natural resources or whose production processes adversely impact the environment. Applications for the minor in Resource Economics are available from the Resource Economics program office and must be filed by June 1 of the year preceding graduation. Space in the minor is limited so acceptance will be on a competitive, space-available basis. Students must successfully complete a minimum of 15 semester hours in required and elective courses. Prerequisites for selected courses must be met.

Required Courses:

Res. Ec. 121, Resource Economics
Env. Studies 289, Environmental Economics
Nat. Res. 272, Assessing Environmental Impact

Elective Courses:

Res. Ec. 222, Env. Studies 290, Nat. Res. 143, 235, Civil Engr. 125, Wildlife and Fish. Biol. 174, Geography 3, Ag. and Res. Ec. 61, 162, 180, 264, Economics 102. Special elective (students may select a course, with the approval of the advisor, that meets special interest needs).

Wildlife and Fisheries Biology

This program prepares individuals for careers requiring expertise in wildlife and fisheries biology and ecology. Required courses satisfy educational requirements of the U.S. Office of Personnel Management for entry-level positions in wildlife biology and fisheries biology. Courses can be elected to meet the educational requirements for certification by The Wildlife Society and the American Fisheries Society. All majors in Wildlife and Fisheries Biology complete the same core of courses during the first year. As sophomores, students elect either the wildlife biology or fisheries biology option.

Graduates may find employment in a variety of federal, state, or private natural resource agencies or organizations, or they may choose to pursue graduate study in wildlife or fisheries science. The broad education in science and natural resources that forms the basis for the Wildlife and Fisheries Biology major also provides an appropriate background for many other career opportunities.

Completion of 122 semester hours of specified and elective courses is required for the Bachelor of Science degree. A minor in Wildlife Biology also is available.

| | 1st SEMESTER | 2nd SEMESTER |
|--|-----------------|-----------------|
| FIRST YEAR | | |
| Biology 1, 2, Principles of Biology | 4 | 4 |
| Chemistry 3, 4 or 42, Intro. Chem. | 4 | 4 |
| Nat. Res. 1, Ecological Aspects of Nat. Res. Conservation | 4 | — |
| Nat. Res. 40, American Wilderness | — | 3 |
| Math. 19, Calculus I ¹ | 3 | — |
| English 1 or 50, Written Expression | — | 3 |
| Race and Culture Course | 1 | — |
| Physical Education Activity | <u>1</u> | <u>1</u> |
| | 17 | 15 |

Wildlife Biology Option

| | 1st SEMESTER | 2nd SEMESTER |
|---|-----------------|-----------------|
| SOPHOMORE YEAR | | |
| Nat. Res. 25, Measurements & Mapping | 4 | — |
| Forestry 21, Dendrology, or Botany 109, Plant Taxonomy | 4 | — |
| Plant & Soil Sci. 161, Intro. to Soil Sci., or Geology 1, Intro. Geology | — | 4 |

| | | |
|---|----------|----------|
| Nat. Res. 140, Nat. Res. Biostatistics | — | 4 |
| Forestry 120, Forest Ecology | — | 3 |
| Forestry 121, Forest Ecology Lab | — | 1 |
| Wildlife & Fish. Biol. 130, Ornithology | — | 3 |
| Speech 11, Effective Speaking | 3 | — |
| Electives ² | <u>4</u> | <u>—</u> |
| | 15 | 15 |

| | 1st SEMESTER | 2nd SEMESTER |
|---|-----------------|-----------------|
| JUNIOR YEAR | | |
| Wildlife & Fish. Biol. 174, Principles of Wildlife Mgmt. | 3 | — |
| Wildlife & Fish. Biol. 161, Fisheries Biology | 4 | — |
| Nat. Res. 102, Water as a Nat. Res. | — | 3 |
| Botany 109, Plant Taxonomy | 4 | — |
| Biology 101, Genetics, or Biology 103, Cell Structure and Function | — | 3-4 |
| Electives ² | <u>4</u> | <u>8-9</u> |
| | 15 | 15 |

| | 1st SEMESTER | 2nd SEMESTER |
|--------------------------------------|-----------------|-----------------|
| SENIOR YEAR | | |
| Env. Studies 290, Env. Policy | 3 | — |
| Nat. Res. 272, Assessing Env. Impact | — | 4 |
| Zoology 217, Mammalogy | 4 | — |
| Electives ² | <u>8</u> | <u>11</u> |
| | 15 | 15 |

Total Credit Hours 122

Fisheries Biology Option

| | 1st SEMESTER | 2nd SEMESTER |
|--|-----------------|-----------------|
| SOPHOMORE YEAR | | |
| Nat. Res. 25, Measurements & Mapping | 4 | — |
| Nat. Res. 140, Nat. Res. Biostatistics | 4 | — |
| Plant & Soil Sci. 161, Intro. to Soil Sci. or Geology 1, Intro. Geology | — | 4 |
| Biol. 103, Cell Structure and Function | 4 | — |
| Forestry 120, Forest Ecology | — | 3 |
| Forestry 121, Forest Ecology Lab | — | 1 |
| Physics 11/21 and 12/22, Intro. Physics | 4 | 4 |
| Speech 11, Effective Speaking | <u>—</u> | <u>3</u> |
| | 16 | 15 |

| | 1st SEMESTER | 2nd SEMESTER |
|---|-----------------|-----------------|
| JUNIOR YEAR | | |
| Wildlife & Fish. Biol. 174, Principles of Wildlife Mgmt. | 3 | — |
| Wildlife & Fish. Biol. 161, Fisheries Biology | 4 | — |
| Biol. 102, Environmental Biology | 4 | — |
| Nat. Res. 102, Water as a Nat. Res. | — | 3 |
| Limnology | 3 | — |
| Wildlife & Fish. Biol. 232, Ichthyology | — | 3 |
| Electives ³ | <u>—</u> | <u>9</u> |
| | 14 | 15 |

| | 1st SEMESTER | 2nd SEMESTER |
|---|-----------------|-----------------|
| SENIOR YEAR | | |
| Wildlife & Fish. Biol. 271/272, Wetlands Ecology | 4 | — |
| Wildlife & Fish. Biol. 279, Marine Ecology, Nat. Res. 271, Wetlands Ecology, or Nat. Res. 270, Toxics | — | 3 |
| Nat. Res. 276, Water Quality Anal. or Nat. Res. 278, Water Res. Prin. | — | 3 |
| Env. Studies 290, Env. Policy | 3 | — |
| Nat. Res. 272, Assessing Env. Impact | — | 4 |
| Electives ^{2,3} | <u>8</u> | <u>5</u> |
| | 15 | 15 |

Total Credit Hours 122

¹Qualified 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.

²Wildlife Biology students must take three of the following courses: 271/272, 273/274, 275, 279, 286 (Modeling and Management of Animal Populations). (Lecture and lab count as one course in each case.)

³Fisheries Biology Option students must take an additional six hours of biological science courses from an approved list.

Wildlife Biology Minor The minor in Wildlife Biology requires a planned course of study that will provide a basic understanding of wildlife resources and wildlife management.

Applications for the minor must be filed no later than June 1 of the year preceding graduation or completion of the requirements for the minor. A minimum of 15 hours of credit is required in prescribed and elective courses.

Required Courses:

Wildlife and Fish. Biol. 130, Ornithology

Wildlife and Fish. Biol. 174, Principles of Wildlife Management

Wildlife and Fish. Biol. 271, Wetlands Ecology and Marsh Management

or

Wildlife and Fish. Biol. 273, Uplands Wildlife Ecology

Elective Courses:

Wildlife and Fish. Biol. 131, 150, 165; 176, 185, 251, 271 or 273, 272, 274, 275, 279, 281, 285.

Undecided – Natural Resources

High school seniors who do not wish to decide among the various programs in the School are admitted as “Undecided-NR” majors and may remain in this category a maximum of two years. These students and their advisors develop a one- or two-year curriculum which enables them to explore several fields of natural resources before committing to a specific major.



Courses of Instruction

The University reserves the right to change 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, but not all, 200-level courses carry graduate credit. Graduate students must refer to the UVM Graduate Catalogue which lists all courses carrying graduate credit. Seniors who wish to take a course for graduate credit must receive permission through the office of their dean (see page 38) prior to enrolling in the course.

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.

Aerospace Studies (ASTU)

AT ST. MICHAEL'S COLLEGE (Phone 654-2551)

Professor Talley (Chairperson); Assistant Professors Suarez, Butts.

101-103 U.S. Air Force Today (1-1) The Air Force in the contemporary world; U.S. military force structure, strategic offensive and defensive forces, general purpose forces, and aerospace support forces. Leadership laboratory activities. One hour.

201-203 History of Early Aviation and Air Power in the Space Age (1-1) Air power from balloons and dirigibles through jet age; historical review of air power employment in military and nonmilitary operations supporting national objectives; evolution of air power concepts and doctrine. Leadership lab activities. One hour.

301-303 Introduction to Leadership and Management (3-1) Integrated management course emphasizing individual motivational and behavioral processes, leadership, communication, and group dynamics providing foundation for professional skills. Case studies. Leadership lab activities. Three hours. An alternate year course with ASTU 401-403.

401-403 National Security Forces in Contemporary American Society (3-1) U.S. national security policy. Formulation, organization, implementation, and context of national security; evolution of strategy; management of conflict; civil-military interaction. Military professional/officer-ship and military justice system. Leadership lab activities. Three hours. An alternate year course with ASTU 301-303.

See additional information in "Air Force ROTC at Saint Michael's College on page 43.

African Studies

COLLEGE OF ARTS AND SCIENCES

Prof. R. Gordon, Director

See International Studies for special topics course listings.

Agricultural and Resource Economics (AREC)

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Associate Professors Fife, Ford, Gilbert, Pelsue (Chairperson), Schmidt; Assistant Professors Condon, Iskow; Extension Professor Bevins; Extension Associate Professor Bigalow; Extension Assistant Professor Wackernagel; Adjunct Lecturer Silver.

PROGRAM IN AGRICULTURAL ECONOMICS

2 World Food, Population, and Development Agricultural development emphasizing natural and economic phenomena and the effect of food supplies on population trends and policies. Three hours. Ford.

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. Gilbert, Pelsue.

151 Food and Lodging Management The art and science of innkeeping and food service management. Practical business management problem solving using the personal computer. *Prerequisite:* Sophomore standing. Three hours. Bevins. Alternate years.

162 Land Economics 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.

166 Small Business Management Introduction to the theory and practice of organizing and operating a small business. Emphasis on basic concepts in financing, accounting, legal arrangements, regulations, taxes, and decision making. *Prerequisite:* Sophomore standing. Three hours. Fife.

167 Small Business Finance Capital requirements of small business, financial analysis, capital budgeting, and types and sources of credit. *Prerequisites:* 61 or Economics 12, 166. Three hours.

168 Small Business Marketing Essentials of marketing for the small business firm. Focus on the fundamental criteria guiding small business marketing decisions. *Prerequisite:* 61 or Economics 12. Three hours. Condon.

169 Small Business Computer Application Using the microcomputer to solve specific small business problems relating to management, finance, and marketing. Search online databases and map business statistics. *Prerequisites:* 166 or equivalent, Vocational Education and Technology 85 or Computer Science 2. Three hours. Bevins.

171 Agriculture in Economic Development Role of agriculture in development of less-developed countries. Discussion of alternative economic development models. *Prerequisites:* 2, 61 or Economics 12. Three hours. Ford.

175 Farm Credit Fellowship Practicum/Seminar Acquaints students who have a strong interest in farm management and farm finance with financial intermediaries serving agriculture. *Prerequisites:* 167, 201, junior standing, and instructor's permission. Three hours. Pelsue.

180 Real Estate Appraisal Basic concepts and methods of measuring real estate values. *Prerequisites:* 61 or Economics 12, or instructor's permission. Three hours. Silver.

191, 192 Practicum in Agricultural and Resource Economics Planned, supervised, off-campus education during semester, academic year, or summer. Grade of satisfactory or unsatisfactory. *Prerequisites:* Junior standing, departmental permission. One to 12 hours.

195, 196 Special Topics in Agricultural Economics Readings and discussion of selected topics in agricultural economics. *Prerequisite:* Departmental permission. Credit as arranged.

197, 198 Undergraduate Research Work on a research problem under direction of a staff member. Findings submitted in written form as prescribed by department. *Prerequisite:* Senior standing. Three hours.

201 Farm Business Management Organization and operation of successful farm business emphasizing resource allocation, production efficiency, and marginal analysis. Field trips required. *Prerequisites:* 61 or Economics 12, 167, or instructor's permission; junior standing. Three hours. Alternate years.

205 Rural Communities in Modern Society (See Sociology 205.)

207 Markets, Food, and Consumers Learn how producers, processors, wholesalers, cooperatives, retailers, consumers, and governments affect the movement of food and fiber products through the production-marketing chain. *Prerequisite:* 61 or equivalent. Three hours. Pelsue. Alternate years.

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. Schmidt.

210 Marketing Institutions Through guest lectures and field trips, students meet and learn from owners and managers of production, processing, marketing, and financial firms. Introduces theory of market institutions. Pre- or corequisite: 168 or 207, permission. Three hours. Condon, Fife.

211 Summer Experience in Agribusiness Management A work-study program that introduces agribusiness. Involves working at a firm four days, classroom instruction and other appropriate activities on the fifth day. *Prerequisites:* 166, 167, or equivalent; junior standing; department's permission. Four hours.

218 Community Organization and Development (See Sociology 207.)

233 Rural Planning (See Geography 233.) *Prerequisites:* 61 or equivalent, senior standing. Three hours.

237 Economics of Sustainable Agriculture Comparative economic analysis of small vs. large scale, full- vs. part-time farming, traditional vs. alternative agricultural systems, specialization vs. diversification, and issues in agricultural sustainability. *Prerequisites:* 61 or Economics 12, or permission. Three hours. Pelsue. Alternate years.

254 Advanced Agricultural Economics The structure of competitive markets; emphasis on allocation of resources and the theory of price determination. *Prerequisites:* 61 or Economics 12, Math. 19, or instructor's permission. Three hours. Iskow.

255, 256 Special Topics in Agricultural and Resource Economics Readings and discussion of selected topics in economics, including those not encompassed in regular course offerings at an advanced level. *Prerequisite:* Departmental permission. Credit as arranged.

264 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. 19, or instructor's permission; computer science and statistics helpful. Three hours. Condon.

266 Small Business Decision Making Applying economic concepts to decision making in a small business. Incremental analysis, contribution margins, personnel management, and linear programming. *Prerequisites:* 166, 167, or equivalent. Three hours. Fife, Iskow.

267 Small Business Planning Instruction and guidance in the actual process of preparing a business plan. Students prepare a business plan including a market analysis; and legal, financial, and operational plans. *Prerequisites:* Senior standing, 266, Vocational Education and Technology 85, or equivalent. Four hours. Bevins, Fife.

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. *Prerequisites:* Junior standing, instructor's permission. Three hours. Ford. Alternate every other year with 273.

273 Agricultural Planning and Project Development Agricultural sector planning and project development processes

with a focus on policy instruments; links between agriculture and the rest of the economy; data requirements; and activity preparation, evaluation, and implementation. *Prerequisite:* 171 or instructor's permission. Three hours. Ford. Alternate every other year with 272.

PROGRAM IN RESOURCE ECONOMICS

(For descriptions of the following courses, refer to *Recreation Management*, page 183, and *Resource Economics*, page 185.)

- 121 Resource Economics
- 157 Ski Area Management
- 222 Natural Resources Evaluation
- 225 Economics of Outdoor Recreation and Tourism
- 287 Spatial Analysis (See Geography 287.)

Agricultural Biochemistry (AGBI)

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Professor Weller; Associate Professor Currier (Acting Chairperson); Research Associate Professor Kent; Lecturer Lauzon.

10 Introductory Biochemistry (3) The biochemical substances and reactions that control important living processes. A direct introduction to biochemistry not requiring preparation in the sciences. Three hours.

191 Biochemistry of Nucleic Acids (2) Structure, function, and properties of nucleic acids, nucleoproteins, and enzymes or proteins that act on nucleic acids. Emphasis on experimental approach. *Prerequisite:* 10 or equivalent or instructor's permission. Two hours. Weller.

195 Special Topics *Prerequisite:* Instructor's permission.

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. Three hours and lab (one hour) as AGBI 202.

202 General Biochemistry Laboratory (0-3) Introduction to techniques and equipment used for the isolation and quantitative analysis of amino acids, proteins, sugars, and enzymes in biological materials. *Prerequisite:* Credit for or concurrent enrollment in 201. One hour. Lauzon.

210 Quantitative Biochemistry (3) Study of the physical principles of biochemistry, methods and theory, with strong emphasis on problem solving and data analysis. Three hours. *Prerequisite:* 201. Kent.

220 Molecular Biology (3-3) Structure and biological function of nucleic acids, proteins, and enzymes. Emphasis on optical, electrophoretic, and ultracentrifugal methods. *Prerequisite:* 201 and 202 or instructor's permission. Three hours and lab (one hour) as AGBI 221. Weller.

221 Molecular Biology Laboratory (0-3) Laboratory practice in protein characterization by disc and SDS-gel electrophoresis and gel isoelectric focusing. DNA separation and characterization by agarose gel electrophoresis and restriction enzyme digestion. *Prerequisite:* Credit for or concurrent enrollment in 220. One hour. Currier, Weller.

230 Advanced Biochemistry (3-3) Study of metabolic cycles emphasizing research methods involving radioisotopes and chromatography. *Prerequisite:* 201 and 202 or 220 and 221 or instructor's permission. Three hours and lab (one hour) as AGBI 231. Currier.

231 Advanced Biochemistry Laboratory (0-3) Laboratory experimentation emphasizing absorption, ion exchange, af-

finity, and partition chromatography. Introduction to modern GLC and HPLC techniques and enzyme isolation, purification and characterization. *Prerequisite:* Credit for or concurrent enrollment in 230. One hour. Currier.

250 Plant Biochemistry (2) Study of specific biochemical principles unique to plants concentrating on the biochemistry of plant cell walls, photosynthesis, and secondary metabolites. *Prerequisite:* 201. Two hours. Currier.

295 Special Topics *Prerequisite:* Instructor's permission.

Agriculture (AGRI)

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

99 Beginnings Introduction to campus resources, identification of students' interests, goals, skills, and values to provide better understanding of themselves in relation to their program. Required for all first-year students in Agriculture and Life Sciences. One hour.

125 Peer Advisor Development Peer advisors develop additional skills in areas of leadership, group dynamics, interpersonal effectiveness, and assertiveness by applying skills as group facilitators in Beginnings course. *Prerequisite:* Sophomore standing, permission. Three hours.

195, 196 Special Topics Appropriate for interdepartmental and interdisciplinary topics in Agriculture and Life Sciences. Permission of Dean's Office. Credit as arranged.

Allied Health (AH)

SCHOOL OF ALLIED HEALTH SCIENCES

Professor McCrorey.

3 Social and Cultural Determinants of Health Application of public health and social science concepts to examine the determinants of health and disease in populations, emphasizing minority health issues. *Prerequisite:* Race and Culture course or instructor's permission. Three hours. McCrorey.

Anatomy and Neurobiology (ANPS; ANNB)

COLLEGE OF MEDICINE

Professors Parsons (Chairperson), Wells, Young (Emeritus); Associate Professors Ariano, Cornbrooks, Fiekers, Freedman, Powers; Assistant Professors Forehand, Mawe, May; Research Assistant Professor Braas; Lecturers Ezerman, Fonda, Lee.

9, 10 Special Topics in Human Anatomy and Physiology A two-semester course with credit given only upon completion of both semesters. The structure and function of the human body. Open only to two-year Dental Hygiene and Radiologic Technology students. Credit not valid towards four-year programs. *Prerequisite:* 9 for 10. Four hours. Lee, Webb.

19-20 Undergraduate Human Anatomy and Physiology Two-semester course with credit given only upon completion of both semesters. Structure and function of human body using cadaver dissections, histological material, and physiological experiments. Required of all Medical Technology, Nursing, Nutritional Sciences, and Physical Education; others with instructor's permission. *Prerequisite:* 19 for 20. Four hours. Lee, Webb.

197,198 Undergraduate Research Individual laboratory research under guidance of 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 of Physical Therapy students; others with departmental permission. Five hours. Mawe, May.

202 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. Includes histology of selected tissues and organs. Required of Physical Therapy students; others with departmental permission. Three hours. Wells.

Animal Sciences (ASCI)

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Professors Bramley (Chairperson), Carew, Foss, A. Smith, Welch; Associate Professors C. Donnelly, Gilmore, Kindstedt, Nichols; Assistant Professors Chen, Plaut; Lecturers Bartlett, Kiely; Instructor Rogers; Extension Professor Gibson; Research Professor Pankey; Adjunct Professors P. Smith, Thomas; Adjunct Assistant Professors S. Donnelly, Grabber, Levine, Stewart-Ballard, Zingeser.

1 Introductory Animal and Food Science (3-3) An overview of the genetics, nutrition, reproduction, and management of livestock and recreation species; introduction to animal food products, emphasizing dairy products. Four hours. Bramley, Carew.

4 Dairy Cattle Judging (2) Principles of dairy cattle judging demonstrated and practiced using live animals. Two hours. Gilmore.

6 Introduction to Companion Animal Care and Management (3) Scientific principles of nutrition, breeding, and selection, health, management practices, pet therapy, and animal bonding. Primary emphasis on cat and dog. Three hours. Smith.

43 Fundamentals of Nutrition I, II Comprehensive study of specific nutrients in terms of their availability, function, and utilization in mammalian species. *Prerequisites:* High school chemistry and biology. Three hours. Carew.

104 Sensory Evaluation of Dairy Foods (2-3) Nature of sensory responses to aroma, taste, and texture of foods; relation of sensory data to instrumental measurements; statistical analysis and interpretation of sensory data. *Prerequisite:* Statistics 211. Three hours. Chen. Alternate years, 1992-93.

106 Processing Frozen and Fluid Dairy Foods (2-3) Fundamentals of ice cream manufacture: raw materials selection, handling, and processing. Ice cream mix formulation, freezing, and freezing equipment. *Prerequisite:* A course in organic chemistry. Three hours. Kindstedt. Alternate years, 1993-94.

110 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.

111 Animal Anatomy (3-3) Dissection of domestic animals, demonstrations, gross and microscopic structure of organ systems of the mammalian body emphasizing farm animals. *Prerequisite:* A biology course. Four hours.

115, 116 Horse Production and Management (2-3) The problems of light horse production. Application of the principles of selection, management, and horsemanship using UVM Morgan Horse Farm. *Prerequisites:* Junior standing. Four hours. Bartlett.

117 Horse in Health and Disease (3) Discusses the basic anatomy and physiology of the horse. Describes common equine diseases and problems, their diagnosis, prevention, and treatment. Three hours. Levine.

119 Animal Health and Its Applications (2-3) A practical hands-on course for detection, treatment, prevention, and control of disease in livestock. *Prerequisites:* Microbiology 65 or 66. Four hours.

120 General Physiology (3-3) Study of organ and organ system function in mammals, emphasizing the regulation and integration to maintain a stable internal environment. *Prerequisites:* Courses in anatomy, chemistry, and biology. Four hours. Foss.

122 Animals in Society/Animal Welfare (3) Designed to heighten awareness and understanding of human-animal relationships in society, agriculture, and science. *Prerequisite:* Sophomore standing. Three hours. Bramley.

131 Practical Equine Management: Showmanship and Training In-depth introduction to horse training techniques combined with enhancing riding skills through instructor and self-evaluation. Taught at Miner Institute, Chazy, NY. *Prerequisites:* 1, 115, 116 or instructor's permission. Eight hours in summer.

132 Career Skills for the Equine Industry A skills development course focusing on communication and laboratory skills important for jobs in equine medicine, research, and teaching. Taught at Miner Institute, Chazy, NY. *Prerequisites:* 1, 115, 116 or instructor's permission. Four hours.

134-135 CREAM (Co-operative for Real Education in Agricultural Management) A two-semester course in which students perform the work and make the financial and management decisions associated with the CREAM dairy herd. *Prerequisite preferred:* Sophomore/junior standing, instructor permission. Eight hours.

197, 198 Undergraduate Research Research activity under direction of qualified staff member. Must have faculty member approval. Written proposal and report required. *Prerequisites:* Junior standing, departmental chairperson permission. One to three hours.

201 Fermented Dairy Foods (3-3) Fundamental processes involved in the manufacture of domestic and imported cheese varieties and other cultured dairy foods. Acquired knowledge of manufacturing procedures applied at pilot plant level. *Prerequisites:* 3; junior standing. Four hours. Kindstedt. Alternate years, 1992-93.

203 Food Microbiology (3-3) Desirable and undesirable activities of bacteria in foods. Mechanisms of food-borne infection and intoxication. Laboratory methods to enumerate and identify microorganisms associated with food. *Prerequisites:* Microbiology 65, 66; a course in biochemistry. Four hours. S. Donnelly.

204 Industrial Microbiology (3) Microbiological processes, procedures, and technology of economic importance are discussed. Emphasis on principles of biotechnology and applied molecular genetics. *Prerequisites:* 203 or Microbiology 65, 66. Three hours. S. Donnelly.

206 Principles of Food Engineering (3-3) Engineering fundamentals involved in food industry. Conservation of mass and energy; thermodynamics; fluid mechanics; conduction, convection and radiation heat transfer; refrigeration, freezing, psychrometrics; and drying. *Prerequisites:* 104 or 106; Physics 11 or 31; calculus required (Math. 19) or instructor's permission. Four hours. Chen.

211 Summer Experience in Farm Management (30 hr/wk) A work-study program on the modern practices associated with farm management. Taught at Miner Institute, Chazy, NY. For students with a strong interest in farm management. *Prerequisites:* Junior, senior, or graduate standing;

departmental permission. Four hours. (Not offered for graduate credit.)

212 Animal Genetics and Breeding (4) Principles of quantitative and statistical genetics studied in relation to animal breeding. Methods of selection and schemes of mating discussed. *Prerequisites:* Statistics and biology or instructor's permission. Four hours. Gilmore.

213, 214 Dairy Herd Management (3-3) Organization and management of the dairy herd. Practical application of feeding, reproduction, milking, and general management principles. *Prerequisites:* Junior standing or instructor permission. Four hours.

215 Physiology of Reproduction (3-3) Fundamental principles of the physiology of reproduction with emphasis on, but not limited to, farm animals. *Prerequisite:* 120 or instructor permission. Four hours. Plaut. Alternate years, 1993-94.

216 Endocrinology (3) Physiology of endocrine and autocrine/paracrine systems and growth factors. *Prerequisite:* Course in both biology and physiology; one course in anatomy desirable. Concurrent enrollment in 217 required. Three hours. Plaut. Alternate years 1992-93.

217 Endocrinology Laboratory (3) Laboratory techniques used in endocrine research. *Prerequisites:* Concurrent enrollment in 216. One hour.

281 Animal Sciences Senior Seminar Reports and discussions of problems and special investigations in selected fields. One hour. Smith.

282 Animal Sciences Graduate Seminar Reports and discussions of problems and special investigations in selected fields. One hour, required each year for graduate students. Pankey.

297, 298 Special Problems in Animal and Food Science Research and field experience activity under direction of faculty member whose approval has been given. Written proposal and report required. *Prerequisite:* Departmental chairperson permission. May enroll more than once for maximum of 15 hours.

Anthropology (ANTH)

COLLEGE OF ARTS AND SCIENCES

Professors Haviland, Mitchell; Associate Professors R. Gordon, Lewin (Chairperson), Pastner, Power, Woolfson; Research Associate 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.

60 Indians of the Northeast: Vermont Vermont's native peoples from their earliest appearance 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.

95, 96 Introductory Special Topics Introductory courses or seminars beyond scope of existing departmental offerings. See Schedule of Courses for specific titles.

101 Anthropology of Third World Development A survey of the role of applied anthropology in the understanding and analysis of development efforts to alleviate (mostly) third world problems. *Prerequisite:* 21. Three hours. Gordon.

128 Linguistic Anthropology Introduction to the anthropological study of language, focusing on language and communication as they pertain to how we become human and what makes us human. *Prerequisites:* 21. Three hours. Woolfson.

160 North American Indians Ethnographic survey of major native American cultures of Mesoamerica and the U.S. against 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 background of aboriginal culture history, and their relation to present day culture spheres. *Prerequisite:* 21. Three hours. Haviland. Alternate years.

162 Cultures of Africa Ethnographic survey of representative native societies of sub-Saharan Africa and major colonial/immigrant minorities emphasizing changes resulting from colonialism, independence, and modernization. *Prerequisite:* 21. Three hours. Gordon. Alternate years.

163 South Pacific Cultures Survey of 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 Culture and social organization of peoples of Pakistan, India, Bangladesh, and Sri Lanka. Theoretical issues in anthropological analysis of these societies discussed. *Prerequisite:* 21. Three hours. Pastner. Alternate years.

166 Peoples of the Middle East Culture and social organization of peoples living in lands from Morocco to Afghanistan, including a consideration of Islam. *Prerequisite:* 21. Three hours. Lewin. Alternate years.

167 Peoples of Canada Exploration of native and immigrant cultures of Canada's minorities and cultural conflicts engendered in the Canadian experience. *Prerequisite:* 21, or Geography 52, or History 65 or 66. Three hours. Woolfson. Alternate years.

168 The French in North America Cultural patterns of French people in Canada, New England, and Louisiana with particular references to the problems of persistence and change. *Prerequisite:* 21 or International Studies 91 or 92. Three hours. Woolfson. Alternate years.

170 Pastoral Nomads Examination of social and economic organization of migratory herding peoples against a backdrop of environmental pressures and participation in larger social systems. *Prerequisite:* 21. Three hours. Pastner. Alternate years.

172 Women, Society, and Culture Cross-cultural treatment of women which emphasizes the interrelationships between female status, social organization, and ideological systems. *Prerequisite:* 21. Three hours. Lewin. Alternate years.

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. Lewin. Alternate years.

177 Crisis Cults and Movements Examination of prophetic, millenarian, and revolutionary sects and movements emphasizing non-Western, nonindustrial societies. Specific movements viewed in their cultural context. *Prerequisite:* 21. Three hours. Pastner. Alternate years.

178 Sociolinguistics Exploration of language and nonverbal interactions as cultural activities. Focus on rules and patterns people display appropriate to communication and social interaction. *Prerequisite:* 128 or Linguistics 101. Three hours. Woolfson. Alternate years.

179 Cultural Ecology (Same as Geography 179.) Interrelationships of social groups and their natural environments and resource bases, with primary emphasis on nonindustrial cultures. *Prerequisite:* 21 or Geography 1 or 16. Three hours. Gade, Pastner (taught on a rotating basis). Alternate years.

180 Psychological Anthropology 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. Alternate years.

185 Urban Anthropology 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. Alternate years.

187 Minority Groups (Same as Sociology 119.) Description and analysis of ethnic, racial, and religious groups in the U.S. Examination of social/cultural patterns in the larger society and in the minorities themselves. *Prerequisite:* 21. Three hours. Woolfson.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

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, instructor's permission. Three to six hours. Summers only.

201 Practicum and Internship Supervised service or research integrating theoretical and practical anthropological issues. *Prerequisite:* Nine hours of anthropology.

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 121, 122, or 149. Three hours. Power. Alternate years.

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. Lewin, Mitchell.

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. Lewin, Mitchell.

283 Culture Change Study of sociocultural transformations in non-Western countries emphasizing 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.

284 Microethnography Tape recorders and video cameras used to explore human patterns of communication; specifically phonemic, paralinguistic, haptic and kinesic de-

tail, as well as ethnographic semantics. *Prerequisite:* 128 or Linguistics 101. Three hours. Woolfson.

290 Methods of Ethnographic Field Work Examination of 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. Alternate years.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles. *Prerequisites:* 21, one 100-level course.

297, 298 Advanced Readings and Research *Prerequisite:* Junior or senior standing. One to three hours.

Art (ART)

COLLEGE OF ARTS AND SCIENCES

Professors Davison, Janson, Lipke, Owe, Zucker; Associate Professors Fengler-Stephany (Chairperson), Hewitt, Higgins, Lyman, McIntyre, Roland, Seyller; Assistant Professors Brennan, Carter, Mierse, Rubin; Instructor Peters; Lecturer Aschenbach.

STUDIO ART

1 Drawing Introductory study of visual experience through drawing and its transformation of the three-dimensional visual world onto a two-dimensional surface. Emphasis varies with instructor. Three hours.

2 Two-Dimensional Studies Introductory study of visual form and imagery, utilizing traditional as well as contemporary media. Emphasis varies with instructor. Three hours.

3 Three-Dimensional Studies Introductory study of the manipulation and actual space in diverse media. Emphasis varies with instructor. Three hours.

Note: Art 1, 2, or 3 may, in certain cases, be taken more than once if with a different instructor and with permission of chairperson.

4 Introduction to Film/Video Production Introductory study of the principles and properties of four-dimensional media, including the mechanical and electronic phenomena behind the creation of a moving image. Three hours. Lyman.

11 Introduction to Fine Metals Emphasizes design in the third dimension. Basic metal fabrication techniques, soldering, forming, forging, fusing, and casting. Drawing required. Three hours. Peters. Fall semester only.

13 Introduction to Ceramics Introduction to traditional forming methods exploring form, surface, color, content. Included are hand-building techniques, introduction to wheel throwing, clay, glaze, firing processes, and applications. Three hours. Carter.

95 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

111 Fine Metals Continuation of three-dimensional fabrication with work in chasing, repousse, casting, stone setting, and more complex methods of construction. Design and drawing required. *Prerequisite:* 11. Three hours. Peters. Fall semester only.

113 Clay: Hand Building Investigation of surfaces and three-dimensional forms. Focus on variety of construction methods, surface treatment, and firing techniques. Related clay and glaze technology. *Prerequisites:* 1, 2, or 3; 13. Three hours. Carter.

114 Clay: Wheel Throwing Development of throwing skills and the capacity to create a range of forms. Investigation of surface treatment techniques such as slip painting and glazing. Low-fire and stoneware firing. Related clay and glaze technology. *Prerequisites:* 1, 2, or 3; 13. Three hours. Carter.

115 Intermediate Drawing Intense investigation of drawing and elements related to the discipline. The figure used to introduce drawing exercises dealing with contour, gesture, color, and compositional geometry. *Prerequisite:* 1 or 2. Three hours. Owre.

121 Painting Painting as an investigation of color, space, and visual perception using traditional motifs and exploring individually developed directions. *Prerequisites:* 1, 2. Three hours. Hewitt, Rubin.

131 Printmaking: Etching Basic procedures in zinc plate printing stressing design and technical control of aquatint, etching, drypoint, and embossment. *Prerequisites:* 1, 2. Three hours. Davison. Offered alternate semesters.

132 Printmaking: Silkscreen Basic procedures in stencil printing stressing design and technical control of stencil cutting, glue and tusche resist, and photo-silkscreening. *Prerequisites:* 1, 2. Three hours. Davison. Offered alternate semesters.

133 Printmaking: Lithography Basic procedures in planographic printing from stone, stressing design and technical competence. Intensity of investigation varies with individual student. *Prerequisites:* 1, 2. Three hours. Davison.

135 Intermediate Filmmaking Techniques and theories of film production. Students edit a sound track, participate in a class-produced synchronous sound project, and individually produce a film/sound project. *Prerequisites:* 4 and either 1, 2, or 3, or instructor's permission. Three hours. Lyman.

136 Intermediate Video Techniques and theories of video production, including a live action studio production, a reflexive feedback production, and an edited location production. *Prerequisites:* 4 and either 1, 2, or 3, or instructor's permission. Three hours. Lyman.

137 Photography Photographic processes as methods of seeing, emphasizing visual discovery through informed manipulation of materials. Students explore light, camera, photosensitive materials relating to photographic realities. *Prerequisite:* 2. Three hours. Brennan, Higgins.

139 Animation Techniques of single frame filmmaking, including drawing on film, producing a flipbook, animating a repetitive form, a two-dimensional sequence, and a three-dimensional sequence. *Prerequisite:* 1, 2, or 3. Three hours. Lyman.

140 History of the Optical Media as Art Theory and development of the art of "optical media:" photography, film, and video. Emphasis on discovery and explication of technical, aesthetic, and expressive properties. Fulfills the Art History requirement for Studio Art majors. *Prerequisites:* 2 or 6 or instructor's permission. Three hours. Lyman.

141 Sculpture Exploration of manipulative materials. *Prerequisites:* 1, 3. Three hours. Aschenbach, Zucker.

144 Computer Art New approaches to making imagery using computers both as direct means of production and as vehicles for work in other media. No prior experience with computers necessary. *Prerequisite:* 1 or 2. Four hours. Three hours. Rubin.

145 Graphic Design The application of graphic design principles to practical problems, including the impact of popular design on society, exploration of visual elements in contemporary printing processes. *Prerequisite:* 1 or 2. Three hours. McIntyre.

147 Visual Environment Exploration of public spaces, structures, architectural detail, landscaping, roadways, lighting, etc. Field trips; meetings with planners and architects; projects. *Prerequisites:* 1, 2, or 3. Three hours.

191 Field Experience, Internship *Prerequisites:* Junior standing, six hours of 100-level courses in appropriate field, departmental permission (a contract must be obtained from and returned to the Art Department during preregistration). Three hours.

193 College Honors

195 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

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 Intense investigation of drawing and elements that relate to that discipline. Emphasis on conceptual method, contemporary techniques, and both objective and nonobjective source material. *Prerequisite:* 115. Three hours. Owre.

221 Advanced Painting Advanced explorations of painting emphasizing issues of scale, materials, and techniques both traditional and contemporary, and their relationship to both the discipline and current issues. *Prerequisites:* 121. Three hours. Hewitt.

237 Advanced Photography Continuation of 137, further exploring the implications of photography and encouraging students to use the medium to better understand their relationships to the world. *Prerequisite:* 137. Three hours. Higgins.

241 Advanced Sculpture Advanced investigation of sculpture. Students work on individual projects under supervision of instructor. Periodic group discussion and analyses of work in progress. *Prerequisite:* 141. Three hours. Aschenbach, Zucker.

281 Advanced Studies in Studio Art Work in close consultation with faculty 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 topic of 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.)

295 Advanced Special Topics in Studio Art Advanced work in existing departmental offerings. *Prerequisite:* Instructor's permission only. Three hours.

ART HISTORY

5 Western Art: Ancient through Medieval Introduction to the visual arts, primarily painting, sculpture, and architecture in the Western world from prehistoric through Gothic. Three hours.

6 Western Art: Renaissance to Modern Introduction to the visual arts, primarily painting, sculpture, and architecture in the Western world from Renaissance to present. *Prerequisite:* It is recommended that Art 5 be taken before 6. Three hours.

8 Asian Art Introduction to the artistic traditions and major architectural monuments of India, China, Japan, and Southeast Asia. Three hours. Seyller.

96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

140 History of Optical Media As Art (See Studio Art.)

146 Egypt and the Ancient Near East The development of sculpture, painting, and architecture in the cradles of Western civilization: Mesopotamia, and Egypt. 3000-300 B.C. *Prerequisite:* 5. Three hours. Mierse.

148 Greek Art Development of painting, sculpture, architecture, and related arts in Greek lands from 3000-30 B.C. *Prerequisite:* 5. Three hours. Mierse.

149 Roman Art Examination of the artistic experiments made by Roman painters, sculptors, and architects from 3rd century B.C. to 5th century A.D. *Prerequisite:* 5. Three hours. Mierse.

150 Christian Iconography Introduction to subject matter and symbolism of Christian Art. Emphasis on major episodes from lives of Mary, of Christ, and of saints most frequently depicted in art. Examples drawn from Early Christian through Baroque periods. *Prerequisite:* 5. Three hours. Fengler-Stephany. Alternate years, 1993-94.

153 Medieval Art to the Year 1000 Painting, sculpture, and architecture from the Early Christian through the Ottonian periods, emphasizing Byzantine and Carolingian art. *Prerequisite:* 5. Three hours. Roland. Alternate years, 1993-94.

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, 1992-93.

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, Dürer, Bosch, and Bruegel. *Prerequisite:* 5. Three hours. Fengler-Stephany.

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:* 5. Three hours. Fengler-Stephany.

164 Italian Renaissance Sculpture Sculpture in Italy from its Gothic sources through the Renaissance period. Special attention to Ghiberti, Donatello, and Michelangelo. *Prerequisite:* 5. Three hours. Fengler-Stephany. Alternate years, 1992-93.

167 Baroque Art in Southern Europe Art of Italy, France, and Spain in the 17th century, emphasizing sculpture of Bernini, architecture of Versailles, and paintings of Caracci, Caravaggio, LaTour, Poussin, Zurbaran, and Velázquez. *Prerequisite:* 6. Three hours. Roland. Alternate years, 1992-93.

168 Baroque Art in Northern Europe Art of The Netherlands, Flanders, and England in 17th century, emphasizing paintings of Rembrandt, Vermeer, Rubens, and VanDyck. *Prerequisite:* 6. Three hours. Roland. Alternate years, 1993-94.

171 Rococo and Romantic Art European architecture, sculpture, and painting, circa 1700-1850, and the origins of the modern movement. *Prerequisite:* 6. Three hours. Janson, Roland.

172 European Painting and Sculpture: 1848-1914 Detailed examination of shifts in European painting and sculpture from the aesthetic of the Academy to the new iconography and stylistic experiments up to WWI. *Prerequisite:* 6 or instructor's permission. Three hours. Lipke. Alternate years, 1992-93.

173 Canadian Art and Architecture A stylistic and thematic survey of the historical development of the visual arts in Canada from 1650 to present. *Prerequisite:* 6 or International Studies 91. Three hours. Lipke. Offered every three years, 1993-94.

174 20th Century Art A survey of movements and new media in European and American painting, sculpture, mixed media, performance, and the influences of film and photography on traditional media. *Prerequisites:* Three hours of art history and preferably 172 or 181. Three hours. Lipke. Alternate years, 1993-94.

175 19th Century Architecture and Design The practice and theory of building and design from early 19th to beginning of 20th century. *Prerequisite:* 6 or a course in historic preservation. Three hours. Janson. Alternate years, 1993-94.

176 20th Century Architecture and Design The practice and theory of building and design from the end of the 19th century to the recent past. *Prerequisites:* 6 or a course in historic preservation. Three hours. Janson. Alternate years, 1992-93.

179 Issues in Contemporary Art A critical inquiry into the development of postmodernism in contemporary art of all media. Emphasis varies with instructor. *Prerequisites:* Three hours of art history. Three hours. Lipke. Alternate years, 1992-93.

181 American Painting and Sculpture A survey of the major developments in American art between 1680 and 1914. *Prerequisites:* Three hours of art history. Three hours. Lipke. Alternate years, 1993-94.

184 American Architecture Building and design from the Colonial to the recent past. Local buildings of interest. *Prerequisite:* 6 or a course in historic preservation. Three hours. Janson.

185 Japanese Art Architecture, sculpture, painting, prints, and decorative arts and their relationship to Japanese culture. *Prerequisites:* Three hours in art history or one of the following Asian Studies courses: Geography 58, History 151, Religion 21, 132, 141. Three hours. Seyller. Alternate years, 1992-93.

187 Chinese Painting History of Chinese painting, emphasizing the landscape painting of the 11th to 17th centuries. *Prerequisite:* Six hours in art history, three at the 100 level or instructor's permission. Three hours. Seyller. Alternate years, 1992-93.

188 Indian Painting Mural, manuscript, and miniature painting from India from 5th to 19th century. Topics to include: courtly and religious patronage and regional styles. *Prerequisites:* Three hours of art history or instructor's permission. Three hours. Seyller.

192 Intermediate Special Topics in Asian Art Intermediate courses on topics beyond the scope of existing departmental offerings in Asian Art. See Schedule of Courses for specific titles. *Prerequisite:* Three hours.

194 College Honors

196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

198 Readings and Research *Prerequisite:* Departmental permission. Three hours.

201 Architecture, Landscape, and History (See Historic Preservation 201.) *Prerequisites:* Six hours advanced studies in art and architecture, permission. Three hours. Liebs.

207 Seminar in American Architecture and Design Selected topics in American art and/or architecture, individual research and reports. *Prerequisite:* By permission to advanced students in art history, architectural studies, or historic preservation. Three hours. Janson.

282 Seminar in Western Art Selected topics in Western Art. See Schedule of Courses for specific offerings each semester. *Prerequisites:* Six hours of 100-level Art History courses, including three hours in the area of the seminar; junior or senior standing. Three hours.

285 Seminar in Asian Art *Prerequisites:* One of the following: Art 8, 185, 187, 188 or 196 (Asian); three additional hours of 100-level courses either in art history or Asian Studies. Seyller.

296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

Asian Studies

COLLEGE OF ARTS AND SCIENCES

Prof. Seybolt, Director

The following courses are among the course offerings; see department listings for specific descriptions. "E", "S", "W" indicates courses on East, South, and West subareas of Asia respectively. Also see International Studies for special topics listings.

Courses entirely on Asia: **Anthropology** 165 (S), 166 (W); **Art** 8 (E, S), 146 (W), 185 (E), 187 (E), 188 (S), 192 (E, S, W), 285 (E, S, W); **Chinese** 1, 2 (E), 51, 52 (E), 61, 62 (E), 101, 102 (E), 201, 202 (E); **Geography** 58 (E); **History** 45 (W), 50 (E), 51 (E), 145 (W), 149 (W), 150 (E), 151 (E), 245 (W), 250 (E), 252 (E); **Philosophy** 121 (E), 122 (E), 221 (E); **Political Science** 175 (E), 176 (E); **Religion** 21 (E, S), 131 (S), 132 (E, S), 141 (E), 145 (E), 240 (E, S).

Courses significantly on Asia: **Anthropology** 101 (E, S, W), 163 (S), 170 (W); **Business Admin.** 127 (E, S, W); **Economics** 254 (W); **Education (EDFS)** 206 (E, S); **Geography** 1 (E, S, W); **History** 293, 294 (E, S, W); **Music** 15 (E, S); **Philosophy** 3 (E); **Political Science** 256 (E); **Psychology** 237 (E, S); **Religion** 20 (E, S), 101 (E, S), 104 (E, S), 106 (E, S), 108 (E, S), 168 (E, S).

Biochemistry (BIOC)

COLLEGE OF MEDICINE

Professors Chiu, Collen, Cutroneo, Long, Mann (Chairperson), Meyer, Rittenhouse, J. Thanassi, Woodworth; Associate Professors Auletta, Hart, P. Tracy; Adjunct Associate Professor Crabb; Assistant Professors Franchlyn, Morrical, R. Tracy, Van Houten; Research Associate Professors Church, Mason, N. Thanassi.

191, 192 Undergraduate Research Participation in a research program currently being pursued by a faculty member of 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.

212 Biochemistry of Human Disease Disorders of hemoglobin, iron bilirubin; biochemistry of diabetes, pancreatitis, atherosclerosis, liver and kidney dysfunction; acid-base balance; gene therapy; diagnostic enzymology. *Prerequisites:* Chemistry 42 or 141, Agricultural Biochemistry 201. Three hours.

213 Biomedical Biochemistry Laboratory Introduction to basic principles underlying biochemical analysis in areas of biomedical interest. *Prerequisite:* Concurrent registration in 212 or permission. One hour.

Biological Science (BSCI)

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

195, 196 Biological Sciences Seminar Presentations and discussion of selected topics by students, staff, and invited guests. Suggested attendance for all seniors in Biological Science for one semester. One hour.

197, 198 Undergraduate Research Special study and research activity under direction of qualified staff member. Requires written proposal and final project report. *Prerequisites:* Junior/senior standing, research advisor and program chairperson approval. Credit as approved with maximum of six hours for undergraduate program.

Botany (BOT)

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Professors Barrington (Interim Chairperson), Etherton, Tyree, Ullrich, Worley; Assistant Professor Hoffmann; Research Associate Professor Lintilhac; Research Assistant Professors Cumming, Hughes.

BIOLOGY (BIOL)

1 Principles of Biology (3-3) Introduction to organismal biology: nature of scientific inquiry, plant form and function, reproductive biology, pollination ecology; animal phylogeny, illustrated by comparative development, physiology, and ecology. Four hours. Barrington, Wilson.¹

2 Principles of Biology (3-3) Introduction to cell biology, genetics, and evolution. Topics presented: biochemistry; origin of life; metabolism; molecular, Mendelian, and population genetics; and microevolution. *Prerequisites:* Chemistry and Biology 1 recommended. Four hours. Hoffmann, Vigoreaux.¹

252 Molecular Genetics (See Botany 252.)

BOTANY (BOT)

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.¹

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. Hoffman.

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:* One year of plant or biological science, beginning chemistry recommended, or instructor's permission. Four hours. Etherton.

107 Biology of Algae and Fungi (3-3) Structure and development as illustrated by "simpler" plant life. Principles of classification; the role of life cycles in ecology and evolution; ecological and economic significance. *Prerequisite:* 4 or Biology 1, 2. Four hours. Not offered 1992-93.

¹Credit not given for both courses in each or any of the following combinations: (Biology 1 and Zoology 8), (Biology 1 and Zoology 9), (Biology 1 and Zoology 95), (Biology 1 and Botany 4), (Biology 2 and Botany 4), (Biology 2 and Zoology 8), (Biology 2 and Biology 3), (Biology 2 and Zoology 96).

108 Land Plants: Form and Phylogeny (3-3) Evolutionary history of land plants with reference to fossil record, ecology, reproductive biology, and genetics. Evolutionary transformations in land-plant form and their functional significance. *Prerequisite:* 4 or Biology 1, 2. Four hours.

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.

117 Plant Pathology (3-2) Diagnosis, life history, control of diseases 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. Alternate years, 1993-94.

132 Elementary Genetics Introduction to the genetics of eukaryotes as applied to plant and animal breeding, systematics, and genetic engineering applied to agriculture. *Prerequisite:* 4 or Biology 1, 2; a semester of college chemistry and either mathematics or statistics. Three hours. I.

152 Plant Anatomy (3-2) A laboratory course in which students observe, draw, and write about the microscopic structure of flowering plants. *Prerequisite:* 4 or Biology 1, 2. Three hours. Etherton.

160 Plant Ecology (3-3) Introduction to interactions among plants and their environments. Dynamics of aquatic and terrestrial ecosystems emphasizing populations; physiological ecology; experimental design and analysis. *Prerequisite:* 4 or Biology 1, 2. Four hours. I. Hoffmann.

165 Introduction to Wetlands The ecology, natural history, diversity, development, and values of wetlands. Hypothesis-testing and assessment methodologies. Predominantly field trips and projects. *Prerequisite:* Six hours science, three hours biological science preferred. Four hours. Worley. Not offered 1992-93.

193, 194 College Honors (For Arts and Sciences seniors.)

197, 198 Undergraduate Research and Apprenticeships Individual projects under direction of a faculty member. 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. Bartlett, Etherton. Alternate years, 1992-93.

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 or 132 recommended. Three hours. Barrington. Alternate years, 1992-93.

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. Hughes.

223 Fundamentals of Field Science (3-3) Pattern and process in natural systems. Weekly discussion of unifying questions in science. Field labs teach sampling and analysis of vegetation, soils, and animals. *Prerequisite:* Graduate standing or several university courses in earth sciences, life sciences, and chemistry. Three hours. Hughes.

232 Botany Field Trip Trips to selected environments outside Vermont, led by faculty members representing different fields of botany. Overall, integrated approach to ecology, structure, and function. One hour. Christmas or spring recess or end of school year.

234 Ecology of Freshwater Algae (2-3) Environmental factors influencing 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. Not offered 1992-93.

241 Tropical Plant Systematics Principles and methods of angiosperm phylogeny. Recent systematic and evolutionary research on flowering plants; survey of tropical flowering plant families. Student presentations on recent research. *Prerequisite:* 109. Four hours. Barrington. Alternate years, 1992-93.

250 Microtechnique (1-4) Theory and practice in preparation of biological materials for anatomical and cytological study, including histochemistry and photomicrography. *Prerequisites:* Introductory Chemistry; some knowledge of organic chemistry, anatomy, or cytology desirable. Three hours. Alternate years, 1993-94.

251 Principles of Light Microscopy for Biologists Introduction to the optics, construction, and care of the light microscope. Theory of phase and interference contrast, fluorescence, and video methods. *Prerequisite:* One year of physics or permission. One hour. Lintilhac.

252 Molecular Genetics II: Regulation of Gene Expression in Eukaryotes How cells control the flow of genetic information from gene into active gene product. Distinctions between quiescent and active genes, mechanisms of genetic communication/regulation. *Prerequisites:* Biology 101 or Agricultural Biochemistry 201 or Biochemistry 301, or equivalent; others by instructor's permission. Three hours. Ullrich. Alternate years, 1993-94.

254 Genetics of Fungi Understanding the classical and molecular genetics of fungi with respect to their contributions in agriculture, basic genetics, biotechnology, industry, recombinant DNA, and gene expression. *Prerequisites:* Biology 101, or Agricultural Biochemistry 201 or Biochemistry 301 or equivalents; others by instructor's permission. Three hours. Ullrich. Alternate years, 1992-93.

256 Advanced Plant Genetics Review of major topics in higher plant genetics and cytogenetics. Designed to be applied to the systematics, breeding, and gene engineering of higher plants. *Prerequisite:* 132 or Biology 101. Three hours. Not offered 1992-93.

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 31, 42. Four hours. Etherton. Alternate years, 1993-94.

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:* Departmental permission.

Business Administration (BSAD)

SCHOOL OF BUSINESS ADMINISTRATION

Professors Brandenburg (Dean), Grinnell, Laber, Savitt, Shirland, Thimm; Associate Professors Averyt, Cats-Baril, Gatti, Gurdon, Hunt, Jesse, Kraushaar, McIntosh, Parke, Sinkula, Tashman; Assistant Professors Battelle, Clark, Dempsey, Noordewier, Thompson, Wilson; Visiting Assistant Professor Ramagopal; Lecturer Woodman.

BUSINESS ENVIRONMENT

17, 18 Business Law Concepts of law as related to business, including law of contracts, sales, bailments, and negotiable instruments, business and laws of agency, partnerships, and corporations. *Prerequisite:* Sophomore standing. Three hours.

72 The Economics of Business Builds on basic economics, looking at creative destruction and how equilibrium is achieved in the functional areas of the firm; including production, marketing, finance, human resources, and corporate strategy. *Prerequisites:* Economics 11, 12; BSAD majors only. Three hours.

132 Legal and Political Environment of Business Interaction of business and society. Emphasis on business roles in the complex and dynamic, legal, political, and social environment. *Prerequisites:* Economics 11, 12; junior standing. Three hours.

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:* 132. Three hours. Not offered 1992-93.

134 Canadian-U.S. Business Relations A study of the Canadian-U.S. bilateral relationship as it affects international business, emphasizing trade, investment, energy, and industrial development policies. *Prerequisites:* Economics 11, 12; junior standing. Three hours.

135 Economics of International Management Study of the economic, political, and technological environments of international management and their influence on strategy formulation and implementation. *Prerequisites:* 120, senior standing. Three hours.

136 Political Risk and the International Corporation Analysis of how the international corporation monitors and manages political risk on international business operations. *Prerequisite:* 132 or instructor's permission. Three hours. Not offered 1992-93.

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:* Second semester BSAD, senior standing. Three hours.

195, 196 Special Topics Specialized or experimental courses offered as resources permit.

197, 198 Independent Study Independent investigation designed by the student as a means of applying prior course work to a specialized problem. Well suited for senior projects. *Prerequisite:* Permission of BSAD Undergraduate Studies Committee.

ACCOUNTING

60 Financial Accounting Introduction to generally accepted accounting principles and techniques regarding corporations, partnerships, and proprietorships as they apply to income determination and financial position presentation. *Prerequisite:* Sophomore standing. Four hours.

61 Managerial Accounting Introduction to use of accounting for planning, cost behavior and control, and decision making. *Prerequisite:* 60. Four hours.

160 Corporate Financial Reporting A study of corporate financial accounting and reporting practices, focusing on contemporary issues and controversies. Not open to students who have completed BSAD 162. *Prerequisites:* 60, junior standing. Three hours.

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, junior standing; 161 for 162. Three hours.

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. *Prerequisites:* 60, junior standing. Three hours.

166 Advanced Accounting Accounting for partnerships, special sales contracts, parent-subsidiary relationships, fiduciary relationships, and governmental units. *Prerequisite:* 162. Three hours.

167 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:* 162. Three hours.

168 Cost Accounting Accounting for inventory valuation and income determination, nonroutine decisions, policy making and long-range planning. *Prerequisites:* 61, junior standing. Three hours.

FINANCE

180 Managerial Finance The financial function in the corporation. Techniques for evaluating current use of resources and proposed resource acquisitions or dispositions. *Prerequisites:* 61, Economics 12, Statistics 141, junior standing. Three hours.

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 examined. *Prerequisite:* 180. Three hours.

182 Security Valuation and Portfolio Selection Examination of the theories and evidence on the behavior of financial asset prices and rational portfolio selection. *Prerequisite:* 180. Three hours.

183 International Financial Management Theories and practices of international financial management examined. Topics investigated include: systems of international exchange, spot and forward markets, and expropriation and exchange risk. *Prerequisite:* 180. Three hours.

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.

185 Topics in Financial Theory and Practice One- to three-credit modules focusing on financial theory and applications. Subjects covered vary each year, including: financial futures markets, options, municipal securities, bankruptcy, SEC regulation, bankers acceptances, interest rate swaps, mortgage-backed bonds, securitization of index trading. *Prerequisite:* 180. One to three hours.

HUMAN RESOURCE MANAGEMENT

120 Principles of Management and Organizational Behavior Fundamentals of management, organization theory, behavior, and interpersonal communication in a transnational context. *Prerequisite:* Junior standing. Three hours.

121 Selected Topics in Organization Behavior Focuses on ways in which individuals and work groups within organizations can be better utilized as organizational resources. *Prerequisite:* 120. Three hours.

122 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:* 120. Three hours.

123 Collective Bargaining and Conflict Resolution Focuses on union-employer relations and on developing the student's negotiation skills. Topics include the union contract, the causes of strikes, and the techniques for resolving conflict. A bargaining simulation is incorporated. *Prerequisite:* 120. Three hours.

126 Current Issues in Management and Organizational Theory One- and two-credit seminars. Subjects include training and development, selection and recruitment, and affirmative action. *Prerequisite:* 120. One to three hours.

127 International Industrial Relations Reviews special problems in the management of human resources in a global economy. Focuses on cultural differences, a comparison of labor-management systems in a number of countries, the role of multinational corporations, and the impact of foreign enterprises on employment practices in host countries. *Prerequisites:* 120; senior standing. Three hours.

MANAGEMENT INFORMATION SYSTEMS

141 Management Information Systems Integrates computer hardware and software concepts with a classical methodology for developing business information systems. Presents the relevant factors in the development of information systems. Discusses the problems of analyzing, designing, and implementing such systems. *Prerequisites:* Computer Science 11, Statistics 141, Math. 20 or 21, junior standing. Three hours.

142 Structured Business Programming — COBOL Fundamental principles of business computer programming. Topics include: the constructs of structured programming, topdown and modular development, sequential and nonsequential access techniques, other features of the COBOL language. Programming exercises include data editing, reporting, file updating. An on-line program development mode used. *Prerequisite:* 141. Three hours.

143 Structured Analysis and Design of Business Systems In-depth study of business information system development cycle emphasizing analysis and design phases. Structured analysis and design techniques used to develop models of business information systems. Case studies such as payroll, inventory, accounts receivables, order entry, billing. *Prerequisite:* 141. Three hours.

144 Data Base Development and Administration Data base system development cycle from analysis to design, implementation, and administration. Central focus on complex data structure modeling, data base implementation and administration. A project involving analysis, design, and implementation required. *Prerequisites:* 141, 143, or instructor's permission. Three hours.

145 Managing the Information System Resource Theory and practice of managing resources of an organization's information system. Responsibilities and interactions of upper level, function area, and information system managers emphasized. Topics include project selection and control, staffing, organizing, planning, and managing the information system function. *Prerequisites:* 120, 143, concurrent enrollment in 144, or instructor's permission. Three hours.

MARKETING

150 Marketing Management The place of marketing in our economy. Analysis of the market structure by function, institutions, and commodities. Consumer and organizational activities reviewed. *Prerequisites:* Statistics 141, Computer Science 11, Economics 11, 12; junior standing. Three hours.

151 Marketing Research The role of research in a marketing information framework. Emphasis on survey research, data collection, and analysis. Experimental designs also examined. *Prerequisites:* 150, Statistics 141. Three hours.

152 Marketing Channels The analysis of distribution channels as economic and behavioral systems. Topics include organizational patterns, power and conflict, transportation, inventory control, site location, and customer service. *Prerequisite:* 150. Three hours.

153 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:* 151 (corequisite of 151 when 153 and 151 offered same semester). Three hours.

158 Current Marketing Developments Analysis of both present and future changes affecting marketing theory and practice. Topics include social changes, functional and institutional marketing system changes. Individual research projects required. *Prerequisite:* 150. Three hours.

159 Marketing Planning and Programming 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. *Prerequisites:* 150 and one other marketing course, not including 151. Three hours.

PRODUCTION AND OPERATIONS MANAGEMENT AND QUANTITATIVE METHODS

170 Business Forecasting Methods Looks inside the crystal ball at major forecasting methods (Smoothing, Regression, Econometric, Box-Jenkins, Combined), and analyzes elements of good forecasting practice in an organization. Extensive use of PC forecasting packages. *Prerequisites:* 61, Math. 20, Statistics 141, Economics 11, 12, Computer Science 11; junior standing. Three hours.

172 Managerial Economics Application of economic, mathematical, and statistical models to managerial decision making. Software support from PC spreadsheet programs. *Prerequisites:* 61, Math. 20, Statistics 141, Economics 11, 12, Computer Science 11; junior standing. Three hours.

173 Production and Operations Analysis Study of methods used in planning, analysis, and control of production and service processes. Topics include forecasting, scheduling, production and inventory control, sequencing, line balancing, learning curves, and networks. *Prerequisites:* Math. 20 or 21, Statistics 141, junior standing. Three hours.

174 Manufacturing Planning and Control Study of systems to plan and control flows of materials through manufacturing. Topics include production, materials, and capacity planning; master scheduling; shop-floor control, and just-in-time production. *Prerequisite:* 173 or senior standing in Engineering or Mathematics. Three hours.

175 The Management of Technology (Same as Engineering Management 175.)

177 Introduction to Decision Making Under Uncertainty Probability models as applied to the optimal choice among alternative actions or strategies when outcomes are uncertain. *Prerequisite:* 173. Three hours.

178 Quality Control Analysis and design of systems for obtaining quality in operations. Statistical process control (SPC) emphasized, along with current management philosophies and concepts. *Prerequisites:* Math. 20 or 21, Statistics 141 or equivalent; junior standing. Three hours.

179 Introduction to Operations Research Analysis, emphasizing applications of business decision problems using mathematical modeling. Topics include mathematical programming, network analysis, and simulation. *Prerequisites:* Math. 20 or 21, Statistics 141, junior standing. Three hours.

272 Discrete Simulation Discrete simulation using monte-carlo techniques and the GPSS simulation processor; mathematical modeling of systems; control systems; validation and sensitivity analysis. *Prerequisites:* Statistics 141 or 151, senior standing. Three hours.

Canadian Studies

COLLEGE OF ARTS AND SCIENCES

Prof. W. Metcalfe, Director

The following courses are among the course offerings; see department for specific description. Also see International Studies for special topics listings.

Anthropology: 128, 160, 167, 168, 178; Art 173, 175, 176; Business Administration 134; English 13 (taught by Prof. Thompson), 42, 135, 136; French 285, 286, 293; Geography 62, 146 (taught by Prof. Meeks), 173, 174, 175, 177, 196, 210, 270; Geology 241 (taught by Mehrkens), 272 (when field course goes to Canada), 273; History 65, 66, 126, 127, 173 (taught by Stoler), 174, 265; Political Science 71, 152, 153, 161, 173, 273, 274, 275, 279, 296; Sociology 29 (taught by Berkowitz), 167, 204, 207, 254, 255; Psychology 237; Economics 150, 185; Linguistics 101; Foundations 206 (EDFS); International Studies 91, 197, 198, 295, 296.

Chemistry (CHEM)

COLLEGE OF ARTS AND SCIENCES

Professors Allen, Bushweller (Chairperson), Flanagan, Geiger, Jewett, Krapcho, Kuehne, Strauss, White; Associate Professors Goldberg, Leenstra, Welton; Assistant Professors Ahmed, Rosenthal, Sentell; Lecturer Lewis.

Note: Credit cannot be given for: 1 and also 3 or 5 or 11 or 13; 2 and also 12 or 14; 3 and also 5; 3 and also 11 or 13; 4 and also 6; 4 and also 42 or 44; 5 and also 11 or 13; 6 and also 42 or 44; 14 and also 121; 42 and also 141; 42 and also 143; 44 and also 141 or 143; 141 and also 143; 142 and also 144; 142 and also 143, 144; 160 and also 162.

1, 2 Introductory Chemistry (3-3) Basic course in 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) One-semester survey of principles and concepts of general chemistry, designed primarily to meet needs of students in agricultural and health sciences. Four hours.

4 Outline of Organic and Biochemistry (3-3) Broad overview of most important facts and principles of organic and biochemistry and interrelationships between these branches of chemistry. *Prerequisite:* 1 or 3. Four hours.

5 Outline of General Chemistry One-semester survey of principles and concepts of general chemistry, designed pri-

marily to meet the needs of students in agricultural and health sciences. NO LABORATORY. Three hours.

6 Outline of Organic and Biochemistry Broad overview of most important facts and principles of organic and biochemistry and of interrelationships between these branches of chemistry. NO LABORATORY. *Prerequisite:* 1 or 3 or 5. Three hours.

7 Earth, Air, Fire, and Water Introductory course for nonscience majors which deals with an understanding of one's 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 required for 12. Three hours.

13, 14 General and Quantitative Analysis Laboratory (0-6) 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. Meets only during first four weeks of 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.) *Prerequisite:* 1 or 3. Four hours.

44 Introductory Organic Chemistry 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.) NO LABORATORY. *Prerequisite:* 1 or 3 or 5. Three hours.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

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) Survey of principles and reactions of organic chemistry for chemistry majors. Concurrent enrollment in 145 required

for 144. *Prerequisites:* 1, 2 or 11, 12; 143 for 144. 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 144 required for 145. Two hours.

160 Physical Chemistry for Biological Science Students Aspects of physical chemistry most pertinent to work in biological sciences: acid-base equilibrium, theory of solutions, thermodynamics and kinetics. *Prerequisites:* 2, Physics 42. 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 42 or 125, Math. 121 for 163. Three hours.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

201 Advanced Chemistry Laboratory (1-6) Laboratory and discussion only. Laboratory problems requiring modern analytical, physical, and inorganic synthetic techniques. *Prerequisites:* 146, 221, credit for or concurrent enrollment in 162 or 163. Three hours.

202 Advanced Chemistry Laboratory (0-6) Laboratory only. Laboratory problems requiring modern analytical, physical, and inorganic synthetic techniques. *Prerequisites:* 201. Two hours.

214 Polymer Chemistry Polymer size and weight distributions. Kinetic models for step polymerization, addition polymerization, copolymerization. Physical properties, characterization of polymers in the solid state and in solution. *Prerequisites:* 144, 162. Three hours. Allen. Alternate years.

221 Instrumental Analysis Systematic survey of modern methods of chemical analysis. Fundamental principles and applications of spectroscopy, electrochemistry, and separation techniques. *Prerequisites:* Credit for or concurrent enrollment in 162 or 163. Three hours. Geiger, Goldberg.

222 Advanced Analytical Chemistry In-depth coverage of selected modern instrumental methods of chemical analysis, emphasizing most recent developments in spectroscopy, electrochemistry, and separation techniques. *Prerequisite:* 221. Three hours. Geiger, Goldberg.

224 Chemical Separations Theory and practice of chromatographic separations. Emphasis on gas-liquid, liquid-liquid, and liquid-solid chromatography. *Prerequisite:* 221. Three hours. Alternate years. Sentell.

225 Electroanalytical Chemistry Principles of modern electrochemical analysis focusing mainly on finite current methods — voltammetry, polarography, chronoamperometry, cyclic voltammetry, etc. Introductory to modern operational amplifier instrumentation. Double layer theory and electron transfer kinetics. *Prerequisite:* 163. Three hours. Geiger. Alternate years.

226 Analytical Spectroscopy Principles of optical spectroscopic methods of analysis. Emphasis on theory and practice of atomic spectroscopy and new molecular spectroscopic methods. *Prerequisite:* 221. Three hours. Geiger, Goldberg.

227, 228 Special Topics in Analytical Chemistry Selected topics of current interest in analytical chemistry. New techniques and methodologies, especially in chemical instrumentation. Credit as arranged.

231 Inorganic Chemistry Survey of inorganic systems: symmetry, group theory, structure, bonding, acid-base chemistry, crystal field theory; solid state, ionic, covalent and electron deficient systems. *Prerequisite:* 162. Three hours. Allen, Rosenthal.

232 Advanced Inorganic Chemistry Ligand field and molecular orbital theories applied to transition metal complexes; introduction to organometallic chemistry, inorganic reaction mechanisms, bioinorganic chemistry. *Prerequisite:* 231. Three hours. Allen, Rosenthal.

234 Organometallic Chemistry Systematic survey of synthesis, properties, structures, bonding, and reactions of both main group and transition series organometallic compounds. Variation of structure and metal-carbon bond stability throughout periodic system. *Prerequisite:* 231. Three hours. Allen. Alternate years.

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. Alternate years.

237, 238 Special Topics in Inorganic Chemistry Areas of current interest involving inorganic systems such as bioinorganic, solid state and polymers with unusual properties. Credit as arranged.

241 Advanced Organic Chemistry Stereochemistry, reactivity criteria, reaction mechanisms, and synthetic methods stressed. Reactive intermediates such as carbanions, carbocations, carbenes, and free radicals used to systematize 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 multistep 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, Strauss, White. Alternate years.

253 Practical NMR Spectroscopy Introduction to high resolution pulsed Fourier transform nuclear magnetic resonance spectroscopy. Chemical shifts, scalar coupling, relaxation, molecular symmetry considerations, chemical exchange effects. *Prerequisites:* 142 or 144, 163. Three hours. (Graduate credit pending.)

257, 258 Special Topics in Organic Chemistry Advanced level discussion of specific topics in organic chemistry of current interest such as photochemistry, carbenes, bioorganic 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. Alternate years.

263 Introduction to Quantum Mechanics General considerations of quantum mechanics. Development of techniques pertinent to application of quantum mechanics to chemical problems. *Prerequisites:* 162, 163. Three hours. Weltin. Alternate years.

264 Fundamentals of Spectroscopy In-depth discussion of the theory of molecular states and transitions between them, with applications to electronic spectroscopy. Explicit treatment of vibrations in molecules. *Prerequisites:* 163, Math. 121. Three hours. Leenstra. Alternate years.

265 Statistical Mechanics Development of statistical mechanics and its application to problems of chemical interest. *Prerequisites:* 162, 163; 263 recommended. Three hours. Flanagan. Alternate years.

266 Molecular Orbital Theory Introduction to Hückel molecular orbital method. Energy levels and orbitals, molecular properties and their interpretation. Effects of substituents on electronic structure. Extensions of Hückel method. *Prerequisites:* 142, 163. Three hours. Weltin. Alternate years.

267, 268 Special Topics in Physical Chemistry Advanced discussion of physical chemistry and chemical physics, group theory, solid state, molecular orbital theory, irreversible thermodynamics, kinetics and mechanisms, solution theory, calculations, spectroscopy. Credit as arranged.

282 Senior Seminar Oral and written presentation of a subject of current chemical interest. *Prerequisite:* Audit of 381. One hour.

291 Undergraduate Research Special study in inorganic, analytical, physical, or organic chemistry with an assigned staff member. Findings submitted in written form. *Prerequisite:* Departmental permission. Credit as arranged with maximum of four hours per semester and 12 hours for the undergraduate program.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific title.

Chinese (CHIN)

COLLEGE OF ARTS AND SCIENCES

Assistant Professors Williams, Wu.

1, 2 Elementary Chinese A study of Mandarin Chinese designed to give the beginning student the fundamental grammar and vocabulary for speaking, reading, and writing the modern national language. Four hours.

51, 52 Intermediate Chinese A continuation of 1, 2 designed to enable the student to converse in everyday Chinese, and to read and write simple texts. *Prerequisite:* 2 or equivalent. Four hours.

101, 102 Advanced Chinese Structured readings with emphasis on sentence structures, vocabulary expansion, and increased fluency in self-expression. *Prerequisite:* 52 or equivalent. Three hours.

197, 198 Readings and Research Individual research project or directed reading in area of special interest to student. *Prerequisite:* Instructor's permission. Variable credit.

201, 202 Advanced Conversation and Composition To improve oral and written proficiency through reading newspapers and short stories, discussion, and composition. *Prerequisites:* 102 or equivalent for 201; 201 for 202. Three hours.

GENERAL LITERATURE

171, 172 Chinese Literature in Translation Selected topics in Chinese Literature. Readings and discussion are in English. No knowledge of Chinese language is required. *Prerequisite:* One course in literature or Asian Studies concentrating on East Asia. Three hours.

Civil Engineering (CE)

COLLEGE OF ENGINEERING AND MATHEMATICS

Professors Beliveau (Interim Chairperson), Cassell, Dawson, Hemenway, Oppenlander, Pinder; Associate Professors Downer, Laible, Olson; Assistant Professors Dougherty, Hayden; Adjunct Professor Knight.

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.

10 Surveying (3-4) Fundamental surveying methods; propagation of errors as applied to surveying measurements; triangulation; control surveys; and traverse adjustments. *Prerequisites:* Math. 21, Computer Science 11. Four hours.

11 Geometronics (2-4) Selected items in analytical photogrammetry; celestial observations, elements of photointerpretation; theory of curves; and digital terrain analysis. *Prerequisites:* 10 or 12, Math. 22. Three hours.

100 Mechanics of Materials (3-0) (Same as Mechanical Engineering 14.) Stress, strain, temperature relationships, torsion, bending stresses, and deflections. Columns, joints, thin-walled cylinders. Combines stresses and Mohr's circle. *Prerequisites:* 1, Math. 121, Mechanical Engineering 12 or concurrent enrollment. 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 (3-0) 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. Three hours.

140 Transportation Engineering (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, junior standing in CE, or instructor's permission. 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. 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 phenomena and theoretical principles underlying water supply, air and water pollution control, and industrial hygiene. *Prerequisites:* Chemistry 1 or 5, Math. 22. 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. *Prerequisites:* 150, 160. 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:* Mechanical Engineering 12. Four hours. Downer.
- 161 Water Resource Engineering Design (3-0)** Formulation of water resource projects; development of design methods for: surface water, risk, storage, and control structures, open channels, and drainage systems; design project. *Prerequisite:* 160. Three hours. Downer.
- 170 Structural Analysis 1 (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. Beliveau, Laible.
- 171 Structural Analysis 11 (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. Beliveau, Laible.
- 172 Structural Steel 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. *Recommended Corequisite:* 171. Three hours. Beliveau.
- 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. Beliveau.
- 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 special topic under guidance of faculty member. Library investigations, unique design problems, laboratory and field studies. *Prerequisites:* Senior standing, departmental permission. Three hours.
- 193, 194 College Honors**
- 195 Special Topics** *Prerequisite:* Senior standing in Civil or Mechanical Engineering.
- 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.
- 230 Community Planning Techniques (3-0)** Size, spacing, and functions of cities; economics, 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.
- 233 Rural Planning** (See Geography 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.
- 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.
- 249 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. Morris.
- 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, transport theory and control techniques used. Emphasis on source measurement and contaminant control design. *Prerequisites:* Chemistry 5, Math. 21. Three hours. Hemenway.
- 254 Environmental Quantitative Analysis (3-3)** 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 1 or 5, Math. 22. Four hours. Hemenway.
- 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, adsorption, ion exchange, membrane processes; pilot plant experimentation. *Prerequisites:* 150, 151 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:* 150, 151 or graduate standing. Three hours.
- 257 Analysis of Aquatic Systems (3-0)** Quantitative study of biological, chemical, and physical phenomena in lakes, streams, estuaries, and ground water; mathematical modeling applied to management of water quality. *Prerequisites:* 150, Math. 271 or 124 or instructor's permission. 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 contaminant generation and measurement. *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.

264 Land Treatment of Wastes (3-0) Fundamental physical, chemical, and biological mechanisms of water and waste constituent transformation, cycling, uptake and removal in the plant/soil profile; system cost, design project centered. *Prerequisite:* Instructor's permission. Three hours.

265 Ground Water Hydrology (3-0) Principles of ground water hydraulics, well characteristics, aquifers, and use of numerical methods to solve ground water flow problems. *Prerequisites:* Calculus III and programming experience or instructor's permission; graduate standing or senior Civil Engineering standing. Three hours.

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.

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, physiochemical concepts, plasticity properties, permeability, and compaction. *Prerequisite:* 180. Three hours. Olson.

283 Designing with Geosynthetics Geotextiles, geogrids, geonets, geomembranes, geocomposites, geopipes. Design for separation, reinforcement, filtration, drainage, erosion, control, liners. Applications in transportation, drainage, solid waste containment. Material testing, behavior. *Prerequisite:* 180. Three hours.

295 Special Topics Content is dictated by expanding professional interest in newly developing, or recently developed, technical areas in which there is particular need or opportunity. Three hours. *Prerequisite:* Senior or graduate standing.

Classics (CLAS)

COLLEGE OF ARTS AND SCIENCES

Professors Ambrose (Chairperson), Gilleland, R. Rodgers, Schlunk; Associate Professor B. Rodgers.

GREEK (GRK)

There are no prerequisites to any Greek course. Students who have previously studied Greek should consult the department.

The first two semesters of a foreign language are excluded from the 45-hour limit on courses from a single department that can be counted toward the 122 hours required for the Bachelor of Arts degree.

1, 2 Elementary Greek Four hours. Ambrose.

51, 52 Intermediate Greek Review of syntax. Fall semester: Readings from Plato, Herodotus, and Euripides. Spring semester: Readings from Homer. Three hours each course. Ambrose, R. Rodgers, Schlunk.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

111, 112 Greek Prose Style Readings in literary prose analyzed stylistically and imitated in composition. Required of Greek majors. Three hours. B. Rodgers, Schlunk.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Readings and Research

201 Greek Orators Three hours. B. Rodgers. Alternate years, on demand.

202 Greek Comedy Three hours. Ambrose. Alternate years.

203 Greek Historians Three hours. B. Rodgers. Alternate years, on demand.

204 Greek Tragedy Three hours. Ambrose. Alternate years.

205 Greek Philosophers Three hours. B. Rodgers. Alternate years, on demand.

206 Greek Epic Three hours. Schlunk. Alternate years, on demand.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

LATIN (LAT)

There are no prerequisites to any Latin course. Students who have had two years of high school Latin normally enroll in Latin 5 or Latin 51. 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.

The first two semesters of a foreign language are excluded from the 45-hour limit on courses from a single department that can be counted toward the 122 hours required for the Bachelor of Arts degree.

1, 2 Elementary Latin For students who present less than two years of high school Latin. Four hours. Gilleland.

5 Basic Latin Grammar Review A complete survey of Latin grammar for students with one or two years of secondary school Latin. No credit with Latin 2. Three hours. B. Rodgers.

51, 52 Intermediate Latin Fall semester: Selections from Cicero and other prose authors. Spring semester: Selections from Vergil and Ovid. Three hours each course. Gilleland, B. Rodgers, R. Rodgers, Schlunk.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

101, 102 Survey of Latin Literature Selections from principal Roman authors. Three hours. R. Rodgers.

111, 112 Latin Prose Style Readings in literary prose analyzed stylistically and imitated in composition. Required of B.A. and B.Ed. Latin majors. Three hours. B. Rodgers, Gilleland.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Readings and Research**203 Republican Prose** Three hours. B. Rodgers.**204 Epic Poets** Three hours. Schlunk.**227 Roman Lyric Poets** Three hours. Schlunk. Alternate years, on demand.**251 Roman Letters** Three hours. B. Rodgers, Schlunk. Alternate years, on demand.**252 Comedy** Three hours. Alternate years, in demand.**253 Roman Oratory** Three hours. Gilleland. Alternate years, on demand.**255 Historians of the Empire** Three hours. B. Rodgers. Alternate years, on demand.**256 Satire** Three hours. Gilleland. Alternate years, on demand.**271 Silver Latin** Three hours. Gilleland. Alternate years, on demand.**295, 296 Advanced Special Topics** Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.**CLASSICS (CLAS)**

Courses entitled "Classics" are not foreign language courses. All readings are in English and no prior knowledge of Greek and/or Latin is required.

22 Etymology Derivation of English words from Greek and Latin bases. Training in analysis of unfamiliar words, special attention to scientific vocabulary. Three hours.**42 Mythology** Greek myth in literature, art, and music from antiquity to modern times. No prerequisites. Three hours. Spring semester. Ambrose.**95, 96 Introductory Special Topics** Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.**153 Greek Drama** Three hours. Ambrose. Alternate years.**154 Greek Historians** Three hours. B. Rodgers. Alternate years.**155 Ancient Epic** Three hours. Davison. Alternate years.**156 Greek and Roman Satiric Spirit** Three hours. R. Rodgers. Alternate years.**193, 194 College Honors****195, 196 Intermediate Special Topics** Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.**197, 198 Readings and Research****295, 296 Advanced Special Topics** Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

See also: Art 148 (Greek Art) and Art 149 (Roman Art); European Studies; History 21 (Classical Greek Civilization), 22 (Classical Roman Civilization), 121 (Greek History), 122 (Roman History), and 149 (Archaeology and History/Ancient Near East).

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 Science and Disorders (CS&D)

COLLEGE OF ARTS AND SCIENCES

Professors Guitar (Chairperson), Lubker, Wilson; Associate Professor McCauley; Assistant Professor C. Smith; Lecturers Holmgren, Houghton.

10 Voice and Articulation Principles of pronunciation, phonetic practice for the improvement of voice and diction in communication. Three hours.**20 (F) Introduction to Disordered Communication** Survey of language, speech, and hearing disorders, emphasizing the importance of understanding such disorders as a part of the fuller understanding of human behavior. Three hours. Wilson.**80 (F) Introduction to Speech and Hearing Sciences** Introduction to the process of normal human communication: current language theory, acoustics of speech, basic production systems, language development, and the evolution of language. Three hours. Lubker.**90 (S) Phonetics** Linguistics, acoustics, and articulatory phonetics applied to the description of speech. Stresses use of the International Phonetic Alphabet with English, foreign languages, and disordered speech. Three hours.**94 (S) Development of Spoken Language** Speech and language acquisition interpreted in light of current learning and cognitive theory, linguistic theory, and methods of linguistic analysis. Three hours. C. Smith.**95, 96 Introductory Special Topics** Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.**101(F) Physiological Phonetics** Structure and function of the respiratory, phonatory, and articulation systems of the vocal tract utilized for production of speech. Models of speech production emphasized. *Prerequisites:* Nine hours of CS&D and psychology, including 80, 90. Three hours. Guitar.**105 Fundamentals of Hearing** Study of processes of human hearing emphasizing sound, acoustics, psychoacoustics, perception of speech, and the anatomy and physiology of the hearing mechanism. *Prerequisite:* 80 or permission. Three hours. Houghton, Lubker.**193, 194 College Honors****195, 196 Intermediate Special Topics** Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.**197, 198 Readings and Research****251(F) Disorders of Speech** In-depth survey of speech disorders: articulation, fluency, voice, etc., including those with functional as well as organic etiology. Includes one hour laboratory for systematic observation and analysis of speech therapy. *Prerequisite:* 94. Four hours. McCauley.**216(S) Disorders of Language** In-depth survey of language disorders including aspects of reception and expressive use of the language. Includes one hour laboratory as in 251. Four hours. C. Smith.**262(S) Measurement and Management of Communication Disorders** Study of the construction, application, interpretation, and implementation of tests of communicative functioning. *Prerequisite:* 251 or 261. Three hours. McCauley.**271(F) Audiological Assessment** Examination of basic parameters in measurement of hearing. Pure tone testing,

masking, impedance, and speech evaluations. *Prerequisite:* 105 or instructor's permission. Three hours. Houghton.

272 Auditory Habilitation of Hearing Impaired Children Survey of the handicapping effect of hearing disorders on the developing child and the principles of rehabilitation utilized for treatment of this disorder. *Prerequisites:* Fifteen credits in CS&D, including 94, 271. Three hours. Houghton.

281 Neuroanatomical Bases of Speech and Hearing The neuroanatomical structures which underlie the formulation, production, and perception of speech are examined and related to language and speech behavior. *Prerequisites:* Nine credits in CS&D at the 200 level. Three hours. Guitar.

287 Current Research in Language Acquisition Recent advances in the study of child language. *Prerequisite:* 94. Three hours.

290 Introduction to Research in Communication Science and Disorders Study of hypothesis formation, review of research literature, and current research topics in communication science. Research project required. *Prerequisites:* At least nine credits at the 200 level. Three hours. Guitar. (Not offered for graduate credit.)

291, 292 Clinical Study Supervised practicum experiences with children and adults presenting disorders of speech, hearing, and language. *Prerequisites:* 261, 262. Credit as arranged.

293, 294 Seminar *Prerequisite:* Instructor's permission. Variable credit.

295, 296 Advanced Special Topics Advanced courses of seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

Computer Science (CS)

COLLEGE OF ENGINEERING AND MATHEMATICS

Professors Absher, Dawson, Oughstun, Williams; Associate Professor Hegner; Research Assistant Professor Barbour; Visiting Faculty Alagic, Kantabutra; Lecturers Douglas, Eppstein, LaForge.

2 Microcomputer Applications Software (2-2) Introduction to popular applications software packages, including word processor, spreadsheet, and database packages. Emphasis on hands-on experience. No credit for E&M majors. *Prerequisite:* Two years high school algebra. Three hours.

3 Concepts of Computer Systems Introduction to computer systems, components, system software, editors, utilities and language processors, programming, problem solving, applications. May not be taken for credit concurrently with, or following receipt of credit for, any CS course numbered higher than 3. *Prerequisite:* Two years high school algebra. Three hours.

11 Computer Programming (2-2) Structure of digital computers. Development of algorithms using structural design techniques. Implementation of algorithms utilizing a higher level language. *Prerequisites:* Math. 17 or 19 or concurrent enrollment in 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. 19, 21, or 23. Three hours.

15 Survey of Business-Oriented Languages (3-0) Survey. COBOL language, emphasizing file manipulation capabilities.

Several applications problems studies. *Prerequisites:* 11 and 12, or instructor's permission. Three hours.

101 Introduction to Computer Science (3-0) Assembly language and machine structure. 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) Systematic treatment of principles underlying the features and implementation of programming languages. Contrast of traditional procedural languages and at least one nontraditional language. *Prerequisites:* 102, Math. 104. 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:* 103, Math. 104. Three hours.

107 System Software Laboratory Programming workshops and assignments that develop assemblers, loaders, compilers, and macro preprocessors. *Prerequisites:* Previous or concurrent enrollment in 102; instructor's permission. One hour.

193, 194 College Honors

195 Special Topics *Prerequisite:* Instructor's permission. Hours variable.

201 Operating Systems (3-0) Supervisory and control software for multiprogrammed computer systems. Processes synchronization, interprocess communication, scheduling, memory management, resource allocation, performance evaluation, object-oriented systems, case studies. *Prerequisite:* 104. 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:* 104, 243. Three hours.

203 Programming Languages II (3-0) Formal specification and program correctness. Multi-tasking and parallelism. Object-oriented and applicative languages. Introduction to translator design. *Prerequisite:* 104. Three hours.

207 Operating Systems Laboratory Programming workshops and assignments that develop or modify various components of an operating system. *Prerequisites:* Previous or concurrent enrollment in 201; instructor's permission. One hour.

222 Computer Architecture (3-0) Architecture of computing systems. Control unit logic, input/output processors and devices, asynchronous processing, concurrency, parallelism, and memory hierarchies. *Prerequisites:* 102, Math. 104, Electrical Engineering 131. Three hours.

223 Introduction to Formal Language Theory (3-0) (Same as Math. 223.) Introduction to theory and applications of context-free languages. Phrase structure and context-free grammars, normal forms, pushdown automata, decision problems, power series in noncommuting variable, application to parsing. *Prerequisite:* Math. 102 or 104. CS 243 highly recommended. Three hours.

224 Analysis of Algorithms (3-0) (Same as Math. 224.) Introduction to both analytical and experimental techniques in algorithm analysis. Basic algorithm design strategies. Introduction to complexity theory. *Prerequisites:* 104, Math. 102 or 104, 121, 124, 173. Three hours.

243 Introduction to Theoretical Computer Science (3-0) (Same as Math. 243.) Introduction to theoretical foundations of computer science. Models of computation. Church's thesis and noncomputable problems. Formal languages and automata. Syntax and semantics. *Prerequisites:* 12, Math. 104. Three hours.

294 Independent Readings and Research Independent readings and investigation under the direction of faculty member. *Prerequisite:* Instructor's permission. Three to six hours.

295 Special Topics in Computer Science (3-0) Lectures, reports, and directed readings on advanced topics. *Prerequisite:* Instructor's permission. Three hours.

Dental Hygiene (DHYG)

SCHOOL OF ALLIED HEALTH SCIENCES

Associate Professors Farnham, Hill (Chairperson), Wootton; Clinical Associate Professor Mercier; Assistant Professor Levi; Instructor Venmar; Lecturers Averill, Emanuelson, Grimes, Pfeifer, Rowell, Seamans.

1 Introduction to Dental Hygiene Principles of dental hygiene, orientation to clinical practice, and preclinical experience. Four hours. Wootton.

2 Introduction to Clinical Dental Hygiene A continuation of 1 with early clinical experience. *Prerequisites:* 1, Anatomy and Physiology 9. Two hours. Wootton.

11 Oral Tissues I Introduction to the morphology and physiology of the oral tissues. Three hours. Grimes.

12 Oral Tissues II Continuation of 11 emphasizing head and neck anatomy and oral embryology. *Prerequisites:* 11, Anatomy and Physiology 9. Three hours. Grimes.

61 Radiography Study, demonstration, and practice of fundamentals of intraoral radiographic technique. Recognition of radiographic appearance of common oral disorders. *Prerequisites:* 1, 11, Anatomy and Physiology 9 or permission. Two hours. Hill.

62 Community Oral Health Discussion and project participation in the planning, development, and implementation of dental health education, public health dentistry, and the private practice of dentistry. Three hours. Pfeifer.

91 Dental Materials Study and manipulation of the materials commonly used in dental practice. *Prerequisites:* 2, 12 or permission. Two hours.

141 Clinical Dental Pharmacology Introduction to clinical pathology and pharmacological management in the treatment of dental patients. *Prerequisites:* 2, 12. Three hours. Hill, Mercier.

143 Periodontics Morphologic and functional aspects of the supporting structures, recognition and therapy for diseases of the periodontium. *Prerequisites:* 2, 12, Anatomy and Physiology 10. Three hours. Hill.

146 Oral Pathology Functional and organic diseases of the oral cavity and their clinical management. *Prerequisite:* 143 or permission. Two hours. Farnham, Mercier.

181 Senior Clinic and Seminar Clinical practice with patients from simple to more difficult cases, both children and adults. *Prerequisites:* 2, 12, Anatomy and Physiology 10. Four hours.

182 Senior Clinic and Seminar Continuation of 181. *Prerequisites:* 143, 181. Four hours.

195 Special Topics *Prerequisites:* Instructor's permission.

Economics (ECON)

COLLEGE OF ARTS AND SCIENCES

Professors Alnasrawi, Campagna, Chase; Associate Professors Boyd, Gedeon, Gibson, Knodell, Thompson (Chairperson), Woolf; Assistant Professors Herreid, Isikdag, McCrate, Rizvi, Young.

11 Principles of Economics Introduction to economic concepts, institutions, and analysis, particularly as related to the macroeconomy. Open to first-year majors in economics. Sophomore standing required for nonmajors. 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:* 11. Three hours.

60 Race, Ethnicity, and the Economy Courses investigating the economic status and significance of racial and ethnic divisions in historical and contemporary U.S. society. Content varies by instructor. Three hours.

100 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. Statistics 141 may be substituted, but Statistics 111 may not. *Prerequisite:* 11; Pre- or corequisite 12. Three hours.

101 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.

102 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.

111 Money and Banking Commercial and central banking with special attention given to the Federal Reserve system, monetary theory and policy. *Prerequisite:* 101. Three hours.

116 Public Policy 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:* 102. Three hours.

122 Industrial Organization The structure, conduct, and performance of U.S. industry and appraisal of its economic efficiency and social impact, including governmental policies. *Prerequisite:* 102. Three hours.

130 Women in the U.S. Economy Historical and theoretical overview of women's participation in the U.S. economy, emphasizing economic controversies surrounding family structure and pay equity issues. *Prerequisite:* 12 or instructor's permission. Three hours. McCrate.

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:* 102. Three hours.

151 International Economics I: Trade Theory, policy, and history in international trade patterns, terms of trade, protectionism, competitiveness, structural adjustment, and international aspects of microeconomics. *Prerequisite:* 102. Three hours.

152 International Economics II: Finance Theory, policy, and history of foreign-exchange markets, balance of pay-

ments, world monetary arrangements, and international aspects of macroeconomics and capital markets. *Prerequisite:* 101. Three hours.

154 Economic Development Theories of economics growth applied to developing countries of the contemporary world including the political and social determinants of economic progress. *Prerequisite:* 101. Three hours.

160 Race, Ethnicity, and the Economy Courses investigating the economic status and significance of racial and ethnic divisions in historical and contemporary U.S. society. Content varies by instructor. *Prerequisites:* Sophomore standing; Economics 12 recommended. Three hours.

170 Evolution of Capitalism Origins and development of capitalism; their social-economic institutions and their transference from Western Europe to North America. *Prerequisite:* 12.

171 Survey of American Economic History Survey of economic history of the U.S. from colonial origins through early 20th century, emphasizing economic and institutional changes and events promoting economic growth and development. *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. *Prerequisite:* 12. Three hours.

193, 194 College Honors Three hours.

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

All 200-level courses have minimum prerequisites of 101, 102, and Statistics 141. Any prerequisites noted in the following course descriptions are in addition to the noted minimum.

Note: No Economics courses are offered for graduate credit.

200 Econometrics A combination of economic theory, mathematics, and statistics for testing of economic hypotheses and developing economic models. Three hours.

201 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. Three hours.

202 National Economic Policies Macroeconomic problems faced by the U.S. economy from the Great Depression to the present and the policies proposed to solve them. Three hours.

223 Antitrust and Regulation Theories, history, and policies of government's role in U.S. economy, emphasizing antitrust laws and decisions and federal regulatory programs. Three hours. Alternate years.

230 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. *Prerequisite:* Math. 19. Three hours

241 Human Resources Labor economics, economic demography, and economic history of female participation in household and market production. *Prerequisite:* 141. Three hours.

242 Labor-Management Relations Economic influences of unionization. The grievance process, arbitration, and labor relations laws. *Prerequisite:* 141. Three hours. Alternate years.

254 Topics in Economic Development Economic analysis

of selected areas of the world, or selected topics in economic development. *Prerequisite:* 154. Three hours.

256 Problems of the International Economy Examination of some of the stresses and strains of the world economy including inflation, growth, role of multinational corporations, external debt, and terms of trade. *Prerequisite:* 151 or 152. Three hours. Alternate years.

260 Income, Wealth, and Welfare Analysis of the distribution of income and wealth and policies which affect them. Three hours.

265 Urban and Regional Economics Economic analysis applied to the problems of cities, states, and regions. Three hours.

268 Economics of Energy International and domestic aspects of energy policies as they relate to output and prices. Three hours.

271 Topics in American Economic History In-depth analysis of selected historical topics, emphasizing the use of economic theory to understand and explain historical events. Three hours.

275 Development of Economics I: Foundations Through the Keynesian Era Development of economic ideas. The Pre-Classical, Classical, Socialist, Neoclassical, Keynesian Schools, and individual theoreticians. Three hours.

276 Development of Economics II: Contemporary Economic Thinking Historical development of the mainstream Keynesian paradigm and its relationship to alternative frameworks of theory, method, analysis, and ideology. Three hours.

277 Marxian Economic Theory Examination of the economic method of Karl Marx concentrating on the labor theory of value, accumulation, crisis, and realization problems. Three hours.

281 The Soviet and Eastern European Economies Analysis of the economic development, structure, performance, and direction of the Soviet and related economies. Three hours.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

297 Readings and Research Independent study with permission of supervising professor prior to registration.

299 Departmental Honors By invitation only.

Education (ED)

COLLEGE OF EDUCATION AND SOCIAL SERVICES

Professors Abruscato, Agne, Carlson, Conrad, Fishell, Fox, Hanley, Hasazi, Nash, Peterson, Rippe, Shiman, Williams, Witkin; Associate Professors Barbour, Burrell, Clarke, Erb, Fitzgerald, Glesne, D. Goldhaber, Griffin, Hunter, Johnston, Lang, Larson, Letteri, Meyers, B. Nichols, Paolucci-Whitcomb, Ponzo, Rathbone, Sandoval, Shelton, Stevenson, Thompson; Assistant Professors Bishop, Bright, Bryant, Chase, Greig, Hood, Lambert, Manning, Mosenthal, Parks, Reagan; Research Associate Professors Cloninger, Thousand; Research Assistant Professors Capone, Giangreco, Hamilton, Lund; Lecturers Bakeman, Broer, Burdett, Christie, Conte-Scheer, Cravedi-Cheng, Dennis, Edelman, T. Fox, Godek, J. Goldhaber, Kay, Keiser, Keogh, McNeil, Mekkelson, Mellencamp, Morgan, Mueller, Razza, Ross-Allen, Salembier, Schattman, Shepherd, Spinney, Watson, Yuan; Extension Associate Professor E. Nichols.

Any information concerning course instructor may be obtained from department chairperson at the beginning of each semester.

The College of Education and Social Services offers the following courses on a program basis. Departmental permission is required for enrollment. Individual courses may require a lab fee.

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 first-year students. Two to six hours.

181 Student Teaching Teaching in elementary or secondary schools under guidance of cooperating teachers, principals, and college supervisors. This is a full-time, full semester, 12-credit experience. *Prerequisite:* Acceptance into the teacher education program, must meet criteria for student teaching. 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:* Instructor's permission. Variable credit, one to four hours. May be repeated up to eight hours.

200 Contemporary Issues Designed so that content and structure may accommodate special issues not especially appropriate within boundaries of an existing course. *Prerequisite:* Twelve hours in education and related areas. One to six hours.

295 Laboratory Experience in Education Supervised field work designed to give students experience in specialized areas for their professional development. *Prerequisite:* Instructor's permission. Credit as arranged.

EDUCATION — EDSS

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. CESS transfer and non-CESS students only. Three hours.

24 Learners and the Learning Process Distinctions among dominant theories of learning and development. Learning theories applied to selected issues derived from context of schools. Students work with individual learner in appropriate setting. *Prerequisites:* EDFS 2, instructor's permission. Three hours.

56 Teachers and the Teaching Process Students examine lives of teachers, demands of the profession, and selected models of teaching. Student observation of teachers in appropriate settings and knowledge of learning and development. *Prerequisite:* EDFS 2; EDSS 24 or ECHD 62 or 80 recommended. Three hours.

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.

193 Environmental Education Philosophy, concepts, and teaching-learning strategies of environmental education. *Prerequisite:* Three hours in education or instructor's permission.

207 The University and Third World Development Examination of the role of educational policies on urbanization vs. ruralization in the human capital formation process of third world countries. *Prerequisites:* Six hours of political science, history, geography, or economics, or instructor's permission. Three hours. (Not offered for graduate credit.)

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.

238 Teaching for Global Awareness 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. Links between local and global concerns. *Prerequisite:* Twelve hours of education and related areas. Three hours.

239 Service-Learning Internships/Field Studies Professional education course designed to facilitate student's integration of academic, social, personal, and career objectives through seminar or project syllabus method of support for internship experience in the community. *Prerequisite:* Instructor's permission, junior standing. Variable credit, three to 12 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.

FOUNDATIONS — EDFS

2 School in Society Introduction to the school as a complex institution and to the many roles it plays in our society. Focus on interrelated themes of socialization, equality, excellence, social change. Three hours.

190 Approaches to Education: Senior Seminar Ideas and values, historic and contemporary, emphasizing ideological bases of American education. Students develop new perspectives as guide toward resolving some crucial issues of our time. *Prerequisite:* Senior standing or instructor's permission. Three hours.

204 Seminar in Educational History Struggles for Freedom and Equality. Selected topics in history of education. Education in democratic and authoritarian social orders. Discussions and research and around such topics as education of women, black heritage, American higher education in transition. *Prerequisite:* Twelve hours in education and related areas or instructor's permission. 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 instructor's permission. Three hours.

206 Comparative Education The study of educational policy and practice in selected countries. Focus on the making of citizens, the achievement of equity goals, and related development issues in countries such as China, Japan, Kenya/Tanzania, and the Commonwealth of Independent States. *Prerequisite:* Twelve hours in education and related areas. Three hours.

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.

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, management of knowledge, and social change. *Prerequisite:* Twelve hours in education and related areas. Three hours.

ELEMENTARY EDUCATION — EDEL

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, junior standing; acceptance into the teacher education program. 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, 134. 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, junior standing; acceptance into the teacher education program. 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.

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 instructor's permission; acceptance into the teacher education program. Three hours.

160 Teaching Mathematics and Critical Thinking in the Elementary School Investigation of modern approach to mathematics emphasizing instructional strategies, curriculum resources, and problem solving. Emphasis on a manipulative approach to teaching mathematics in elementary school. *Prerequisites:* Math. 15 and 16 or instructor's permission; acceptance into the teacher education program. Three hours.

186 Seminar for Teachers Instructional support to interns during student teaching experience. Weekly meetings and personal conferences centering around difficulties and successes of student teaching held in various field sites. *Prerequisites:* 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 program. *Prerequisites:* Twelve hours in education and/or related areas including introductory course in reading or instructor's permission. Three hours.

234 Literature and Language for Children and Youth Characteristics, interest, 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 instructor's permission. 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 instructor's permission. 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.

SECONDARY EDUCATION — EDSC

137 Reading in the Secondary School Principles underlying teaching of reading in content areas; materials of instruction; development of word recognition, vocabulary, comprehension, and study skills. *Prerequisite:* Junior stand-

ing; acceptance into the teacher education program. Three hours.

138 Analysis of Problems in Reading and Related Language Instruction Analysis and evaluation of reading and writing difficulties in content areas; critiquing tests and interpreting data, strategies for improvement. *Prerequisite:* 137; acceptance into the teacher education program; concurrent enrollment in Student Teaching. Three hours.

178 Secondary Methods and Procedures Prepares students for teaching in secondary school. Micro-teaching, role playing, classroom simulation, analysis of classroom behavior, and preparation of individualized materials. *Prerequisite:* Acceptance into the teacher education program. Three hours.

179 Secondary Methods and Procedures in Special Subject Areas *Prerequisites:* Prior or simultaneous enrollment in 178, acceptance into the teacher education program. Three hours. (English majors enroll in English 282.)

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 instructor's permission. Three hours. (Also offered for undergraduates under 137.)

225 Teaching Social Studies in Secondary Schools Multiple teaching modes, questioning techniques, microteaching laboratory, analysis of historical content to determine students' prerequisite cognitive skills and processes for construction of historical scenarios. *Prerequisite:* Twelve hours in 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, instructor's permission. Three hours.

257 Teaching Mathematics in Secondary Schools Contemporary secondary school mathematics curricula and instructional strategies for grades 7–12. Topics may include problem solving, research in mathematics education, use of calculators and computers, manipulatives, and evaluation. *Prerequisites:* Twelve hours in education and related areas, instructor's permission. Three hours.

AGRICULTURAL AND NATURAL RESOURCE EDUCATION

HOME ECONOMICS EDUCATION

INDUSTRIAL ARTS/TECHNOLOGY EDUCATION

TRADES AND INDUSTRY EDUCATION

Courses related to these four programs are offered through the Vocational Education and Technology Department (see page 194).

ART EDUCATION — EDAR

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. Three hours.

177 Curriculum and Practice in Elementary Art Study and implementation of curriculum in elementary school. Students work directly in an elementary classroom. Lec-

tures and discussions. *Prerequisites:* Eighteen hours studio art, junior standing. Four hours.

178 Practicum in Field Experience Student works as teaching assistant to faculty member in foundation, studio, advanced studio, art history, or museology depending on interest and capabilities. *Prerequisites:* Senior standing, permission. Four hours.

283, 284 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, 12 hours in art and/or related areas. Three hours.

MUSIC EDUCATION — MUS

The Music Department offers a number of pedagogy courses in specific musical areas. All are open to nonmajors by permission of the instructor. See Music course listings.

181 Music for Elementary Teachers Development of musical skills, understandings, and attitudes pertinent to the teaching of music in elementary classroom. *Prerequisite:* Elementary majors, acceptance into teacher education program. Three 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. *Prerequisite:* Undergraduate major in Music Education or instructor's permission. 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 instructor's permission. 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 teaching experience or instructor's permission. Credit variable. May be taken for one to four hours each semester, may be repeated up to eight hours.

281 Elementary Music Education Methods Methods and materials in the teaching of vocal and instrumental music in elementary schools. Five hours classroom observation per week required. *Prerequisite:* Junior standing in Music Education. Three hours.

282 Secondary Music Education Methods Methods and materials in the teaching of vocal and instrumental music in secondary schools. Five hours classroom observation per week required. *Prerequisite:* Junior standing in Music Education. Three 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.

SPECIAL EDUCATION-RESPONSIVE TEACHER PROGRAM — EDRT

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.

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 in-

teraction curricula; analysis of specific teachers' and childrens' behavior in classroom setting. *Prerequisite:* Acceptance into Responsive Teacher Program. Credit variable, three to 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. Credit variable, three to six 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 instructor's permission. 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 instructor's permission. Three hours.

216 Instruction for Mildly Handicapped Individuals I Introduction to curriculum for instruction of children with learning disabilities, mental retardation, and behavior disorders emphasizing objectives, assessment, task analysis curriculum, and evaluation. *Prerequisite:* Instructor's permission. 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 improve student's academic and social behaviors. *Prerequisites:* Twelve hours in education and related areas, instructor's permission. Juniors and seniors. Three hours.

EARLY CHILDHOOD AND HUMAN DEVELOPMENT — ECHD

3 Introduction to Early Childhood and Human Development I First of three seminars designed to introduce students to the concepts and practices of the discipline. Emphasis on methods of studying individuals and families. *Prerequisite:* Majors only. Two hours.

4 Introduction to Early Childhood and Human Development II Second of three seminars designed to introduce students to the concepts and practices of the discipline. Emphasis on the applications of research findings. *Prerequisites:* 3 or permission. Two hours.

7 Introduction to Field Work in Early Childhood and Human Development Third of three seminars introducing concepts and practices of the discipline. Emphasizes supervised field experience in a child and/or adult developmental service setting. *Prerequisite:* 4. One hour.

20 Aging: Change and Adaptation (Same as Nursing 20 and Sociology 20.) Individual and social meanings of aging

and old age; physical, physiological, psychological, and sociological changes accompanying aging; individual, family, community, and societal adaptations to aging. Three hours. Brown, Cutler.

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 children and their relationships with family, peers, and institutions. *Prerequisites:* Sophomore standing. Psychology 1. Three hours. D. Goldhaber, Shelton.

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.

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. *Prerequisite:* 80 for 81. Six to eight hours. D. 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:* Instructor's permission. Three hours.

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 instructor's permission. Three hours.

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 instructor's permission. Three hours. Nichols, Shelton.

165 Practicum: Facilitating Human Sexuality Discussion Groups Designed to train participants to become effective facilitators of discussion groups dealing with human relationships and sexuality. *Prerequisites:* 65, sophomore standing, permission. Three hours. Barbour.

184 Early Childhood Programs An active examination of present day early childhood programs in relationship to their historical development from early history. Three hours.

185 Cognitive and Personality Development in Aging Perception, memory, learning, and creativity in old age. Continuity and change in personality during the later years. *Prerequisite:* 80, 81 or 20 or instructor's permission. Three hours.

187 Field Practicum Supervised teaching in accredited early childhood facilities licensed or approved by responsible boards. *Prerequisite:* Permission. Eight hours.

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 Readings and Research, Early Childhood Seminar, and Curriculum Workshop. *Prerequisite:* Permission. Fifteen hours. J. Goldhaber.

195 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:* Varies with course.

260 Family Ecosystem Family viewed in and as an environment for human development. The family ecological approach applied to practical family concerns. *Prerequisite:* Senior standing or instructor's permission. Three hours. E. Nichols.

263 Advanced Child Development Survey of professional literature in child development with special emphasis on 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 instructor's permission. Three hours.

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, instructor's permission. 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 hours. *Prerequisites:* Junior standing, nine hours of human development or equivalent. Three hours.

281 Infancy Development and rearing from conception to 18 months and their relationship to subsequent development. *Prerequisites:* Nine hours in human development, nutrition, and physiology or biology or instructor's permission. Three hours. Shelton.

282 Seminar in Physical Development and Health in Later Life Physical manifestations of senescence, anatomical and physiological development, longevity, vitality, health care, nutrition, chronic conditions and disability. *Prerequisite:* 185 or permission. Three hours.

283 Personal and Family Development in Later Life Cognitive development, intellectual performance, work and achievement, retirement and leisure, personal development, self-esteem, coping mechanisms, dying, couples, intergenerational and kinship issues. *Prerequisite:* 185 or permission. Three hours.

284 Public Policy and Programs for Elders Demography of aging, social institutions and roles, policy and program implementation, income maintenance, housing, health care, social services, transportation, legal and political issues. *Prerequisite:* 185 or permission. Three hours.

291 Special Problems Reading, discussion, and special field and/or laboratory investigations. *Prerequisite:* Departmental permission. Students may enroll more than once up to 12 hours. One to six hours.

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 community representative, credit arranged up to 15 hours. *Prerequisite:* Departmental permission.

PHYSICAL EDUCATION — EDPE

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.

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 Emergency Care. *Prerequisite:* PE, HDS, and Health majors, others by instructor's permission. Three hours.

26 Water Safety Instructor 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.

32 Recreational Sports Officiating Basic techniques and skills of rule interpretation for officiating recreational sport competition. Two hours.

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:* Junior standing, Elem. Ed. majors only. Three hours.

104, 105 Physical Education Teaching Experience (Petex) Experience-based course sequence emphasizing relationship of motor development to learning. Includes age level needs and appropriate physical education activity sequences. First semester: 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. *Prerequisite:* Skill competency in basketball, sophomore standing; PE majors, coaching minors, others by instructor's permission. 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 instructor's permission. Two hours.

124 Coaching Track Analysis and practice of the skills, techniques, and knowledge involved in coaching interscholastic track. *Prerequisites:* Skill competency in track, sophomore standing or instructor's permission. 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 instructor's permission. Two hours.

126 Coaching Gymnastics Analysis and practice of skills, techniques, and knowledge involved in teaching and coaching gymnastics. *Prerequisites:* Skill competency in gymnastics, sophomore standing. Two hours.

127 Coaching Swimming Knowledge, analysis, and practice of skills and techniques involved in coaching swimming. *Prerequisite:* Skill competency in swimming, sophomore standing or instructor's permission. Two hours.

128 Coaching Field Hockey Theory and technique of coaching interscholastic field hockey. Includes skill and game analysis; practice, game, and schedule organization; and development of a coaching philosophy. *Prerequisite:* Skill competency in field hockey. Two hours.

129 Coaching Volleyball Theory and techniques of coaching volleyball. Includes skill and game analysis, practice, game and schedule organization. *Prerequisite:* Skill competency in volleyball, sophomore standing or instructor's permission. Two hours.

130 Coaching Tennis Analysis and practice of skills, techniques, and knowledge essential for teaching/coaching tennis. Methodology for individual and large group instruction. *Prerequisite:* Skill competency in tennis, sophomore standing or instructor's permission. Two hours.

131 Coaching Lacrosse Theory and techniques of coaching lacrosse. Includes skill and game analysis, practice, game and schedule organization. *Prerequisite:* Skill competency in lacrosse, sophomore standing or instructor's permission. 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 instructor's permission. Two hours.

141 Alternative Careers in Physical Education and Sport Analysis of nonteaching employment opportunities, career options related to sport within a broad range of school and nonschool settings. *Prerequisite:* Sophomore standing. Credit not given for both 21 and 141. Three hours.

145 Seminar in Athletics Contemporary issues, strategy, analysis, and problems areas related to selected comparative sports. Variable credit, one to 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 aged 12-18. *Prerequisite:* Junior standing, PE majors only. Three hours.

157 Care and Prevention of Athletic Injuries Prevention, recognition, and care of injuries related to school physical education and athletic programs. Two hours.

166 Kinesiology Designed for the teacher/coach to analyze factors of peak physical performance. Muscle actions, mechanical principles, related factors enhancing movement are emphasized. *Prerequisite:* One year of biological science; PE majors, coaching minors; others by instructor's permission. Three hours.

167 Sports Physiology Analysis of responses on circulatory, respiratory, and other body systems to vigorous activity. Comprehensive aspects of conditioning, fatigue, heat, attitude, nutrition, energy continuum, ergogenic aids, aging also examined. *Prerequisite:* PE majors, coaching minors; others by instructor's permission. 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. *Prerequisites:* Six hours in EDPE or health education, junior standing. Three hours.

172 Psychology of Coaching Application of psychological subdisciplines 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 pre-

scribed 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, instructor's permission. Variable credit, two to 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. *Prerequisites:* 157, instructor's permission. Three hours.

186 Advanced Athletic Training II Emphasis upon use of modalities and techniques of rehabilitation in treatment of athletic injuries. *Prerequisites:* 157, 185; PE, PT majors; others by instructor's permission. Three hours.

192 Recreational Sports Programming I Exploration and examination of the philosophy, science, and communications within a recreational sports setting. Three hours.

193 Recreational Sports Programming II Exploration, examination, and development of skills in programming techniques, governance procedures, and facility maintenance operations in recreational sports. *Prerequisite:* 192 or permission. Three hours.

195 Recreation Leadership and Programming Practical approach to 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. *Prerequisite:* Twelve hours in 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.

230 Philosophy of Coaching In-depth study of over 100 major philosophical coaching considerations. Lectures by visiting coaches. Study in areas of need and interest. *Prerequisite:* Junior standing. Three hours.

240 Principles of Motor Learning and Human Performance Study of nature of motor learning; factors effecting 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, ECHD 62 or 63. 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. *Prerequisite:* Twelve hours in physical education and related areas. Variable credit, two to four hours.

253 Curriculum Design in Health and Physical Education Philosophy and techniques of curriculum innovation in health and physical education. Emphasis upon interrelationships 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.

HEALTH EDUCATION — EDHE

46 Personal Health 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 hours in health education or instructor's permission. Variable credit, one to 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. *Prerequisite:* Permission. Variable credit, one to four hours.

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.

211 Community Health Education Governmental and voluntary agencies' sociological, historical, educational, environmental, and medical influences. Role of community health educator in these influences and major American health concerns. *Prerequisite:* 46. Three hours.

220 Stress Management for Health Professionals Physiological, psychological, and sociological aspects of stress. Theory, practices, teaching techniques, and application relevant to teaching students and/or clients. *Prerequisite:* 46. Three hours.

SPECIAL EDUCATION—EDSP

5 Issues Affecting Persons With Disabilities Students explore the effects of severe disabilities. Best service practices, current legislation, advocacy, and family issues for children and adults are emphasized. Three hours.

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 instructor's permission. Three hours.

275 Developing Vocational Instruction for Students With Special Needs (See Vocational Education and Technology 275.)

HIGHER EDUCATION—EDHI

202 Human Relations in University Residence Halls Emphasis on human relations, group dynamics, advising models, student development theory, organizational development, and contemporary student issues in a residential environment. *Prerequisite:* Residence hall staff. One hour. (Not offered for graduate credit.)

213 Leadership: Theories, Styles, and Realities Intro-

ductory course in leadership development designed for student leaders. Includes study of planning, time management, organizational theory, communication skills, group process, team building. Two hours. (Not offered for graduate credit.)

214 Advanced Seminar in Leadership Focuses on student leaders' experiences and how those experiences relate to activities beyond the University setting. Two hours.

COUNSELING—EDCO

220 Developmental Perspectives in Counseling 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.

291 Special Topics in Counseling 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.

PHYSICAL EDUCATION—PEAC

Physical Education Activities. Two or three hours weekly. One-half or one credit.

Two hours of physical education activities are required of undergraduate students (see page 37). 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.

| | |
|-----------------------|------------------------|
| Aerobics | Running for Fitness |
| Archery | SCUBA Diving |
| Badminton | Ski Instructors |
| Conditioning | Soccer |
| Cross Country Skiing | Social Dance |
| Fencing | Squash |
| Fitness Assessment | Stretch and Relaxation |
| Folk and Square Dance | Swimming |
| Golf | Tennis |
| Gymnastics | Track and Field |
| Handball | Volleyball |
| Lifeguard Training | Weight Reduction |
| Modern Dance | Weight Training |
| Racquetball | 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 | Ice Skating |
| Bowling | Judo |
| Downhill Skiing | Modern Jazz |
| Figure Skating | Moo Gong Do |
| Horseback Riding | |

The following activities, co-offered by the Physical Education and Military Studies Departments, may be counted toward the physical education requirements:

Orienteering
Rappelling
Wilderness Survival

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.

Electrical Engineering (EE)

COLLEGE OF ENGINEERING AND MATHEMATICS

Professors Absher, Anderson, Evinger, Golden (Chairperson), Mirchandani, Oughstun, Williams; Associate Professors Fuhr, Titcomb; Assistant Professors Schwartz, Snapp, Stavarakis, Varthue; Adjunct Professor Pricer.

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.

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.

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.

100 Electrical Engineering Concepts I (3-3) Introduction to analog and digital electrical measurements and circuits; introduction to microprocessors. No credit for EE majors. *Prerequisite:* Physics 42 with 22 or 125. Four hours.

101 Electrical Engineering Concepts II (3-3) Microprocessor applications; power systems. No credit for CS or EE majors. *Prerequisite:* 100. Four hours.

110 Control Systems (3-0) Analysis and design of continuous and discrete-time control systems; stability, signal flow, performance criteria, classical and state variable methods, simulation design tools, computer-based realizations. *Prerequisite:* 171. Three hours.

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.

131, 132 Fundamentals of Digital Computer Design (3-0) (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.

134 Fundamentals of Microcomputer Based Systems (3-2) Introduction to digital computers. Hardware and software structure. Techniques of interfacing. *Prerequisite:* 100, Computer Science 11, or instructor's permission. Four hours.

141 Electromagnetic Field Theory I Basic laws and elementary applications of electromagnetic fields emphasizing time-independent fields; vector analysis, static electric and magnetic fields, boundary conditions and boundary

value problems. No credit may be received for both EE 140 (offered in prior years) and the current EE 141. *Prerequisites:* Math. 271, Physics 42 or 125. Three hours.

142 Electromagnetic Field Theory II Basic laws and elementary applications of electromagnetic fields emphasizing time-dependent fields; Faraday's law, Maxwell's equations, Poynting's theorem, plane wave propagation, transmission lines, wave guides, antennas. *Prerequisites:* 141 or Physics 213. Three hours.

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. Electro-mechanical transducers. Thermal waves. Diffusion process. *Prerequisite:* 141. Three hours.

163 Solid State Physical Electronics I (3-0) Physical principles of operation of common semiconductor devices. Detailed models of p-n junctions, bipolar junction transistors, Schottky barriers, and field-effect transistors. *Prerequisite:* Physics 42 with 22 or 128. Three hours.

164 Solid State Physical Electronics II (3-0) Physical principles of electronic materials. Atomic and electronic structure of solids, energy band theory, carrier transport. Semi-conductor, dielectric, magnetic, and superconducting materials. *Prerequisites:* 163, Physics 128. Three hours.

171 Signals and Systems (4-0) Fundamentals of discrete and continuous signals and systems analysis. Input/output descriptions. Solutions to difference and differential equations. Convolution, Fourier Analysis, Laplace Transform, and z-Transform. *Prerequisites:* 4, Math. 121. Four hours.

174 Introduction to Communication Systems (3-0) General background. Coding and error correcting codes. Noise and topics in statistical communications. Data, computer, and secure communications. *Prerequisite:* 171. Three hours.

195 Special Topics *Prerequisite:* Departmental permission. Variable credit.

LABORATORIES

81 Sophomore Laboratory I (3-0) Electrical instruments; oscilloscope measurements; resistive, capacitive, and inductive components; nonlinear resistive elements; binary concepts and digital logic; transient response of RC circuits; three terminal networks. *Prerequisite:* Sophomore standing in EE. Two hours.

82 Sophomore Laboratory II (1-3) Transients in RLC circuits; steady state response in RLC circuits; network theorems, bridge measurement circuits; mutual inductance; spectrum analysis; diode circuits; DC power supply design. *Prerequisite:* 81. Two hours.

183 Junior Laboratory I (1-3) Characteristics of active devices; BJT and JFET amplifiers; MOSFET, UJT, and SCR applications; applications of operational amplifiers; semiconductor diode characteristics. *Prerequisite:* Junior standing in EE. Two hours.

184 Junior Laboratory II (1-3) Dielectric materials; current flow in volume conductors; photovoltaic cells; passive, active, and digital filters. *Prerequisite:* 183. Two hours.

185 Senior Laboratory I (0-3) AC and DC machines; power transformers; A/D and D/A conversion; design and construction of multivibrator and Schmitt trigger circuits; design project. *Prerequisite:* Senior standing in EE. One hour.

186 Senior Laboratory II (0-3) Open and closed loop control systems; electromagnetic waves on transmission lines; time domain reflectometry; microwaves; special topics; design project. *Prerequisite:* 185. One hour.

187 Senior Project Experimental or theoretical design

project conducted under faculty supervision. Variable credit, usually three hours.

193, 194 College Honors

ADVANCED UNDERGRADUATE AND GRADUATE COURSES

201 Linear System Theory (3-0) Basic concepts in system theory; linear algebra; state variable and input/output representation; stability; controllability; and observability. *Prerequisite:* 171 or graduate standing. Three hours.

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.

221 Principles of VLSI Digital Circuit Design (2-3) The design, layout, and simulation of VLSI digital circuits. Emphasis on custom, laboratory design; typical topics will include memory, PLA, ALU, and elemental arithmetic circuits. *Prerequisites:* 131, 163, 121. Three hours.

222 Principles of VLSI Analog Circuit Design (3-0) The design, layout, and simulation of VLSI analog circuits. Emphasis on small signal models and circuits used in operational amplifiers. *Prerequisites:* 163, 121, instructor's permission. Three hours.

227 Biomedical Measurements, Instrumentation, and Systems Biomedical and clinical engineering in research, industry, and health care institutions. Measurement techniques and instrumentation. Integrated biomedical monitoring, diagnostic, and therapeutic systems. Three hours. *Corequisites:* 121, Physiology and Biophysics 101, instructor's permission.

231, 232 Digital Computer Design (3-0) (3-0) 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 intersystem communications. *Prerequisite:* Departmental permission. Three hours.

233 Microprocessor-Based Systems and Applications (3-3) 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. *Prerequisites:* Departmental permission, Computer Science 101 desirable. Four 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.

241 Electromagnetic Theory I (3-0) Maxwell-Lorentz theory emphasizing uniqueness and conservation laws. Potential theory with applications to boundary value problems, Green's function techniques, multipole expansions, and numerical methods. *Prerequisites:* 141; Math. 262 recommended. Three hours.

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.

245 Lasers and Electro-Optical Devices (3-0) A theoretical description of light-matter interactions in photon emitting resonant cavities. A practical understanding of laser design and operation. *Prerequisites:* 141, Physics 128, instructor's permission. Three hours.

246 Engineering Optics Applications of optics to the solution of engineering problems. Optical signal processing, fiber optic sensors, integrated optics. *Prerequisite:* 245 or instructor's permission. Three hours.

261 Solid State Materials and Devices I (3-0) Energy band theory, effective mass, band structure on electronic properties of semiconductors. Transport of electrons and holes in bulk materials and across interfaces. Homojunctions, heterojunctions, and Schottky barriers. *Prerequisite:* 163. Three hours.

262 Solid State Materials and Devices II (3-0) Multi-junction and interface devices. Heterostructure and optical devices. Dielectric and optical properties of solids. High-frequency and high-speed devices. *Prerequisite:* 261. Three hours.

266 Science and Technology of Integrated Circuits (3-0) Science and technology of silicon monolithic integrated circuit processing and the interactions of the processing steps with the electrical circuit properties. *Prerequisites:* 163 or 261, concurrent registration in 164 or 262. Three hours.

270 Probability Theory and Stochastic Processes (Same as Statistics 270.) Probability theory, random variables, and stochastic processes. Response of linear systems to random inputs. Applications in electrical engineering. Three hours. *Prerequisite:* 171 or equivalent.

271 Least Squares Estimation and Filtering (Same as Statistics 271.) Foundations of linear and nonlinear least squares estimation, smoothing and prediction, computational aspects, Kalman filtering, nonlinear filtering, parameter identification, and adaptive filtering. Three hours. *Prerequisites:* 270, 201.

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 Digital Signal Processing and Filtering (3-3) Sampling, aliasing, and windowing. FIR and IIR filters. DFT and FFT. Linear predictive coding. Vocoders. Digital simulation and implementation using real-time processors and evaluation modules. *Prerequisites:* 171, instructor's permission. Four hours.

276 Image Processing and Filtering (3-3) Image sampling, quantization, and reconstruction. Discrete two-dimensional transforms and linear processing techniques. Image enhancement and restoration methods. Lab includes realtime and interactive image processing. *Prerequisite:* 275. Four hours.

277 Image Analysis and Pattern Recognition (3-0) Image, shape, and texture analysis. Statistical pattern recognition methods. Pattern recognition and computer vision techniques for machine parts recognition and automatic visual inspection. *Prerequisite:* 276. Three hours.

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 Engineering Design Analysis and Synthesis (3-0) Advanced engineering problem solving, analytical techniques and simulations involving control systems, digital electronics, computer hardware and software; technical writing and documentation emphasized. *Prerequisite:* Graduate standing in EE or department permission. Three hours.

295 Special Topics Formulation and solution of theoretical and practical problems dealing with electrical circuits, apparatus, machines, or systems. *Prerequisite:* 4. Three hours.

Engineering Management (EMGT)

DIVISION OF ENGINEERING, MATHEMATICS, AND BUSINESS ADMINISTRATION

175 The Management of Technology (Same as Business Administration 175.) Role of technology in industry, the nature of technological change, strategies, management, research and development, forecasting, product service/project selection, development, management, transition to market, and evaluation. *Prerequisite:* Senior standing in engineering or business administration.

176 Plant Planning and Design Analysis of facilities and services requirements, material handling, office and clean room layout, mathematical and computer techniques, safety and plant conservation. *Prerequisites:* Junior standing in engineering or business administration, or instructor's permission. Four hours.

185 Senior Project (0-9) Individual management engineering study designed to the particular interest of the student, utilizing and synthesizing the student's engineering management education experience. *Prerequisite:* Senior standing in EMBA. Three hours.

195 Special Topics Specialized or experimental course offered as resources permit.

English (ENGL)

COLLEGE OF ARTS AND SCIENCES

Professors Bradley (Chairperson), Broughton, Clark, Eschholz, Fulwiler, Gutman, Huddle, Manchel, Orth, Poger, Rosa, Rothwell (Emeritus), Shepherd, Stephany, Thompson; Associate Professors Biddle, A. I. Dickerson, Edwards, Hall, Magistrale, Mzamane, Simone, Stanton, Warhol; Assistant Professors M.J. Dickerson, Lin, Schnell, Sweterlitsch, Winter; Lecturer Moore.

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.

4 English for International Students Review of English grammar, practice in expository writing, vocabulary building, and improvement of speaking and listening skills. *Prerequisite:* Instructor's permission. Fall only. Martenis.

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 Introduction to fiction, poetry, and drama — past and present, British and American.

12 Introduction to Drama Approach to the play as a work of literature and as a dramatic experience. Continental, British, and American drama from all ages.

13 Introduction to Fiction Exploration of variety of fictional forms, including the short story, the novella, and the novel.

14 Introduction to Poetry Examination of the forms of poetry, past and present, British and American. Provides a wide variety of perspectives on the poem.

21, 22 British Literature Survey of major figures in British literature such as Chaucer, Milton, Swift, Wordsworth, and Shaw.

23, 24 American Literature Survey of major American writers from the beginning of the 19th century to the present, such as Hawthorne, Melville, Twain, Hemingway, and Faulkner.

25, 26 World Literature Survey in comparative literature dealing with the great writers of the world, to include Virgil, Dante, Goethe, and similar major figures. Students may not take for credit both English 25 and 27; or both English 26 and 28.

27, 28 Literature of Western Tradition: Integrated Humanities Study of primary authors in the Western cultural tradition from Homer to the modern period with particular reference to history, religion, and philosophy. Students may not take for credit both English 25 and 27; or both English 26 and 28. *Prerequisites:* Concurrent enrollment in Religion 27, 28; History 27, 28; Integrated Humanities Program. Three hours. Simone, Stephany.

30 Introduction to the English Language Topics 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, Sweterlitsch.

Courses numbered in the 40's and 60's are open to first-year students 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 Detective Fiction A study of the historical development of American and British detective fiction from Poe to the present. Three hours. Poger.

42 Women in Literature Survey of women's literary tradition in English. Focuses on the ways women have written, read, written about, and been represented in 19th and 20th century literature. Three hours. Clark, Lin, Warhol.

50 Expository Writing Writing and analysis of expository (nonfiction) essays. *Prerequisite:* Sophomore standing. Biddle, Edwards, Eschholz, Howe, Moore, Rosa, Sweterlitsch, Warhol.

53 Writing: Poetry and Fiction Introductory course in techniques of writing poetry and short prose fiction. Classes organized around discussion of student work; weekly writing assignments. *Prerequisite:* Sophomore standing. Broughton, Edwards, Huddle.

57 Race and Ethnicity in Literary Studies: Introductory Courses addressing the representation and construction of "race" in literature and/or the contributions of ethnically diverse writers to American culture. Focus and readings vary by instructor. May be repeated for credit. Three hours. Topic for 1992-93: Comparative American Identities. M.J. Dickerson.

65 Survey of Folklore Basic concepts of folklore; development of the discipline; defining the major genres; role of folklore in modern society. Sweterlitsch.

81, 82 Survey of British and American Literature Study of literary movements, themes, and backgrounds as illustrated in selected representative texts. No prerequisite, but recommended only for students with sophomore standing, or first-year students with Advanced Placement. Required of all English majors.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

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 Principles of historical linguistics and their application to English. Clark. Alternate years, 1992-93.

106 Bible as Literature Jewish and Christian scripture analyzed as literary documents. Hall, Stephany.

108 Dante's Comedy (Same as General Literature 173.) A study of Dante's *Comedy* in Modern English translation. Stephany. Alternate years, 1993-94.

110 Old English The sounds, works, and structure of Old English; simple prose texts and selections from *Beowulf*. A. I. Dickerson. Alternate years, 1992-93.

111 Chaucer Study of the principal works of Chaucer, emphasizing 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. Alternate years, 1993-94.

115, 116 Shakespeare Rothwell, Schnell, Simone.

118 Milton *Paradise Lost*, *Paradise Regained*, *Samson Agonistes*, some minor poems, and selected prose works.

119 16th Century English Literature A survey of 16th century lyric, dramatic, and narrative genres, emphasizing the rise of a national literary culture. Alternate years, 1992-93.

120 English Literature: 1603-1660 A survey of lyric, dramatic, and narrative genres of early Stuart and Commonwealth England, emphasizing the intersection of religion, literature, and politics. Alternate years, 1992-93.

121 Restoration and 18th Century Prose, Poetry, and Drama Significant writers and dramatists from Dryden to Sheridan and Johnson, Stanton. Alternate years, 1993-94.

123 18th Century English Novel English fiction from its origin through the 18th century. Hall, Stanton, Warhol.

124 19th Century English Novel English fiction of the 19th century. Hall, Stanton, Warhol.

125 Romantic Period I Development of the Romantic Movement through Wordsworth and Coleridge. Lin, Stanton.

126 Romantic Period II Development of the Romantic Movement through Byron, Shelley, Keats, and other Romantic poets and prose writers. Lin, Stanton.

127 Victorian Literature Significant writers, exclusive of novelists, from 1832 to 1900. Stanton. Alternate years, 1993-94.

128 Folktale and Ballad Traditional folktales and ballads viewed from literary, cultural, structural, and psychological perspectives. Relationship of both forms to 19th and 20th century literature explored in detail. Sweterlitsch.

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 British novelists since 1900, including Forster, Conrad, Lawrence, Woolf, and other more recent writers. Three hours. Bradley, Stanton.

134 Modern Irish Literature Irish literature from 1890 to the present, emphasizing 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 Post-World War II Canadian poetry and fiction in English, including Atwood and Laurence. Three hours. Thompson.

140 Modern Poetry Survey of poetry from beginning of modern period to end of World War II, emphasizing poetry of Yeats, Eliot, Stevens, Auden, Frost, Williams, and others. Edwards, Gutman, Poger.

141 19th Century American Novel The flowering of the novel in the U.S. Hawthorne, Melville, Twain, Howells, James, and others. Biddle, Shepherd.

144 American Poetry to World War I Major American poets to 1917, including Poe, Whitman, Dickinson, and others. 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. Eschholz.

150 Modern Short Fiction. I, II. Late 19th and 20th century short fiction by such European and American writers as Chekhov, Kafka, Joyce, Lawrence, Hemingway, Faulkner, O'Connor, Welty, Cheever, and Carver. Three hours. M. J. Dickerson, Edwards, Huddle, Magistrale, Moore, Shepherd.

151 Modern American Novel American novelists from 1915 to 1945. Magistrale, Shepherd, Winter.

152 Modern American Drama Recent and contemporary, including plays by O'Neill, Miller, and Williams. Orth.

153 Contemporary American Poetry American poetry since 1950. Edwards, Gutman.

154 Contemporary American Novel Significant American novelists since 1945. Shepherd.

155 African American Literature Through the Harlem Renaissance A survey of the writing of African Americans from the early poetry and prose of Phillis Wheatley, Frederick Douglass, and Frances Harper through the works of such writers as Nella Larsen, Countee Cullen, and Jean Toomer. Three hours. M. J. Dickerson.

156 African American Literature Since the Harlem Renaissance A survey of the writing of African Americans from the poetry and prose of Langston Hughes and Zora Neale Hurston through the works of such contemporaries as Amiri Baraka, Toni Morrison, and Audre Lorde. Three hours. M. J. Dickerson.

157 Race and Ethnicity in Literary Studies: Intermediate Courses addressing the "race" in literature and/or the contributions of ethnically diverse writers to American culture. Focus and readings vary by instructor. May be repeated for credit. Three hours. Topic for 1992-93: Re-orienting the Western Landscape. Lin; Slavery and American Fiction. Warhol.

161 Pan-African Literature Experimental trends in 20th century Pan-African fiction, focussing on works by African, Caribbean, and African-American authors and their relationship to Western and other literary traditions. Three hours. Mzamane.

171 Writing Literary Criticism Introduction to theory and practice of literary criticism. Students read and write about literary theories representing various approaches to selected works of literature. Warhol.

172 Personal Voice Intensive examination of writing from the first person point of view. Theory and practice in personal writing and analysis of published writing in this mode. *Prerequisite:* 50 or 53. Fulwiler.

173 The Composing Process Exploration of the process by which writers produce texts. Students study their own writing, the writing and reflections of established authors, and current research. *Prerequisite:* 50 or 53. Eschholz.

174 Reading and Writing Autobiography Study of the autobiographical literary tradition as well as practice writing within this tradition. *Prerequisites:* 50, permission of instructor. Three hours. M. J. Dickerson, Edwards.

175 The Art of Nonfiction Theory, readings, and practice in literary nonfiction, including the essay and/or literary journalism. *Prerequisites:* 50, permission of instructor. Three hours. Moore, Sweterlitsch.

177, 178 Advanced Writing Students follow their own interests in the writing of poetry, fiction, and nonfiction. Instructor's permission required. *Prerequisite:* 53 for poetry and fiction, 50 for nonfiction. No more than six credit hours of English 177, 178 Advanced Writing, or 179 Writers' Workshop, will count toward fulfillment of major requirements. Broughton, M. J. Dickerson, Fulwiler, Huddle.

179 Writers' Workshop An intensive two-week workshop with assignments designed to emphasize autobiographical aspects of poetry and fiction writing. Summer only. Broughton, Engels, Huddle.

191, 192 Internship May not be used to satisfy major requirements. *Prerequisites:* Instructor's permission, junior or senior standing. One to six hours.

193, 194 College Honors Departmental permission required. Not to exceed three hours per semester.

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Reading and Research Departmental permission required. Not to exceed three hours per semester.

The prerequisite for courses numbered 200-298 is 81, 82, and six hours at the intermediate level (100-100). 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 Folklores

282 Seminar for Prospective Teachers of English Approaches to teaching composition, literature, and the English language in secondary school. This course does not satisfy the seminar requirement for English majors. *Prerequisites:* 50 or 53; 81 and 82; 101 or 102. Three hours. Biddle, Eschholz.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles. *Prerequisites:* Graduate or advanced undergraduate standing; instructor's permission.

297, 298 Readings and Research For advanced undergraduate and graduate students. Departmental permission required. Not to exceed three hours per semester. Three hours.

FILM (FILM)

Film courses may not be used to satisfy requirements for the major in English.

5 Development of the Motion Picture I An overview of the technological, artistic, economic, and sociological history of the cinema from its inception through the 1920's. Manchel.

6 Development of the Motion Picture II An overview of the cinema's technological, artistic, economic, and sociological history from 1929–1960. Manchel.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

107 Film Criticism Intensive analysis of films to develop appropriate critical methods and standards. Possible approaches are sociological, psychological, aesthetic, and journalistic. Organized either historically or topically. *Prerequisite:* 5 or 6. Manchel.

161 Contemporary Cinema A survey of the artistic trends, important personalities, economic and social factors that have shaped the past 25 years of narrative feature film history. *Prerequisite:* 5 or 6. Manchel.

162 American Film Genres An investigation of the circumstances surrounding the production of American film genres, especially between the years 1930–1960. *Prerequisite:* 5 or 6. Manchel.

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

271, 272 Seminar in Film Selected topics in film, May be repeated with departmental permission. *Prerequisite:* Six hours of film courses, including 107. Manchel.

Environmental Studies (ENVS)

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

COLLEGE OF ARTS AND SCIENCES

COLLEGE OF EDUCATION AND SOCIAL SERVICES

SCHOOL OF NATURAL RESOURCES

Professors Reidel (Director), Worley; Associate Professors Hudspeth, King, Richardson; Assistant Professors Kaza, McArthur; Adjunct Associate Professor Eddy.

1 Introduction to Environmental Studies Survey of environmental studies examining ecological, socioeconomic, aesthetic, and technological influences determining quality of life on earth. *Prerequisite:* First-year or sophomore standing, or instructor's permission. Four hours. Reidel.

2 International Environmental Studies A multidisciplinary analysis of the interaction of global and local variables in understanding and solving pervasive environmental problems. *Prerequisite:* First-year or sophomore standing. Four hours. King.

95, 96 Introductory Special Topics

100 Environmental Theory Comparative analysis of emerging concepts of human/environment relationships; the history, philosophy, and theoretical framework of environmental studies. *Prerequisites:* 1, 2. Three hours. Worley.

151 Intermediate Environmental Studies Analysis of environmental problems and issues from the perspective of various academic disciplines and professional fields,

emphasizing interdisciplinary scholarship and research. *Prerequisites:* Major in Environmental Studies; 1, 2, 100. Three hours. Kaza.

178 Environmental Ethics Critical examination of contemporary environmental moral problems; metaethical and normative analyses of issues including animal rights, earth duties, war, deep ecology, ecosophy, and alternative ethics. *Prerequisites:* One course in environmental studies, junior standing. Three hours. Worley.

191 Environmental Practicum Individual readings and research, internship, or field-based learning experience under direction of a faculty member or environmental practitioner. Credit arranged. *Prerequisite:* Permission of course coordinator. Reidel.

195, 196 Special Topics Special topics courses taught by Program faculty and community environmental practitioners which vary each semester. Topics have included environmental health, energy, regional planning, international studies, literature, natural area management.

201 Research Methods Planning, design, and methods of research for the study of environmental problems. *Prerequisite:* 151, junior standing, major in Environmental Studies. Three hours. McArthur. (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. McArthur, Richardson. (Not offered for graduate credit.)

203 Senior Project and Thesis (Honors) Richardson.

204 Seminar in Environmental Studies Review and discussion of current environmental research and literature. *Prerequisites:* 100, senior standing, major, coordinate major, or minor in Environmental Studies. Three hours. Reidel. (Not offered for graduate credit.)

289 Environmental Economics Application of economic theory and methods to environmental problems and policies. Includes cost-benefit analysis and economic incentives as tools for environmental problem solving. *Prerequisites:* 1, three hours intermediate economics. For students in Arts and Sciences: Economics 11-12, intermediate course in ENVS. Three hours. King.

290 Environmental Policy Public policy dimensions of natural resource management and environmental protection; U.S. historical context; policy analyses of contemporary issues; administration of environmental resource institutions. *Prerequisite:* Six hours of intermediate or advanced courses in ENVS, natural resources, or related areas. Three hours. Reidel. (Not offered for graduate credit.)

291 Special Topics

293 Environmental Law Principles of environmental law, including legal research methods, threshold issues, case law, trial procedure, and international comparisons in aspects of air, land, and water law. *Prerequisite:* Junior standing. Three hours. Richardson.

294 Environmental Education Philosophy, concepts, and strategies of environmental education, emphasizing integration of environmental concerns into formal and nonformal educational programs for youth and adults. *Prerequisite:* Six hours of intermediate or advanced courses in environmental studies, natural resources, or related areas. Three hours. Hudspeth.

295 Advanced Seminar

European Studies

COLLEGE OF ARTS AND SCIENCES

Prof. Moyser, Director.

See International Studies for special topics course listings.

Forestry (FOR)

SCHOOL OF NATURAL RESOURCES

Professors Bergdahl, DeHayes, Donnelly (Program Chair), Hannah, Reidel, Whitmore; Associate Professors Forcier, Newton, Wang; Extension Associate Professor Bousquet, McEvoy; Lecturer Turner; Adjunct Associate Professors Sendak, Tritton; Research Assistant Professor Scherbatskoy.

1 American Forestry Forests and our quality of life; forest conservation eras; forest ownership; the profession of forestry; ethics; aspects of forest biology and basic forest measurements. Three hours.

3 North American Trees (2-3) Survey of principal forest trees of North America; their identification, silvics, and major uses. Primary emphasis directed toward trees of eastern U.S. Three hours. Whitmore.

21 Dendrology (3-4) Classification, silvical characteristics, and identification features of native and introduced trees and shrubs. Four hours. Donnelly.

73 Small Woodland Management (2-4) Concepts of forest ecology, resource inventory, cultural practices, and multiple use management for small woodland areas. Three hours. Turner.

120 Forest Ecology Forest environment and its effects on the development and distribution of forest communities. Introduction to population dynamics, systems and analysis, diversity, stability, ecosystem disturbances, and succession. *Prerequisite:* Natural Resources 1, or another introductory biological science course. Three hours. Donnelly, Hirth.

121 Forest Ecology Laboratory Field application of ecological principles in the analysis of forest communities. *Prerequisite:* Natural Resources 25, a course in tree identification, and previous or concurrent enrollment in 120. One hour. Donnelly.

122 Forest Ecosystem Analysis An integrated field course to investigate, through quantification and interpretation, the flora, fauna, and abiotic components (soils, physiography, water, and microclimate) of a selected forest ecosystem. *Prerequisite:* Knowledge of plant identification, land measurements, and statistics recommended. Twenty days during Summer Session. Four hours. Donnelly, Turner.

123 Silviculture (3-4) Principles of regeneration, production, and culture of forest stands. *Prerequisites:* 120, Natural Resources 25. Four hours. Hannah.

124 Forest Genetics Concepts in general, population, and quantitative forest genetics and their application to the improvement of trees for artificial regeneration purposes. *Prerequisites:* Biology 1, 2. Three hours. DeHayes. Alternate years, 1992-93.

126 Forest Ecology Field Trip Assessment of southeastern forest ecosystems including Smoky Mountain communities, and upland and bottomland forests of the Georgia Piedmont and South Carolina Coastal Plain. Field trip at end of spring semester. *Prerequisites:* A course in plant identification, a course in ecology, instructor's permission. Two hours. Donnelly, Hannah.

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. *Prerequisite:* 120 or concurrent enrollment. Three hours. Bergdahl.

133 Forest Entomology (See Plant and Soil Science 107.) Three hours.

134 Forest Pathology (2-4) A survey of principal diseases of forest and shade trees emphasizing identification, morphology, ecology, epidemiology, and integrated disease management. *Prerequisites:* Biology 1, 2. Four hours. Bergdahl.

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; a course in tree identification. Three hours. Whitmore.

153 Forest Finance Forestry investment analyses. Return on investment, net present value, land expectation value, sinking funds, and amortization schedules. Valuation based on anticipated net incomes. Managerial accounting. *Prerequisite:* A course in economics. One hour.

155 Forest Taxation Federal, state, and local taxation of forest properties. Income taxes, capital gains, and property taxes including various state laws on taxation based on current-use assessment. *Prerequisite:* A course in economics. One hour.

157 Trade and Marketing of Forest Products World trade and marketing of forest products. Consumer behavior, employment and productivity in forest products, appraisal of standing timber, marketing standing timber, and commodity markets. *Prerequisite:* A course in economics. One hour.

162 Properties and Uses of Wood (2-4) Properties, uses, and identification of commercial woods of the U.S. Manufacture of major wood products. *Prerequisite:* A course in tree identification. Three hours. Bousquet, Whitmore. Alternate years, 1992-93.

163 Timber Harvesting, Planning, and Management Private forest emphasis; impacts of alternative techniques on cultural and natural resources; preharvest inventory, prescription, layout, contracts, bookkeeping; postharvest operations. Three hours. Turner. Alternate years, 1993-94.

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. *Prerequisite:* A course in tree identification. Three hours. Hannah. Alternate years, 1993-94.

185 Special Topics Readings, investigations, and lectures in selected forest resource subjects. *Prerequisite:* Instructor's permission. Credit arranged.

191 Forestry Practicum Supervised work experience in forest resource area. *Prerequisite:* Instructor's 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, 1992-93.

222 Advanced Silviculture (2-4) Scientific basis and contemporary status of silviculture practices. *Prerequisites:* 123, permission. Three hours. Hannah. Alternate years, 1993-94.

225 Tree Structure and Function The anatomy and phys-

iology of woody plants with particular emphasis on those facets unique to trees. *Prerequisite:* Junior standing in a plant science curriculum. Three hours. Donnelly. Alternate years, 1992–93. (Not offered for graduate credit.)

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:* Three hours. Donnelly, Klein. Alternate years, 1992–93.

231 Integrated Forest Protection Integration of concepts of forest protection using a holistic ecological approach to forest pest management. Detection, population dynamics, evaluation, prediction, and pest management considerations. *Prerequisites:* 133, 134 or instructor's permission. Three hours. Bergdahl. Alternate years, 1993–94.

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:* Permission. Three hours. Newton. Alternate years, 1993–94.

244 Quantitative Assessments of Natural Resources (See Natural Resources 244.) Three hours. Newton.

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:* Senior standing in Natural Resources or permission. Three hours. Reidel. (Not offered for graduate credit.)

252 Nonresidential Real Estate Appraisal Real Estate fundamentals and their application to nonresidential properties. Case histories of forest appraisals. Real estate appraisal in the 21st century. Business ethics. *Prerequisite:* Six hours of economics. Two hours. (Associated one-hour project may be elected concurrently.)

254 Advanced Natural Resource Policy Advanced seminar in natural resource policy, emphasizing current issues in forest policy. *Prerequisites:* Graduate or advanced undergraduate standing; 251 or instructor's permission. Three hours. Reidel. Alternate years, 1992–93.

271 Forestry Operations Research Operations research procedures in forest management. Microcomputer approaches to queuing applications, replacement, inventory, linear programming, and simulation. *Prerequisite:* Computer Science, Math. 19, a 100-level course in Natural Resources, or permission. Three hours.

272 Forest Resources Management Application of mathematical programming, growth and yield forecasting, and economic analysis to the planning and organization of forests for multiple-use sustained yield production. *Prerequisites:* 123, 153. Four hours. Newton.

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. *Prerequisite:* Natural Resources 102, junior standing or permission. Three hours. Alternate years, 1992–93. (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, instructor's permission. 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.)

General Literature (GLIT)

COLLEGE OF ARTS AND SCIENCES

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.

131 French Literature in Translation Selected topics in French literature. Readings and discussion of representative works in English translation. No knowledge of French required. *Prerequisites:* Sophomore standing, one course in any literature. Three hours.

132 Francophone Literature in Translation Selected topics in the literature of the French-speaking world (excluding France). Readings and discussion of representative works in English translation. No knowledge of French required. *Prerequisites:* Sophomore standing, one course in any literature. Three hours.

141 Spanish Literature in Transition Selected topics in Spanish literature. Readings and discussion of representative works in English translation. No knowledge of Spanish required. *Prerequisites:* Sophomore standing, one course in any literature. Three hours.

142 Spanish-American Literature in Translation Selected topics in Spanish-American literature. Readings and discussion of representative works in English translation. No knowledge of Spanish required. *Prerequisites:* Sophomore standing, one course in any literature. Three hours.

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. Ambrose. Alternate years, 1992–93.

154 Greek Historians Three hours. B. Rodgers. Alternate years, on demand.

155 Ancient Epic Three hours. Davison. Alternate years, on demand.

156 Greek and Roman Satiric Spirit Three hours. Gilleland. Alternate years, 1992–93.

161, 162 German Literature in Translation Topics such as German author(s), genre, literary movement, or theme, such as Goethe, proverbs, Expressionism, Faust, Holocaust, or the German film. *Prerequisite:* Sophomore standing. Three hours.

171, 172 Chinese Literature in Translation Selected topics in Chinese literature. Reading and discussion are in English. No knowledge of Chinese language is required. *Prerequisite:* one course in literature or Asian Studies concentrating on East Asia. Three hours. Williams, Wu.

173 Dante's Comedy (Same as English 108.) A study of Dante's *Comedy* in Modern English translation. Three hours. Stephany. Alternate years, 1993–94.

181 19th Century Russian Literature in Translation Survey of major 19th century authors and genres. Close readings supplemented by lectures and discussions. Particular attention to literary and social institutions in Russia. Three hours. Henry, McKenna, Nalibow.

182 20th Century Russian Literature in Translation From Russian modernism to the present. Close readings supplemented by lectures and discussions. Attention to both official and unofficial texts from the Soviet period. Three hours. Henry, McKenna, Nalibow.

183 Topics in Russian Literature in Translation Study of topics such as Russian author(s) (e.g. Dostoevsky and

Tolstoy), genre (e.g. the Russian novel), literary school (e.g. Russian Formalism). Three hours. Henry, McKenna, Nalibow.

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.

Geography (GEOG)

COLLEGE OF ARTS AND SCIENCES

Professors Gade, Meeks, VanderMeer; Associate Professors Barnum, Bodman (Chairperson), Lind; Assistant Professors Kennedy, Seager.

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 landforms, 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, Seager.

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, Meeks.

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 Gade.

52 Canada Seager.

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.

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 distribution. *Prerequisite:* Instructor's permission. Three hours. I, II. Barnum, Kennedy.

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 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

99 First-Year Seminar Intensive survey of geography as a systematic discipline. Focus on processes producing spatial patterns in the natural and human environment. By departmental invitation. Three hours.

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.

144 Geomorphology (See Geology 151.) *Prerequisite:* Geology 1. Three hours. Bucke.

146 Physical Geography of North America Physical environment and natural resources of the U.S. and Canada. Emphasis on landform regions and mineral and water resource development and problems. *Prerequisite:* 2, or Geology 1. Three hours. Meeks.

155 Historical Geography of Europe (Same as History 120.) European geography within a framework of past times; the historical development and distribution of settlement, economic, and political patterns. *Prerequisite:* 55. Three hours. Barnum.

158 Mediterranean Lands Unity and diversity in the regions, countries, and landscapes of Southern Europe, North Africa, and Western Asia. Emphasis on environmental history. *Prerequisite:* 1 or 55 or History 21. Three hours. Gade.

162 Geography of Place Names Investigation and interpretation of the names found on maps of Vermont, North America, and Europe. *Prerequisite:* Three hours in geography. Three hours. Barnum.

170 Historical Geography of the U.S. (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 11 or 12. Three hours.

171 Cultural Geography Distribution of race, ethnicity, language, and religion at different geographical scales and how these factors contribute to world and regional events. *Prerequisites:* 1 or Anthropology 21 or Sociology 1. Three hours. Gade.

172 Medical Geography The distribution of health and disease and access to health care at different geographic scales and between more and less developed countries. *Prerequisite:* Three hours in Geography. Three hours. Kennedy.

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. 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 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 161.) 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 51 or 71. Three hours. Bodman.

179 Cultural Ecology (Same as Anthropology 179.) Interrelationships of social groups and their natural environments and resource bases, with primary emphasis on nonindustrial cultures, examined from the perspectives of anthropology and geography. *Prerequisite:* 1 or 16 or Anthropology 21. Three hours. Pastner (Anthropology), 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. Kennedy.

182 Introduction to Geographic Information Systems (Same as Natural Resources 143.)

191 Geography Internship Supervised internship in applied geography working with a local public agency or private firm. Individually arranged. *Prerequisites:* Junior or senior standing, departmental permission. One to six hours. Bodman, Meeks.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

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, instructor's permission. 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 (Same as Agricultural and Resource Economics 233, Civil Engineering 233.) Study of rural, regional water, and natural resource planning concepts and principles. Field exercises in plan evaluation, carrying capacity, agricultural land protection, growth control. *Prerequisites:* Senior standing, Agricultural and Resource Economics 61 or equivalent. Three hours.

242 Problems in Physical Geography *Prerequisite:* Senior or graduate standing with at least 12 hours in geography. Three hours. Gade, Lind, Meeks.

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, Kennedy, Meeks, Seager, VanderMeer.

281 Problems in Cartography Special laboratory projects. *Prerequisites:* 81, junior, senior, or graduate standing with at least 12 hours in geography. Three hours. Kennedy.

285 Remote Sensing and Environmental Problems (Same

as Geology 274.) Research projects in remote sensing; application of multispectral data for environmental studies. *Prerequisite:* 85, Civil Engineering 210, or Forestry 146. Three hours. Lind.

287 Spatial Analysis (Same as Agricultural and Resource Economics 287.) 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, Kennedy.

295, 296 Advanced Special Topics Advanced courses or seminars beyond the scope of existing departmental offerings. Three hours.

297, 298 Readings and Research

Geology (GEOL)

COLLEGE OF ARTS AND SCIENCES

Professors Hunt, Stanley; Associate Professors Bucke, Doolan, Drake, Hannah (Chairperson), Mehrtens; Adjunct Professors Ratte, Stein.

1 Introductory Geology (3-3) Process, agents, and their effects on materials, structures, and morphology of earth's crust. Laboratory includes field trips, study and interpretation of rocks, minerals, and maps. Four hours. Bucke.

10 Geological Oceanography Characteristics and development of the oceans, their basins and shorelines. Plate tectonics and related investigations. *Prerequisite:* 1 or introductory science course. Three hours. Bucke, Hunt.

35 Global Water Cycle A geologic perspective and global analysis of pathways of water and its major dissolved constituents on, above, and below earth's surface. *Prerequisite:* High school chemistry. Three hours. Drake, Mehrtens.

41 Plate Tectonics and Earth History (3-3) Introduction to concepts of the new global tectonics and its role in shaping earth history. Labs stress graphical solutions to plate movements. Four hours. Doolan, Mehrtens.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

101 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. *Prerequisite:* 1 or instructor permission. Four hours.

110 Earth Materials (3-3) Introduction to crystallography, chemical, and physical properties of minerals and rocks. Laboratory stresses concepts of crystallography and hand specimen identification of rocks and minerals. *Prerequisite:* 1. Four hours. Drake.

112 Optical Mineralogy (0, 6) Introduction to the petrographic microscope, the behavior of light in crystalline materials, and the microscopic identification of minerals. *Prerequisite:* 110 or concurrent enrollment. Two hours. Doolan.

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, 10, or Biology 1, or equivalent. Senior Biology majors by permission only. Three hours. Hunt.

131 Igneous and Metamorphic Petrology (3-3) Description, classification, and genesis of igneous and metamor-

phic rocks. Introduction to petrogenetic models of the earth's crust and mantle. *Prerequisite:* 112. Four hours. Hannah.

151 Geomorphology (Same as Geography 144.) Examination and interpretation of landforms resulting from the action of rivers, glaciers, waves, and the wind. Emphasis on processes. *Prerequisite:* 1 or instructor permission. Three hours. Bucke.

153 Stratigraphy and Sedimentary Petrology (3-3) Properties of physical sedimentation, principles of stratigraphy and basin analysis, and comparison of modern and ancient environments. Lab includes description and classification of sedimentary rocks. *Prerequisite:* 112. Four hours. Mehrtens.

155 Fluvial Geology A discussion of fluvial systems including hydrology, sedimentation, geomorphology, water chemistry, and human impacts. *Prerequisite:* Instructor's permission. Three hours. Drake, Mehrtens.

170 Geophysics The structure of the solid earth, using seismic, magnetic, and gravitational methods. *Prerequisites:* Math. 20, Physics 16. Three hours. Detenbeck (Physics), Doolan.

176 Water Quality Analysis (See Natural Resources 176.)

180 Soil Mechanics (See Civil Engineering 180.) Four hours. Olsen.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Research in Geology Supervised research and readings in a 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.

201 Advanced Field Geology (1-6) Advanced field mapping techniques, analysis of field data, preparation of geological maps and reports. *Prerequisite:* 260. Three hours. Doolan, Hannah, Mehrtens, Stanley.

220 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.

230 Advanced Igneous and Metamorphic Petrology (3-3) Application of phase equilibria, elemental and isotopic data, and textural interpretations to problems in igneous and metamorphic petrology, stressing modern theories of tectonics and petrogenesis. *Prerequisite:* 131. Four hours. Hannah.

235 Geochemistry of Natural Waters Basic concepts of chemical equilibria applied to natural waters, including thermodynamics, pH, oxidation-reduction, weathering, and solution equilibria. *Prerequisites:* 110, Chemistry 1, 2. Three hours. Drake.

237 Economic Geology Distribution and mode of occurrence of principal metallic ores; geochemical methods used to develop models of ore genesis. *Prerequisites:* 101, 131. Three hours. Hannah.

241 Clastic Depositional Systems 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. *Prerequisites:* 153. Three hours. Mehrtens. Alternate years.

243 Clastic Petrology Laboratory Study of clastic rocks

in hand specimen and thin section. *Prerequisite:* Concurrent enrollment in 241. One hour. Mehrtens.

245 Carbonate Depositional Environments Paleoenvironmental analysis of carbonate rocks including selected readings, field investigations, and petrographic studies. *Prerequisite:* 153. Three hours. Mehrtens. Alternate years.

247 Carbonate Petrology Laboratory Study of carbonate rocks in hand specimen and thin section. *Prerequisite:* Concurrent enrollment in 245. One hour. Mehrtens.

251 Recent Sedimentation (1-6) Investigation of recent sedimentary environments using geolimnological and oceanographic techniques. Group and individual projects. *Prerequisite:* 153 or equivalent. Three hours. Hunt.

252 Soil Classification and Land Use (See Plant and Soil Science 261.) Three hours. Jokela.

256 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:* 153. Three hours. Bucke.

260 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. *Prerequisites:* 101, 110, Physics 31. Four hours. Stanley.

272 a, b Regional Geology 272a (1 hour) Discussion of the geology of a selected region of North America; **272b** (3 hours) A four-week summer field trip to the area in question. *Prerequisites:* 101, 110; 272a for 272b. Four hours.

273 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:* 101, 131. Three hours. Doolan.

274 Remote Sensing of the Environment (See Geography 285.) Three hours.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

German (GERM)

COLLEGE OF ARTS AND SCIENCES

Professors Mieder (Chairperson), Scrase; Associate Professors Mahoney, Richel, Schreckenberger; Lecturer Wood.

The first two semesters of a foreign language are excluded from the 45-hour limit on courses from a single department that can be counted toward the 122 hours required for the Bachelor of Arts degree.

1, 2 Elementary German An introduction to all aspects of contemporary standard German: Speaking, listening, reading, writing. Cultural components include topics such as: music, art, literature, and current events. No previous knowledge of German needed for 1. Four hours each course.

51, 52 Intermediate German Comprehensive review of German grammar, vocabulary-building skills, development of reading strategies and compositional abilities, study of contemporary German culture through literary texts. *Prerequisite:* 1, 2 or equivalent for 51; 51 for 52. Three hours.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

103 Composition and Conversation An intensive language course concentrating on more advanced syntax,

vocabulary building, and idiomatic expression through written compositions, translations, and oral presentations. *Prerequisite*: 52 or equivalent. Three hours.

104 German News Media Analysis of journalistic style and content in news coverage of contemporary events as reported in newspapers, magazines, radio, and television in German-speaking countries. *Prerequisite*: 52 or equivalent. Three hours. Mahoney, Schreckenberger.

121 Culture and Civilization to 1900 Historical, intellectual, and artistic developments of German culture and civilization from Roman times through the 19th century, stressing written and oral work. *Prerequisite*: 52 or equivalent. Three hours. Mahoney, Richel, Schreckenberger.

122 20th-Century Culture and Civilization Social, cultural, and political developments in the German-speaking countries since the turn of the century, stressing written and oral components. *Prerequisite*: 52 or equivalent. Three hours. Mahoney, Richel, Schreckenberger.

155 Survey of German Literature to 1830 Selected prose, drama, and poetry from Medieval through Baroque literature, in-depth readings and analyses of major works by Lessing, Goethe, Schiller, and the Romantics. *Prerequisite*: 52 or equivalent. Three hours. Mahoney, Richel.

156 Survey of German Literature from 1830 Major literary and intellectual movements and figures of the period through in-depth analyses of works by Büchner, Mann, Kafka, and Brecht. *Prerequisite*: 52 or equivalent. Three hours. Schreckenberger, Scrase.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Readings and Research

201 Methods of Research and Bibliography Introduction to tools and methods of research, including major bibliographical sources, reference works, dictionaries, editions, and journals concerned with German literature, language, and folklore. *Prerequisite*: Two 100-level courses. Three hours. Mieder.

202 Expository Writing Improvement of writing skills through work with authentic texts from different content areas (literature, media, science, business). Emphasis on stylistic development and sophisticated vocabulary-building. *Prerequisite*: Two 100-level courses. Three hours. Mieder, Schreckenberger.

For all courses numbered 213 to 296 the *prerequisite* is 155 or 156 and one other 100 level course.

213 History of the German Language Historical and linguistic development of the German language from Indo-European to the present, emphasizing sound shifts, the 16th century, and the modern age. Three hours. Mieder.

214 Middle Ages Analysis and discussion of several "Minnesang" poets (esp. Walther and Neidhart), the *Nibelungenlied*, the courtly epics *Erec*, *Parzival*, and *Tristan*, and the satirical epic *Helmbrecht*. Three hours. Mieder.

225 Goethe Study of Goethe's accomplishments in poetry, drama, and the novel during major phases of his literary career: "Sturm und Drang," Classicism, and Romanticism. Three hours. Mahoney, Richel.

226 Schiller Major attention will be paid to Schiller's development as a dramatist (from *Die Räuber* to *Wilhelm Tell*) as well as to his contributions to German Classicism. Three hours. Mahoney, Richel.

237 19th-Century Prose Literary and stylistic analysis of prose works by Tieck, Kleist, Stifter, Gotthelf, Droste-

Hülshoff, Storm, Keller, and Hauptmann with emphasis on Romanticism, Poetic Realism, and Naturalism. Three hours. Mieder.

238 19th-Century Drama Analysis of plays by Tieck, Kotzebue, Kleist, Büchner, Grillparzer, Nestroy, Hebbel, and Hauptmann. Consideration of traditional Viennese "Volks theater" and the period's major literary movements. Three hours. Richel.

247 German Literature from 1890 to 1945 Naturalism, Symbolism, Expressionism and subsequent trends through readings of authors such as Hauptmann, Rilke, Kaiser, Kafka, Mann, and Brecht. Three hours. Schreckenberger, Scrase.

248 Contemporary German Literature Literary movements and their major representatives from 1945 to the present, including relevant sociopolitical, intellectual, and cultural aspects. Three hours. Schreckenberger, Scrase.

251 German Folklore Verbal folklore genres (fairy tales, legends, folk songs, and proverbs) treated in their relation to literature, mass media, and popular culture. Three hours. Mieder.

252 Faust Focus on one of the major themes of world literature. Readings include the "Volksbuch" of 1587, and works by Marlowe, Goethe, and Thomas Mann. Three hours. Richel.

263 German Romanticism Study of major works by authors such as Friedrich Schlegel, Novalis, Brentano, Hoffmann, and Eichendorff in their literary, artistic, philosophical, and sociopolitical contexts. Three hours. Mahoney.

264 German Lyric Poetry The lyric genre and the historical development of German poetry from the age of Goethe to the present. Three hours. Scrase.

271 Proverbs Diachronic and synchronic survey of German proverbs, proverbial expressions, and wellerisms, emphasizing their use and function in literature, art, mass media, advertisements and oral communication. Three hours. Mieder.

273 German Intellectual Movements A survey of developments in art, music, philosophy, and social thought from the Enlightenment to 1945, with particular attention to their impact on German literature. Three hours. Mahoney.

275 Fin-de-Siècle Prevalent literary and intellectual movements at the turn of the 20th century in their historical, sociopolitical, and cultural contexts. Study of Nietzsche, Freud, Rilke, Hofmannsthal, Schnitzler, and Mann. Three hours. Schreckenberger.

276 Brecht and the Modern Drama Brecht's revolutionary concept of "epic theatre" in theory and practice and its influence on subsequent dramatists, including Dürrenmatt, Frisch, Handke, Hochhuth, Müller, and Weiss. Three hours. Richel.

278 GDR Fiction GDR fiction in its literary, historical, and social contexts, with reference to major developments in the GDR from 1949–89. Three hours. Scrase.

279 The German Short Story after 1945 Aesthetic and thematic evolution of the short story and its relation to historical, political, and cultural developments from 1945 to the present. Three hours. Schreckenberger.

281 Seminar on Literary Genre, Period, or Theme Study of a literary genre, period, or theme through close readings of representative texts supplemented by lectures and reports on sociocultural context. May be repeated. Three hours.

282 Seminar on a Particular Author or Authors Study of author(s) through close readings of representative texts

supplemented by lectures and reports on the works' socio-cultural context. May be repeated. Three hours.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

GENERAL LITERATURE

161, 162 German Literature in Translation (See course description under General Literature.)

Hebrew (HEBR)

COLLEGE OF ARTS AND SCIENCES

Lecturer Lewin.

1, 2 Elementary Hebrew The spoken language of everyday use with oral, aural, and written practice in speaking, reading, and comprehension. Four hours. Lewin.

51, 52 Intermediate Hebrew Reading, translation, and discussion in Hebrew of texts selected to show the development of Hebrew culture from Biblical times to the present. *Prerequisites:* 1, 2 or equivalent for 51; 51 for 52. Three hours. Lewin.

Historic Preservation (HP)

COLLEGE OF ARTS AND SCIENCES

Professor Liebs; Lecturer Visser.

201 Architecture, Landscape, and History (Same as Art 201, History 201.) An examination of methods for deciphering the underlying cultural and environmental forces that have shaped the nation's buildings, towns, cities, and rural landscapes. *Prerequisites:* One advanced course in one of the following areas: American history, architectural history, historical or cultural geography, archaeology, or by permission. Three hours. Liebs.

202 Special Topics. Three hours.

203 Conservation Techniques for Historic Structures An overview of historic building technology including basic techniques of scientific field and laboratory investigations; seminars and demonstrations on preserving wood, plaster, paint, and masonry by nationally-recognized architectural and conservation specialists. *Prerequisites:* 201, familiarity with the building trade. Three hours. Visser.

204 Historic Preservation: Development Economics Survey of economic, financial aspects of real estate development pertaining to preservation and adaptive use of historic buildings (market studies, pro-formas). Field trips. Actual proposal development for underutilized properties. *Prerequisite:* 201. Three hours. Lang.

205 Historic Preservation Law Legal issues in conservation of the built environment. Basic legal techniques for protection of historic structures (historic districts, protective legislation, easements, covenants). Study of significant court decisions. *Prerequisite:* 201. Three hours. Kellogg.

History

COLLEGE OF ARTS AND SCIENCES

Professors Andrea, Felt, Hand, Hutton (Director of Graduate Studies), Liebs, Metcalfe, Overfield (Chairperson), Seybolt, Steffens, Stoler, Stout; Associate Professors McGovern, B. Rodgers, See, True; Assistant Professors Bergen, Saad, Youngblood; Visiting Assistant Professors Gustafson, Randall; Lecturer Visser.

History course numbers are designed to indicate method of instruction and expected preparation level of students, as follows:

9-14 Introductory Surveys Open to all students, but primarily designed for first-year students. Designed to teach not only historical content but also skills such as library use, writing, methods of citing evidence, analysis of various types of historical sources.

21-96 Specialized Introductory Courses Open to all students, but especially designed for sophomores, juniors, and first-year students with special interests or preparation. Paper writing is normally an important component.

120-199 Intermediate Courses Intended primarily for juniors and seniors, these courses all have prerequisites. Requirements include independent research projects.

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.

9 Global History to 1500 The development and cross-fertilization of Civilizations in Eurasia, Africa, and the Americas from about 3500 B.C.E. to A.D. 1500. Three hours. Andrea.

10 Global History Since 1500 Character, development, and emerging interdependence of the world's major civilizations since 1500. Three hours. Bergen, Overfield.

11, 12 History of the U.S. Survey from the pre-Revolutionary period to the present. First semester: to 1876; second semester: 1876 to present. Three hours.

13, 14 Ideas in the Western Tradition: Integrated Humanities Great books of Western civilization in their historical setting. First semester: Greece and Rome. Second semester: Renaissance to Existentialism. Credit will not be given for History 14 and History 25 or 26. *Prerequisites:* Concurrent enrollment in English 27, 28; Religion 27, 28; Integrated Humanities Program. Three hours. Hutton.

21 Classical Greek Civilization Detailed study of Athens in the 5th century B.C.E., continuing through Alexander the Great. (Students who have already taken 121 or 122 may not take 21 or 22.) Three hours. B. Rodgers, Schlunk.

22 Classical Roman Civilization Growth of the Roman Empire; political and social disruption at Rome and elsewhere from the early 2nd century B.C.E. through the 1st century C.E. Three hours. B. Rodgers.

23 The Birth of Europe Survey of history of Western Europe from the late Roman Empire to the stabilization of Medieval Civilization around A.D. 1000. Three hours. Andrea.

24 High and Later Middle Ages: A.D. 1000-1500 The stabilization and expansion of Western European civilization in the Age of the Crusades; the crisis of the 14th century; 15th century recovery. Three hours. Andrea.

- 25 European Civilization to 1815** Introduction to political, social, and intellectual movements which have shaped the foundations of Western civilization from the Renaissance to the French Revolution. Three hours. Overfield, Randall, Steffens.
- 26 Europe, 1815–1945** Europe from the fall of Napoleon to the end of World War II, focusing on political, social, economic, and intellectual developments. Three hours. Bergen, Steffens, Youngblood.
- 27 Modern Eastern Europe** Eastern Europe since 1772, especially areas comprising present-day states of Croatia, Czechoslovakia, Hungary, Poland, Slovenia, and Yugoslavia. Focus on politics and culture of nationalism. Three hours. Youngblood.
- 40 Introduction to African History** Lecture survey: traditional Africa, the European impact, colonial rule, African nationalism and independence. Three hours. Saad.
- 45 Introduction to Middle East History** Survey of the Middle East from the emergence of Islam to the present, emphasizing political, cultural, social, and economic developments. Three hours. Saad.
- 50 East Asian Civilization: China and Japan to 1800** Historical development of the politics, economics, social, structure, philosophy, religion, and the arts in East Asia from neolithic times to 1800. Three hours. Seybolt.
- 51 East Asian Civilization: China and Japan Since 1800** Continuity and change in the politics, economics, society, and culture of China and Japan in the 19th and 20th centuries. Three hours. Seybolt.
- 60 Birth of the Americas** Origins of the complex and culturally diverse societies in the Americas created by Indians, Africans, and Europeans in the Western Hemisphere between 1492 and 1763. Three hours. True.
- 61 Introduction to the Modern History of Latin America** Latin American history concentrating on the post-independence period. Selected national histories. Three hours. True.
- 65, 66 Canadian History** Canada from earliest French exploration and settlement to present, concentrating on Amerind-European contact, New France, British North America, political development, international relations, and cultural diversity. First semester: to 1867. Second semester: 1867 to present. Three hours. See.
- 85, 86 History of Science** 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.
- 90 Western World since 1945** Comparative history of European nations and the United States since 1945. Three hours. Hutton, Randall, Youngblood.
- 91 Africa, Asia, and Latin American since 1945** Non-Western societies since 1945 emphasizing problems relating to national independence and economic development. Three hours.
- 95, 96 Introductory Special Topics** Courses on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.
- 120 Historical Geography of Europe** (Same as Geography 155.) Three hours.
- 121 History of Greece** Survey of history of ancient Greece from prehistoric times (emphasizing the Minoan and Mycenaean cultures) to the Hellenistic Age. *Prerequisite:* 9 or 21 or appropriate work in Classics. Three hours. B. Rodgers.
- 122 History of Rome** History of ancient Italy from prehistoric times (emphasizing the Italic peoples, the Etruscans, and Greek colonization) to the age of Justinian. *Prerequisite:* 9 or 22 or appropriate work in Classics. Three hours. B. Rodgers.
- 123 The Crusades: 1095–1291** The evolution of western Europe's crusading ideal and the impact of the movement on Latin, Byzantine, Muslim, and Jewish societies. *Prerequisite:* 23 or 24. Three hours. Andrea.
- 124 The Medieval Papacy** The development of Western European civilization seen through the perspective of the history of the Roman papacy: A.D. 100–1517. *Prerequisite:* 23 or 24. Three hours. Andrea.
- 125 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:* 9 or 10 or 14 or 25 or 26. Three hours. Overfield.
- 126 The Reformation** European society from the Renaissance to mid-17th century. Emphasis on religious struggles growing out of Protestant Reformation and their impact on the social, political, economic, and cultural movements of era. *Prerequisites:* 10 or 14 or 25. Three hours. Overfield.
- 128 European Society and Culture, 1880–1920** European society and culture before and during "The Great War." Transitions in the arts, philosophy, science and technology, industry, dance, theatre, attitudes, and diplomacy. *Prerequisite:* 26. Three hours. Steffens.
- 129 European Intellectual History to 1800** Emphasis upon ideas in the relation to major political and social movements. *Prerequisite:* 25. Three hours. Overfield, Steffens.
- 130, 131 Modern European Intellectual History** Intellectuals and intellectual movements in the context of 19th century European culture. *Prerequisite:* 26. Three hours. Hutton.
- 132 Modern Irish History** Ireland 1600 to present. English subjugation of Ireland, Anglo-Irish, emergence of Irish nationalism, Irish Literary Renaissance, Irish Free State, and ongoing problem of Northern Ireland. *Prerequisite:* 25 or 26. Three hours.
- 133 Early English History** Political, cultural, and social history of England from the Anglo-Saxons to ca. 1500. *Prerequisites:* 8 or 9 or 10 or 14 or 25 or six hours of history. Three hours. Metcalfe.
- 134 Tudor-Stuart England** England from 1485 to 1660, emphasizing the period from the 1530's to the 1640's (the Henrican Reformation to the Puritan Revolution). *Prerequisites:* 133 preferred, otherwise 10 or 14 or 25 plus three additional hours of history. Three hours. Metcalfe.
- 135 France 1700–1851** An introduction to French civilization. Principal themes: Absolutism, Enlightenment, French Revolution, 19th Century Society and Culture. *Prerequisites:* 14 or 25 or 26 or work in French or permission. Three hours. Hutton.
- 136 France in the Contemporary World** Politics, society, and culture of France since 1870. *Prerequisite:* 14 or 26, or 135. Three hours. Hutton.
- 137 History of Russia** Russian political, social, and intellectual history from Kievan Rus' to the Revolutions of 1917, focusing on the Imperial period (1700–1917). *Prerequisite:* 10 or 26. Three hours. Youngblood.
- 138 History of the Soviet Union** Soviet political and social history, 1917–1991, centering on the Stalin era and on efforts of post-Stalin regimes to deal with the Stalinist legacy. *Prerequisite:* 10, 26 or 137. Three hours. Youngblood.

139 Modern Germany Political development and changing social and economic structure of Germany during the Bismarkian empire, the Weimar Republic, the Nazi dictatorship, and the post-war period. *Prerequisite:* 14 or 26 or work in German. Three hours. Bergen.

140 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:* 40. Three hours. Saad.

145 Middle Eastern History to 1800 Political, social, and economic study of the Middle East from Muhammad to the end of the 18th century, emphasizing origins and achievements of the Islamic age. *Prerequisite:* 45 or permission. Three hours. Saad.

146 Modern Middle East Political, social, and economic study of the modern Middle East from the late 18th century to the present, emphasizing the rise of modern nation states. *Prerequisites:* 45 or permission. Three hours. Saad.

149 Archaeology and History of the Ancient Near East Survey of primary civilizations of Egypt and Mesopotamia and the secondary cultures of Anatolia, Syria-Palestine, Assyria, and Iran, with major emphasis on archaeological evidence. *Prerequisite:* 9 or 21 or appropriate work in Classics. Three hours.

150 China: The 19th and 20th Centuries China from the late Qing Dynasty to the present, with particular attention to the influence of Western imperialism, the process of revolution, and the Communist era. *Prerequisite:* Six hours of history, 50 recommended. Three hours. Seybolt.

151 Modern Japan Transition from tradition to modernity in Japan from the Meiji Restoration, 1868 to the present. *Prerequisite:* Six hours of history, 50 recommended. Three hours. Seybolt.

161 Topics in the History of Modern Latin America Topics include plantation economy, slavery, race relations, immigration, militarism, economic development, *indigenismo*, and influence of U.S. Classroom emphasis on dialogue and question-asking. *Prerequisite:* 61. Three hours. True.

162 History of Mexico Mexico's national history, including an intensive study of its 20th century revolution. Introduces students to Mexican culture and nationality. *Prerequisite:* 61 or permission. Three hours. True.

165 Canadian-American Relations Canada's relationship with the U.S. from the Revolutionary War to the present, emphasizing diplomatic, economic, social, and environmental relations in the 19th and 20th centuries. *Prerequisite:* Three hours in U.S. or Canadian history. Three hours. See.

170 Historical Geography of the U.S. (Same as Geography 170.) Three hours.

171, 172 Social History of the U.S. Selected topics in history of American society, including community structures, family life, work patterns, value systems, social class, and mobility. *Prerequisites:* For 171: 11 or 182; for 172: 12 or 182. Three hours. Gustafson, McGovern.

173, 174 History of U.S. Foreign Relations The domestic and international contexts of U.S. relations with the rest of the world. First semester: 1776–1914. Second semester: 1914–present. *Prerequisites:* For 173: 10 or 11; for 174: 10 or 12. Three hours. Stoler

175, 176 Intellectual History of the U.S. An examination of the interaction between intellectuals, the public, and social institutions, as a means to understanding how ideas relate to the social and institutional needs of particu-

lar historical periods. The effects of movements such as Puritanism, democracy, Darwinism, progressivism, and the search for self on past and present discussed. *Prerequisites:* For 126: 11; for 127: 12. Three hours. Felt.

177 American Revolution Survey of the Revolutionary Era, 1760–1791. Causes of the Revolution, War for Independence, establishment of the Constitution. *Prerequisite:* Six hours of history or other social sciences of which History 25 is highly recommended. Three hours. Stout.

178 The U.S. in the Age of Industrialization Chronological survey of U.S. history from 1876 to 1914. *Prerequisite:* 12. Three hours. Felt.

179 U.S. History Since 1960 Topical review of U.S. history since 1960, emphasizing problems of interpreting and reconstructing the recent past. *Prerequisite:* 12. Three hours. Hand.

180 African-American History Economic, social, political, and intellectual developments in U.S. history as they have affected and been effected by the African-American; emphasis on the period since 1865. Three hours.

182 History of Women in the U.S. Survey of the origins and changes in images, status, and roles of women in American society since the colonial period. *Prerequisite:* 11 or 12. Three hours. Gustafson, McGovern.

183 U.S. Military History Development of the U.S. military establishment within the framework of U.S. history from the Colonial era to the present. *Prerequisite:* 10 or 11 or 12. Three hours. Stoler.

184 Vermont History Survey of Vermont history from early times to the present. *Prerequisite:* 11 or 12. Three hours. Hand.

185 Science and Culture Science as an integral part of 20th-century culture, emphasizing works of leading scientists, mathematicians, and humanists. *Prerequisite:* 86 or six hours of European history, or science major. Three hours. Steffens.

186 The Scientific Revolution Interrelationship between European scientific activity and social change during 16th and 17th centuries. Emphasis on philosophical, religious, artistic, and social context of the times. *Prerequisite:* 85 or six hours of European history or science major. Three hours. Steffens.

191 World War II Causes, conduct, and consequences of global war from 1931–1945, including social, economic, political, and diplomatic as well as military aspects. *Prerequisite:* 10 or 12 or 26 or 51. Three hours. Stoler, Seybolt.

192 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 Sciences College major requirements.) *Prerequisite:* Acceptance in teacher certification program. Three hours.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles. *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.

199 Internship in History Supervised cooperative internship work in history in archives, museums, libraries, etc. To be individually arranged for each student. *Prerequisite:* Junior or senior standing, department permission. Three to six hours.

Prerequisites for Seminar Courses (all following courses): Enrollment limited to juniors, seniors, and graduate students who have taken at least 12 hours of 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.

209, 210 Seminar in Global History Selected topics on the nature and results of interactions among the world's peoples. 209: to 1500. 210: since 1500. *Prerequisites:* Junior, senior, or graduate standing; 12 hours of history. Three hours. Andrea, Overfield.

221, 222 Seminar in Ancient History Selected aspects of Near Eastern, Greek, or Roman History (e.g. trade and colonization, imperialism, social and political institutions, cultural and intellectual developments). *Prerequisites:* Junior, senior, or graduate standing, 12 hours of history.

224 Seminar in Medieval Europe Selected topics on Europe from the Fall of Rome to the Renaissance. *Prerequisites:* Twelve hours of history including 23 or 24; junior, senior, or graduate standing. Three hours. Andrea.

225 Seminar in Early Modern Europe Selected topics on European history from the Renaissance to the French Revolution. *Prerequisite:* Junior, senior, or graduate standing and 12 hours of history. Three hours. Metcalfe, Overfield, Randall.

226, 227 Seminar in Modern Europe Selected topics on European history from 1815 to present. Three hours. Bergen, Hutton.

228 Seminar in Popular Culture History of the attitudes of ordinary people towards every day life in European society from the Middle Ages to the present. *Prerequisite:* Junior, senior, or graduate standing, 12 hours of history. Three hours. Hutton.

237 Seminar in Russian History Before 1917 Selected topics in Russian intellectual, social, and cultural history focusing on the period 1825–1917. *Prerequisites:* Junior, senior, or graduate standing, 12 hours of history including 137. Three hours. Youngblood.

238 Seminar in Soviet History Selected topics in Soviet social and cultural history from the Bolshevik Revolution to the death of Stalin (1917–53). *Prerequisite:* Junior, senior, or graduate standing, 12 hours of history including 138. Three hours. Youngblood.

245 Islamic History In-depth study of Islam, focusing on ideas rather than events. Topics include law, Sufism, art, philosophy, and resurgent Islam. *Prerequisite:* 145 or permission. Three hours. Saad.

246 Seminar on Modern Middle East Historical analysis of the major conflicts in the region, emphasizing the roles of nationalism, religion, foreign influences, and wars. *Prerequisite:* 146 or permission. Three hours. Saad.

250 Seminar in East Asian History Topics in the history of East Asia. *Prerequisites:* Junior, senior, or graduate standing, 12 hours of history. Three hours. Seybolt.

252 Seminar on China Selected topics on the history of China. *Prerequisites:* Junior, senior, or graduate standing; 12 hours of history, including 150 or equivalent. Three hours. Seybolt.

261, 262 Seminar in Latin American History Selected topics in Latin American history. 261: Early Latin America; 262: Modern Latin America. *Prerequisites:* Junior, senior, or graduate standing, 12 hours of history. Three hours. True.

265 Seminar in Canadian History Topics in 19th and 20th Century Canadian history; national development, regionalism, multiculturalism, and international relations. *Prerequisites:* Junior, senior, or graduate standing, 12 hours of history. Three hours. See.

271, 272 Seminar in U.S. Social History Topics in U.S. Social History. 271: to the Civil War; 272: Civil War to the present. *Prerequisites:* Junior, senior, or graduate standing, 12 hours of history. Three hours. Gustafson, McGovern.

273, 274 Seminar in Modern U.S. History Three hours.

277 Colonial Origins of American Society How European patterns of life and systems of belief eroded in 17th and 18th century America and evolved into a distinctly American society. *Prerequisites:* Junior, senior, or graduate standing, two courses in the social sciences, at least two courses in history (25 or 177 recommended), at least one from anthropology, economics, geography, religion, or sociology. Three hours. Stout.

278 Colonial Origins of U.S. Government Evolution of government (local to national levels) from English background through establishment of the U.S. Constitution, emphasizing political and constitutional aspects of the American Revolution. *Prerequisites:* Two courses in the social sciences, one political science course, two courses in history (at least one course above 100; 177 or 277 recommended). Three hours. Stout.

284 Seminar in Vermont History Topical approach to Vermont history through original research utilizing primary sources available at UVM, the Vermont Historical Society, and the Vermont State Archives. *Prerequisites:* Junior, senior, or graduate standing, 184 or permission. Three hours. Hand.

285 Seminar in History of Science Selected topics in the history of science. *Prerequisites:* Junior, senior, or graduate standing, 12 hours of history. Three hours. Steffens.

287 Seminar in Historiography Topics and methods in contemporary historical writing. *Prerequisites:* Junior, senior, or graduate standing, 12 hours of history. Three hours. Hutton, Youngblood.

290 Historical Research and Computer Analysis Role of computers and quantifiable research in broadening historical understanding. Practical computer skills lead to research projects using Vermont census material as a primary source. *Prerequisites:* Junior, senior, or graduate standing, 12 hours of history. Three hours. See.

291 Seminar in History and Film Topics in the history of European cinema and society, focusing on the concepts of the filmmaker as historian and the film as historical artifact. *Prerequisite:* Will vary according to topic. Youngblood.

292 Seminar in Comparative History Investigation of phenomena such as revolution, social change, class conflict, etc., in a comparative context. Three hours.

293, 294 Seminar in Comparative African/Asian/Latin American History Investigation of similarities and differences in experience of "Third World." Three hours.

295, 296 Special Topics Seminar Seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles. *Prerequisites:* Junior, senior, or graduate standing, 12 hours of history. Three hours.

Integrated Humanities (HUM)

COLLEGE OF ARTS AND SCIENCES

Professors Dickerson, Holstun, Hutton, Martin, Metcalfe, Rodgers, Simone (Director), Sugarman.

195 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing offerings. See Schedule of Courses for specific titles.

Also see course descriptions for English 27, 28, History 13, 14, and Religion 27, 28.

International Studies (IS)

COLLEGE OF ARTS AND SCIENCES

Executive Committee: Professors Andrews, Dunlop, Gibson, Gordon, McKenna (Director), Metcalfe, Nalibow, Seybolt, Shiman, Whitebook.

7,8,9,10 Directed Language Study in Critical Languages

91 Introduction to Area (A) Introduction to Canada: A team-taught introduction to Canada through interdisciplinary perspective. (B) Introduction to Russia and East Europe: An interdisciplinary overview from the perspectives of economics, fine arts, geography, history, political science, Russian language and literature, and sociology. Primarily designed for first-year students. Three hours.

93 Southern Africa: The Politics of Race and Culture An interdisciplinary introduction analyzing the forces that led to creation of that system of government known as *Apartheid*. Assessment of strategies and tactics of change. Three hours.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Readings and Research

291 European Studies Seminar Multidisciplinary study of Europe as a geocultural area primarily for European Studies majors. Content will vary by instructor from departments including, for example, Classics, History, Political Science. *Prerequisite:* Permission of instructor. Three hours.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles. *Prerequisite:* Permission by Executive Committee of International Studies. Other area courses offered by individual academic departments.

Also see specific course listings under Canadian Studies, Latin American Studies, Asian Studies, African Studies, European Studies, and Russian and East European Studies.

Latin American Studies

COLLEGE OF ARTS AND SCIENCES

Prof. Gibson, Director

The following courses are among the course offerings; see department for specific course description. Also see International Studies for special topics listings.

Anthropology 161; Geography 56; History 61, 161, 162; Political Science 174; International Studies 193, 194, 195, 196, 197, 198 or 297, 298; Economics 255; Spanish 185, 186, 281, 285, 286, 293.

Linguistics (LING)

COLLEGE OF ARTS AND SCIENCES

101, 102 Linguistics Introductory course to acquaint student with the methods and theory of systematic observation and explanation of language phenomena (linguistics). *Prerequisite:* 101 or 102. Three hours. Clark.

Mathematics (MATH)

COLLEGE OF ENGINEERING AND MATHEMATICS

Professors Ashikaga, Chamberlain, Cooke, Costanza, Dinitz (Associate Chairperson), Foote, Gross (Chairperson), Haugh, Lakin, Wright; Associate Professors Archdeacon, Burgmeier, Dummit, Mickey, Sands, Son, Wilson, Zwick; Lecturers Brown, Johansson, Kost, Larson, Lawlor, MacPherson, Morency, Puterbaugh; Research Professor Aleong; Research Associate Professor McAuliffe.

The Mathematics and Statistics Department provides instruction for students throughout the University. The following lists of courses, grouped according to their prerequisites, are provided for the information of students seeking a first course in mathematics. Consultation is available at the Department office.

Minimal background one year of high school algebra:

Math. 1, Elementary College Algebra (evenings and summers only)

Two years of high school algebra and one year of geometry:

Math. 2, Plane Trigonometry

Math. 9, College Algebra

Math. 10, Precalculus Mathematics

Math. 17, Applied Finite Mathematics

Math. 19, Fundamentals of Calculus I

Four years or more of college preparatory mathematics in high school:

Math. 17, Applied Finite Mathematics

Math. 19, Fundamentals of Calculus I

Math. 21, Analytic Geometry and Calculus I

Students entering with Advanced Placement in Calculus may take Math. 20, 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. Topics normally included in intermediate algebra in high school. Students who have satisfactorily completed two years of high school algebra, or the equivalent, 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, 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 20 or above. Credit not given for both 2 and 10. *Prerequisite:* 1 or 9. Three hours. Offered only in Evening Division and Summer Session.

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 19 or above. Credit not given for both 9 and 10. *Prerequisites:* Two years of secondary school algebra, one year of secondary school geometry. Three hours.

10 Precalculus 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 not given for both 2 and 10 nor 9 and 10. *Prerequisites:* Two years of secondary school algebra, one of secondary school geometry. Three hours.

15, 16 Fundamental Concepts of Elementary School Mathematics Comprehension of operations with real numbers, measurements, and informal geometry provide background for algebra, number theory, statistics, probability, compass and ruler constructions, and problem solving. *Prerequisite:* 15 for 16. Open only to students in elementary education. Three hours.

17 Applied Finite Mathematics Elementary matrix operations, graphing, simple linear programming, probability and the mathematics of finance with many practical applications. *Prerequisite:* Two years of secondary school algebra or 9 or 10. Three 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 not given for more than one of the courses 19, 21 unless followed by 22. *Prerequisite:* 9, 10, or sufficiently strong background in secondary school algebra and geometry. Three hours.

20 Fundamentals of Calculus II Introduction to integral calculus with a wide variety of applications. A student who completes 20 may be admitted to 22; however 19, 21, 22 is preferable to 19, 20, 22. *Prerequisite:* 19.* Three hours.

*Math 21 may be accepted as the prerequisite for Math. 20 with permission of department.

21 Calculus I** Introduction to calculus of functions of one variable including: limits, continuity, techniques, and applications of differentiation and integration. Credit not given for more than one course in the pair 19, 21. *Prerequisite:* 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. For A&S math major requirements, 19 and 20 may be substituted for 21 with departmental approval. Four hours may be counted toward math requirements.

22 Calculus II Logarithmic, exponential, and trigonometric functions. Further techniques and applications of integration. Taylor polynomials, sequences and series, power series. *Prerequisite:* 21. Four hours.

31 Elementary Numerical Methods Computer-aided problem-solving techniques including root-finding, interpolation, approximation, numerical integration, and systems of equations. *Prerequisite:* Computer Science 11. *Corequisite:* Math. 22. Not applicable toward the requirements for a major in mathematics. Three hours.

41, 42 Mathematical Analysis I and II Problem seminar, cultivating analytical skills through study of exemplary classical and modern problems. *Prerequisites:* Special interest in mathematics, adequate secondary school background, departmental permission; 41 for 42. Three hours.

95 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles. *Prerequisite:* Instructor's consent. Hours variable.

101 Fundamentals of Mathematics I Introduction to algorithms, mathematical language, logic, induction, functions and numerical methods, with computer programming used to support concepts presented. *Corequisite:* Math. 21. Three hours.

102 Fundamentals of Mathematics II Fundamental mathematical concepts and techniques, emphasizing proofs and algorithms, are investigated within the context of topics such as number theory and graph theory. Credit not given for both 102 and 104. *Prerequisite:* 101 or Computer Science 11. Three hours.

104 Fundamentals of Mathematics of Computation Introduction to mathematical theory and techniques underlying computer science. Set theory, graph theory, game theory, semi-groups, free monoids, and finite groups. *Prerequisite:* 22, Statistics 151 desirable. Three hours.

121 Calculus III Vectors, vector-valued functions. Calculus of functions of several variables: partial derivatives, gradient, divergence, curl, multiple integrals, line integrals, Stokes' and Green's theorems. *Prerequisite:* 22. Four hours.

124 Linear Algebra Matrices, linear dependence, vector spaces, linear transformations, characteristic equations and applications. *Prerequisite:* Math. 102 or 104 or instructor's permission. Three hours.

161 The Development of Mathematics Historical development of mathematical sciences emphasizing interrelations among them. Individual assignments correspond to background and interests of students. *Prerequisite:* Nine hours of college mathematics. Three hours.

162 Geometry for Elementary and Middle School Teachers An informal, investigative approach to geometry. Extensive use of discovery experiences through inductive procedures as opposed to the traditional emphasis on deductive process found in high school geometry. Credit not given for Engineering and Math. curriculum. *Prerequisite:* 15 or a teaching certificate. Three hours.

173 Basic Combinatorial Theory Introduction to basic combinatorial principles emphasizing problem-solving techniques. Enumeration, Generating Functions, Fibonacci Numbers, Pigeonhole Principle, Inclusion-Exclusion, and Graph Theory. *Prerequisite:* 102 or 104. Three hours.

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. *Prerequisites:* Education 178, acceptance to teacher education, or instructor's permission. Three hours.

191, 192 Special Topics An approved project under guidance of a staff member and culminating in a written report. Involvement with off-campus groups permitted. *Prerequisites:* Junior or senior standing, approval of department chairperson. One to three hours as arranged.

193, 194 College Honors

195 Special Topics

207 Probability Theory (Same as Statistics 251.)

221 Deterministic Models in Operations Research The linear programming problem. Simplex algorithm, dual problem, sensitivity analysis, goal programming. Dynamic programming and network problems. *Prerequisites:* 124; 121 desirable. Three hours.

222 Stochastic Models in Operations Research Development and solution of some typical stochastic models. Markov chains, queueing problems, inventory models, and dynamic programming under uncertainty. *Prerequisite:* 207 or Statistics 151, or instructor's permission. Three hours.

223 Introduction to Formal Language Theory (Same as Computer Science 223.)

224 Analysis of Algorithms (Same as Computer Science 224.)

230 Ordinary Differential Equations Solutions of linear ordinary differential equations, the Laplace transformation, and series solutions of differential equations. *Prerequisite:* 121. *Corequisite:* 124 or instructor's permission. Credit not granted for more than one of the courses Math. 230 or 271.

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, 1991-92.

237 Introduction to Numerical Analysis Error analysis, root-finding, interpolation, least squares, quadrature, linear equations, numerical solution of ordinary differential equations. *Prerequisites:* 121; 124 or 271; knowledge of computer programming. Three hours.

238 Numerical Differential Equations Numerical solution of differential equations: initial-value and boundary-value problems; finite difference and finite element methods. *Prerequisite:* 237, either 230 or 271 recommended. Three hours.

240 Fourier Series and Integral Transforms Fourier series, orthogonal functions, integral, transforms and boundary value problems. *Prerequisite:* 230 or 271. Three hours.

241 Real Analysis I Properties of the real numbers, metric spaces, infinite sequences and series, continuity. *Prerequisites:* 121, 124. Three hours.

242 Real Analysis II Differentiation in \mathbb{R}^n , Riemann-Stieltjes integral, uniform convergence of functions, Inverse and Implicit Function Theorems. *Prerequisite:* 241. Three hours.

243 Introduction to Theoretical Computer Science (Same as Computer Science 243.)

251 Abstract Algebra I Basic theory of groups, rings, fields, homomorphisms, and isomorphisms. *Prerequisite:* 124 or instructor's permission. Three hours.

252 Abstract Algebra II Modules, vector spaces, linear transformations, rational and Jordan canonical forms. Finite fields, field extensions, and Galois theory leading to the insolubility of quintic equations. *Prerequisite:* 251. Three hours.

255 Elementary Number Theory Divisibility, prime numbers, Diophantine equations, congruence of numbers, and methods of solving congruences. *Prerequisite:* 102 or 104. Three hours.

257 Topics in Group Theory Topics may include abstract group theory, representation theory, classical groups, Lie groups. *Prerequisite:* 251. Three hours. Alternate years, 1992-93.

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:* 102 or 104. Three hours.

264 Vector Analysis Gradient, curl and divergence, Green, Gauss, and Stokes Theorems, applications to physics, tensor analysis. *Prerequisite:* 121, 124 or 271. Three hours. Alternate years, 1992-93.

271 Applied Mathematics for Engineers and Scientists Matrix Theory, Vector Analysis, Linear Ordinary Differential Equations. Emphasis on methods of solution, including numerical methods. *Prerequisite:* 121. Three hours. No credit for mathematics majors. For a mathematics concentration, a sequence beginning with 230 is advised. Credit not granted for more than one of the courses Math. 230 and Math. 271.

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 Combinatorial Graph Theory Paths and trees, connectivity, Eulerian and Hamiltonian cycles, matchings, edge and vertex colorings, planar graphs, Euler's formula and the Four Color Theorem, networks. *Prerequisite:* 102 or 104 or instructor's permission. Three hours.

274 Numerical Linear Algebra Direct and iterative methods for solving linear equations, least square factorization methods, eigenvalue computations, ill-conditioning and stability. *Prerequisite:* 237. Three hours.

283 Junior-Senior Seminar Students required to give presentations on selected topics. *Prerequisite:* Instructor's permission. One hour.

293, 294 Undergraduate Honors Thesis Program of reading and research culminating in written thesis and oral presentation. Honors notation appears on transcript and Commencement Program. Contact department chairperson for procedures. Six to eight hours. (Not offered for graduate credit.)

295 Special Topics For advanced students in the indicated fields. Lectures, reports, and directed readings on advanced topics. *Prerequisite:* Instructor's permission. Credit as arranged. Offered as occasion warrants.

Mechanical Engineering (ME)

COLLEGE OF ENGINEERING AND MATHEMATICS

Professors Flanagan, Francis, Hermance, Hundal (Associate Chairperson), Outwater, Pope, von Turkovich; Associate Professor Durham; Assistant Professors Chattopadhyay, Huston, Keller, Squires; Adjunct Professor Ferris-Prabhu; Lecturer Rossi.

1 Introduction to Engineering (2-3) Introduction to engineering analysis and design. Communication methods. Design and research projects. Three hours.

2 Graphical Communication (1-2) Orthographic and isometric views, dimensioning, sketching, surface layout, graphs. *Prerequisite:* Enrollment in, or application for admission to, engineering. Two hours.

12 Dynamics (3-0) Kinematics and kinetics of particles and rigid bodies in two and three dimensions. Computer-aided analysis. *Prerequisites:* Civil Engineering 1, Math. 121. Three hours.

14 Mechanics of Solids (3-0) (Same as Civil Engineering 100.) Stress, strain, temperature relationships, torsion, bending stresses and deflections. Columns, joints, thin-walled cylinders. Combined stresses and Mohr's circle. *Prerequisites:* Civil Engineering 1, Math. 121, ME 12 or concurrent enrollment. Three hours.

40 Thermodynamics (2-2) Principles of engineering thermodynamics; applications of these principles to thermodynamic cycles. Credit not allowed for both 40 and 41. *Prerequisite:* Math. 22. *Corequisite:* Physics 31 with 21. Three hours.

41 Thermodynamics and Heat Transfer (3-2) Principles of engineering thermodynamics; applications of these principles to thermodynamic cycles; introduction to heat transfer. Credit not allowed for both 40 and 41. 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. Three hours.

101 Engineering Materials I (3-0) Physical and mechanical metallurgy, structures, atomic, crystalline, amorphous; thermodynamics, multicomponent systems, phase equilibria; diffusion; electronic; structural changes, microplasticity, dislocations; fracture. *Prerequisite:* 14. Three hours.

102 Engineering Materials II (3-0) Mechanical behavior: elastic, plastic. Testing: tensile, compression, impact, fatigue, creep. Failure: fracture, fatigue, corrosion. Modification of properties; polymers, ferrous and nonferrous metals, ceramics. *Prerequisite:* 101. Three hours.

111 System Dynamics (3-0) Modeling of systems with mechanical, electrical, fluid, and thermal elements. Linear systems analysis. Response of vibratory and feedback systems. Computer simulation. *Prerequisite:* Junior standing in engineering. Three hours.

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. *Prerequisite:* Junior standing in ME. One hour.

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. *Prerequisite:* 41. 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.

150 The Engineering Profession (3-0) Professional practice of engineering. Laws, ethics, engineering economy, liability, insurance, and contracts. *Prerequisite:* Senior standing or instructor's permission. Three hours.

161 Manufacturing Engineering I (3-0) Mechanical and thermal processing of metallic and nonmetallic materials; casting, forming, cutting, grinding, joining, high energy forming, EDM, ECM, Laser, and ultrasonic. *Prerequisite:* Senior ME standing. Three hours.

162 Manufacturing Engineering II (3-0) Machine tools engineering, flexible manufacturing systems, robotics in manufacturing, automatic factory, computer-aided manufacturing. *Prerequisite:* 170. Three hours.

164 Manufacturing Design Project (0, 1) Projects involving "design for manufacturing" of a product. One hour.

170 Mechanical Design I (4-0) Advanced mechanics of materials, stress strain, bending and torsion of slender members, energy methods, finite element modeling, and CAD topics including parametric and solid modeling. *Prerequisite:* 101. Four hours.

171 Mechanical Design II (3-3) Design of machine elements; fatigue designs; selection of mechanical and electrical components; introduction to tribology. *Prerequisite:* 170. Four hours.

172 Mechanical Design III (3-0) Design synthesis and optimization; probabilistic aspects in design; expert systems in design. *Prerequisite:* 171. Three hours.

174 Industrial Design Project (0-1) Design projects from industry. *Prerequisite:* 171. One hour.

183 Senior Laboratory (0-3) Advanced engineering experimentation and data collection and reduction techniques applied to several mechanical engineering areas. *Prerequisite:* Senior standing in ME. One hour.

185-186 Senior Project (0-6), (0-3) 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. Fall: two hours. Spring: one hour.

191 Thesis (0-9) Investigation of a research or design project under supervision of assigned staff member culminating in acceptable thesis. *Prerequisites:* Senior standing, departmental permission. Three hours.

193, 194 College Honors

195 Special Topics *Prerequisite:* Senior standing in Civil or Mechanical Engineering.

203 Machinery Analysis and Synthesis (3-0) Kinematic and kinetic analysis of two- and three-dimensional machines; kinematic synthesis, electromechanical and servo mechanisms; application to robotic mechanisms. *Prerequisite:* Senior standing in ME. Three hours.

207 Biomechanics I Introduction to the structure and mechanics of the musculoskeletal system. Application of mechanics to bone, tendon, ligaments, and other biological materials. *Prerequisite:* Senior or graduate standing in ME, or instructor permission. Three hours.

208 Biomechanics II Introduction to biomaterials and the mechanical behavior of bioviscoelastic fluids or solids. *Prerequisite:* 207 or instructor permission. Three hours.

232 Micromanufacturing Technologies (3-0) Crystal processes; thin films; vacuum, chemical vapor deposition; integrated circuit materials, processes selection. Manufacture of semiconductors, printed circuit boards, microchips, wafers. Micromachining, microfilming, precision instruments. *Prerequisite:* 161. Three hours.

241 Combustion Processes (3-0) Combustion thermodynamics; chemical kinetics; laminar flames, premixed and diffusion; turbulent flames; ignition, explosion, and detonation; droplet combustion; flame spread; large scale fires; rocket combustion. *Prerequisite:* Senior or graduate standing. Three hours.

243 Compressible Flow (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.

245 Advanced Heat Transfer (3-0) Transient heat conduction; integral methods; convection; formulation and solution; boiling, condensation; radiant heat exchange in enclosures and with emitting-absorbing gases, advanced view factors. *Prerequisite:* Senior standing in ME or instructor's permission. Three hours.

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:* 101. Three hours.

273 Corrosion of Materials Corrosion principles: electrochemical, environmental, and metallurgical aspects. Corrosion testing. Corrosion prevention. Seawater corrosion. Biological corrosion. Material selection. *Prerequisite:* 102. Three hours.

277 Composite Materials Fibers, matrices. Unidirectional and short fiber composites. Experimental characterization. *Prerequisite:* 102. Three hours.

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 Special Topics Content is dictated by expanding professional interest in newly developing, or recently developed, technical areas in which there is particular need or opportunity. *Prerequisite:* Senior or graduate standing. Three hours.

Medical Technology (MEDT)

SCHOOL OF ALLIED HEALTH SCIENCES

Associate Professors Howard, Lachapelle, Reed, Sullivan; Assistant Professor Huot; Clinical Associate Professor Russell (Chair); Clinical Instructors Busch, Chatfield, Dopp, Durett, Fiore, Giroux, Hammond, Isham, Kemp, Koktowski, Messier, Morgan, Page, Powden, Purchase, Reardon, Standage, Sullivan, Thomas, Truskolowski, Westenfeld, Wilcke.

1 Professional and Health Issues in Medical Laboratory Sciences Discussion of relevant issues in the profession of medical laboratory sciences and the delivery of health care. Fall. One hour.

3 Medical Terminology Terminology related to medical science and hospital services. Required of all students in Medical Technology. Open to nonmajors by instructor's permission. Fall. One hour.

23 Introduction to Clinical Chemistry Lectures and laboratory experiences introduce basic principles in the quantitative analysis of body fluids; test results are correlated with clinical case studies. *Prerequisite:* Chemistry 2. Fall. Four hours. Sullivan.

34 Human Blood Cells Lecture and laboratory experiences in cells of the blood, their quantitation, physiology, and alterations in disease. Spring. Three hours. Reed.

54 Introduction to Clinical Microbiology Lectures and laboratory experiences related to the identification of bacteria in clinical specimens. Spring. Four hours.

61 Introduction to Transfusion Medicine Lectures and laboratory experiences in the basic principles of blood transfusion. Fall. Two hours. Howard.

102 Clinical Microscopy Lectures and laboratory experiences dealing with urinalysis, identification of parasites, and the analysis of various body fluids. Spring. Two hours.

170 Medical Cytology Practicum Development of expertise (speed and accuracy) of daily evaluation of slides of gynecologic and nongynecologic materials for cellular changes. Ten hours. Spring.

171 Medical Cytology I Identification of cells and concepts of cell growth and differentiation. Biology and pathology of the female genital tract. Patient management and specimen collection techniques introduced. Four hours. Giroux, Korson.

172 Medical Cytology II Biology and pathology of the nongynecologic body systems. Medical cytogenetics introduced. *Prerequisites:* 171, 173. Cytology Lab I. Four hours. Korson, Lee.

173 Medical Cytology Lab I Microscopic study and recognition of normal and abnormal cellular manifestations in gynecologic materials. Three hours. Giroux.

174 Medical Cytology Lab II Microscopic study and recognition of normal and abnormal cellular manifestations in the nongynecologic body systems. *Prerequisites:* 171, 173. Three hours. Giroux.

175 Cytology Seminar Topics in oncology, pathophysiology (case studies), and management. Students are responsible for some presentations. Three hours. Giroux.

178 Cytology Term Project Independent investigation of topic in medical cytology. Research project or extensive literature review are options. Written paper and oral presentation required. One to three hours. Giroux.

179 Cytology Techniques Handling and processing of cellular specimens is covered in two semesters. Includes collection, fixation, smear preparation, cytocentrifuge, staining, and safety techniques. Fall. Three hours.

220 Clinical Practicum: Chemistry Experiences with chromatography, immunoassays, random access analyses, and a variety of manual and automated test systems. MT majors only. Fall and spring. Three hours. Sullivan.

222 Advanced Clinical Chemistry Two-part course detailing testing techniques including chromatography, electrophoresis, nephelometry, electrochemistry, and automation; clinical case studies on the pathophysiology of diseases when abnormal chemistry test results are present. Lab focuses on troubleshooting and problem solving. *Prerequisite:* Biochemistry 212. Spring. Variable credit. Three to three and one-half hours. Sullivan.

229 Seminar: Clinical Chemistry Discussion of recent advances in clinical chemistry. One hour. Sullivan. (Not offered for graduate credit.)

230 Clinical Practicum: Hematology Experiences in clinical analysis of blood cells in the MCHV laboratories. MT majors only. Fall and spring. One hour. Reed.

231 Pathophysiology of Blood Cells Advanced theory and analysis of blood cell physiology and related pathology. Concepts of hemostasis and clinical assessment methods. *Prerequisite:* Biochemistry 212. Fall. Three hours. Reed.

239 Seminar: Hematology Discussion of recent advances in hematology. One hour. Reed. (Not offered for graduate credit.)

242 Immunology Concepts of the human immune system. Topics covered include: cellular and humoral immunity; immunoglobulin and T-cell receptor structure and function; autoimmunity; hypersensitivity; tumor immunology; immunodeficiency. Spring. Three hours. Huot. (Not offered for graduate credit.)

244 Immunology Laboratory Laboratory exercises that utilize techniques which elucidate antigen-antibody reactions. Techniques covered include: agglutination; precipitation; immunodiffusion; fluorescence; cell labelling and quantitation; ELISA applications. One hour. Huot.

249 Seminar: Immunology Discussion of recent advances in immunology. One hour. Huot. (Not offered for graduate credit.)

250 Clinical Practicum: Microbiology Practical experiences at the Medical Center Hospital. MT majors only. Fall and spring. One and one-half hours. Lachapelle.

255 Advanced Clinical Microbiology Advanced instruction in the study of clinically significant microorganisms, infectious disease process, and laboratory methods used for the isolation and identification of microorganisms from clinical specimens. Fall. *Prerequisite:* Microbiology 222. Three hours. Lachapelle.

259 Seminar: Clinical Microbiology Discussion of recent advances in clinical microbiology. One hour. (Not offered for graduate credit.)

260 Clinical Practicum: Immunohematology Laboratory experiences at Medical Center Hospital and Red Cross Blood Center. MT majors only. Fall and spring. One hour. Howard.

262 Advanced Immunohematology Advanced theory and experience related to human blood groups and transfusion practice. Spring. Three hours. Howard.

269 Seminar: Immunohematology Discussion on recent advances and practices used in transfusion of patients. Spring. One hour. (Not offered for graduate credit.)

293 Research Concepts Discussion of research methodology with or without individual research participation. *Prerequisite:* MT majors only. Fall and spring. Variable credit.

295 Principles of Education and Management Introduction to theories of education and management. Fall. Three hours. Russell.

296 Senior Seminar Review of case studies for clinical correlation. Spring. Two hours.

299 Special Topics Courses or seminars beyond scope of existing departmental offerings. *Prerequisite:* Departmental permission. Variable credit.

Merchandising, Consumer Studies, and Design (MCSD)

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Associate Professor Kelly (Interim Chairperson), Loker, Walsh ; Assistant Professors Kolodinsky, Petrillo, Scannell, Sullivan; Instructor Wilson; Lecturers Ashman, Hanson.

15 Design (1-4) Creative decision making in the visual arts. Use of principles and elements of design in selection and creation of aesthetic and functional designs. Three hours. Petrillo.

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. Spring.

20 Textiles: Fiber to Fabric (2-2) Today's fibers, fabrics, and finishes. Consumer problems and responsibilities in selection, use, and care. Three hours. Spring.

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. Wilson.

56 Consumer Management Principles Application of the principles and process of decision making for individuals and families in the allocation, use, and management of human and material resources. Three hours. Kolodinsky. Fall.

58 Consumers and the Market Overview of market problems facing consumers in contemporary life emphasizing consumer education, information, and protection. Three hours. Ashman. Spring.

107 Fashion Design and Trend Analysis (2-2) Analysis of 20th century clothing trends and innovative designers. Creating and rendering original designs. *Prerequisite:* 15. Three hours. Loker. Fall.

115 Surface Design and Printing Application of design to fabric and paper surfaces. Emphasis on repeat patterns derived from natural and historic motifs. *Prerequisite:* A design course or departmental permission. Three hours. Petrillo. Fall.

116 Weaving (1-4) Introductory course in four harness loom weaving. Application of design fundamentals to

woven textiles. *Prerequisites:* 15 or departmental permission; junior standing. Three hours.

117 History of Costume (See Theatre 41.) *Prerequisite:* Art 6 or Theatre 1. Three hours. Fall.

120 Textile Dyeing and Finishing (2-2) Review of textile fibers emphasizing the interaction of dyes and finishes with textile fibers and the application of dyes and finishes to fabric. *Prerequisites:* 20, Chemistry 3. Three hours. Fall.

121 Physical Testing of Textiles (2-2) Introduction to textile testing standards and equipment. Testing and evaluation of physical properties of selected fabrics. *Prerequisites:* 20, Chemistry 3. Three hours. Spring.

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. *Prerequisite:* 22 or Theatre 40 or instructor's permission. Three hours. Loker. Fall.

125 Retail Management Organization of retail institutions and the functions of personnel management, buying, and merchandising as related to fashion industry. *Prerequisite:* Economics 11. Three hours. Sullivan. Fall.

126 Apparel and Textile Marketing Analysis of marketing concepts as applied to apparel and textiles, including buyer behavior, demand, positioning, product development, pricing, channels of distribution, promotion. Includes discussion of international markets. *Prerequisites:* Concurrent enrollment in Economics 12 or Agricultural and Resource Economics 61; junior standing. Three hours. Sullivan. Spring.

127 Consumer Motivation Analysis of consumer choices from a sociopsychological and economic perspective, emphasizing the impact of social class, family structure, and cultural background on behavior. *Prerequisites:* Sophomore standing. Three hours. Kolodinsky. Spring.

128 The Consumer and Advertising Examination of the principles of advertising. Emphasis on research, technique, and the impact of advertising strategies on consumers. *Prerequisites:* A psychology course; junior standing. Three hours. Kolodinsky. Fall.

150 Consumer Research Methods Examines research methodologies useful in the analysis of qualitative and quantitative data. Emphasizes description and prediction of consumer behavior. Lecture and weekly microcomputer lab sessions. *Prerequisites:* Statistics course and computer course. Three hours. Kolodinsky. Fall.

151 Housing, Consumers, and Society Introduction to factors influencing consumer choice in housing including social-psychological, economic, and community aspects. *Prerequisite:* Economics 11 or equivalent and a sociology or psychology course. Three hours. Walsh. Alternate years, 1993-94. Fall.

155 Consumer Economics Examination of economic principles as they relate to the consumer and analysis of consumer interactions with public and private sector institutions. *Prerequisite:* Economics 12. Three hours. Walsh. Spring.

157 Consumer Law Analysis of the statutes, regulations, and case law that protect consumers from unfair and deceptive advertising and sales practices. *Prerequisite:* Sophomore standing. Three hours. Ashman. Fall.

158 Personal and Family Finance An examination of personal and family financial management concepts and topics within various income levels and stages in the life cycle. *Prerequisites:* Economics 11 or equivalent. Three hours. Fall.

159 Consumer Assistance Program Jointly sponsored by

UVM and Vermont Attorney General. Under supervision of an attorney, students respond to phone and mail requests for consumer information and handle consumer complaints. *Prerequisite:* Instructor's permission. Three to six hours. Ashman.

190 Professional Development Workshop Develop creative use of skills to attain career objectives, refine decision-making strategies, and increase self-awareness through communication. Discussion format with group participation and interaction. *Prerequisite:* Junior or senior standing. Two hours. Fall.

195 Special Topics Lectures, laboratories, readings, or projects relating to contemporary areas of study. *Prerequisite:* Varies with course. Enrollment may be more than once, up to 12 hours.

196 Field Experience Professionally-oriented field experience jointly supervised by faculty and business or community representative. Total credit toward graduation in 196 and 296 cannot exceed 15 credits. Sophomore standing only.

197 Design Workshops I Short courses dealing with specific areas related to design, fashion, and textiles. Enrollment may be more than once up to six hours. *Prerequisite:* 15. One hour.

198 Undergraduate Research Independent research sponsored by a faculty member. *Prerequisites:* Departmental permission; junior standing. One to six hours.

222 Apparel Design II (1-4) Creative designing through a combination of flat pattern and draping techniques. Problems requiring original solutions relate fabrics to the design of the garment. *Prerequisites:* 15, 122. Three hours. (Not offered for graduate credit.) Loker. Spring.

231 Advanced Workshops Independent laboratory work. Emphasis on planning, design, research, management, techniques, production, and evaluation. *Prerequisite:* Completion of highest level course in Related Art. May be repeated with instructor's permission. Three hours. Loker, Petrillo. Spring. (Not offered for graduate credit.)

291 Special Problems Independent projects under the direction of a faculty member. Includes undergraduate teaching assistance. *Prerequisite:* Departmental permission. Students may enroll more than once for a maximum of 12 hours. One to six hours.

295 Special Topics Lectures, laboratories, directed readings, and projects on advanced topics as announced. *Prerequisite:* Departmental permission. Credit as arranged.

296 Field Experience Professionally-oriented field experience under joint supervision by faculty and business or community representative. Total credit toward graduation in 196 and 296 cannot exceed 15 credits. *Prerequisite:* Departmental permission. Credit arranged up to 15 hours. (Not offered for graduate credit.)

Microbiology and Molecular Genetics (MMG)

COLLEGE OF AGRICULTURE AND LIFE SCIENCES
AND COLLEGE OF MEDICINE

Professors Albertini, Fives-Taylor, Gump, T. Moehring, Novotny, Schaeffer, Wallace (Chairperson); Associate Professor Burke, Fishel, Kurjan, Macara, Periasamy, Sjogren; Assistant Professors Bateman, Gilmartin, Johnson, Pederson, Van Houten; Research Professor J. Moehring; Research Associate Professor Raper; Research Assistant Professors Kow, Melamede, Pratt; Lecturers Silverstein, Tessmann.

65 Microbiology and Pathogenesis Comprehensive overview of microbiology through the study of all microorganisms, their structure, development, role, and interactions in nature. Bacteria emphasized as model systems; consideration given to microbial-host interactions and underlying molecular events. *Prerequisite:* Four hours of general chemistry; a good preparation in biology. Four hours. Sjogren.

66 Microbiology and Molecular Genetics I Introduction to microbiology emphasizing molecular genetics for biological sciences majors. Emphasis on the bacterium *Escherichia coli*, the yeast *Saccharomyces cerevisiae*, and viruses. *Prerequisite:* One semester chemistry and biology, or equivalent, or instructor's permission. Four hours. Burke.

195 Special Topics *Prerequisite:* Instructor's permission. Credits negotiable.

197, 198 Undergraduate Research Undergraduate honors students accommodated in individual research projects sponsored by department member. Arrangement with individual department member and department chairperson approval. Credits negotiable.

201 Microbiology and Molecular Genetics Lab I: Molecular Cloning Intensive advanced laboratory course in the fundamentals of recombinant DNA technology through the isolation and characterization of an eukaryotic gene. *Prerequisite:* 65 or 66 or equivalent. Three hours. Silverstein. Not offered 1992-93.

203 Microbiology and Molecular Genetics Lab II: Mammalian Cell and Molecular Biology Analysis of gene expression in mammalian tissue culture cell lines. The basic principles and techniques of mammalian cell culture, basic animal virology as well as somatic cell and mammalian molecular genetics. *Prerequisite:* Biochemistry, genetics and/or cell biology courses and instructor's permission. Four hours. T. Moehring. Alternate years, 1992-93.

211 Microbiology and Molecular Genetics II: Prokaryotic Genetics The organization, replication, and expression of genes in prokaryotes, focusing on the genetics of *Escherichia coli* and its viruses. *Prerequisite:* Introductory microbiology, biochemistry, genetics, and/or cell biology courses. Three hours. Novotny.

212 Microbiology and Molecular Genetics III: Lower Eukaryotic Genetics with an Emphasis on Yeast The use of lower eukaryotes, such as the yeasts *Saccharomyces cerevisiae* and *Schizosaccharomyces pombe*, as model genetic systems to answer questions of biological importance. Three hours. Johnson. Alternate years, 1993-94.

220 Environmental Microbiology The activities of microorganisms, primarily bacteria, in air, soil, and water. *Prerequisite:* A previous course in microbiology. Three hours and lab (one hour) as 221. Sjogren. Alternate years, 1993-94.

222 Clinical Microbiology Comprehensive study of human pathogenic microorganisms and their disease states in humans. Collecting and handling specimens, pathogenic bacteriology, medical mycology, and virology. Laboratory sessions provide practice experience in handling and identifying these pathogens. *Prerequisite:* 65 or 66 or equivalent. Immunology recommended but not required. Four hours. Silverstein.

223 Immunology Analysis of the immune response with respect to structure and function of immunoglobulins and the T-cell receptor, tolerance, innate and adaptive immunity, the Major Histocompatibility Complex, hypersensitivity states, cancer, and AIDS. *Prerequisite:* Instructor's permission. Three hours. Silverstein. Alternate years, 1993-94.

225 Microbiology and Molecular Genetics IV: Interaction of Eukaryotic Viruses with Mammalian Cells. In-depth analysis of eukaryotic virus-mammalian cell interactions

emphasizing mechanisms by which viruses modulate gene expression in infected cells. *Prerequisite:* 65 or 66 or equivalent. Three hours. Silverstein. Alternate years, 1992–93.

254 Microbiology and Molecular Genetics V: Macromolecular Processing by Prokaryotes, Yeast, and Viruses Cellular, replication, recombination, repair, and transcription of DNA, and processing, transport, and translation of RNA occur in macromolecular assemblies. Structure, formation, and function of these nucleoprotein assemblies using examples from prokaryotes, yeast, viruses, and mammalian cells in culture. *Prerequisite:* 211 or equivalent, and Agricultural Biochemistry 201 or Biochemistry 301 and 302 or equivalent. Three hours. Pederson. Alternate years, 1992–93.

Military Studies (MSTD)

Chairperson LTC Collins; Majors Froeb, Shea; Captain Graham; Master Sergeant Wilson; Sergeant First Class Williams; Staff Sergeants Daxton, Jordan.

Note: Total allowable credit for Military Studies varies with 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. A two-hour weekly leadership laboratory is optional for all noncontracted students enrolled in MSTD 1-4. Students interested in pursuing an officer's commission through the ROTC should check with the Department of Military Studies.

1 Fundamentals of National Defense (1) Provides a perspective on U.S. defense policy, military force structure, and their roles in providing for the nation's defense and attaining national objectives. *Prerequisite:* First-year or sophomore standing or departmental permission. One hour. Graham.

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. *Prerequisite:* 1. First-year or sophomore standing or departmental permission. Spring. Two hours. Graham.

3 Simulations and Wargaming (3) Examines military and nonmilitary use of modeling, simulation, and wargaming. Surveys types of models, simulation, and wargaming in present use. Uses role-playing simulations and existing wargames to play test selected models. *Prerequisite:* 1. First-year or sophomore standing or departmental permission. Fall. Three hours. Froeb.

4 Contemporary Military Concepts (2) Examines international uses of military forces viewed against a background of long-range national concerns (required subjects for sophomores). *Prerequisite:* 1. First-year or sophomore standing or departmental permission. Spring. Two hours. Froeb.

***12 Rappelling (1/2 Physical Education credit)** Basic instruction in rope management, rope installation, and rappelling, consisting of both classroom instruction and outdoor practical exercises. Daxton.

***14 Orienteering (1 Physical Education Credit)** Basic introduction to orienteering. Concentration in map, compass, and terminology concluding with a moderate level orienteering competition. Classroom instruction and outdoor practical exercises. Williams.

101 Special Studies (Academic credit as arranged) In-depth analysis of topics broached in 1, 2, 3, or 4. Guided research. Student proposes topic. Two hours. Froeb.

102 Special Studies (Continuation of 101) Two hours.

****201 Leadership and Management I (2)** Fundamentals

of leadership and management. Introduction to counseling and communication skills. Military land navigation. Orientation to officer specialty fields. Military professionalism and ethics. *Prerequisite:* 4. Fall. Two hours. Shea.

****202 Leadership and Management II (2)** Development of leadership skills. Instruction and practical application of skills required of a military leader. Management of small organizations. *Prerequisite:* 201. Spring. Two hours. Shea.

****203 Leadership and Management III (2)** Study of the preparation, conduct, and evaluation of training. Investigates leadership and management dilemmas of ethics and morality. Analysis of the military as a profession. *Prerequisite:* 202. Fall. Two hours. Collins.

****204 Leadership and Management IV (2)** Study of the legal processes and logistics and garrison systems used by the officer to resolve leadership and management problems. Spring. Two hours. Collins.

Leadership Laboratory A two-hour practical training exercise incorporating classroom instruction while developing unit cohesion and leadership techniques. Shea, Williams.

*Also listed under Physical Education Activities.

**Leadership and management I-IV must be taken sequentially. Acceptance into Army ROTC Advanced Course or departmental permission. 200-level Military Studies courses are not offered for graduate credit.

Music (MUS)

COLLEGE OF ARTS AND SCIENCES

Professor J. Ambrose (Chairperson), Chapman, T. Read, Wigness; Associate Professors Brown, Neuweem, Nelson; Assistant Professor Davenport; Lecturers Atherton, Boyer, Brubaker, Fleming, Goeghegan, Janson, Kaiser, Klimowski, E. Metcalfe, Parker, Parshley, E. Read, Soons.

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. Music majors in all degree programs are expected to regularly participate in ensembles. A reasonable division between large and small ensembles should be observed.

THEORY AND COMPOSITION

3 Introductory Music Theory Rudiments of notation, rhythm, melody, harmony, scales, form, and terminology. Three hours.

31, 32 Basic Musicianship Melodic and rhythmic dictation, sight singing, and elementary harmony and counterpoint. Three hours.

131, 132 Intermediate Theory Contrapuntal and harmonic dictation; intermediate counterpoint and harmony. Music analysis. *Prerequisites:* 31, 32; 131 for 132, or instructor's permission. Three hours. Concurrent enrollment in 133, 134.

133, 134 Intermediate Theory Lab Sight singing, keyboard, conducting skills. Concurrent enrollment in 131, 132. One hour.

231, 232 Advanced Theory Advanced counterpoint and harmony; analysis of form in music. *Prerequisites:* 132, 134; 231 for 232, or instructor's permission. Three hours.

233 Arranging Characteristics of instruments; arranging for ensembles. *Prerequisite:* 132 or instructor's permission. Three hours.

234 Orchestration Studies in orchestral scoring. *Prerequisite:* 233 or instructor's permission. Three hours.

235 Fugal Composition Study of representative baroque, classical, and contemporary fugal procedures through analysis and composition. *Prerequisites:* 231 or instructor's permission. Three hours.

237, 238 Composition Creative work in free composition with instruction according to needs and capabilities of individual student. *Prerequisite:* 231, 235, or instructor's permission. Three hours. May be repeated for credit.

240 Seminar in Musical Analysis Advanced study of musical forms. Comparison of standard approaches to harmonic, motivic, and rhythmic analysis. *Prerequisites:* 235, instructor's permission. Three hours.

241 Senior Project in Music Theory Advanced study focusing on a theoretical topic under direction of assigned staff member. *Prerequisite:* Senior standing as Theory major. Three hours.

297, 298 Advanced Reading and Research Studies in comparison or related special topic under direction of assigned staff member.

HISTORY AND LITERATURE

1 Introductory Music Listening A concise view of Western music from plain song to the present, emphasizing baroque, classical, romantic, impressionistic, and modern music. Involves both in-class and outside listening. Three hours.

4 The Experience of Music Explores the phenomenon called "music" through aural examination of its composite elements: rhythm, melody, harmony, texture, form. Musical examples drawn from Western traditional and contemporary repertory. *Prerequisite:* Nonmajors only. Three hours.

11, 12 Survey of Western Music Historical study of 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.

15 World Music Cultures Survey of non-Western and non-European music primarily of the geographic areas of Australia, Indonesia, China, Japan, India, Black Africa, and Native American Indians. Offered in alternate years. *Prerequisite:* Ability to read music desirable. Three hours. Nelson.

42 Introduction to the History of Jazz Survey of New Orleans, Chicago, Swing, bebop, cool, funky, and free jazz styles through the work of important soloists and bands, 1915-1965. Three hours. Brown.

44 Introduction to the Blues and Related Traditions Survey of performers, musical procedures, technical means, and traditional lyrics of songsters, jug bands, gospel, barrel house piano, and important blues styles to about 1955. Three hours. Brown.

111 Classical, Romantic Chronological, analytical study of representative examples of music literature from approximately 1750-1900; Mozart, Haydn, Beethoven, Schubert, Berlioz, Schumann, Chopin, Liszt, Brahms. *Prerequisite:* 1, 3, 11, 12 or permission, ability to read music. Three hours. Offered in alternate years.

112 Contemporary Music Development and style characteristics of 20th century music from the late romanticists to the experimentalists. Both European and American composers presented. *Prerequisites:* 1, 3, 11, 12, or permission, ability to read music. Three hours. Offered in alternate years.

113 Medieval, Renaissance Chronological, analytical study of music literature from approximately 600-1600: Gregorian chant, Notre Dame, Burgundian, English, and Netherlands schools. *Prerequisites:* 1, 3, 11, 12, or permis-

sion, ability to read music. Three hours. Offered in alternate years.

114 Baroque Music Chronological, analytical study of music literature from approximately 1600-1750: Roman and Venetian schools, beginnings of opera, culminating in works of Handel and J.S. Bach. *Prerequisites:* 1, 3, 11, 12, or permission, ability to read music. Three hours. Offered in alternate years.

115 Genre or Specific Area Courses American music; ethnomusicology. *Prerequisites:* Three hours from 1, 3, 4, 11, 12, or permission. Three hours. Ambrose.

193, 194 College Honors

195, 196 Special Topics *Prerequisites:* Junior or senior standing; Music 11, 12, 131, 132, 133, 134. Three hours.

211, 212, 213, 214, 215 Seminars in Music Literature Seminars will treat in detail topics surveyed in intermediate level music literature sequence. Subject matter determined by instructor. *Prerequisites:* 11, 12; 111 for 211, 112 for 212, 113 for 213, 114 for 214; 115 for 215. Three hours. Offered on irregular basis as required by major enrollment.

216 Bibliography Seminar Biographies and critical works, bibliographies, Festschriften, scholarly and performing editions of music and discography surveyed. *Prerequisites:* 11, 12, one additional music literature course at 100 or 200 level. Three hours.

221 Senior Project For the advanced music history student — an opportunity to work with a faculty member on a topic of mutual interest. All topics subject to departmental approval. *Prerequisites:* 11, 12, six hours of intermediate and/or advanced courses in music literature. Three hours.

PERFORMANCE

For the fees for instruction, see page 18.

For B.A. students with a concentration in performance and B.M. students, except theory majors, a senior recital is required. See repertory lists in department office for differences in expectations for B.A. and B.M. students. Regular appearances in informal recitals are required of all performance students. At the end of each semester, jury examinations are given in performance. In the second semester of the sophomore year, all prospective performance majors are required to pass a junior-standing examination by faculty jury to determine whether they will be accepted as majors.

All music majors in any curriculum are required to pass a FUNCTIONAL PIANO FACILITY examination before certification of 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 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.

B.A. students electing a concentration in piano must take two semesters of accompanying (171); B.M. students majoring in piano will take four semesters of accompanying (171).

Each hour of credit in performance study requires a minimum of 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 Chair.

5-8 Performance Study Group voice or piano. No prerequisites, but contact must be made in Music Department

office to determine availability of space. Lab fee required if taken as elective. One hour.

51-58 Performance Study Private instruction in an instrument or voice for nonmajors. Subject to availability of staff. Lab fee required. Contact department office for placement. Not open for credit to music majors or minors. One or two hours.

151-158 Performance Study Private instruction in an instrument or voice for music majors and minors at the first-year and sophomore levels. Lab fee required. Variable hours.

251-253 Performance Study Private instruction in an instrument or voice for majors at junior and senior levels. Lab fee required. Variable hours.

256 Performance Study Private instruction in voice or an instrument in the semester of senior recital. Lab fee required. Variable hours.

257 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 major field. *Prerequisites:* Senior standing in performance, consent of instructor. Variable hours. (Not offered for graduate credit.)

259 Conducting Technique of the baton, score reading, laboratory practice. Preparation and performance of selected scores, including rehearsal procedures. Selected students may conduct University major ensembles. *Prerequisites:* 132, 134. Three hours.

PERFORMING ENSEMBLES

Large Ensembles Attendance at all rehearsals and public performances is required. *Prerequisite:* Audition. One hour. May be repeated for credit.

161 Band

162 Choir

163 Choral Union

164 Orchestra

165 Vermont Wind Ensemble

Small Ensembles Study and performance of masterworks for small groups. Attendance at all rehearsals and public performances required. Outside practice required. *Prerequisite:* Audition. Variable hours. May be repeated for credit.

171 Accompanying

172 Brass Ensemble

173 Contemporary Ensemble

174 Madrigal Choir

175 Opera Workshop

176 Percussion Ensemble

177 Small Ensemble

178 Stage Band

179 Trombone Choir

Pedagogy Classes Primarily for Education majors; others accepted with departmental permission. One hour. May be repeated for credit.

81 Brass Class

83 String Class

85 Voice Class

87 Woodwind Class

89 Percussion Class

181 Music for Elementary Teachers Development of musical skills, understandings, and attitudes pertinent to

teaching of music in elementary classroom. *Prerequisite:* Junior standing. Three hours.

184 Instrument Repair 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. Offered on occasional basis only.

186 Piano Repair – Tuning Basic knowledge of piano construction, tuning, and repairing. Departmental permission. One hour. Offered on occasional basis only.

265 Vermont Wind Ensemble Study and performance of masterworks for wind ensemble and concert band. Attendance at all rehearsals and concerts required. *Prerequisite:* Audition. One hour. May be repeated for credit. Nelson.

281 Elementary Music Education Methods (Same as Education EDMU 281). *Prerequisite:* Junior standing in Music Education. Three hours. Nelson.

282 Secondary Music Education Methods Methods and materials in the teaching of vocal and instrumental music in secondary schools. Five hours classroom observation per week required. *Prerequisite:* Junior standing in Music Education. Three hours. Nelson.

Natural Resources (NR)

SCHOOL OF NATURAL RESOURCES

Professors Cassell, DeHayes, Donnelly, Manning, Reidel; Associate Professors Forcier, King, LaBar, Lindsay, McIntosh, Newton, Wang; Assistant Professor Levine; Extension Associate Professor Marek; Lecturers Smith, Turner.

1 Ecological Aspects of Natural Resource Conservation Introduction to renewable natural resources emphasizing the integrated and interactive nature of resources, natural history of Vermont, and the biological basis of plant and animal conservation ecology. Four hours. DeHayes.

6 Race and Culture in Natural Resources Introduces the first-year student to issues of race and culture from a variety of disciplinary perspectives. One hour.

25 Elementary Natural Resource Measurements and Mapping Introduction to surveying, mapping, aerial photo measurements, and interpretation for natural resource planning and management. *Prerequisites:* A course in high school or college trigonometry; permission required of nonmajors. Four hours. Turner.

40 The American Wilderness History, philosophy, and management of wilderness. Emphasis on evolving attitudes toward wilderness and natural resources and contemporary management issues. Three hours. Manning.

51 Environmental Aesthetics and Planning Examines historical changes in perceptions of natural and built landscapes, the issues involved in the appearance of landscapes today, and techniques for enhancing landscape beauty. Three hours. Alternate years, 1993–94.

73 Understanding Water Quality Introduction to water quality and water pollution in streams, lakes, wetlands, and ground water. Provides foundation for knowledgeable citizen participation in management of public waters. Credit not allowed for both 73 and 102. Three hours.

102 Water as a Natural Resource Characteristics of watersheds, lakes, rivers, and wetlands; discussion of the management of these ecosystems; effects of society on the water resource. *Prerequisites:* Biology 1; Zoology 9 or Botany 4 or equivalent; Chemistry 1, 3, 4, or 42 or equivalent. Three hours. Levine.

140 Natural Resources Biostatistics Introduction to

applied statistical methods for typical natural resources biological problems. Descriptive statistics, hypothesis testing, regression, and sampling design. Emphasis on problem formulation and solution. *Prerequisites:* Sophomore standing, two years of high school algebra. Four hours. Newton.

143 Introduction to Geographic Information Systems Discussion and application of basic techniques involved in the use of computer-based, geographically-referenced information systems. *Prerequisites:* Sophomore standing. Computer Science 3 or 11. Three hours. Smith.

154 Limnology Ecology of freshwater lakes: origins, components, functions, and human-related perturbations. *Prerequisite:* One year of college-level science. Three hours. LaBar.

155 Fluvial Geology (See Geology 155.) Three hours. Drake, Mehrtens.

176 Water Quality Analysis (Same as Geology 176.) Selected aspects of elementary water chemistry and bioassay as related to surface and ground waters. Five laboratory experiences. *Prerequisite:* 176. Three hours. (2.5 hours lecture per week and 20 hours lab per semester.) Cassell.

185 Special Topics Special topics in natural resources beyond the scope of existing formal courses. Variable credit.

193 Honors

220 Landscape Ecology Study of pattern, process, and dynamics in the landscape. Considers the role of landscape pattern in determining habitat quality and ecosystem function. *Prerequisites:* One biology, one ecology course; senior standing. Two hours. Wang. Alternate years, 1992-93.

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.

236 Geochemistry (See Geology 235.) Three hours. Drake.

240 Wilderness and Wilderness Management (See Recreation Management 240.) Three hours. Manning.

244 Quantitative Assessments of Natural Resources Principles associated with inventorying selected natural resources. Survey of measurement and estimation techniques for land, timber, wildlife, fisheries, surface water, and recreation. *Prerequisites:* One course in statistical methods, one 200-level natural resource course, instructor's permission. Three hours. Newton.

251 Recent Sedimentation (See Geology 251.) Three hours. Hunt.

252 Visual Resource Planning and Management Investigates the theories and principles of aesthetics related to landscape perception, and their applications to visual impact assessment and scenic resource planning. *Prerequisite:* Senior standing. Three hours.

254 Advanced Natural Resource Policy (See Forestry 254.) Three hours. Reidel.

262 International Problems in Natural Resource Management Discussion of problems associated with the management of natural resources which have international implications. Topics may include deforestation, desertification, fisheries, wildlife, refuges, fuelwood, pollution. *Prerequisites:* Senior standing, permission. Three hours. Newton.

270 Toxic and Hazardous Substances in Surface Waters The fate of toxic and hazardous pollutants, including trace elements and organics, in surface waters; effects on human health and aquatic biota. *Prerequisites:* Biology 1, Chemistry 3; senior standing. Three hours. McIntosh.

271 Effect of Human Activities on the Lake Champlain Ecosystem Physical, chemical, and biological characteristics of lakes. Effects of stresses, including nutrient enrichment and toxic substances, on lakes. Corrective measures; coupling of management and science. *Prerequisites:* 102, 276, 278, Zoology 236, or equivalent, senior standing. Three hours. McIntosh.

272 Assessing Environmental Impact Application of knowledge of science, policy, social systems, and human behavior to assess impacts arising from use and management of natural resources. *Prerequisite:* Senior standing, SNR. Four hours. Wang.

275 Natural Resource Planning: Theory and Methods Investigates theoretical development of natural resource planning. Studies planning methods appropriate to protection and use of scenic, recreational, forest, agriculture, and historic resources and ecologically sensitive areas. *Prerequisite:* Senior standing. Three hours. King.

276 Water Quality Analysis and Interpretation Selected aspects of water chemistry and bioassay as related to surface and ground waters. Laboratory analysis of water quality parameters and data interpretation. *Prerequisite:* One course in chemistry, calculus, statistics; senior standing. Three hours. Cassell.

278 Principles of Aquatic Systems Study of physical, chemical and biological principles as related to natural aquatic systems. Modelling dynamic behavior of aquatic systems using system simulation techniques. *Prerequisites:* Math. 19, Physics 11, Chemistry 3, 4 or equivalent, senior standing. Three hours (two hours lecture and three hours laboratory per week). Cassell.

285 Advanced Special Topics in Natural Resource Planning Advanced special topics in natural resource planning beyond the scope of existing formal courses. *Prerequisites:* Graduate or senior standing, instructor's permission.

Nursing (NURS)

SCHOOL OF NURSING

Associate Professor Dale, Dean.

Professional Nursing: Professors McGrath (Chairperson), Winstead-Fry; Associate Professors Brown, Deck, Green-Hernandez, Hamel-Bissell, B. Murray, Palmer; Assistant Professors B. Johnson, L. Murray, Schnell; Clinical Assistant Professor M. Johnson; Visiting Associate Professor Sample; Lecturers Laferriere, Tyler, Whitney; Adjunct Associate Professor Nosek; Adjunct Assistant Professors Davis, Gruppi, Hawksworth, Howe, McDonald, Webber-Jones; Instructor Owen.

Technical Nursing: Associate Professors Clarke (Chairperson), Cohen; Assistant Professors Copeland, Malone-Rising; Clinical Assistant Professor Pahunbo; Lecturers Gagne, Moss; Adjunct Assistant Professors Clough, Dapice, Geran, Green.

FOR NONMAJORS

15 Personal Power in Health Explores consumer power in health care. Addresses how an individual can influence personal health as well as health of community. Three hours.

20 Aging: Change and Adaptation (Same as Early Childhood and Human Development 20/Home Economics 20 and Sociology 20). Individual and social meanings of aging and old age; physical, physiological, psychological, and sociological changes accompanying aging; individual family, community, and societal adaptations to aging. Three hours.

96 Visions Exploration of educational preparation and roles of professional nurse in today's society. Includes on-site observations. Open to first-year majors and others with instructor permission. One hour.

100 Biology of Aging Biological and physiological changes in the human body over time, and the adaptations required for successful aging. Three hours.

135 Health Issues in Developing Countries Discussion of status and practice issues in developing countries including several Black African countries and Peoples' Republic of China. Historical, sociocultural, religious, political perspectives. Three hours.

140 Issues in Women's Health Exploration of psychosocial, biophysical needs of women as health care consumers/providers. Considers pros and cons of stereotypical, theoretical, clinical approaches utilized in treating women. *Prerequisites:* Introductory psychology, human development, or sociology; junior standing or instructor's permission. Three hours.

195, 196 Special Topics

PROFESSIONAL NURSING MAJOR (PRNU)

Note: All courses limited to students majoring in Professional Nursing.

25 Concepts of Health Study of psychosociocultural effects on health, health care, and the professional nursing role. Introduction to cognitive processes and communication skills used in nursing. Two hours.

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:* Sophomore standing; successful completion of Anatomy and Physiology 19. *Pre- or Corequisites:* Anatomy and Physiology 20, Microbiology and Pathogenesis 65 or Introduction to Clinical Microbiology 54.

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. Dynamics of groups (family and peer). Laboratory experiences in different hospital settings and with families in community. *Prerequisites:* A grade of C or better in PRNU 25 and 26, successful completion of Chemistry 3 and 4, Anatomy and Physiology 19 and 20, Microbiology and Pathogenesis 65 or Introduction to Chemical Microbiology 54, Early Childhood and Human Development 80 and 81, Psychology 1, Fundamentals of Nutrition 43, Sociology 1 or 11 and a grade-point average (GPA) of 2.0.

128 Nursing Implications of Drug Therapy Study of drug influences on major body functions and the nurse's role in drug therapy. *Prerequisites:* Chemistry 3, 4, Microbiology/Pathogenesis 65, Anatomy and Physiology 19-20, PRNU 26, or instructor's permission. Three hours.

195 Independent Study Independent study in nursing as indicated by student's interest. *Prerequisite:* Departmental permission. One to three hours.

196 Special Topics

225 Nursing III Continuation and expansion of 125-126. Content and experiences organized around interrelationships of the individual, family, and community at varying levels of wellness. Focus is on more complex nursing challenges. Laboratory experiences in community agencies including the hospital. *Prerequisites:* 126, 128. 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. *Prerequisites:* 225, 251. Nine hours. (Not offered for graduate credit.)

251 Nursing Research Introduction to research in nursing. Each student participates in designing a study of a nursing problem. *Prerequisite:* 126. Three hours. (Not offered for graduate credit.)

252 Senior Practicum Practicum in a setting selected to meet student identified learning objectives. *Prerequisites:* 225, 251. Six hours. (Not offered for graduate credit.)

TECHNICAL NURSING MAJOR (TENU)

Note: All courses limited to students majoring in Technical Nursing except by permission of departmental chairperson.

15-16 Fundamentals of Nursing Principles of nursing care. Includes assessing human functions using the nursing process to provide direct care to individuals of any age. Microbiology content integrated. Concurrent clinical experiences provided. *Prerequisites:* For 16: 15, Anatomy and Physiology 19. Six hours. Cohen, Palumbo.

123-124 Nursing Care of Children and Adults Focuses on using the nursing process to identify alterations in normal human functions to arrive at nursing diagnosis. Concurrent clinical experiences in hospital setting provided. *Prerequisites:* 15-16, Anatomy and Physiology 19-20, Nutritional Sciences 43, Early Childhood and Human Development 80, 81, English 1. Ten hours. Copeland, Gagne, Malone-Rising, Moss.

130 Nursing Seminar Focuses on issues in nursing and the role of the associate degree nurse within the profession of nursing. *Prerequisite:* 123. Two hours. Clarke.

195 Independent Study Independent study in nursing as indicated by student's interest. *Prerequisite:* Departmental permission. One to two hours.

Nutritional Sciences (NUSC)

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Professor Carew; Associate Professors Pintauro, Ross, Tyzbir (Chairperson); Assistant Professor Johnson, McArthur; Extension Assistant Professor Harvey; Research Associate Professor Poehlman; Lecturers Janson, Kanfer, Knisley.

37 Basic Concepts of Foods (3-0) Study of the scientific aspects of food emphasizing reasons for procedures used and phenomena occurring in food preparation. Three hours. Ross. Spring.

38 Basic Concepts of Foods Laboratory (0-3) Developing comprehension of scientific principles of food preparation through modification of standard recipes, manipulation of ingredients and techniques, and evaluation using sensory and objective methods. *Prerequisite:* 37 or concurrent registration in 37 or permission. One hour. Ross. Spring.

43 Fundamentals of Nutrition (3-0) Comprehensive study of specific nutrients in terms of their availability, function, and utilization in mammalian species. *Prerequisites:* High School chemistry and biology. Three hours. Carew. Fall/Spring.

44 Survey of the Field: Nutritional Sciences (1-0) Introduction to the professional field and career opportunities

in human nutrition and foods. Required of all first-year and transfer students. One hour. Guerrina. Fall.

138 Quantity Food Production and Service (3-4) Principles and techniques of food accounting, recipe and menu planning/costing, preparation and service including equipment, sanitation, and time motion studies. Includes field trips and studies of the techniques of different types of food service establishments. *Prerequisite:* 37. Four hours. Kanfer. Fall.

143 Obesity, Weight Control, and Fitness (3-0) Introduction to the causes, consequences, and reputed cures of obesity which includes: evaluation of body composition and modification of eating and exercise behaviors in weight control. *Prerequisite:* 43 or equivalent. Three hours. Tyzbir. Fall.

144 Nutrition in the Life Cycle (3-0) Nutritional needs of individuals during the life cycle emphasizing physiological and environmental factors which affect nutritional status. Designed for nutrition majors. *Prerequisites:* 43, Chemistry 42 or 141 or equivalent, completed or concurrently enrolled in Anatomy/Physiology 19 or equivalent. Three hours. Johnson. Fall.

195 Special Topics Lectures, laboratories, readings, or projects relating to contemporary areas of study. Enrollment may be more than once, maximum of 12 hours in 195 and 295 combined. *Prerequisite:* Departmental permission.

196 Field Experience Professionally-oriented field experience under joint supervision by faculty and business or community representative. Hours arranged, maximum of 15 hours in 196 and 296 combined. *Prerequisite:* Departmental permission.

197, 198 Undergraduate Research Individual laboratory or community research in food or nutritional sciences under the guidance of a faculty member. *Prerequisites:* Arrangement with faculty member, department chairperson permission. Credit negotiable up to three hours per semester.

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, Chemistry 42 or equivalent, Anatomy/Physiology 19; junior standing. Three hours.

237 Food Safety and Regulation (3-0) Comprehensive study of the relationships between food processing and preservation, food toxicology, and the scope, applicability, and limitations of U.S. food laws. *Prerequisite:* Agricultural Biochemistry 201. Three hours. Pintauro. Spring.

238 Food Service Systems Management (3-0) Organization and administration of food service systems including principles of production, accounting management decisions, communications, and legal responsibilities specific to quantity food production. Emphasis on problem solving. *Prerequisites:* Business Administration 120; Nutrition 138 or permission. Three hours. Janson. Spring.

240 Methods in Nutrition Education (2-2) Needs assessment, planning, and presenting of appropriate methods and materials for an identified audience in a community, school, or institutional setting emphasizing interpersonal communication, interviewing, and group process skills. *Prerequisites:* 43, Speech 11 or equivalent; junior standing. Three hours. Knisley. Spring.

241 Nutrition and Aging (3-0) Study of physiologic, psychologic, sociologic, and economic factors which influence nutrient requirements, nutritional status, and food habits of older people. *Prerequisite:* 144. Three hours. Poehlman. Spring.

242 Advanced Nutrition (3-0) Study of nutrients and

their specific functions in metabolic process integrating cellular physiology, biochemistry, and nutrition. *Prerequisites:* 43, Agricultural Biochemistry 201 or equivalent, Anatomy/Physiology 19 or equivalent; junior standing. Three hours. Tyzbir. Spring.

245 Nutritional Biochemistry (3-0) Comprehensive study of metabolism of carbohydrates, lipids, and protein emphasizing hormonal control, nutritional and metabolic interrelationships, and dietary abnormalities (e.g. starvation and obesity). *Prerequisites:* 242 or instructor's permission. Three hours. Tyzbir. Fall.

246 Diet and Disease (3-2) Examination of the physiologic, biochemical, and psychosocial basis of several disease states with application of the normal and therapeutic food and nutrition principles associated with treatment. *Prerequisites:* 37, 144, 240, 242. Four hours. Ross. Fall.

248 Community Nutrition (3-0) Analysis of current programmatic and policy approaches addressing the major nutrition-related health problems in the U.S. Emphasis on program planning, marketing, and evaluation of community nutrition services. *Prerequisites:* 246, senior standing. Three hours. Johnson. Spring.

249 Nutrition Seminar (1-0) Review of recent developments in nutrition research. *Prerequisites:* 242, instructor's permission. One hour. Tyzbir. Fall/Spring.

290 Research Methods in Nutritional Sciences (1-6) Advanced research methods, including grant proposal preparation, Institutional Review Board requirements, data analysis and presentation, and selected laboratory techniques in advanced nutritional biochemistry. *Prerequisites:* Agricultural Biochemistry 201, 202, senior/graduate student standing or instructor's permission. Four hours. Pintauro. Spring.

295 Special Topics Lectures, laboratories, readings, or projects relating to contemporary areas of study. Credits negotiable. Enrollment may be more than once, maximum of 12 hours in 195 and 295 combined. *Prerequisite:* Departmental permission.

296 Field Experience Professionally-oriented field experience under joint supervision of faculty and business or community representative. Credits negotiable. May enroll more than once. Maximum up to 15 hours in 196 and 296 combined. *Prerequisite:* Departmental permission.

Pathology (PATH)

COLLEGE OF MEDICINE

Professors Craighead, Howard, Korson, Mossman, Stark, Trainer (Interim Chairperson), Winn; Associate Professors Bovill, Hardin, Heintz, Huber, Lee, Leslie, Macara, MacPherson, Pendlebury, Tindle; Assistant Professors Anderson, B. Durand, D. Durand, Jessen, Lunde, Taatjes, Tracy, Tutschka, Van Houten, Waters, Weaver.

101 Introduction to Human Disease (2-3) Elementary course in human pathology designed for Allied Health students. First portion deals with general mechanisms of disease, followed by disorders of specific organs. *Prerequisites:* College biology, anatomy, and physiology. Three hours.

305 Pathobiology Basic introductory course in pathological mechanisms for graduate and postdoctoral students who are not candidates for M.D. degree, advanced medical students, pathology residents, and undergraduates by permission of course coordinator. Alternate years. Three hours.

375 Special Topics in Molecular Pathobiology Three independent, rotating one-semester modules concerning

coronary heart disease (fall), DNA replication (spring), and DNA repair (fall). Based on critical review of primary literature. *Prerequisites:* Biochemistry 301, 302, open to undergraduates with instructor's permission. Three hours. Heintz, Tracy, Van Houten.

395 Special Topics in Pathology: Immunopathology In-depth analysis of the role of the immune system in disease processes. Discussions center on current and controversial areas of immunopathology. *Prerequisites:* 305, immunology (Microbiology 223) desirable, or departmental permission. Two hours. Alternate year course with 305.

Pharmacology (PHRM)

COLLEGE OF MEDICINE

Professors J. Bevan (Chairperson), R. Bevan, Hacker, McCormack, Nelson, Scollins, Tritton; Associate Professors Brayden, Reil, Roberts; Assistant Professor Shreeve; Research Assistant Professors Bhushan, Bigelow, Borman, Dolci, Laher; Adjunct Assistant Professor Bress.

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. *Prerequisites:* Physiology and Biophysics 101–102, Pathology 101, Physical Therapy 131, 132, 133. 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. *Prerequisites:* Organic chemistry, background in biology. Three hours.

290 Topics in Molecular and Cellular Pharmacology Focuses on basic principles, drug interactions with receptors, membranes, synapses, neurotransmitters, macromolecules, cytoskeleton, ion channels and pumps, and mechanisms of drug resistance. *Prerequisites:* Introductory course in organic chemistry, background in physiology or health sciences. Three hours. Hacker.

302, 303 Pharmacological Techniques Experiments conducted under supervision in the areas of drug metabolism, modes of drug action, physicochemical properties of drugs, bioassay, and toxicology. Open to undergraduates with instructor's permission. Two hours, by arrangement.

328 Introduction to Medicinal Chemistry Important classes of drugs are surveyed. Emphasis on relationships between physicochemical properties and pharmacologic activity; synthetic aspects considered. *Prerequisites:* Chemistry 131–132. Open to undergraduates with instructor's permission. Three hours. McCormack.

Philosophy (PHIL)

COLLEGE OF ARTS AND SCIENCES

Professors Hall, Hansen, Kornblith (Chairperson), Mann; Associate Professors Guignon, Kuflik, Pereboom; Assistant Professors Christensen, Loeb, Miller.

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 possibil-

ity of knowledge. Contemporary and historical readings. Three hours. Offered every semester. Guignon, Hall, Kornblith, Loeb, Miller, Pereboom.

3 Comparative East-West Philosophy* Introduction to the historical dialectic of philosophy by comparisons and contrasts between Chinese and Western traditions of philosophy. Three hours. Offered every semester. Hansen, Van Norden.

*Credit will not be given for both 1 and 3.

4 Introduction to Ethics Analysis of the principal problems and theories of ethics. Three hours. Hall, Kuflik, Loeb.

13 Introduction to Logic Study of the basic principles of deductive inference. Three hours. Christensen, Kornblith, Mann.

101 History of Ancient Philosophy Study of the works of the Pre-Socratics, Plato, Aristotle, and their successors. *Prerequisite:* 1, 3, or 4. Three hours. Fall. Hall, Mann.

102 History of Modern Philosophy Study of works of the major philosophers of the 17th and 18th centuries: Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, Kant, and others. *Prerequisite:* 1, 3, or 4. Three hours. Spring. Pereboom.

105 History of Medieval Philosophy Study of works of such major philosophical figures as Augustine, Anselm, Abelard, Aquinas, Duns Scotus, and William of Ockham. *Prerequisite:* 101 is recommended. Three hours. Alternate years. Mann.

107 19th Century Philosophy Study of works of such philosophers as Hegel, Fichte, Schopenhauer, J. S. Mill, Kierkegaard, Nietzsche, and Marx. *Prerequisite:* 102 is recommended. Three hours. Alternate years. Hall.

110 Nature of Mind Examination of philosophical issues raised by influential psychological views of the nature of the human mind. *Prerequisite:* 1, 3, or 4 or one course in psychology. Three hours. Fall. Kornblith, Pereboom.

112 Introduction to the Philosophy of Science 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. Fall. Christensen.

113 Intermediate Logic 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. Alternate years. Christensen, Mann.

121 Chinese Philosophy I 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, Van Norden.

122 Chinese Philosophy II Chinese thought from the Han Dynasty to Mao Zedong's thought. *Prerequisite:* 121. Three hours. Alternate years. Hansen, Van Norden.

130 Philosophical Foundations of Education Critical examination of the aims of education and the most appropriate means of achieving those aims. Readings from historical and contemporary sources. *Prerequisite:* 1, 3, or 4. Three hours. Alternate years. Miller.

133 Marxism Survey of the philosophy of Karl Marx and the Marxist tradition on such topics as historical materialism, human nature, alienation, freedom, social change, and revolution. *Prerequisite:* 1, 3, or 4. Three hours. Miller. Alternate years.

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, 3, or 4. Three hours. Offered once a year. Hall, Mann.

140 Social and Political Philosophy Analysis of such fundamental theories and problems in social and political thought as political obligation, rights, and justice. *Prerequisite:* 1, 3, or 4. Three hours. Offered once a year. Hall, Kuflik, Loeb.

142 Philosophy of Law I (Same as Political Science 143.) Analysis of the nature of law, the relation between law and morality, obligation to obey the law, the judicial decision, responsibility in law, legal ethics. *Prerequisite:* 1, 3, or 4 or Political Science 41. Three hours. Offered once a year. Hall, Hansen, Kuflik, Loeb; Wertheimer (Political Science).

143 Philosophy of Law II (Same as Political Science 144.) Problems of liberty, e.g. freedom of expression, privacy, paternalism; scope and limits of the criminal law; philosophy of punishment; selected problems in criminal justice, e.g. plea bargaining; preventive detention. *Prerequisite:* 1, 3, or 4 or Political Science 41. Three hours. Offered once a year. Hansen, Kuflik, Loeb; Wertheimer (Political Science).

144 Philosophical Problems in Medicine 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, 3, or 4. Three hours. Offered once a year. Kuflik, Loeb.

151 Philosophical Ideas in Literature Philosophical themes as exemplified in literature. *Prerequisite:* 1, 3, or 4. Three hours. Alternate years. Guignon, Hall.

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:* 1, 3, or 4. Three hours. Offered once a year. Hall.

160 Recent Continental Philosophy Survey of 20th century continental philosophy, including phenomenology, hermeneutics, critical theory, structuralism, and poststructuralism. Readings from Husserl, Heidegger, Sartre, Saussure, Wittgenstein, Habermas, and Foucault. *Prerequisites:* 1, 3, or 4, or instructor's permission. Three hours. Guignon.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Readings and Research

201 Theory of Knowledge Critical examination of nature and sources of knowledge; belief, truth, evidence, perception, memory, and induction. *Prerequisite:* 102 or 112. Three hours. Offered every fall semester. Kornblith.

202 Metaphysics 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. Christensen, Kornblith, Mann.

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. Alternate years. Kornblith, Pereboom.

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 standing in a science major. Three hours. Alternate spring semesters. Christensen.

217 Philosophy of Language Philosophical study of the nature of language. *Prerequisite:* 113 or Linguistics 101, 102. Three hours. Alternate years. Christensen, Hansen, Kornblith.

221 Topics in Chinese Philosophy Detailed examination of a classical Chinese philosophical text or school. *Prerequisite:* 121 or 122. Three hours. Alternate years. Hansen, Van Norden.

240 Contemporary Ethical Theory Analysis of the ideas of contemporary moral philosophers in normative ethics and metaethics. *Prerequisite:* 140, 142, 143 or 144. Three hours. Alternate years. Kuflik, Loeb, Van Norden.

241 Contemporary Social and Political Philosophy An analysis of the ideas of contemporary philosophers in social and political philosophy. *Prerequisite:* 140, 142, 143, or 144. Three hours. Alternate years. Kuflik, Loeb.

242 Justice and Equality (Same as Political Science 213.) An examination of contemporary normative theories of distributive justice and equality. *Prerequisite:* 140, 132, 143, or 144. Three hours. Offered once a year. Kuflik, Loeb; Wertheimer (Political Science).

260 Topics in Continental Philosophy Study of the central issue in current continental philosophy, e.g. social theory, psychoanalysis, or aesthetics. Readings from Nietzsche, Heidegger, Gadamer, Ricoeur, Habermas, Derrida, and Foucault. *Prerequisites:* 107, 160, or instructor's permission. Three hours. (May be repeated for credit when topic is significantly different.) Guignon. Alternate years.

262 Existentialism 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. Alternate years. Guignon, Hall.

265 American Philosophy The thought of such leading American philosophers as Peirce, James, Royce, Santayana, Dewey, and Whitehead. *Prerequisites:* 101, 102. Three hours. Alternate years. Miller.

271, 272 Seminar: Major Philosophical Author or School Study of 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 hour. Offered once a year.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

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 (PT)

SCHOOL OF ALLIED HEALTH SCIENCES

Professors Feitelberg (Chairperson), Moffroid; Associate Professors Emery, Held, Reed, Zimny; Clinical Assistant Professors Henry, Kelley, Nalette, Nelson, O'Rourke; Clinical Instructors Currier, Tandy.

41 Introduction to Physical Therapy Profession Introduction to PT profession. Aspects of practice management

skills; the medical, ethical, and legal aspects of practice. Clinical assignments provide opportunity for observation of concepts in practice. *Prerequisites:* Sophomore standing; Anatomy 201 corequisite. Three hours. Emery, Feitelberg.

120 Musculoskeletal Bases for Practice of Physical Therapy Principles of structure and function of the musculoskeletal system related to static and dynamic elements of movement. Practice of basic tests and measurements used by physical therapists to identify abnormalities of musculoskeletal system. *Prerequisites:* Anatomy and Neurobiology 201, Physics 11. Six hours. Moffroid, Zimny.

121 Musculoskeletal Evaluation and Management Procedures Advanced principles and methods of physical therapy evaluation and management as they relate to patients with musculoskeletal dysfunction. *Prerequisites:* Junior standing in PT; 120, Anatomy and Neurobiology 201. Three hours. Currier, Zimny.

122 Sensory-Motor Development Sensory-motor provisions for posture and movement at all ages, including neuroanatomical substrates, simple reflex patterns, and complex motor sequences of movement. Basic physiological changes throughout the life cycle. *Prerequisites:* Junior standing in PT, Anatomy and Neurobiology 202. Three hours. Feitelberg, Kelley.

124 Modalities Theory and application of physical agents including heat, cold, light, water, sound, electricity, massage, traction, pneumatic pressure, and biofeedback. Selected clinical topic areas. *Prerequisites:* Junior standing in PT; Physics 11, 12, Physiology and Biophysics 101-102. Five hours. Reed.

126 Performance Physiology Cellular and systemic aspects of physiology of exercise applied to theory and practice of physical therapy. *Prerequisites:* Senior standing in PT; Physiology and Biophysics 101-102. Two hours. Reed.

127 Neurophysiological Bases and Practice of Physical Therapy Advanced concepts in the neurophysiological basis of normal and abnormal movement control as a context for therapeutic intervention in neurologically impaired individuals. *Prerequisites:* Senior standing in PT, Anatomy and Neurobiology 202. Five hours. Held, O'Rourke.

131-132-133 Clinical Medicine I-III Introduction to diagnosis and medical/surgical management of orthopaedic disorders including the physical therapist's role in identifying these problems. I: two hours; II: two hours; III: three hours.

143 Communications in the Health Care Setting Development of the written and verbal skills of professional communication emphasizing legal and ethical ramifications. Preparation to fulfill communication responsibilities of clinical practice. *Prerequisite:* 41. One hour. Emery, Nelson.

144 Health Care Systems An overview of health care in the U.S. emphasizing the social, economic, regulatory, and political systems as they affect the practice of physical therapy. *Prerequisites:* 41, 143. Two hours. Feitelberg.

145 Educational Methodology for Physical Therapy Practice Introduction to learning theory and methods as they apply to the various teaching roles of the physical therapist. *Prerequisites:* Senior standing in PT; 41, 143, 144. Two hours. Emery, Nalette.

146 Administration and Organization in Physical Therapy Methods of health care administration and management as applied to the practice of physical therapy. Analysis and discussion related to social forces influencing the administration of physical therapy services. *Prerequisites:* Senior standing in PT; 145. Two hours. Emery, Nalette.

156-158 Clinical Education I-II Students assigned to approved clinical centers throughout the U.S. but focused

in the Northeast. 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. *Prerequisite:* Satisfactory completion of all departmental courses. Emery, O'Rourke.

175 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. One to three hours, variable. Emery, Feitelberg, Held, Moffroid, O'Rourke, Reed, Zimny.

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. Three hours. Held.

Physics (PHYS)

COLLEGE OF ARTS AND SCIENCES

Professors Arns, Brown, Detenbeck, Nyborg (Emeritus), Rankin, Scarfone, Smith (Chairperson); Associate Professors Sachs, Sparthian; Assistant Professor Wu.

1 Celestial Physics Description of various historical models of the observable universe. Nature of light and description of optimal 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 announced in advance. Students may enroll for from one to three credits. Limited use of algebra and geometry.

3, 4 Optical Holography First semester: Basic theory, equipment, and production of simple holograms. Second semester: Theory and production of complex holograms; nondestructive testing. *Prerequisites:* 3 for 4, instructor's permission. Three hours.

5 Introductory Astronomy Survey of astronomy and astrophysics from broad scientific and cultural perspective. Stellar and galactic astronomy. Limited use of algebra and geometry. Three hours.

6 Introductory Astronomy Survey of astronomy and astrophysics from broad scientific and cultural perspective. Planetary and extragalactic astronomy, relativity, and cosmology. Limited use of algebra and geometry. Three hours.

11, 12 Elementary Physics (3-0) Survey of principles of classical and modern physics without calculus, appropriate for students concentrating in life or health sciences. Accompanying labs: Physics 21, 22. *Prerequisites:* 11 or 31 for 12; secondary school algebra and trigonometry. Three hours.

21 Introductory Laboratory I (1-2) *Prerequisite:* Concurrent enrollment or credit in 11 or 31. One hour.

22 Introductory Laboratory II (1-2) *Prerequisite:* Concurrent enrollment or credit in 12 or 42. One hour.

31 Introductory Physics (3-0) Mechanics, thermodynamics, waves. Recommended for students of engineering, natural sciences, premedical programs. Accompanying lab: 21. *Prerequisites:* Math. 21, secondary school trigonometry. Three hours.

42 Electromagnetism and Modern Physics (3-0) Electric-

ity, magnetism, optics, modern physics. Recommended for students in natural sciences, premedical programs. Credit not allowed for both 42 and 125. Accompanying lab: 22. *Prerequisite:* 31. Three hours.

121 Biological Physics (3-2) Physical laws, concepts, and methods discussed with respect to their reference to biology. *Prerequisites:* 12 or 42, Chemistry 2, Math. 22. Three hours.

125 Electromagnetism and Optics (3-2) Electricity, magnetism, electromagnetic waves, optics. With lab. Recommended for students of engineering, physical sciences. Credit not allowed for both 42 and 125. *Prerequisites:* 31; Math. 22, concurrent enrollment in Math. 121. Four hours.

128 Introductory Modern Physics (3-2) Introduction to theory of relativity and to modern descriptions of radiation, the electron, the atom, the atomic nucleus, and elementary particles. *Prerequisites:* 42 or 125, Math. 121. Four hours.

170 Geophysics (3-0) Structure of the solid earth, using seismic, magnetic, and gravitational methods. *Prerequisites:* Six hours calculus, six hours physics. Three hours. Alternate years, spring 1993.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing department offerings. See Schedule of Courses for specific titles. *Prerequisite:* 128, department permission.

197, 198 Readings and Research *Prerequisite:* 128, department permission.

201, 202 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:* 42 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:* 42 or 125, Math. 121. Three hours.

213 Electricity and Magnetism Fundamental principles of electricity and magnetism; electrostatic fields, and magnetic fields of steady currents. Electric and magnetic properties of matter and electromagnetic energy. *Prerequisites:* 42 or 125, Math. 121. Three hours.

214 Electromagnetism Introduction to time dependent electromagnetic fields. Maxwell's equations in vacuum and in matter. Electromagnetic waves and radiation. *Prerequisite:* 213. Three hours. Alternate years, spring 1994.

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.

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 semiconductors. Elementary band theory and introduction to electronic transport theory. *Prerequisite:* 128. Three hours.

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, fall 1993.

255 Physical Optics Introduction to physical optics in-

cluding polarization, birefringence, dichroism, scattering, and diffraction of light. Fourier transform analysis of optical images. *Prerequisites:* 125 or 42, 213, Math. 121. Three hours.

257 Modern Astrophysics Stellar structure and evolution, compact objects, the interstellar medium, galactic structure, gravitational theory, and cosmology, the formation of our solar system and terrestrial life. *Prerequisite:* One 100-level course in physical science or engineering. Three hours. Rankin.

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.

264 Introduction to Elementary Particles Theoretical and experimental aspects of elementary particles including their properties, classification schemes, symmetries, conservation laws, fundamental interactions, models of particle structure, and special topics as time allows. *Prerequisites:* 128, 213. Three hours.

265 Thermal Physics Thermodynamics, kinetic theory, statistical mechanics. *Prerequisites:* 128 or 42; Math. 121. Three hours.

273 Quantum Mechanics I Introduction to nonrelativistic quantum mechanics. Schroedinger equation and applications to simple systems. *Prerequisites:* 128, 211. Three hours.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing department offerings. See Schedule of Courses for specific titles.

Physiology and Biophysics (PSLB)

COLLEGE OF MEDICINE

Professors Alpert (Chairperson), Evans, Gibbons, Hendley, Low, McCrorey, Patlak, Warshaw; Associate Professors Hamrell, Periasamy, Webb; Assistant Professor Haeberle; Research Professor Maughan; Research Associate Professor Mulieri; Research Assistant Professors Blanchard, Mitchell, Woodcock-Mitchell.

9-10 Special Topics in Human Anatomy and Physiology The structure and function of the human body. Open only to two-year Dental Hygiene and Radiologic Technology students. Credit not valid towards four-year programs. *Prerequisite:* 9 for 10. Four hours. Lee, Webb.

19-20 Undergraduate Human Anatomy and Physiology Two-semester course with credit given only upon completion of both semesters. Structure and function of human body using cadaver prosections, histological material, and physiological experiments. Required of Medical Technology, Nursing, Nutritional Sciences, and Physical Education; others with instructor's permission. *Prerequisite:* 19 for 20. Four hours. Lee, Webb.

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 or equivalent, two semesters general physics, one semester mathematics, permission. Four hours per semester.

191, 192 Undergraduate Research Individual laboratory research under guidance of faculty member. *Prerequisite:* Departmental permission. Three or six hours.

Plant and Soil Science (PSS)

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Professors Bartlett, Boyce, MacCollom, Magdoff (Chairperson), Murphy, Parker, Pellett; Assistant Professor Mzamane; Extension Professor Gotlieb; Extension Associate Professors Berkett, Bosworth, Costante, Perry; Extension Assistant Professors Jokela, Nielsen.

7 Orientation to Urban Forestry and Landscape Horticulture Role of plants in the urban environment; survey of professions and career planning in Urban Forestry and Landscape Horticulture. One hour. Donnelly, Pellett.

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. Boyce, Pellett.

11 Principles of Plant Science Principles and practices involved in the culture, management, and utilization of economically important horticulture and agronomic crops. Three hours. Boyce.

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.

122 Small Fruit Crops (2-2) Principles of small fruit production, including propagation, culture, management, and harvesting. *Prerequisite:* 11. Three hours. Boyce.

123 Garden Flowers and Indoor Plants (2-3) Identification, growth habit, use, care, environmental tolerances, and problems of outdoor herbaceous plants and indoor flowering and foliage plants. Considered from professional viewpoint. *Prerequisite:* 10 or 11 or Botany 4. Three hours. Pellett. Alternate years, 1993-94.

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. Alternate years, 1992-93.

125 Woody Landscape Plants (3-3) Identification, climatic requirements, cultural management, and use of ornamental plant materials in landscape planting. *Prerequisite:* 11 or Botany 4 or permission. Four hours. Pellett.

131 Landscape Design I (2-4) A studio course emphasizing theory of landscape design and its application to actual landscape design problems. Graphic communication techniques included. *Prerequisite:* 11 or permission. Three hours.

132 Landscape Design II (2-4) Advanced techniques in landscape design. Grading, construction details, graphic techniques, site analysis as well as various design problems. *Prerequisites:* 125, 131, or Recreation Management 138. Three hours.

138 Commercial Plant Propagation (3-2) 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. Alternate years, 1992-93.

145 Turfgrasses (2-3) Establishment, maintenance, and utilization of turf for lawns, parks, athletic fields, airports, cemeteries, roadsides, golf courses, and ski slopes. *Prereq-*

uisite: 11 or Botany 4. Three hours. Alternate years, 1992-93.

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 source 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.

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 department chairperson for approved off-campus project.

205 Mineral Nutrition of Plants (See Botany 205.) Alternate years, 1992-93.

207 Water Relations of Plants (See Forestry 229.) Three hours. Donnelly and Botany and Plant and Soil Science staff. Alternate years, 1992-93.

210 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 arrangements. *Prerequisites:* 161, Math. 2 or 9, Chemistry 3. Three hours. Alternate years, 1992-93.

215 Weed/Crop Ecology Weed identification, reproduction, ecological relationships with crops, and integrated management. *Prerequisite:* 11, 161. Three hours. Murphy. Alternate years, 1992-93.

217 Pasture Production and Management Physiological and ecological relationships of pasture plants, effects of grazing livestock on them; grazing management effects on livestock and pastures; emphasis on French Voisin system of rational grazing. *Prerequisites:* 11, 161. Three hours. Murphy. Alternate years, 1993-94.

221 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. Alternate years 1992-93.

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, 1992-93.

242 Plant Tissue Culture Survey the uses and potentials for plant cell and tissue culture including micropropagation, virus elimination, protoplast culture, embryogenesis, and pollen cell culture. *Prerequisites:* 11 or Botany 4 or biology course, instructor's permission. Three hours. Alternate years 1992-93.

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:* 161 or a total of six hours in ecology, geography, or geology. Three hours. Alternate years, 1992-93.

264 Chemistry of Soil and Water (3-3) A biologically biased study of the colloidal chemistry of soil and its interfaces with roots, water, and air. *Prerequisites:* 161, two semesters chemistry. Four hours. Magdoff. Alternate years, 1992-93.

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. Alternate years, 1992-93.

281 Seminar Presentation and discussion of papers on selected topics of current interest by students and staff. Spring semester. *Prerequisite:* Senior standing. One hour.

297 Special Topics Lectures, laboratories, readings, field projects, surveys, or research designed to provide specialized experience in horticulture, agronomy, soils, entomology, and integrated pest management. *Prerequisite:* Senior standing and/or permission. One to three hours.

Political Science (POLS)

COLLEGE OF ARTS AND SCIENCES

Professors Ball, Elliott, Moyser, Pacy, Wertheimer; Associate Professors Bryan, Burke (Chairperson); Feldman, Nelson, Rice, Stavrakis; Assistant Professors Altemus, Burgin, Forrest, Gierzynski, Kaufman, Moyano, Neal, Taylor, Thomas, Tubbs, Zheng; Lecturer Levine.

The following courses (21, 41, 51, 71, 81) may all be taken without prerequisite. Each course introduces students to a different sub-field of political science.

21 American Political System Institutions, processes, and problems of American government. Three hours.

41 Introduction to the Problems of Political Thought Examination of basic problems in political philosophy, e.g. mortality and law; punishment; freedom; equality; obligation and disobedience. Three hours.

51 International Relations The state as actor in international relations. Global division and problems. Three hours.

71 Comparative Political System Examination of political behavior, political structures, and political processes from a cross-national perspective. Three hours.

81 Political Behavior Introduction to the political beliefs and activities of individual citizens. Topics include: voting, elections, socialization, and public opinion. Three hours.

All courses numbered 121–198 require sophomore standing and the appropriate core course.

121 Law and Politics An examination of civil and criminal justice in the U.S. *Prerequisite:* 21. Three hours.

122 Constitutional Law I Emphasis on developing skills of legal analysis. Historical origins and general principles of constitutionalism. *Prerequisite:* 121. Three hours.

123 The Vermont Political System Analysis of the political processes and institutions of governance in Vermont in the context of the federal system and other American states. *Prerequisite:* 21. Three hours.

124 The Presidency The functions and activities of the President and staff. *Prerequisite:* 21. Three hours.

125 Political Parties Analysis of political parties with special emphasis upon party realignment and reform, campaign techniques for nomination and election, and comparative party systems. *Prerequisite:* 21. Three hours.

126 Introduction to Public Administration Introduction to study of public administration emphasizing such matters as organization, management, personnel, financial administration, and policy making in modern bureaucracies. *Prerequisite:* 21. Three hours.

127 The Congressional Process Organization, procedure, and behavior of the chambers of the U.S. Congress. *Prerequisite:* 21. Three hours.

128 Issues of Public Policy Analysis of selected prob-

lems of public policy, e.g. welfare, macroeconomic policy, regulation, energy, and housing. *Prerequisite:* 21, 41; Economics 11-12 strongly recommended. Three hours.

129 Civil Rights in America: Law and Politics Legal, political, historic bases of race and discrimination in America. Federal courts' efforts to provide equal justice examined; congressional and presidential efforts to end race discrimination. *Prerequisites:* 21. Three hours.

132 The U.S. Supreme Court: Process and Policy The U.S. Supreme Court as one of the three major political institutions, including the selection process, intracourt politics, and dynamics of court decision making. *Prerequisite:* 21. Three hours.

134 Public Policy Analysis Examination of the principles for choosing among alternative public policies. Discussion of basic analytical tools, e.g. welfare economics, cost-benefit analysis, operations research. *Prerequisites:* 21, 41; Economics 11-12 strongly recommended. Three hours.

135 Women in American Politics Examines the intersections of race, gender, and class in shaping women's participation in American politics and their approaches to public policy issues dealing with sex and gender. *Prerequisite:* 21. Three hours.

141, 142 History of Political Thought First semester: Development of political thought from Plato to Burke. Second semester: Political thought of the 19th and 20th centuries emphasizing socialist ideologies from Marx to Marcuse. *Prerequisites:* 41. Three hours.

143 Philosophy of Law I (Same as Philosophy 142.) Analysis of the nature of law, the relation between law and morality, obligation to obey the law, the judicial decision, responsibility in law, legal ethics. *Prerequisite:* 41 or Philosophy 1 or 2 or 3 or 4. Three hours.

144 Philosophy of Law II (Same as Philosophy 143.) Problems of liberty, e.g. freedom of expression, privacy, paternalism; scope and limits of the criminal law; philosophy of punishment; selected problems in criminal justice. *Prerequisite:* 41 or Philosophy 1 or 2 or 3 or 4. Three hours.

145 Introduction to Political Economy Basic concepts and historical development of international political economy. Topics include capitalism; socialism; several hybrid systems; trade and industry policy. *Prerequisites:* 51, 71; Economics 11 or 12 strongly recommended. Three hours.

146 Marxist Political Theory Intellectual foundations of Marx's thought, the development of Marx's social and political theory, and the major strains and developments in Marxist political thought. *Prerequisite:* 41. Three hours.

151, 152 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:* 21, 51. Three hours.

153 International Organization Theory and practice in supranational institutions. *Prerequisite:* 51. Three hours.

161 Political Geography (See Geography 177.) *Prerequisite:* 51 or 71 or Geography 1 or 3.) Three hours.

Courses numbered 170–179 may be taken by International Studies majors without political science prerequisite if the student has the appropriate area studies background.

170 Politics and Political Change in India The evolution of democratic government in India and its capacity to address problems arising from colonialism, social diversity, and economic inequality. *Prerequisite:* 71. Three hours.

171 Western European Political Systems A comparative examination of the British, German, and French political systems. *Prerequisite:* 71. Three hours.

172 Government and Politics of the Soviet Union and Its Successor States Examination of the structure and process of the Soviet Union and its successor states. *Prerequisite:* 71. Three hours.

173 Canadian Political System Institutions, process, and problems of the Canadian policy. *Prerequisite:* 71. Three hours.

174 Latin American Political System Comparative examination of selected Latin American political systems. *Prerequisite:* 71. Three hours.

175 Government and Politics of China Institutions, processes, and problems of government of China. *Prerequisite:* 71. Three hours.

176 Government and Politics of Japan Institutions, process, and problems of government of Japan. *Prerequisites:* 71. Three hours.

177 Political Systems of Tropical Africa Development of differing political systems in African countries located south of the Sahara and north of South Africa. *Prerequisite:* 71, or one course in African Studies. Three hours.

178 The Israeli Political System Background, contemporary political structures and behavior, and current foreign policy considerations in Israeli politics. *Prerequisite:* 71. Three hours.

179 Women and Development An examination of the impact of national development on women in Third World countries with attention to the relationship between class and gender. *Prerequisite:* 71. Three hours.

181 Fundamentals of Social Research (Same as Sociology 100.) Introduction to research methods in social science. Includes examination of research design, measurement, data collection, data analysis, and the presentation and theoretical interpretation of research findings. *Prerequisite:* 21 or 81. Four hours.

183 Political Leadership Methods of identifying leaders, their relationships with nonleaders and with one another, their impact on public policy, and their personalities and social backgrounds. *Prerequisite:* 81. Three hours.

185 Voting Behavior Introduction to theories of voter turnout and candidate choice. Topics include: the social background of voters, partisanship, political issues, the impact of campaigns and media. *Prerequisite:* 21 or 81. Three hours.

191, 192 Internships

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Readings and Research

All courses numbered 221–298 require: (1) junior or senior standing, (2) completion of at least three core courses including the specified core course, (3) completion of three hours at the 100 level or a specified 100-level course; or instructor's permission.

221 Urban Government and Politics An analysis of metropolitan governments and their problems and roles. *Prerequisites:* 21, three hours at 100 level. Three hours.

222 Constitutional Law II Selected topics in constitutional law. *Prerequisite:* 122. Three hours.

223 The American Bureaucracy An examination of the history, current structure, politics, behavior, reform, and accountability of the American federal bureaucracy. *Prerequisite:* 126. Three hours.

224 State Administration Problems in planning, policy

development, and program coordination. *Prerequisite:* 126. Three hours.

225 Intergovernmental Relations Problems of the federal system. National-state-local cooperative administration of selected public functions. *Prerequisites:* 21, three hours at 100 level. Three hours.

226 Topics on the Presidency Further study of the executive branch and its operations. Selected topics, e.g. presidential decision making. White house staffing and operations, congressional-executive relations. *Prerequisite:* 124. Three hours.

227 Topics in Public Administration The political problems of the administrative state. *Prerequisite:* 126. Three hours.

228 Congress and Foreign Policy Congress's role in foreign policy making, emphasizing congressional action in the post-Vietnam period. *Prerequisites:* 21, three hours at 100 level. Three hours.

229 Seminar in American Politics Three hours.

241 Justice and Equality (Same as Philosophy 242.) Examination of contemporary normative theories of distributive justice and equality. *Prerequisites:* 41, or Philosophy 1 or 2 or 3 or 4, three hours at 100 level. Three hours.

242 American Political Thought American political thought from the colonial period to recent times. *Prerequisites:* 41, three hours at 100 level. Background in American history recommended. Three hours.

243 Democratic Theory The nature of democracy. Both contemporary debates within democratic theory and the classical sources of democratic theory are examined. *Prerequisites:* 41, three hours at 100 level. Three hours.

249 Seminar in Political Theory Three hours.

251 Foreign Policy of the Soviet Union and Its Successor States Historical topical study of Soviet foreign relations of the Soviet Union and its successor states. *Prerequisites:* 51, three hours at 100 level. Three hours.

252 Craft of Diplomacy Emphasis on experiences and reflections of diplomatic personalities, supplemented by studies of specialists. *Prerequisites:* 51, three hours at 100 level. Three hours.

253 Defense Politics Seminar U.S. defense politics, policies, and processes. Civil-military relations, strategic policy, arms control, defense-industrial complex, defense budget. *Prerequisite:* 151. Three hours.

254, 255 International Law I, II Principles and applications of public international law. *Prerequisites:* For 254: 51, three hours at 100 level; for 255: 254. Three hours.

256 Marxism in the Third World Explores Marx's theory of revolution, Marx's writings on the third world, and contemporary Marxist writings on the third world. Second part of the course focuses on revolutionary strategies and country case studies. *Prerequisites:* 41, 51, 71, three hours at 100 level. Three hours.

257 Politics of European Integration Survey of the European community, including development, public opinion, institutions, internal policies, external relations, and future prospects. *Prerequisites:* 51, 71, and three hours at the 100 level; or 171. Three hours.

259 Seminar in International Relations Three hours.

271 Peasants, Politics, and Rebellion Peasants as political actors with a focus on rural ecology and economy, peasant mentality and culture, and theories of rural rebellion and revolution. *Prerequisites:* 71, three hours at 100 level. Three hours.

272 Eastern European Political Systems Examination of

Eastern European political systems with emphasis on the role of ethnic conflict and Marxist-Leninist ideology. *Prerequisites*: 71, three hours at 100 level. Three hours.

273 Comparative Judicial Systems The political roles of courts in modern democracies, e.g. Sweden, England, France, West Germany, Italy, Canada, the U.S., Australia, and Japan. *Prerequisites*: 71, three hours at 100 level or 121. Three hours.

274 Comparative Legislative Behavior The important structures, processes, and functions of legislative institution in a variety of Western and non-Western societies with discussion of comparative research methodologies. *Prerequisites*: 71, three hours at 100 level. Three hours.

275 Comparative Federalism Comparative study of federal political institutions and political behavior in Canada, the U.S., Australia, and West Germany. *Prerequisites*: 71, three hours at 100 level. Three hours.

276 British Politics Topics include the role of the citizenry; the character of political and governmental institutions; and policy making in particular fields. Northern Ireland is also covered. *Prerequisites*: 171. Three hours.

277 Comparative Ethno-Nationalism Ethnicity and nationalism in Europe, Asia, and Africa. Political, historical, social, and economic factors are examined comparatively. *Prerequisites*: 71, three hours at the 100 level. Three hours.

279 Seminar in Comparative Politics Three hours.

283 Methods of Political Science Research Examination of advanced problems in political methods. Topics include: measurement, correlation, multiple regression, and scaling techniques. *Prerequisite*: 181, or equivalent with instructor's permission. Three hours.

284 Public Opinion: Theory and Research I (Same as Sociology 241.)* *Prerequisite*: 181 or Sociology 100. Three hours.

285 Public Opinion: Theory and Research II (Same as Sociology 242.)* *Prerequisite*: 284 (Sociology 241). Three hours.

*Credit not given for both 284 and Sociology 241 or both 285 and Sociology 242.

287 Participation and Democracy Political participation in selected Western democracies. Topics include the structure of participation; social bases of political activism; protest; mass-elite linkages. *Prerequisites*: 81, three hours at 100 level. Three hours.

289 Seminar in Political Behavior Three hours.

293 Senior Honors Seminar I Examination of major contemporary research topics in political science. *Prerequisite*: Admission by invitation only. Three hours. (Not offered for graduate credit.)

294 Senior Honors Seminar II Tutorial format centered on individual student research projects and a comprehensive examination. *Prerequisite*: 293. Three hours. (Not offered for graduate credit.)

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

297, 298 Readings and Research For advanced undergraduate and graduate students. Three hours.

Psychology (PSYC)

COLLEGE OF ARTS AND SCIENCES

Professors Achenbach, Albee, Bond, J. Burchard, Compas, Crockenberg, Forgays, Howell (Chairperson), Joffe, Kapp, Lawson, Leitenberg, Musty, Rosen; Associate Professors Bouton, Bronstein, S. Burchard, Gordon, Hasazi, Kessler, Leff, Miller, Rothblum, Yadau; Research Associate Professors Carling, Solomon; Research Assistant Professors Besio, Hamilton, Livingston, Pascoe; Adjunct Associate Professor Copeland; Adjunct Assistant Professor Thompson; Clinical Assistant Professors Cioffari, Dietzel, Does, Peyser.

Credit not given for 101 and 109 or 110.

1 General Psychology Introduction to the entire field, emphasizing the behavior of the normal adult human being. Three hours. Albee, Forgays, Musty.

101 Introduction to Psychological Research Methods Basic course in principles of experimental design, methodologies, and statistical procedures. Focus on preparing non-majors to understand and evaluate psychological research. *Prerequisite*: 1. Three hours. S. Burchard. Credit not given for 101 and 109 or 110.

109, 110 Principles of Psychological Methodology and Research Prepares students to understand and conduct research in a variety of areas of psychology. Focus upon designs, methodologies, and statistical procedures essential for psychological research. Laboratory experiences. Credit not given for 101 and 109 or 110. *Prerequisite*: 1, 109 for 110. Four hours. Bouton, Gordon.

119 History of Psychology Review of major theoretical and empirical developments in psychology, including schools of psychology that have influenced contemporary models of psychology. *Prerequisites*: 1, junior or senior standing. Three hours. Lawson.

121 Biopsychology Biological bases of behavior: classical and contemporary issues, including introduction to nervous system, behavioral effects of drugs, chemical bases of behavioral disorders. *Prerequisite*: 1 or Biology 1. Three hours. Kapp, Musty.

130 Social Psychology An introduction to concepts and methods used to study the behavior of individuals in various social situations. *Prerequisite*: 1. Three hours. Leff, Miller.

132 Environment and Behavior Introduction to Environmental Psychology. Major subareas of this field are discussed as they relate to the interaction between the behavior of individuals and the environment. *Prerequisite*: 1 or course in environmental studies. Three hours. Forgays.

152 Abnormal Psychology Describing and defining abnormal behavior; models of etiology; research evidence for biological and social models; methods of intervention and prevention. *Prerequisite*: 1. Three hours. Albee, Rothblum, Solomon.

161 Developmental Psychology: Childhood Survey of research and theories on child development from conception to adolescence emphasizing experimental analyses of early social and cognitive development. *Prerequisite*: 1. Three hours. Bond, Burchard.

162 Development of Sex Differences Critical analysis of research and theory on factors that influence the development of sex roles and purported sex differences in behavior, personality, and cognitive and intellectual functioning. *Prerequisite*: 1. Three hours. Bond, Joffe.

163 Process and Effects of Mass Communication Study of mass communication process and effects in socialization of children, diffusion of information, and persuasive campaigns in such areas as health, politics, consumer behavior. *Prerequisite*: 1. Three hours. Yadau.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Research Individual research under staff direction. *Prerequisite:* Departmental permission. Three to six hours.

205 Learning Analysis of theory and research on the basic learning process and behavior. *Prerequisite:* 110 or 101. Three hours. Bouton.

206 Motivation Theory and research on the nature of motives, their influence on behavior, and their relation to other psychological processes. *Prerequisite:* 110 or 101. Three hours. Joffe.

207 Thinking Survey of cognitive psychology, examining theory and research on perception, memory, language, cognition, and their interactions. *Prerequisites:* 110 or 101. Three hours. Gordon.

220 Animal Behavior Behavior of animals under controlled experimental conditions and in their natural environments. Consideration of evolution, development, function, and control of behavior. *Prerequisite:* 110 or 101 or Biology 102. Three hours. Bouton.

221 Physiological Psychology I Structure and function of mammalian nervous system, emphasizing neurological correlates of sensory experience and perception. Individual laboratory experience. *Prerequisite:* 110 or 101. For hours. Kapp.

222 Physiological Psychology II Study of role of central nervous system mechanisms in determination of innate behavior, arousal, motivation, learning, and memory. Individual laboratory experience. *Prerequisite:* 221. Four hours. Kapp.

223 Psychopharmacology Effects of drugs (both medical and recreation) on behavior. Topics such as drug effects on learning, memory, motivation, perception, emotions, and aggression. *Prerequisites:* 110 or 101, 121 or 222. Three hours. Musty.

230 Advanced Social Psychology Advanced survey of current research on the behavior of individuals in social situations. *Prerequisite:* 110 or 101 or 130. Three hours. Miller.

231 Psychology of Women Psychological theories about women and research on women's roles. Biological, personality, cognitive, and developmental factors considered. *Prerequisite:* One psychology course at the 100 level. Three hours. Rothblum.

233 Psychology of Experience and Creativity Enhancement Explores psychological processes for developing creative thinking and for enhancing the quality of conscious experience. Emphasizes personal growth as well as theoretical understanding. *Prerequisite:* Advanced background in at least one relevant field (such as psychology, environmental studies, art, or education). Three hours. Leff.

234 Psychology of Social and Environmental Change Examines psychological foundations for beneficial changes in social and physical environments. 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.

236 Theories of Human Communication Study of the role of perception, human information processing, language, nonverbal codes, meaning, cognition, and interpersonal and sociocultural context in human communication process. *Prerequisite:* 109 or 101 or 130. Three hours. Yadav.

237 Cross-Cultural Communication Study of cultural factors, cognitive processes, communication patterns, and problems in cross-cultural communication; role of communication in development and social change in third world countries. *Prerequisites:* 109 or 101 or 130 or 230; other advanced background in education or a social science. Three hours. Yadav.

240 Organizational Behavior Study of the impact of macro and micro features of organizations (culture, systems, and individuals) upon leadership, decision making, group process, conflict, and organization development. *Prerequisites:* 1, 109, 110, or instructor's permission. Three hours. Lawson.

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. *Prerequisites:* 152; 110 or 101. Three hours. Bronstein, Compas, Kessler.

251 Behavioral Disorders of Childhood An overview of theory, research, and practice in developmental psychopathology from infancy through adolescence. The major disorders of social and emotional development reviewed. *Prerequisite:* 109 or 101 or 161 (109 may be taken concurrently). Three hours. Hasazi.

253 Advanced Behavior Modification Application of techniques for the modification of human behavior in a variety of educational and social situations involving the collection and analysis of behavioral data. *Prerequisites:* 109 or 101, 152. Three hours. J. Burchard.

254 Primary Prevention An examination of empirical approaches to prevention of mental and emotional disorders; history of public health methods; sources of support and opposition to prevention efforts. *Prerequisites:* 152. Three hours. Albee, Joffe.

255 Introduction to Health Psychology Psychology of the cause, treatment, and prevention of physical illness and disability. Topics include: stress, health behavior, medical compliance, patient-provider relationships, coping with illness. *Prerequisite:* 110 or 101 or advanced standing in Allied Health Sciences. Three hours. Rosen, Solomon.

257 Personality The understanding of personality development and human behavior from a psychoanalytic, humanistic, trait measurement, and sociocultural perspective. *Prerequisites:* 109 or 101. Three hours. Bronstein.

261 Cognitive Development 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:* 109 or 101 or 161 (109 may be taken concurrently). Three hours. Bond.

262 Social Development Examination of theory and research concerning interpersonal development in humans from infancy through adulthood. Relationships between language, cognition, and social development emphasized. *Prerequisite:* 109 or 101 or 161 (109 may be taken concurrently). Three hours.

263 Disabilities of Learning and Development Seminar in etiology, treatments, prevention of developmental and learning disabilities within framework of current service and educational practices. Effectiveness, ethical, legal, psychological issues examined. *Prerequisite:* One 100-level psychology course or advanced standing in Psychology, Education, or Physical Therapy. Three hours. S. Burchard.

264 Developmental Psychobiology 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:* 110 or 101 or 121 or 161. Three hours. Joffe.

266 Communication and Children Study of the role of communication, especially television, in cognitive and social development from preschool to adolescence. Relationship between television violence and abnormal behavior examined. *Prerequisite:* 109 or 101 or 161 or 163. Three hours. Yadav.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

Radiologic Technology (RT)

SCHOOL OF ALLIED HEALTH SCIENCES

Associate Professor Izzo (Chairperson); Instructors Deininger, Giasson, Laberge; Lecturer Marschke; Clinical Instructors McCarthy, Pembroke.

FOR NONMAJORS

55 The Use of Radiation in our Society A mini-course to introduce nonmajors to radiation. Covers applications in medicine and industry as related to benefits and risks. *Prerequisite:* Sophomore standing. One hour (five weeks). Izzo, Marschke.

FOR ALL MAJORS

4 Introductory Radiologic Science (3-0) Introduction to ionizing radiation, emphasizing its interaction with matter, its effect on the human body, and methods of protecting patients and technologists. *Prerequisite:* Instructor's permission. Three hours. Marschke.

6 Introduction to Medical Terminology and Human Anatomy Introduction to the clinical setting by presenting information about patient handling, medical ethics, diagnostic and therapeutic procedures, medical terminology, and human anatomy. *Prerequisite:* Enrollment in the Radiologic Technology curriculum or instructor's permission. Two hours. Giasson, Marschke.

77 Summer Clinical Practicum (0-40) Thirteen weeks during summer at an affiliated hospital. Both 77 and 177 required to meet eligibility requirements of national certifying examinations. Three hours. Izzo, McCarthy, Pembroke.

91, 92 Special Radiologic Projects Independent projects under direction of faculty members. *Prerequisite:* Faculty permission. Variable credit hours.

142 Senior Seminar Topics include: related allied health modalities, career mobility, national certification, and future trends; also includes research methods and requires completion of a project. *Prerequisite:* Senior standing in Radiologic Technology. Two hours. Izzo, Marschke.

177 Summer Clinical Practicum (0-40) Thirteen weeks during summer at an affiliated hospital. Both 77 and 177 required to meet eligibility requirements of national certifying examinations. Three hours. Izzo, McCarthy, Pembroke.

191, 192 Advanced Radiologic Projects Independent projects under direction of faculty members. *Prerequisite:* Permission of department chairperson. Variable credit hours.

NUCLEAR MEDICINE TECHNOLOGY MAJORS

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 and Physiology 9. One hour. Giasson, 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, 4. Three hours. Giasson, Izzo.

33, 34 Nuclear Medicine Clinical Practicum (0-4) Routine imaging procedures emphasizing patient positioning, instrumentation, and film processing on Gamma Cameras; includes introduction to pharmacology. *Prerequisite:* Enrollment in RT. One hour. Giasson.

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 instructor's permission. Five hours. Deininger, Giasson, 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. Giasson.

133, 134 Advanced Nuclear Medicine Practicum (0-12) Experience in advanced clinical and pharmacological procedures, including portable gamma camera, computers, departmental administration, cardiac studies, and radioassays. *Prerequisites:* 34 for 133, 133 for 134. Three hours. Giasson.

RADIATION THERAPY TECHNOLOGY MAJORS

21, 22 Introduction to Radiation Therapy (1-0, 1-2) Introduction to the theories and practice of radiation therapy technology through discussion and laboratory sessions. *Prerequisites:* 4 for 22; enrollment in Therapy program. Two hours. Laberge, Marschke.

23, 24 Radiation Therapy Clinical Practicum (0-4) Students observe and participate in the Medical Center Hospital of Vermont Radiation Therapy Department. *Prerequisite:* Enrollment in Therapy program. One hour. Laberge, Marschke, Pembroke.

26 Radiologic Technology Clinical Lab Concurrent enrollment in RT 24, the clinical practicum course. Activities include unit calibration, patient care and handling, immobilization techniques, etc. *Prerequisite:* 23. One hour. Laberge.

121, 122 Radiation Therapy Techniques (3-0, 3-1) Instructs students in the theory and clinical techniques involved in radiation therapy. *Prerequisite:* 121 for 122. Three hours, four hours. Marschke.

123, 124 Senior Radiation Therapy Clinical Practicum (0-10) A continuation of 23, 24 emphasizing increasing clinical capabilities. *Prerequisites:* 23, 24. Three hours each. Marschke, Pembroke.

125 Clinical Oncology (3-0) Various types of neoplasms, methods of treatment, and elementary pathology. *Prerequisite:* Anatomy and Physiology 9-10 or instructor's permission. Three hours. Marschke.

Recreation Management (RM)

SCHOOL OF NATURAL RESOURCES

Professor Manning (Program Chair); Associate Professors Gilbert, Hudspeth, Lindsay; Lecturers Kaufman, Koenemann; Extension Professor Bevins; Adjunct Associate Professors Echelberger, More.

30 National Parks of the U.S. The natural beauty and unique phenomena of our National Parks are emphasized. Historical development and current problems are cited. Credit not granted for both 30 and Natural Resources 40. Three hours. Lindsay.

40 The American Wilderness (See Natural Resources 40.) Three hours. Manning.

50 Tourism Planning Examination of tourism including its economic, environmental, and social effects. Emphasis on planning to maintain the integrity of tourist regions. Three hours. Kaufman, Manning.

138 Park and Recreation Design Recreational design methodology applied to the design of public and private recreational facilities. Four hours.

151 Food and Lodging Management Economic decision making for the food and lodging industry. Emphasis on analysis of business investment and profitability over the recreation firm's life. Credit not granted for both 151 and Agricultural and Resource Economics 166. *Prerequisite:* Instructor's permission. Three hours. Bevins. Alternate years.

153 Recreation Administration and Operations Administration and operation of outdoor recreation agencies and businesses. Special emphasis on recreation administrative structures, personnel management, and maintenance of parks and outdoor recreation areas. *Prerequisites:* Senior standing, permission. Three hours. Koenemann.

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. Alternate years, 1992-93.

158 Resort Management and Marketing Study of the management of year-round resort facilities. Emphasis on resort marketing, internal support functions, and associated recreational facilities. *Prerequisites:* Junior standing, permission. Three hours. Kaufman.

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 Independent study. *Prerequisites:* Junior standing, permission. One-half to three hours.

191 Recreation Management Practicum Supervised field experience in national, state, urban, or private park and recreation operations. *Prerequisite:* Instructor's permission. One to six 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, Gilbert.

235 Outdoor Recreation Planning Planning large land areas for outdoor recreation use. Emphasis on the planning process relative to the leisure time use of natural resources. *Prerequisites:* Advanced standing in Recreation Management or permission. Four hours. Lindsay.

240 Wilderness and Wilderness Management History, philosophy, and management of wilderness, national parks, and related areas. *Prerequisite:* Permission. Three hours. Manning. Alternate years. Not offered 1992-93.

255 Environmental Interpretation Philosophy, principles, and techniques of communicating environmental values, natural history processes, and cultural features to recreation visitors through the use of interpretive media. *Prerequisite:* 235 or permission. Four hours. Hudspeth. Not offered 1992-93.

Religion (REL)

COLLEGE OF ARTS AND SCIENCES

Professors Martin, Paden (Chairperson); Associate Professors Andrews, Brenneman, Sugarman; Assistant Professors Clark, Gussner, Trainor.

Religion 20, 21, 22, 23, and 27 all address basic questions about the nature and interpretation of religion and about ways of understanding the religious expressions of other historical and cultural worlds. Credit will be given only for two courses at the introductory level (20-27). Credit will be given for only one from Religion 22, 23, 27.

20 Introduction to the Study of Religion: Comparative Study of patterns and differences in religious life; selected comparisons of Asian, Western, and tribal religions. Three hours. Brenneman, Gussner, Paden, Trainor.

21 Introduction to the Study of Religion: Asian Traditions Study of the Hindu, Buddhist, and East Asian religious traditions as expressed in their basic symbolisms, writings, practices, and cultural forms. Three hours. Andrews, Brenneman, Gussner.

22 Introduction to the Study of Religion: Western Traditions Study of the basic motifs, mythic patterns, and historical transformations in religious life from the ancient Near East to the modern West. Three hours. Martin, Sugarman.

23 Introduction to the Study of Religion: Bible Study of religious expressions as exemplified in biblical and related texts. Three hours. Clark, Martin.

27, 28 Introduction to the Study of Religion: Integrated Humanities Study of religious and philosophical thought in Western culture from Hebraic and Greek antiquity to present. *Prerequisites:* Concurrent enrollment in Integrated Humanities Program, English 27, 28 and History 27, 28. Three hours. Sugarman.

80 Religion and Race in America Historical survey of forms of African-American religion in the U.S. in their relation to slavery, segregation, and civil rights; current issues in education and cultural diversity. Three hours. Gussner.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

100 The Interpretation of Religion Examination of major theories and methods used in studying and interpreting religious phenomena. *Prerequisite:* Three hours in religion. Three hours. Fall. Brenneman, Paden.

101 The Social Dimension of Religious Life Comparative study of 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. Martin.

104 Mysticism, Shamanism, and Possession Comparative study of ways in which the inward dimension of religious life finds expression. *Prerequisite:* Three hours in religion. Three hours. Paden.

106 Images of the Goddess Study of earth symbolism and its expression in goddess figures of various religious traditions. Attention paid to general feminine symbolism as expressed through goddess myths and cults. *Prerequisite:* Three hours in religion. Three hours. Brenneman.

108 Myth, Symbol, and Ritual Study of 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.

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 human existence, world, and God. *Prerequisite:* Three hours in religion. Three hours. Sugarman.

114 Hebrew Scriptures Study of the history and writings of the Hebraic-Judaic religion to the first century B.C. *Prerequisite:* Three hours in religion. Three hours. Sugarman.

116 Judaism Investigation of sustaining rituals, customs, institutions, and beliefs of normative Judaism. *Prerequisite:* Three hours in religion. Three hours. Sugarman.

122 Christian Origins Historical study of the first four centuries of Christianity in its sociocultural context, including consideration of New Testament texts. *Prerequisite:* Three hours in religion. Three hours. Martin.

124 Christianity Historical study of the Christian tradition examining major religious movements of early, medieval, and Reformation Christianity, and the spirituality of Christians during these periods. *Prerequisite:* Three hours in religion. Three hours. Clark.

131 Studies in the Hindu Tradition Selected writings, rituals, and developments in the Hindu tradition with reference to cultural assumptions of India. *Prerequisite:* Three hours in religion. Three hours. Gussner.

132 The Buddhist Tradition A study of early Buddhist thought and practice and their later developments through an examination of selected scriptures and other resources. *Prerequisite:* Three hours in religion. Three hours. Andrews, Trainor.

141 Religion in Japan An examination of Japanese values as expressed in folk, Shinto, and Buddhist traditions, and in social structures, aesthetic pursuits, or business practices. *Prerequisite:* Three hours in religion. Three hours. Andrews.

145 Religion in China Examination of the content and development of the folk, Confucian, Taoist, and Buddhist traditions, and of contemporary Marxist values. *Prerequisite:* Three hours in religion. Three hours. Andrews.

155 Celtic Myth and Ritual An examination of Celtic symbols, myths, and rituals focusing upon the Celts in Ireland, including their relationship to the Christian tradition in the 5th century A.D. *Prerequisite:* Three hours in religion. Three hours. Brenneman.

157 Religion in America Study of the relationship between religion, the cultural ethos, and identity in America. *Prerequisite:* Three hours in religion. Three hours. Martin.

159 Religion and Secular Culture The effects of modern culture on religion, and the emergence of new forms of religious life and expression. *Prerequisite:* Three hours of religion. Three hours. Brenneman.

168 Contemporary Spiritual Life Study of human involvement with the spiritual as manifested in contemporary religious groups, or in modern theory and practice of meditation. *Prerequisite:* Three hours in religion. Three hours. Gussner.

173 Studies in Gender and Religion Selected topics in the history of the Christian tradition focusing on the social and religious construction of gender and the shape of women's religious lives. *Prerequisite:* Three hours in religion. Three hours. Clark. May be repeated up to six hours.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Readings and Research Variable credit.

201 Senior Seminar: Creative Hermeneutics Selected contemporary issues in theory and interpretation; group interpretations of common texts or phenomena; preparation and presentation of individual senior projects. *Prerequisites:* Twelve hours in religion, including 100 and six hours at the intermediate level, senior standing. Three hours. (Spring).

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.)

224 Studies in Christianity Examination of selected issues, movements, periods, or individuals within the Christian tradition. *Prerequisites:* Nine hours in religion (122, 124, or 173 recommended). Three hours. May be repeated up to six hours. Three hours. Clark, Martin.

226 Studies in Hellenistic Religion Study of religion in the Mediterranean area during the period from the 4th century B.C. though the 4th century A.D. including Christian origins. *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 examined. *Prerequisite:* Nine hours in religion, with three hours at the intermediate level. Three hours. May be repeated up to six hours. Clark, Sugarman. (Not offered for graduate credit.)

240 Studies in Asian Religions Concentrated studies in the history, life, or thought of a selected Asian religious tradition. *Prerequisite:* Three hours in religion at intermediate level in the same religious traditions. Three hours. Andrews, Gussner, Trainor.

280 Symbol and Archetype 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. 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, instructor's permission. Three hours. (Not offered for graduate credit.)

Resource Economics (RSEC)

SCHOOL OF NATURAL RESOURCES

Associate Professors Gilbert (Program Chair); Extension Professor Bevins.

RSEC 121 Resource Economics 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 Economics Issues (See Agricultural and Resource Economics 162.) Three hours.

RSEC 222 Natural Resources Evaluation An analysis of economic procedures used in the evaluation of public natural resource developments, emphasizing benefit-cost analysis. *Prerequisite:* 121. Three hours. Gilbert.

RM 225 Economics of Outdoor Recreation and Tourism (See Recreation Management 225.) Three hours. Bevins, Gilbert.

RSEC 255, 256 Special Topics in Resource Economics

Romance Languages (FREN, ITAL, SPAN)

COLLEGE OF ARTS AND SCIENCES

Professors Carrard, Weiger, Whatley, Zarate; Associate Professors Crichfield, T. Geno, Kuizenga (Chairperson), Murad, Senecal, van Slyke, Wesseling; Assistant Professors Maura, Roof, Whitebook; Instructors Ngame, Ruggiero.

French, Italian, 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 sequence for the beginning levels of French, Italian, and Spanish is: 1-2-51-52. French 9 and Spanish 9 are optional courses which may be elected prior to French or Spanish 51, if the student's background warrants it. Students should enter the sequence at the point dictated by previous background, achievement, and/or consultation with the department. For placement in advanced language courses (100 or above), first-year students should consult with this department. Students may not take a language course lower than the level most recently attained except with the permission of the department. This stricture does not apply to literature or civilization courses.

The first two semesters of a foreign language are excluded from the 45-hour limit on courses from a single department that can be counted toward the 122 hours required for the Bachelor of Arts degree.

FRENCH LANGUAGE

1 Elementary I Fundamentals of French composition, comprehension, pronunciation, speaking, reading, writing. Structure of the basic French sentence. No prior knowledge expected. Four hours.

2 Elementary II Continuation of 1. *Prerequisite:* 1 or equivalent. Four hours.

9 Basic French Grammar Review Thorough review of French grammar in preparation for intermediate level. Considerable emphasis on written exercises. Three hours.

51 Intermediate Reading and Conversation I Designed to help students move from a basic knowledge of French to the ability to read, speak, and understand French better. Some grammar review and short compositions. *Prerequisite:* 2 or 9 or equivalent. Three hours.

52 Intermediate Reading and Conversation II Continues building on skills developed in 51. Less stress on grammar review. Reading selections and compositions are longer and more sophisticated than in 51. *Prerequisite:* 51 or equivalent. Three hours.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

101 Intensive Written Expression Guided practice of French written expression through a systematic study of writing processes and strategies. Three hours.

102 Intensive Oral Expression Guided practice of oral-aural skills through vocabulary and pronunciation exercises, readings, and oral presentations. Writing exercises reinforce oral work. Three hours.

201 Advanced Composition and Conversation Course activities (discussions, exposes, written work, etc.) designed to lead to mastery of French oral and written expression. Three hours. (Not offered for graduate credit.)

209 Advanced Grammar Comparative grammatical study centered on the specific problems encountered by Anglophones in written and spoken French. Three hours. Conrad, van Slyke.

210 Romance Philology Development of French, Spanish, and Italian from Latin. Study of documents. *Prerequisite:* Intermediate level in at least two of the languages, or permission. Taught in English. Three hours. Whitebook.

215 Methods of Text Analysis Introduction to procedures and terminology used in 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.

ITALIAN LANGUAGE

1 Elementary I Fundamentals of Italian composition, comprehension, pronunciation, speaking, reading, writing. Structure of the basic Italian sentence. No prior knowledge expected. Four hours.

2 Elementary II Continuation of 1. *Prerequisite:* 1 or equivalent. Four hours.

51 Intermediate Reading and Conversation I Designed to help students move from a basic knowledge of Italian to the ability to read, speak, and understand Italian better. Some grammar review and short compositions. *Prerequisite:* 2 or 9 or equivalent. Three hours.

52 Intermediate Reading and Conversation II Continues building on the skills developed in 51. Less stress on grammar review. Reading selections and compositions are longer and more sophisticated than in 51. *Prerequisite:* 51 or equivalent. Three hours.

SPANISH LANGUAGE

1 Elementary I Fundamentals of Spanish composition, comprehension, pronunciation, speaking, reading, writing. Structure of the basic Spanish sentence. No prior knowledge expected. Four hours.

2 Elementary II Continuation of 1. *Prerequisite:* 1 or equivalent. Four hours.

9 Basic Spanish Grammar Review Thorough review of Spanish grammar in preparation for intermediate level. Considerable emphasis on written exercises. Three hours.

51 Intermediate Reading and Conversation I Designed to help students move from a basic knowledge of Spanish to the ability to read, speak, and understand Spanish better.

Some grammar review and short compositions. *Prerequisite:* 2 or 9 or equivalent. Three hours.

52 Intermediate Reading and Conversation II Continues building on the skills developed in 51. Less stress on grammar review. Reading selections and compositions are longer and more sophisticated than in 51. *Prerequisite:* 51 or equivalent. Three hours.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

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 expected. Three hours each course.

105 Phonology Study of Spanish and Spanish-American phonemic systems. Contrast of Spanish and English phonemes. Practical exercises with vowels, consonants, syllables, rhythm, intonation, and gestures. Fall. Does not fulfill Arts & Sciences foreign language requirement, but does not count toward Spanish major. *Prerequisite:* Spanish 51. Three hours. Weiger.

109 Spanish Grammar An intensive study of Spanish grammar. Topical approach. Three hours.

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. (Not offered for graduate credit.)

210 Romance Philology (See French 210.) Three hours.

LITERATURE AND CIVILIZATION COURSES IN FRENCH, ITALIAN, AND SPANISH

While the literature and civilization courses in French and Spanish are divided chronologically, it is not essential that students adhere strictly to this order. In general, a 100-level literature course or its equivalent is the prerequisite for all more advanced literatures courses: exceptions can be 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.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

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.

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.

235 Literature of the French Renaissance Readings in

fiction, poetry, and essays: Rabelais, the lyric poets Louise Labé, Ronsard, and Du Bellay, the tales of Marguerite de Navarre; Montaigne. Three hours. Kuizenga, Whatley.

245 The Baroque Age 1600-1650 The literature after France's civil wars up to the triumph of classicism: religious, lyric, baroque drama; Pascal. Three hours. Whatley.

246 17th Century Selected works of the century with emphasis on Corneille, Racine, and Moliere. Three hours. Kuizenga.

247 Moliere (Same as Theatre 229.) A study of the major portion of Moliere's comic creation as classical French theatre and literature. Three hours. T. Geno.

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.

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.

265 19th Century Literature Discourses of knowledge through imagination, instinct, emotion in early manifestos, romantic writers, symbolists, and fin de siècle decadents. Representative authors: Stael, Hugo, Flaubert, Rimbaud, Mallarmé. Three hours. Crichfield.

266 Revolution and Reaction in 19th Century Narrative Study of the representations of major social issues of the period, such as power, class, money, and women. Representative authors: Balzac, Flaubert, Sand, Stendhal, Zola. Three hours. Van Slyke.

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.

285 Quebec Literature A study of contemporary (1960-1985) major works of fiction, poetry, and drama. Authors studied include Anne Hebert, Michel Tremblay, Jacques Godbout, Gaston Miron. Three hours. Senecal.

289 African Literature of French Expression 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.

290 Contemporary French Thought: The Linguistic Model Study of the model of structural analysis established by Saussure and its adaptation to other domains of contemporary thought such as anthropology, psychoanalysis, and philosophy. Three hours. van Slyke.

291 Civilization of France French civilization from the Middle Ages through the 19th century, including major socioeconomic, political, intellectual, and cultural aspects. Three hours.

292 Contemporary French Civilization 20th century France, emphasizing current social, economic, and political structures, cultural and intellectual developments, and daily life. French 291 or History 53 strongly recommended as preparation. Three hours.

293 Quebec Culture Sociocultural study of the Francophone civilization of Canada. Three hours. Senecal.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

297, 298 Advanced Readings and Research

ITALIAN LITERATURE AND CIVILIZATION

121, 122 Italian Civilization and Culture Emphasis on increasing oral and written command of the language. Class

discussions and written work are based on literary selections, newspaper and magazine articles, and film scripts. *Prerequisite:* 52 or equivalent. Three hours. Ruggiero.

155 Masterworks A study of major authors and genres from the origins of Italian literature to the 18th century. *Prerequisite:* 52 or equivalent. Three hours. Ruggiero.

156 Masterworks A study of major authors and genres from 18th century to the present. *Prerequisite:* 52 or equivalent. Three hours. Ruggiero.

SPANISH LITERATURE AND CIVILIZATION

155 Masterworks Representative novels, plays, poetry of the period before 1800. Three hours.

156 Masterworks Representative plays, novels, poetry since 1800. Three hours.

185 Readings in Spanish American Literature Survey of the literature of Spanish America from pre-Columbian times through the colonial period and Romanticism. Three hours. Zarate.

186 Readings in Spanish American Literature Survey of the literature of Spanish America from *Modernismo* through *Vanguardismo*, *Realismo Magico* to the present. Three hours. Murad.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Readings and Research

235 Golden Age Drama and Prose The picaresque novel and the drama of the 16th and 17th centuries, emphasizing Lope de Vega, Calderon, Quevedo, Tirso de Molina. Three hours each course. Weiger.

236 Golden Age Poetry The major poets (Garcilaso, Fray Luis, San Juan, Quevedo, and Gongora) and the poetic tradition of the 16th and 17th centuries. Three hours. Wesseling.

245, 246 Cervantes *Don Quijote*, the *Novelas Ejemplares*, and the theatre of Cervantes. Three hours. Weiger.

265 19th Century Spanish Literature Romanticism and realism: (1) Romantic theatre; (2) the realist and naturalist novelists: Galdos and Leopoldo Alas. Three hours. Wesseling.

266 20th Century Spanish Poetry and Drama Vanguard vs. tradition from the Generation of 1898 to present. Three hours. Roof, Wesseling.

277 20th Century Spanish Prose Fiction and Essay Innovation and experimentation from the Generation of 1898 to the present. Three hours. Roof, Wesseling.

281 Spanish-American Prose Fiction of the 20th Century A study of representative works by major authors tracing the development of narrative forms from their roots in the last century to the present. Three hours. Murad.

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.

291 Civilization of Spain Topical approach to the study of Spanish civilization through the 17th century, emphasizing ideas, art, and literature. Three hours. Maura.

292 Civilization of Spain Topical approach to the study of Spanish civilization from the 18th century to the present, emphasizing ideas, art, and literature. Three hours. Roof.

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 religion. Three hours. Zarate.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

297, 298 Advanced Readings and Research

The following extra-departmental courses may not be taken for credit toward a major in the Department of Romance Languages except by special agreement with the department chair:

GLIT 72 Romance Literature in Translation

GLIT 131 French Literature in Translation

GLIT 132 Francophone Literature in Translation

GLIT 141 Spanish Literature in Translation

GLIT 142 Spanish-American Literature in Translation

LING 101, 102 Linguistics

Russian (RUSS)

COLLEGE OF ARTS AND SCIENCES

Associate Professors McKenna, Nalibow; Assistant Professor Henry.

The first two semesters of a foreign language are excluded from the 45-hour limit on courses from a single department that can be counted toward the 122 hours required for the Bachelor of Arts degree.

1, 2 Elementary Russian An introduction to all aspects of contemporary standard Russian: speaking, listening, reading, writing. Cultural components include topics such as music, art, literature, and current events. No previous knowledge of Russian needed for 1. Four hours each course. Henry, McKenna, Nalibow.

51, 52 Intermediate Russian Continued practical work in all language skills (speaking, listening, reading, writing), with more analysis of the structure of Russian. Continuation of cultural components. *Prerequisite:* 1, 2. Four hours each course. Henry, McKenna, Nalibow.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

101 Phonology Practical work on Russian intonation, element order, and phonetics, using primarily Russian materials. Classroom and language laboratory work. May be taken together with 52. *Prerequisite:* 52 or concurrent enrollment in 52. Three hours. Nalibow.

121, 122 Composition and Conversation Continued practical work on all four language skills. Emphasis on oral and written self-expression. Presentations and compositions based on Russian-language media and literature. *Prerequisite:* 52. Three hours. Henry, McKenna, Nalibow.

141 Reading Comprehension Development of contextual strategies for reading authentic texts on a number of content areas, primarily expository texts from Russian newspapers, magazines, historical and scientific documents. *Prerequisite:* 52. Three hours. Henry, McKenna, Nalibow.

142 Listening Comprehension Intensive directed aural work with authentic Russian-language media (especially television, radio, and films), supplemented by work on vocabulary development and listening strategies. *Prerequisite:* 52. Henry, McKenna, Nalibow.

161 Russian Lexicology Study of Russian word roots and derivational morphology to increase vocabulary recognition

and retention, building on correspondences with English/Latinic equivalent roots where possible. *Prerequisite:* 52. Three hours. McKenna.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Readings and Research

201 Survey of Russian Literature Readings and discussions about Russian literature to the rise of modernism. Particular attention to the social and historical context of the 19th century novel. *Prerequisites:* 52, GLIT 181 recommended. Three hours. Henry, McKenna, Nalibow.

202 Survey of 20th Century Russian Literature Readings and discussions about Russian literature from the rise of modernism to present. Particular attention to function of literature in Soviet society. *Prerequisites:* 52, GLIT 182 recommended. Henry, McKenna, Nalibow.

221 Culture and Civilization to the 1905 Revolution Social, cultural, and political institutions from the time of Peter the Great to the 1905 revolution. Particular attention to Russian music, art, and literature. *Prerequisite:* 52. Three hours. Henry, McKenna, Nalibow.

222 Culture and Civilization in the 20th Century Social, cultural, and political institutions from the 1905 revolution to the present. Particular attention to tensions between official and unofficial culture during the Soviet period. *Prerequisite:* 52. Three hours. Henry, McKenna, Nalibow.

251 Russian News Media Analysis of journalistic style and content in news coverage of contemporary events as reported in Russian newspapers and radio and television broadcasts. *Prerequisites:* 52, 141 or 142 recommended. Three hours. McKenna.

271 Slavic Linguistics The linguistic prehistory of Slavic. Linguistic history of the Russian language: introduction to Old Church Slavic and Old Russian, tracing Slavic declensional development. *Prerequisite:* One 100-level Russian course or instructor's permission. Three hours. Nalibow.

281 Seminar on a Selected Literary Genre or Period Study of a literary genre or period through close readings of representative texts supplemented by lectures and reports on sociocultural context. May be repeated. *Prerequisite:* One 100-level Russian course. Three hours. Henry, McKenna, Nalibow.

282 Seminar on a Selected Author or Authors Study of author(s) through close readings of representative texts supplemented by lectures and reports on the works' sociocultural context. May be repeated. *Prerequisite:* One 100-level Russian course. Three hours. Henry, McKenna, Nalibow.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

GENERAL LITERATURE

181 19th Century Russian Literature in Translation Survey of major 19th century authors and genres. Close readings supplemented by lectures and discussions. Particular attention to literary and social institutions in Russia. Three hours. Henry, McKenna, Nalibow.

182 20th Century Russian Literature in Translation From Russian modernism to the present. Close readings supplemented by lectures and discussions. Attention to both official and unofficial texts from the Soviet period. Three hours. Henry, McKenna, Nalibow.

183 Topics in Russian Literature in Translation Study of topics such as Russian author(s) (e.g. Dostoevsky and Tolstoy), genre (e.g. the Russian novel), literary school (e.g. Russian Formalism). Three hours. Henry, McKenna, Nalibow.

Russian and East European Studies

COLLEGE OF ARTS AND SCIENCES

Prof. Nalibow, Director.

The following courses are among the course offerings: Russian 52; History 27; Geography 53; Economics 11, 12, 185, 277, 281; Political Science 172, 272; General Literature 181, 182, 183 (see department for specific course description). Also see International Studies for special topic listings.

Social Work (SWSS)

COLLEGE OF EDUCATION AND SOCIAL SERVICES

Professor Witkin (Chairperson); Associate Professors Burrell, Paolucci-Whitcomb, Thompson; Assistant Professors Bishop, Moroz, Roche.

2 Foundations of Social Work An introduction to the profession of social work, its functions, values, knowledge, and the problems it addresses. Three hours.

47 Human Behavior in the Social Environment I Introduction to life span development from birth to death. There is a primary focus on the individual. *Prerequisites:* 2, 51, or instructor's permission. Three hours.

48 Human Behavior in the Social Environment II A systems approach to understanding various levels of social organization; for example, families, groups, organizations, and communities. *Prerequisite:* 47. Three hours.

51 Human Needs and Social Services Students provide volunteer service in a social agency, relate observations to theory about clients, agency structure, programs, and operations, and assess their commitment to working with people. *Prerequisite:* 2 or instructor's permission. Three hours.

165 Issues and Policy in Social Welfare I An introduction to economic, political, historical, and social forces that influence the development and implementation of social welfare policy. *Prerequisites:* 2, 47, 48, 51, Economics 11, Political Science 21, Psychology 1, Sociology 1. Three hours.

166 Issues and Policy in Social Welfare II In-depth examination of social welfare policy and accompanying social services in the U.S.; major policy analysis models presented and used. *Prerequisites:* Social work major or permission; 165. Three hours.

167 Racism and Contemporary Issues Study of perception, conceptualization, and comprehension of racism. Strategies, techniques, and procedures to identify and decrease many facets of racism. Three hours.

168 Social Work Intervention I Social work theory and practice methods employed by social workers in providing services to individuals and in group situations. *Prerequisite:* Accepted Social Work major or permission. Three hours.

169 Social Work Intervention II Social work theory and practice methods employed by social workers in providing services to families and communities. *Prerequisites:* Student standing — accepted SW major or permission; 168. 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:* 169, majors, senior standing. Twelve hours.

171 Field Experience Seminar Weekly seminar. *Prerequisite:* Concurrent enrollment in 170. Three hours.

194 Introduction to Social Work Research Introduction to models and methods of social research from a social work perspective. *Prerequisite:* Social Work major or permission. Three hours.

197 Readings and Research *Prerequisite:* Social Work major. Pre-arrangement only. Variable credit, one to four hours.

291 Senior Seminar Weekly seminar for social work majors to examine issues in social work practice. *Prerequisites:* Senior standing, SW majors. Three hours.

Sociology (SOC)

COLLEGE OF ARTS AND SCIENCES

Professors Cutler, Danigelis, Loewen, Mintz, Sampson, Smith, Stanfield; Associate Professors Berkowitz, Fengler, Finney, Fishman, McCann, Schmidt (CALS); Assistant Professors Diouf, Kahn, Krymkowski, Streeter, Tang.

1 Introduction to Sociology Fundamental principles and problems in the sociological analysis of the structure and dynamics of modern society. Three hours.

11 Social Problems Introduction to sociology through detailed examination of a selected number of major structural problems characteristic of contemporary societies. Problems treated may vary. Three hours. Fengler, Finney, Kahn, Krymkowski, Schmidt, Smith.

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. Fishman, McCann, Stanfield.

19 Race Relations in the U.S. Analysis of racial prejudice, discrimination, and other dominant group practices directed toward Native, Asian-, and African-Americans and their social movements for integration, accommodation, and separatism. Three hours. Berkowitz, Danigelis, Diouf, Fishman, Loewen, Tang.

20 Aging: Change and Adaptation (Same as Nursing 20 and Early Childhood and Human Development 20/Education) Individual and social meanings of aging and old age; physical, physiological, psychological, and sociological changes accompanying aging; individual, family, community, and societal adaptations to aging. Three hours. Brown, Cutler.

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. Kahn, Sampson, Streeter.

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, Kahn.

31 Race and Ethnicity in Canada and the United States Comparison of Canadian and U.S. responses to issues of race and ethnicity for people of native, African, or Asian origin and for Spanish- or French-speaking people. Three hours. Berkowitz, Stanfield.

43 Survey of Mass Communication The historical development of the socioeconomic, political, educational, and religious impacts of the press, film, radio, and television in American society. *Prerequisite:* 1 or Psychology 1. Three hours. Streeter.

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. Fishman, McCann.

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. Streeter.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing department offerings. See Schedule of Courses for specific titles.

All courses numbered 100–199 require three hours of sociology, preferably Sociology 1, specified experience or work in another discipline as indicated, or the instructor's permission.

100 Fundamentals of Social Research (Same as Political Science 181.) Introduction to research methods in social science. 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. Four hours. Berkowitz, Cutler, Danigelis, Krymkowski, Loewen, McCann, Tang.

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, Tang.

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. Diouf, Loewen, Schmidt.

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. Kahn, Sampson, Streeter.

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. Fishman, McCann, Stanfield.

119 Minority Groups (Same as Anthropology 187.) Description and analysis of ethnic, racial, and religious groups in the U.S. Examination of social/cultural patterns in the larger society and in the minorities themselves. *Prerequisite:* Three hours of sociology. Three hours. Danigelis, Diouf, Tang, Woolfson.

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. *Prerequisite:* Three hours of sociology or professional experience working with the elderly. Three hours. Cutler, Danigelis, Fengler.

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, Kahn, Mintz, Smith.

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, Mintz, Sampson, Smith.

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 vary. *Prerequisite:* 10, 29, or six hours in a related social science. Three hours. Fengler, Kahn.

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, Diouf, Finney, Krymkowski, McCann, Mintz, Sampson, Smith, Tang.

141 Language and Society Examination of the relationship between languages, perception, thought, and the sociocultural contexts of meaning and communication. *Prerequisite:* Three hours of sociology. Three hours. Kahn, Streeter.

150 Popular Culture Analysis of social significance of a selected range of contemporary nonelite cultural forms in the U.S., such as rock music, television programming, and popular literature. *Prerequisite:* Three hours of sociology. Three hours. Streeter.

151 Sociology of Religion Analysis of the sociocultural organization of religions with special attention to the changing forms of religions in contemporary society and their relationships to other institutions. *Prerequisite:* Three hours of sociology or six hours of religion. Three hours. Kahn, 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. Fengler, Kahn.

161 Sociology of Leisure Analysis of the sociocultural organization of nonwork activity, emphasizing the relationships of class, life style, education, and work to contemporary recreation and leisure use patterns. *Prerequisite:* Three hours of sociology. Three hours. Danigelis, Streeter.

178 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 instructor's permission. Three hours. Danigelis, Diouf, Loewen, McCann, Sampson, Schmidt.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Readings and Research

All courses numbered 200–299 are seminars or individual tutorials and require a minimum of six hours of sociology, three of which must be at the 100 or intermediate level, equivalent preparation as indicated or instructor's permission.

204 Ecological Perspective on Human Communities Analysis of relationships between the social, economic, and technological organization of communities and their physi-

cal and sociocultural environments. Emphasis upon community land use and settlement patterns. *Prerequisite:* Six hours of sociology or Anthropology/Geography 179. Three hours. Schmidt.

205 Rural Communities in Modern Society The changing structure and dynamics of rural social organization in context of modernization and urbanization. Emphasis on rural communities in the U.S. *Prerequisite:* Six hours of sociology. Three hours. Diouf, Schmidt, Smith

206 Urban Communities in Modern Society The changing structure and dynamics of urban social organization in context of modernization and urbanization. Emphasis on cities and metropolitan areas in the U.S. *Prerequisite:* Six hours of sociology. Three hours. Loewen, Sampson.

207 Community Organization and Development Communities as changing sociocultural organizational complexes within modern society. Special attention given to problems of formulation and implementation of alternative change strategies. *Prerequisite:* Six hours of sociology. Three hours. Diouf, Finney, Schmidt.

209 Small Groups 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. Kahn.

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. Berkowitz, Danigelis, Diouf, Schmidt.

213 Women in Development in Third World Countries An examination of the meaning and measurement of development, sociodemographic characteristics, sex stratification, and effects of Colonialism and Westernization on women's issues in the third world. *Prerequisites:* Six hours of sociology or permission. Three hours. Diouf, Kahn, McCann, Smith.

214 Delinquency Analysis of the nature and type 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. Fishman, Stanfield.

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. Fishman, McCann, 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. Fishman, Stanfield.

219 Race Relations Examination of American racial subordination in social and historical perspective. Analysis of interracial contacts, racial subcultures and social structures, and responses to racial prejudice and discrimination. *Prerequisite:* Six hours of sociology. Three hours. Danigelis, Diouf, Loewen, Tang.

220 Internship in Gerontology Supervised service or research internship integrating theoretical and practical gerontological issues. *Prerequisites:* 20, 120; 221 or 222; or equivalent gerontological preparation. Three hours. Cutler. (Not offered for graduate credit.)

221 Aging and Social Change Examines effects of social changes on older persons on the aging process. Also analyzes how an increasing proportion of older persons in the

population leads to social change. *Prerequisites:* Six hours of sociology. Three hours. Cutler.

222 Aging and Ethical Issues Analysis of selected ethical issues posed by an aging society and faced by older persons, their families, health care and service providers, and researchers. *Prerequisite:* Six hours of sociology. Three hours. Cutler.

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, Mintz, 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 instructor's permission. Three hours. Berkowitz, Diouf, Finney, Mintz.

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 explored. *Prerequisite:* 129 or six hours of sociology. Three hours. Fengler, Kahn, Smith.

232 Social Class and Mobility Comparative and historical analysis of 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, Diouf, Finney, Krymkowski, McCann, Mintz, Sampson, Schmidt, Smith, Tang.

237 Occupations and Professions Analysis of social organization of economic roles in industrial societies, the institutional relationships of occupations and professions, and impact of working structure on the individual. *Prerequisite:* Six hours of sociology. Three hours. Finney, Mintz, Smith, Tang.

239 Women and Public Policy in Vermont A detailed analysis of the social processes involved in public policy formation in Vermont, and the consequences for women. *Prerequisite:* Six hours of sociology. Three hours. Smith. (Graduate credit pending.)

240 Political Sociology Examination of the social organizations 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, Diouf, Loewen, Mintz.

241 Methods of Public Opinion Research (Same as Political Science 284.)* Methods used in conducting public opinion research, emphasizing design, sampling, questionnaire construction, administration, data control, and analysis of cross-sectional, longitudinal and time series data. *Prerequisite:* 100 (Political Science 181) or equivalent with instructor's permission. Three hours. Berkowitz, Danigelis.

242 Public Opinion: Theory and Research (Same as Political Science 285.)* Examination of theories of public opinion. Topics include: attitude formation and change, political ideology, alienation and allegiance, political socialization, tolerance, and political extremism. *Prerequisite:* 241 (Political Science 284) or instructor's permission. Three hours. Sampson.

243 Mass Media in Modern Society Intensive examination of selected topics in the structure of media organizations and their relationships to and impacts upon the major institutions and publics of contemporary issues. *Prerequisite:* Six hours of sociology. Three hours. Streeter.

250 The Sociology of Culture The relations of cultural forms and subjective experience to social structure and power; in-depth applications of interpretive approaches in contemporary sociology. *Prerequisite:* Six hours of sociology. Three hours. Kahn, Streeter. (Graduate credit pending.)

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, Kahn, Mintz.

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.

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. Stanfield.

274 Research Seminar Principles of research design, data gathering, ethics, measurement, data analysis, and data presentation. Students will complete a research project. *Prerequisites:* 100 or equivalent with instructor's permission. Three hours. Danigelis, Finney, Krymkowski, Loewen, Schmidt, Tang.

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 emphasizing multivariate techniques. *Prerequisite:* 100 or equivalent with instructor's permission. Three hours. Berkowitz, Danigelis, Krymkowski, McCann, Tang.

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 also examined. *Prerequisite:* 178. Three hours. McCann, Sampson.

281, 282 Seminar Presentation and discussion of advanced problems in sociological analysis. *Prerequisites:* Twelve hours of sociology, instructor's permission. Three hours.

285, 286 Internship *Prerequisites:* Twelve hours of sociology including at least one 200-level course in substantive area relevant to field placement, departmental permission.

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 students who serve concurrently as teaching assistants in the Department. Three hours.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

297, 298 Readings and Research

*Credit not given for both 241 and Political Science 284 or for both 242 and Political Science 285.

Statistics (STAT)

COLLEGE OF ENGINEERING AND MATHEMATICS

Statistics Program Steering Committee: Professors Ashikaga, Costanza, Haugh (Director), Howell, McCrorey; Associate Professors Gordon, Mickey, Newton, Son; Research Professor Aleong; Research Associate Professor McAuliffe; Lecturers Badger, Low, MacPherson, Weaver.

11 Introduction to Statistics via Microcomputers Various study designs considered. Graphical and analytic techniques for presenting results. Wide variety of applications surveyed. PC-based software used. Experience gained in sample survey work. *Prerequisite:* High school algebra. Three hours.

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 sophomores, juniors, or seniors in the mathematical and engineering sciences.

95 Topics in Statistics Lectures, reports, and directed readings at an introductory level. *Prerequisite:* As listed in course schedule. One to three 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.

*A student may receive credit for only one of 111 and 141, unless special permission has been given by the Statistics Program.

141 Basic Statistical Methods Foundational course for students taking further quantitative courses. Exploratory data analysis, probability distributions, estimation, hypothesis testing. Introductory regression, experimentation, contingency tables, and nonparametrics. Computer software used. *Prerequisites:* Math. 19 or 21, sophomore standing. Three hours.

151 Applied Probability Foundations of probability, conditioning, and independence. Business computing, biological, engineering reliability, and quality control applications. Classical discrete and continuous models. Pseudo-random number generation. *Prerequisites:* Math. 22 or 20 with instructor's permission. Three hours.

191 Special Projects Student-designed special project under supervision of a staff member culminating in a report. *Prerequisites:* Junior standing, permission of Program Director. One to four hours as arranged.

195 Special Topics For Undergraduate Students Lectures, reports, and directed readings. *Prerequisite:* As listed in course schedule. One to three hours as arranged.

200 Medical Biostatistics (Same as Biostatistics 200.) Introductory design and analysis of medical studies. Epidemiological concepts, case-control, and cohort studies. Clinical trials. Students evaluate statistical aspects of published health science studies. *Prerequisite:* 141 or 211. Three hours.

201 Statistical Analysis Via Computer (Same as Biostatistics 201.) Intensive coverage of computer-based data processing and analysis using statistical packages, subroutine libraries, and user-supplied programs. Students analyze real data and prepare a comprehensive report. *Prerequisites:* 111 with permission of Director, or 141, or corequisite 211. Three hours.

211 Statistical Methods I (Same as Biostatistics 211.) Fundamental concepts and techniques for data analysis and experimental design. Descriptive and inferential statistics,

including classical and nonparametric methods, regression, correlation, and analysis of variance. *Prerequisites:* Junior standing, Math. 19 or 21, or college algebra with instructor permission. Three hours.

221 Statistical Methods II (Same as Biostatistics 221.) Multiple regression and correlation. Basic experimental design. Analysis of variance (fixed, random, and mixed models). Analysis of covariance. Computer software usage. *Prerequisites:* 211 or 241 or 261 or 141 with instructor's permission. Three hours.

223 Applied Multivariate Analysis (Same as Biostatistics 223.) Analysis methods for categorical and continuous multivariate data. Discriminant analysis, logistic regression, canonical correlation, principal components, factor analysis and log linear models. Computer software usage. *Prerequisites:* 211 or 241 or 261, or 141 with instructor's permission. Math. 124 recommended. Three hours.

224 Statistics for Quality and Productivity (Same as Biostatistics 224.) Statistical methods for product quality and productivity. Statistical process control. Shewhart, CUSUM, empirical Bayes control charts. Acceptance, continuous, sequential sampling. Selected statistical computer programs utilized. *Prerequisites:* Any one of 211, 241 or 261, or 141 with instructor permission. Three hours.

225 Applied Regression Analysis (Same as Biostatistics 225.) Simple linear and multiple regression models; least squares estimates, correlation, prediction, forecasting. Problems of multicollinearity and influential data (outliers). Selected statistical computer programs utilized. *Prerequisite:* Any one of 111, 141, 211, 241, or 261. Three hours.

227 Statistical Methods for the Behavioral Sciences (Same as Psychology 341.) *Prerequisite:* 211 with computer experience or Psychology 340.

229 Reliability and Survival Analysis (Same as Biostatistics 229.) Probabilistic modeling and inference in reliability. Replacement, maintenance inspection policies. Weibull, lognormal analyses. Accelerated life tests. Regression analyses with survival data; proportional hazards. Computer applications. *Prerequisites:* Any one of 211, 241, 261, or 141 plus a second statistics course; Math. 121. Statistics 151 recommended. Some computer experience desirable. Three hours.

231 Experimental Design (Same as Biostatistics 231.) Randomization, complete and incomplete blocks, cross-overs, covariance analyses, factorial experiments, confounding, fractional-replication, nesting split plots, repeated measures, response surface optimization, Taguchi methods, and optimal designs. *Prerequisite:* Any one of 141, 211, 241, or 261. Three hours.

233 Design of Sample Surveys (Same as Biostatistics 233.) Design and data analysis for sample surveys. Simple random, stratified, systematic, cluster, multistage sampling. Practical issues in planning and conducting surveys. *Prerequisites:* 211, 241 or 261, or 141 with instructor's permission. Three hours.

241 Introduction to Statistical Inference (Same as Biostatistics 241.) Introduction to statistical theory: related probability fundamentals, derivation of statistical principles, and methodology for parameter estimation and hypothesis testing. *Prerequisites:* 151 or 251 and a course in statistical methods recommended; Math. 121. Three hours.

251 Probability Theory (Same as Math. 207.) Distributions of random variables and functions of random variables. Expectations, stochastic independence, sampling and limiting distributions (central limit theorems). Concepts of random number generation. *Prerequisite:* Math. 121, Statistics 151 recommended. Three hours.

252a Applied Discrete Stochastic Process Models Markov chain models for biological, social, and behavioral systems models. Random walks, transition and steady-state probabilities, passage and recurrence times. *Prerequisite:* 151 or 251. One hour.

252b Applied Continuous Stochastic Process Models Queueing models for operations research and computer science systems analysis. Birth-and-death processes with applications. Exponential, Erlang, and Poisson distributions. Monte Carlo simulation. *Prerequisite:* 151 or 251. One hour.

253 Applied Time Series and Forecasting (Same as Biostatistics 253.) Autoregressive moving average (Box-Jenkins) models, autocorrelation, partial correlation, differencing for nonstationarity, computer modeling. Forecasting, seasonal or cyclic variation, transfer function and intervention analysis, spectral analysis. *Prerequisite:* Any one of 141, 211, 225, 241, or 261. Three hours.

261, 262 Statistical Theory I, II (Same as Biostatistics 261, 262.) Point and interval estimation, hypothesis testing, and decision theory. Application of general statistical principles to areas such as nonparametric tests, sequential analysis, and linear models. *Prerequisites:* For 261: 151 with instructor permission or 251; for 262: 241 with instructor permission or 261. Three hours each.

270 Stochastic Theory in Electrical Engineering (See Electrical Engineering 270.)

271 Least Squares Estimation and Filtering of Time Series (See Electrical Engineering 271.)

281 Statistics Practicum Intensive experience in carrying out a complete statistical analysis for research project in substantive area with close consultation with project investigator. *Prerequisites:* Any one of 200, 201, 221 through 233; or 253; some statistical software experience. No credit for graduate students in Statistics or Biostatistics. One to four 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 hours.

295 Special Topics in Statistics For advanced students. Lectures, reports, and directed readings on advanced topics. *Prerequisite:* As listed in course schedule. One to four hours as arranged.

Theatre (THE)

COLLEGE OF ARTS AND SCIENCES

Professors Bryan, Feidner; Associate Professors Schenk, Snider, Thaler (Chairperson); Assistant Professor Fawcett; Lecturers Lynch, Whitney.

1 Introduction to Theatre Overview of general theatre practices and theories, emphasizing performances and practical application. Three hours. I, II. Feidner.

5 Oral Interpretation of Literature Performance of literature that is traditionally nondramatic. Three hours. I, II. Feidner.

10 Fundamentals of Acting Basic tools of acting, focusing on self-awareness and developing techniques to increase flexibility of voice, mind, and body. Skills applied to scene work. Three hours. Fawcett.

11 The Stage Voice I Series of exercises to free, develop, and strengthen the voice; to establish positive physical and vocal habits conducive to an expressive speaking voice. *Prerequisites:* 10 or permission. Three hours.

12 Stage Movement Development of physical awareness through techniques in relaxation and flexibility, with the goal of expanding choice and range in expressive movement for the theatre. *Prerequisite:* 10 or permission. Three hours. Fawcett.

15 Stagecraft Scenic elements of play production; analysis of theatre forms, study and application of basic elements of scenery construction. Three hours and lab. I, II. Schenk.

40 Fundamentals of Stage Costuming Primary course in area of costume design and construction. Three hours. I. Thaler. Offered fall semester only.

41 History of Costume (Same as Merchandising, Consumer Studies, and Design 117.) Overview of period costume and its adaptation for the stage. Three hours. I. Thaler. Offered fall semester only.

110 Topics in Acting Advanced topics in acting theory and practice, including Advanced Scene Analysis, Ethnic Theatre, Performance Theories, Classics, Women's Theatre, Playing Against Type/Make-Up, and Dialects. *Prerequisites:* 11, 12, permission. Three hours. Fawcett.

111 The Stage Voice II Advanced work on resonance and articulation, increases vocal color and clarity and strengthens the relationship between the voice and the text. *Prerequisite:* 11 or permission. Three hours.

112 Topics in Stage Movement Advanced movement for the actor, including such topics as Masks and Clowning, Physical Characterization (playing age and type), Beginning Stage Combat. *Prerequisite:* 12 or permission. Three hours. Fawcett.

115 Basic Scene Design Fundamental principles of scenic design, history, and practice. *Prerequisites:* 1, 15. Three hours. I. Schenk.

120 Stage Lighting Practice and theory in the illumination of stage productions and the creation of aesthetic effects. *Prerequisite:* 1. Three hours. II. Schenk.

135 Dramatic Analysis: Form Examination of 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, 1991-92. Bryan.

136 Classical and Medieval Theatre A study of the earliest dramatic rituals, the stage conventions of classical Greece, Rome, and the Middle Ages. *Prerequisites:* 1, 135. Three hours. Bryan.

137 Renaissance, Baroque, and Neo-Classical Theatre An examination of the theatrical and dramatic innovations of the 16th, 17th, and 18th centuries. *Prerequisite:* 136. Three hours. Bryan.

138 19th and 20th Century Theatre Backgrounds, theatrical conventions, and dramas representative of Romanticism, Realism, and the revolts against Realism. *Prerequisite:* 137. Three hours. Bryan.

140 Stage Costume Design Elements, principles, and styles of design applied to the visual creation of a dramatic character. *Prerequisites:* 1, 40; 41 highly recommended. Three hours. I. Thaler. Offered spring semester only.

141 Advanced Costume Construction: Draping and Flat Pattern Explores the methods of creating period shapes. Students develop a sloper, fit it to a human body, create a researched and completed period costume. *Prerequisite:* 40 or Merchandising, Consumer Studies, and Design 22. Offered every fourth year. Thaler.

142 Advanced Costume Construction: Period Undergarments Focuses on techniques for creating artificial

understructures that support period silhouettes. Corsetry, hooped skirts, petticoats, etc., are researched, fit on the human body, and constructed. *Prerequisite:* 40 or Merchandising, Consumer Studies, and Design 22. Offered every fourth year. Thaler.

143 Advanced Costume Construction: Millinery Explores methods of hat construction, including work in various media. Methods of shaping, covering, and trimming are researched, leading to the completion of hats. *Prerequisites:* 40 or Merchandising, Consumer Studies, and Design 22. Offered every fourth year. Thaler.

144 Advanced Costume Construction: Tailoring Explores traditional methods of tailoring as well as practical adaptations for the stage. Research, discussion, and demonstration lead to completion of a period suit. *Prerequisite:* 40 or Merchandising, Consumer Studies, and Design 22. Offered every fourth year. Thaler.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Readings and Research

210 Performance Practicum Practical matters such as auditioning, private coaching, organizational affiliation, and professional certification. *Prerequisites:* Six hours of both voice and movement courses selected from 11, 12, 111, 112. Three hours.

215 Advanced Scene Design Analysis of the drama from the standpoint of its visual creation upon the stage; audience-stage relationships, styles of production. *Prerequisites:* 15, 120. Three hours. Schenk. (Not offered for graduate credit.)

229 Moliere (Same as French 247.) All course work conducted in French. (Not offered for graduate credit in Theatre.)

243 Repertory Theatre Operation *Prerequisite:* Permission. Summer only. (Not offered for graduate credit.)

250 Directing I Theory of theatrical directing, including script analysis; approaches to audition, rehearsal, and performance; coaching actors. *Prerequisites:* 10, 15, 40, 115 or 140, 135. Three hours. Bryan.

251 Directing II Development of skills and aesthetic through the direction of a complete theatrical event. *Prerequisites:* 250, and declared Theatre majors only. Three hours.

283, 284 Seminar (Not offered for graduate credit.)

297, 298 Senior Readings and Research (Not offered for graduate credit.)

SPEECH (SPCH)

Speech credits will not count toward a Theatre major or toward fulfillment of the College of Arts and Sciences fine arts distribution requirement..

11 Effective Speaking Fundamentals course in effective, informative, and persuasive public speaking and critical listening. Includes theory and practice. Three hours. I, II. Lynch, Nelson, Whitney.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

111 Persuasion Human motivation, attitudes, emotion,

stereotypes, attention and audience psychology as applied in the speaking situation. *Prerequisites:* 11. Three hours. Snider.

112 Argument and Decision Inductive, deductive, causal, and analogical reasoning as applied to the speaking situation. *Prerequisite:* 11. Three hours. Snider.

214 Issues in Public Address Each semester emphasizes analysis of specific speakers, movements, theses, and strategies encompassed by a selected topic of public address. *Prerequisite:* Nine hours of related courses, of which three must be at the 100 level. Three hours. Snider.

283, 284 Seminar Seminar topics include: Nonverbal Communication, Rhetorical Criticism, Advanced Argumentation, Advanced Persuasion, Debate, Interpersonal Communication in Group Interaction, Communication in Conflict Management. *Prerequisite:* Six hours of speech, of which at least three hours must be at the 100 level. Three hours. Snider.

Vocational Education and Technology (VOTC)

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Professors Chamberlain, Fuller; Associate Professors Bloom, Ferreira, Kelly (Interim Chairperson); Extension Associate Professors Harris, Patterson.

1 Architectural Drafting and Printreading (2-4) Principles and procedures of technical graphics including orthographic, pictorial, and auxiliary views. Drafting as the universal language of industry. Introduction to architectural drawing. Three hours. Ferreira.

2 General Shop and Small Engine Mechanics (1-4) Materials, procedures, hand and power tools commonly used in general woodworking and metalworking. Selection, operation, maintenance, and minor repair of small-engine powered equipment. Three hours. Ferreira.

6 Energy Alternatives (3-0) 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. Three hours.

30 Woodworking Technology (2-2) Common methods, processes, materials, and equipment employed in transforming wood into useful products. Three hours. Bloom, Ferreira.

35 Welding and Metal Fabrication (2-2) Oxyacetylene, electric arc, MIG and TIG welding and the machinery, tools, and processes utilized to transform dimensional metals into useful products. Three hours. Ferreira.

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. Chamberlain, Fuller.

53, 54 Teaching Internship in Occupational and Home Economics Education Teaching under 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, department permission. Two hours each. Through Continuing Education. Fuller.

85 Microcomputer Applications in Agriculture and Life Sciences Use of microcomputers and application software for computations, word and data processing, problem solv-

ing, and telecommunications related to the agricultural and life sciences. Three hours.

101 Computer-Aided Drafting and Design (CADD) Using a computer to create, manipulate, and record drafting and design concepts, symbols, and conventions to prepare technical and/or presentation drawings. *Prerequisite:* 1 or instructor's permission. One to three hours. Ferreira.

110 Entrepreneurial Industrial Production (1-4) Principles, concepts, methods employed in organizing capital, labor, tools, machines for producing products. Students function as labor source and mass produce and market a product. *Prerequisites:* 30 or 35, or Agricultural and Resource Economics 166, or instructor's permission. Three hours. Bloom, Ferreira.

121 Drainage and Irrigation Systems (3-0) Small watershed hydrology; water control structures; small pond design; drainage systems design; sprinkler and trickle irrigation. *Prerequisite:* Math. 9 or 10. Three hours.

131 Light Frame Buildings (3-0) Site planning, building planning, material selection. Functional and structural considerations including heating, ventilating, and insulation. Consideration of environmental relationships. *Prerequisite:* 6 or Math. 9 or 10. Three hours. Ferreira.

134 Cost Estimating Residential, Agricultural, and Light Commercial Structures Basic principles, practices, and guidelines used to formulate accurate cost estimates of material, labor, and overhead of residential, agricultural, and light commercial construction projects. *Prerequisites:* College algebra. Three hours. Ferreira.

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 may qualify for credit. *Prerequisites:* Voc. Ed. majors—52; admission to teacher education, instructor's permission; Agr. Tech. majors—12 hours VOTC, instructor's permission. Credit as arranged.

151 Methods and Procedures in Occupational and Home Economics Education (3-0) Three modules of five weeks' duration. Laboratory management, multimedia 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. Bloom, Chamberlain, Fuller.

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. *Prerequisite:* 151. One hour for each module. May enroll for total of three hours. Bloom, Chamberlain, Fuller.

155 Teaching Practicum in Occupational and Home Economics Education Teaching in elementary or secondary schools under guidance of cooperating teacher and college supervisors. Usually a full-time, 16-week experience. *Prerequisites:* 152, acceptance into teacher education. Variable credit, three to 15 hours. Bloom, Chamberlain, Fuller.

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:* 6 or Math. 9 or 10, or instructor's permission. Three hours. Ferreira.

165 Applied Electronics Electronic circuits, controls, and instrumentation. Introduction to robotics. *Prerequisite:* 6 or 162 or Physics 12 or permission. Three hours.

170 Solar Strategies for Building Construction Passive, active, and hybrid heating; photovoltaic electric systems. Physical principles, site evaluation, component and system

analysis, materials selection, and design of low-cost systems. *Prerequisite:* Math. 10 or permission. Three hours.

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 permission. Three hours. Patterson.

183 Communication Methods (3-0) Presentation of information through the media of press, radio, television, and audiovisual techniques. *Prerequisite:* 52 or instructor's permission. Three hours. Patterson.

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 instructor's permission. Variable credit, three to 12 hours. Fuller, Patterson.

197 Special Problems Individual investigation of a problem selected to meet special needs of students. May enroll more than once up to six hours. *Prerequisite:* Six hours, departmental permission. Credit as arranged.

199 Senior Technology Laboratory Utilizing and synthesizing the total technology educational experience to formulate and solve practical problems under guidance of a faculty member. *Prerequisites:* Twelve hours VOTC at 100 level, department permission. One to three hours.

251 Media, Methods, and Materials for Teaching Home Economics Advantages, disadvantages, guidelines for using, and development of media, materials, and methods for teaching in a variety of home economics-related programs. *Prerequisite:* 52 or instructor's permission. Three hours. Chamberlain.

252 Evaluation in Home Economics, Occupational, and Extension Education Test and questionnaire construction and nontesting means of evaluation, usability, validity, reliability, and discrimination of evaluation instruments. Selected sociometric techniques and evaluation in affective domain. *Prerequisite:* 251 or instructor's permission. Three hours. Chamberlain.

253 Curriculum Development in Home Economics, Occupational, and Extension Education Basic principles of curriculum development applied to vocational education. Unique characteristics and contributions of vocational education as related to educational, economic, and sociological trends. *Prerequisite:* Nine hours in education or instructor's permission. Three hours. Bloom, Chamberlain.

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 instructor's permission. Three hours.

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. *Prerequisite:* Completion of 12 credits in vocational or special education at the 100 or 200 level or permission. Offered during Summer Session. Variable credit, one to three hours, may enroll more than once up to six hours.

273 Technical Writing Through readings and regular writing assignments, students will learn the rhetorical art of technical writing essential for scientists and engineers. Focus is on form and content. (Fall semester for students with research data; spring semester for undergraduates and new graduate students.) Three hours.

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 instructor's permission. Three hours.

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 instructor's permission. Three hours. Kelly, Patterson.

292 Seminar Reports, discussions, and investigations in selected fields. May enroll more than once up to six hours. *Prerequisites:* Six hours VOTC at 100 level, instructor's permission. One to three hours.

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. *Prerequisite:* Senior standing, six hours 100 level, departmental permission. Credit as arranged.

For additional education offerings, see pages 137–144.

Wildlife and Fisheries Biology (WFB)

SCHOOL OF NATURAL RESOURCES

Associate Professors Capen, Hirth (Program Chair), LaBar; Research Associate Professors Parrish, Watzin, Williams.

74 Wildlife Conservation Historical and contemporary values of wildlife; impacts on habitats and populations; strategies for conservation, allocation, and use. Nonmajors only. *Prerequisite:* Basic understanding of biological terms and concepts. Three hours.

130 Ornithology Taxonomy, classification, identification, morphology, physiology, behavior, and ecology of birds. *Prerequisites:* Biology 1, 2 or equivalent. Three hours. Capen.

131 Field Ornithology Identification and field studies of birds, emphasizing resident species. Two weeks in summer. *Prerequisite:* 130; preference to WFB majors. Two hours. Capen.

150 Wildlife Habitat and Population Measurements Field methods for measuring habitat variables and estimating population parameters. Two weeks in summer. *Prerequisites:* 131, Forestry 21 or Botany 109, Natural Resources 140. Two hours. Hirth.

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.

174 Principles of Wildlife Management Application of ecology and sociology to the management of wildlife populations and habitat; integration of wildlife management with demands for other resources; consideration of game species, endangered species, and biological diversity. *Prerequisites:* Natural Resources 40; an ecology course. Three hours. Capen.

176 Florida Ecology Field Trip Major ecosystems and associated wildlife, ranging from north Florida flatwoods to south Florida Everglades. Field trip over spring recess. *Prerequisites:* 130, 174; permission. Two hours. Hirth. Alternate years, 1992–93.

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.

191 Wildlife and Fisheries Practicum Supervised work experience in the wildlife and fisheries area. *Prerequisite:* Instructor's permission. Credit as arranged.

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. Alternate years, 1992–93.

251 Wildlife Habitat and Population Analysis Management, analyses, and interpretation of animal census and survey data; home range analyses; population modeling; habitat evaluation, classification, and preference analysis. *Prerequisites:* 150, Natural Resources 140. Three hours.

271 Wetlands Ecology and Marsh Management Structure and dynamics of natural and manmade marsh systems; emphasis on applied ecology, freshwater habitats, and their wildlife populations. *Prerequisite:* 174 or permission. Three hours.

272 Wetlands Ecology and Marsh Management Laboratory Qualitative and quantitative assessment of marsh habitats and wildlife populations, emphasizing management of waterfowl and furbearers. Technical paper required. One weekend trip. *Prerequisites:* 150; previous or concurrent enrollment in 271. One hour.

273 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:* 150, 174. Three hours. Hirth.

274 Uplands Wildlife Ecology Laboratory Laboratory and field experience related to upland species and management of their habitat. Field project required. *Prerequisite:* Previous or concurrent enrollment in 273. One hour. Hirth.

275 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.

279 Marine Ecology Structure and function of major marine communities, including open ocean, benthos, coral reefs, and estuaries. Emphasis on unique ecological insights gained in the marine environment. *Prerequisites:* Biology 1 and 2, an ecology course, or instructor permission. Three hours. Watzin.

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.)

¹Credit not given for both courses in each or any of the following combinations: (Biology 1 and Zoology 8), (Biology 1 and Zoology 9), (Biology 1 and Zoology 95), (Biology 1 and Botany 4), (Biology 2 and Botany 4), (Biology 2 and Zoology 9), (Biology 2 and Biology 3), (Biology 2 and Zoology 96).

²Biology and Zoology majors will not receive credit for Biology 3, or Biology 6, or Biology 7, or Zoology 8, or Zoology 9, or Zoology 95, or Zoology 96.

285, 286 Advanced Special Topics

287, 288 Advanced 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:* Senior standing or permission. Credit arranged. (Not offered for graduate credit.)

Women's Studies (WST)

COLLEGE OF ARTS AND SCIENCES

Professors J. Ambrose, Z.P. Ambrose, Bond, V. Clark, Elliott, Mintz, Rankin, J. Smith; Associate Professors Kuizenga, C. Lewin, McGovern, Rothblum, van Slyke, Warhol; Assistant Professors Bergen, A. Clark, M.J. Dickerson, Kahn, Lin, McCrate, Seager, Tang; Research Assistant Professor Livingston.

73 Introduction to Women's Studies Survey of feminist theory and its application to specific areas of inquiry, including analysis of the intersections among race, class, and gender. Three hours.

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

273 Seminar in Feminist Theory An interdisciplinary examination of theories accounting for women's position in culture and society. Special emphasis on the relationship between gender, race, class, ethnicity, and sexuality. *Prerequisites:* 73, six additional hours in Women's Studies, and admission to the Women's Studies minor program. Three hours.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

Also see course listings for English 42; History 182; Nursing 140; Physics 2; Sociology 122, 213; Anthropology 172; Psychology 231. See specific requirements for minor on page 72. Additional Women's Studies courses are available as special topics in individual departments. See Schedule of Courses for specific titles.

Zoology (ZOOL)

COLLEGE OF ARTS AND SCIENCES

Professors Bell, Happ (Chairperson), Heinrich, Herbers; Associate Professors Davison, Kilpatrick, Landesman, Schall, VanHouten, Wilson; Assistant Professors Goodnight, Lannigan, Otter, Stevens.

BIOLOGY (BIOL)

1 Principles of Biology (3-3) Introduction to organismal biology: nature of scientific inquiry, plant form and function, reproductive biology, pollination ecology; animal phylogeny, illustrated by comparative development, physiology, and ecology. Four hours. Barrington, Wilson.

2 Principles of Biology (3-3) Introduction to cell biology, genetics, and evolution. Topics presented: biochemistry; origin of life; metabolism; molecular, Mendelian, and population genetics; and microevolution. *Prerequisites:* 1 and introductory chemistry recommended. Four hours. Hoffmann, Stevens.

3 Human Biology For nonscience majors. Selected biological topics relevant to humans, such as cancer, human genetics, environmental toxicants; biological concepts necessary for understanding these problems. Three hours. Landesman.^{1,2}

4 The Human Body Introduction to basic human anatomy and organ system physiology emphasizing normal homeostatic mechanisms and the changes that accompany common disorders and diseases. Three hours. Landesman.

6 Evolutionary Biology For nonscience majors. The process of biological evolution; evidence for evolution; mechanisms of evolutionary change; origin of adaptations; evolution of behavior; social and reproductive behavior. Three hours. Schall.^{1,2}

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 humans. Three hours. II. Potash.^{1,2}

101 Genetics Study of the basis of inheritance, covering topics from classical genetics to modern molecular studies. Analysis of genetic data emphasized. *Prerequisites:* 1, 2; organic chemistry recommended. Three hours. II. Van Houten.

102 Environmental Biology (3-3) Ecosystem and community structure; population growth; species interactions and niche dynamics; population and chromosomal genetics; speciation in fossil records; ecology of animal behavior; applied ecology. *Prerequisites:* 1, 2; Math. 19 or 21. Four hours. I. Goodnight.

103 Cell Structure and Function (3-3) Molecules, structures, and physiology of cell membranes; energy transformations; nuclear and cytoplasmic events; extracellular matrix; cell signaling; and cell types and fates. *Prerequisites:* 2, Chemistry 2; organic chemistry recommended. Four hours. Wilson.

203 Population Ecology Analysis of growth, regulation, and interrelations of biological populations in theoretical, laboratory, and natural systems. *Prerequisite:* Biology 102. Three hours. II. Schall.

205 Advanced Genetics Laboratory Lecture/discussions alternated with laboratories to provide experiences with genetic techniques. Bench work and data analysis emphasized. *Prerequisite:* 101. Four hours. II. Van Houten.

ZOOLOGY (ZOOL)

8 The Animal World Discussion of animal forms with specific reference to their usefulness in our understanding of general biological processes. Three hours. Davison.^{1,2}

95, 96 Introductory Special Topics Introductory courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.^{1,2}

104 Comparative Animal Physiology (3-3) Physiology of organs and organ systems in animals emphasizing basic principles of physiology common to all forms. *Prerequisite:* Biology 103; Physics 12 recommended. Four hours. Otter.

193, 194 College Honors

195, 196 Intermediate Special Topics Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

197, 198 Undergraduate Research Individual laboratory research under guidance of faculty member. Students electing Zoology 197 and 198 must follow the guidelines outlined on page 63 or they will be disenrolled. *Prerequisites:* Junior or senior standing, departmental permission. Three or six hours.

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 instructor's permission. Three hours. I. Davison.

208 Morphology and Evolution of Insects (2-4) Interrelationships, fossil history, comparative anatomy of major insect groups. Morphology and way of life of representatives of important insect orders and classes of arthropods. *Prerequisite:* 104 or Biology 102. Four hours. Bell.

209 Field Zoology (2-4) Collection, identification of invertebrates; September field work. Half of student's collection is general, identified to family; half is one or two groups identified to species. *Prerequisite:* 104 or Biology 102. Four hours. Bell.

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. Landesman.

217 Mammalogy (3-3) Classification, identification, morphology, evolution, and distribution of mammals. *Prerequisite:* Biology 102. Four hours. Kilpatrick.

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, 1992-93.

223 Developmental Biology An analysis of the cellular, subcellular, molecular, and genetic mechanisms that operate during oogenesis and embryogenesis in invertebrate and vertebrate organisms. *Prerequisites:* Biology 101, 103. Three hours. Landesman.

225 Physiological Ecology Processes by which animals cope with moderate, changing, and extreme environments. *Prerequisites:* Biology 102, 104. Three hours. Heinrich.

231 Cell Physiology Topics of current interest in the scientific literature. Emphasis on techniques and experimen-

tal approaches utilized to derive an understanding of cell structure and function. *Prerequisites:* Biology 103, Chemistry 141, 142, departmental permission. Three hours. Otter. Alternate years, 1992-93.

233 Cell Motility and the Cytoskeleton (2-6) Intensive laboratory-oriented study of the fundamental principles of cell motility. Light microscopy of cell structure and movement. Biochemistry of molecules that make cells move. *Prerequisites:* 103; Chemistry 141, 142; and instructor's permission. Four hours. Otter. Alternate years, 1993-94.

251 Insect Physiology (3-3) Anatomy and physiology emphasizing growth, reproduction, and sensory physiology. *Prerequisite:* 104 or instructor's permission. Four hours. Happ.

255 Comparative Reproductive Physiology Various means by which animals reproduce. Special emphasis on the embryological origin and evolutionary relationships of sex cell differentiation. *Prerequisite:* 104. Three hours. Davison.

263 Genetics of Cell Cycle Regulation Molecular events during the cell cycle; mutants defective in cell cycling; comparison of normal and transformed (cancer) cell cycling. *Prerequisite:* Biology 101 or instructor's permission. Three hours. Van Houten.

265 Developmental Molecular Genetics Current topics in developmental genetics explored through lectures and discussions of current literature; emphasis on molecular approaches. *Prerequisites:* Biology 101. Three hours. Van Houten.

270 Speciation and Phylogeny Contributions of modern research in such fields as genetics, systematics, distribution, and serology to problems of evolutionary change. *Prerequisite:* Biology 101 (Biology 102 recommended). Three hours. Kilpatrick. Alternate years, 1993-94.

281 through 284 Seminar Review and discussion of current zoological research. Attendance required of Zoology graduate students. Seniors in zoological research programs may enroll. Without credit.

295, 296 Advanced Special Topics Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

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