

ACADEMIC PROGRAM

DEGREE REQUIREMENTS

2016-2017 UVM CATALOGUE

Academic programs in the Rubenstein School include four kinds of requirements: **UNIVERSITY**, **GENERAL EDUCATION**, **CORE CURRICULUM**, and **MAJOR**.

■ UNIVERSITY REQUIREMENTS

There are University requirements which must be fulfilled by all UVM degree candidates, regardless of school or college affiliation:

1. Diversity Course Requirement
2. Foundational Writing and Information Literacy Requirement
3. Sustainability Requirement
4. Minimum cumulative grade point average of 2.00
5. 30 of the last 45 hours of academic credit applied toward the degree must be earned at UVM

■ GENERAL EDUCATION REQUIREMENTS

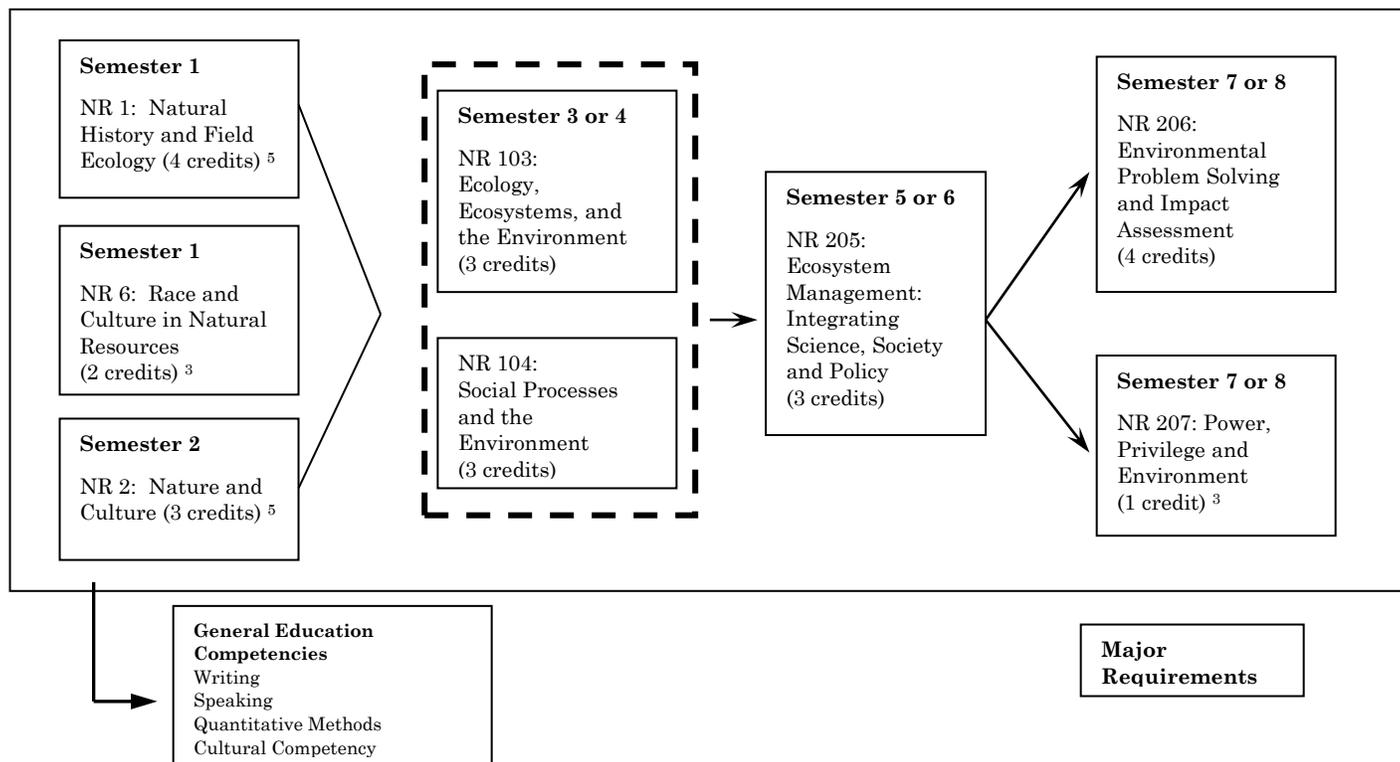
The Rubenstein School general education requirements are designed to enhance a student's ability to assimilate and analyze information, think and communicate clearly, and respect multiple perspectives. These requirements are flexible in order to encourage creativity in meeting educational goals. Fulfilling general education requirements will account for approximately one-quarter of your total program. This is work that can be spread throughout the four-year sequence, though there are distinct advantages to taking certain classes early on. Also, some majors have specific requirements that should be considered as you make selections; you often can simultaneously fulfill a general education and a major requirement with a single course.

All students must complete each of the following general education requirements¹:

1. **WRITING²**
ENGS 1 or HCOL 85 (3 cr.)
2. **SPEAKING**
SPCH 11, CALS 183, or NR 21 (2 or 3 cr.)
3. **RACE AND CULTURE IN NATURAL RESOURCES³**
NR 6, NR 207, and 3 credits from the approved list of D1 or D2 diversity courses (6 cr.)
4. **MATHEMATICS⁴**
MATH 9 or higher, but **NOT** MATH 17 (3 cr.)
5. **STATISTICS⁴**
NR 140, STAT 111, STAT 141 or STAT 211 (3 or 4 cr.)
6. **Three courses in a self-design sequence**
Each student defines a learning objective and selects at least 9 credits from departments outside the Rubenstein School to meet that objective. This sequence of courses must be approved by your advisor before the completion of four semesters or 60 credit hours (although the timeframe may be extended for transfer students).

■ CORE CURRICULUM REQUIREMENTS

The core curriculum of the Rubenstein School represents a body of knowledge, skills, and values that the faculty believe is central to the study of natural resources and the environment. The core curriculum's eight required courses (**23 total credits**)⁵ cut across all academic programs within the School, integrating the natural and social sciences in an effort to approach full understanding and resolution of natural resource and environmental issues. The sequence of the core curriculum is shown schematically in the diagram below:



IMPORTANT NOTES:

¹ With the exception of the third Race and Culture course chosen from the approved list of University Approved Diversity courses, no single course may be used to satisfy more than one of the above requirements.

² This requirement also fulfills the University Writing and Information Literacy Requirement. In addition to ENGS 1 and HCOL 85, students may use any other course approved to count for the University Requirement.

³ This requirement also fulfills the University Diversity Requirement. Internal and external transfer students to RSENR may take any 3-credit Category D1 course from the University Approved Diversity courses to substitute for NR 6 and NR 207, and any 3-credit Category D1 or D2 course to complete the University Diversity Requirement.

⁴ Requirement varies depending on major choice.

⁵ Internal and external transfer students to RSENR substitute NR 95, Social-ecological Systems for NR 1 and NR 2, for a total of 20 credits in the Core Curriculum.

CORE CURRICULUM COURSE DESCRIPTIONS

NR 1 and NR 2 provide an introduction to the study of natural resources and the environment from natural and social science standpoints, respectively. At the completion of these courses, students should (1) have a basic understanding of the School's integrated approach to natural resources and the environment, (2) be better prepared to make informed decisions about their academic majors, and (3) be prepared to advance to an intermediate level of study in natural resources. The intermediate courses in the sequence, NR 103 and NR 104, emphasize ecosystems and social systems, respectively. NR 205 and NR 206 focus directly on integrated and holistic management. In NR 205, students integrate natural and social science to understand environmental management principles and policies. In NR 206, the capstone course taken senior year, students are challenged to synthesize and apply the interdisciplinary knowledge, skills, and values they have learned to contemporary natural resources and environmental issues. NR 6 and NR 207 explore how social justice and environmental issues are intertwined, and help students become culturally competent in an increasingly diverse world.

NR 1

Natural History and Field Ecology

Introduction to the dynamics of the natural world. Basic concepts of biological, chemical, physical, and ecological sciences and the application and interpretation of the quantitative measurements are presented within a natural history context. (4 credits)

NR 6

Race and Culture in Natural Resources

Introduces the first-year student to issues of race and culture and their relevance to society, natural resources, and the environment. (2 credits)

NR 2

Nature and Culture

Introduction to natural resources and the environment from a social/cultural perspective. Emphasis on environmental history, values, and ethics with application to natural resource and environmental policy. (3 credits)

NR 103

Ecology, Ecosystems, and Environment

Major ecological concepts and their application. Analysis of form, structure and function of organisms, populations, communities, ecosystems and landscapes. (3 credits)

NR 104

Social Processes and the Environment

Social science theories and their application to environmental issues. Analysis of issues using theories of government, economics, and social movements. Emphasis on integrating frameworks to analyze environmental issues. (3 credits)

NR 205

Ecosystem Management: Integrating Science, Society, and Policy

Integration of natural and social science into ecosystem management and policy. Consideration of ecosystem integrity, ecosystem degradation, human needs and values and the application of management principles within a holistic context. (3 credits)

NR 206

Environmental Problem Solving and Impact Assessment

Group dynamics, impact assessment, risk assessment and decision making. Emphasis on the process of solving complex environmental problems, interdisciplinary team work, and the National Environmental Policy Act. (4 credits)

NR 207

Power, Privilege and Environment

The senior level multicultural experience combines synthesis and personal reflection with a forward-looking perspective about how issues of diversity and equity will influence the lives of students after they graduate. (1 credit)

■ MAJOR REQUIREMENTS

Major requirements are the additional courses that you must take in order to graduate in a specific discipline. The Rubenstein School of Environment and Natural Resources awards degrees in six majors; several of these include distinct options, each of which has somewhat different requirements. The choices are:

Environmental Sciences

Agriculture and the Environment
Conservation Biology and Biodiversity
Ecological Design
Environmental Analysis and Assessment
Environmental Biology
Environmental Chemistry
Environmental Geology
Global Environmental and Climate Change
Water Resources

Environmental Studies

Forestry

Natural Resources

Integrated Natural Resources
Resource Ecology
Resource Planning

Parks, Recreation, and Tourism

Wildlife and Fisheries Biology

Fisheries Biology
Wildlife Biology

MINORS

A minor is a secondary concentration of course work, outside the area of the major. Some UVM academic programs require students to have a minor, but the Rubenstein School of Environment and Natural Resources does not. We do, however, offer minors in:

Environmental Studies

Forestry

Geospatial Technologies

Parks, Recreation, and Tourism

Sports Management

Wildlife Biology

These minors are available to students from any academic unit on campus. Rubenstein School students are also welcome to complete minors in academic departments outside the School.

ENVIRONMENTAL SCIENCES

The demand for environmental scientists has increased dramatically in recent years. State and federal regulations addressing water pollution, solid waste management, air quality and global climate change, and environmental impact assessment have created a substantial demand for personnel with strong basic and applied scientific backgrounds. Large companies are hiring environmental scientists to help them respond to environmental regulations. Consulting firms are growing rapidly, and they are employing scientists with specific skills to work on multi-disciplinary teams. The need for environmental scientists trained to tackle environmental problems will continue to increase.

The interdisciplinary Environmental Sciences major combines a natural science-based core curriculum with hands-on experience needed to identify, analyze, and solve environmental problems arising from human activity. Blending hands-on field and laboratory instruction with real-world environmental internship, research, and study abroad opportunities, students acquire the skill set needed to tackle complex environmental problems. With the School's emphasis on such cutting-edge areas as ecological design, restoration of damaged ecosystems, and environmental assessment, Environmental Sciences graduates are equipped with the knowledge to protect the health and integrity of our terrestrial, aquatic, and urban ecosystems.

Prior to the junior year, students select a concentration designed to provide greater depth of knowledge in a particular aspect of the field. Concentrations are offered in **Agriculture and the Environment, Conservation Biology and Biodiversity, Ecological Design, Environmental Analysis and Assessment, Environmental Biology, Environmental Chemistry, Environmental Geology, Global Environmental and Climate Change, and Water Resources.**

Internships: Experiential learning is strongly recommended. Students are encouraged to do a professionally oriented internship under joint supervision of faculty and business, regulatory, or community representatives.

Students may enroll in the Environmental Sciences major through the Rubenstein School of Environment and Natural Resources, the College of Agriculture and Life Sciences, or the College of Arts and Sciences. Majors in the College of Arts and Sciences complete ENSC 1, 130, and 160, while those in the College of Agriculture and Life Sciences and the Rubenstein School complete all five Environmental Sciences Foundation Courses and major requirements. General education and other school-based requirements differ.

Program Chair: Professor Jen Pontius, 205C Aiken, 802-656-3091

DEGREE REQUIREMENTS

All students who enroll in the Environmental Sciences major in the Rubenstein School must fulfill the following requirements for graduation:

1. Complete the Rubenstein School's core curriculum.
2. Complete the Rubenstein School's general education requirements.
3. Complete a minimum of 120 credit hours of courses.
4. Complete the Environmental Sciences minimal basic science/quantitative coursework:

BCOR 11 and 12, Exploring Biology (8 cr.)

CHEM 31 and 32, General Chemistry 1 and 2 (8 cr.)

CHEM 42, Introduction to Organic Chemistry* (4 cr.)

(cont. on p. 26)

GEOL 55, Environmental Geology
- or - PSS 161, Introduction to Soil Science (4 cr.)
MATH 19 and 20, Calculus I and Calculus II** (6 cr.)
NR 140, Applied Environmental Statistics (4 cr.)
- or - STAT 141, Basic Statistical Methods** (3 cr.)

*Students interested in areas such as environmental analysis and assessment should consider taking more advanced courses such as CHEM 141/142.

** Also fulfills a Rubenstein School general education requirement.

5. Complete the Environmental Sciences foundation courses:

ENSC 1, Introduction to Environmental Sciences (3 cr.)
ENSC 9, Orientation to Environmental Sciences* (1 cr.)
ENSC 130, Global Environmental Assessment (3 cr.)
ENSC 160, Pollutant Movement through Air, Land, and Water (4 cr.)
ENSC 201, Recovery and Restoration of Altered Ecosystems (4 cr.)
ENSC 202, Applied Environmental Analysis and Assessment (4 cr.)

*Internal and External Transfer students to ENSC are exempt from ENSC 9

6. Complete focus track requirements (14 credits) in **Agriculture and the Environment, Conservation Biology and Biodiversity, Ecological Design, Environmental Analysis and Assessment, Environmental Biology, Environmental Chemistry, Environmental Geology, Global Environmental and Climate Change, and Water Resources**. A list of courses approved for each track is available from the Program Director or Dean's Office or from the ENSC website www.uvm.edu/~ensc/. Students may also elect a self-designed track in a particular area of interest.

ENVIRONMENTAL STUDIES

Environmental Studies is an interdisciplinary major which combines required core courses with a self-designed program of study chosen to meet individual learning goals. Students may select from one of the six concentrations to focus their academic plan. The Environmental Studies core courses include perspectives of the sciences, social sciences, and humanities in local, national, and global contexts. Students complete a culminating nine-credit senior capstone thesis, internship, or advanced course option.

The Environmental Studies Program at the University of Vermont was established in 1972 to meet the need for greater understanding of the ecological and cultural systems supporting all life on earth. This broadly interdisciplinary program is a campus-wide program serving students in four colleges across the university. The faculty are committed interdisciplinary thinkers drawing on the sciences, social sciences, and humanities to create a lively hub, addressing local and global issues with equal concern. We believe in collaborative problem-solving and the power of human imagination to create a more sustainable future.

The Environmental Program offers a major in Environmental Studies that can be pursued in four different colleges, including the College of Agriculture and Life Sciences, the College of Arts and Sciences, the College of Education and Social Services and the Rubenstein School of Environment and Natural Resources. Students can choose which college best suits their broad educational needs and then pursue the Environmental Studies major from within that college. While major requirements differ slightly from college to college, the core curriculum is the same. Following the introductory courses and working closely with faculty advisors, each student creates a plan for an individually-designed major concentration in their focus area(s) of choice. This learning plan culminates in a final capstone project or thesis, usually

carried out in the senior year.

Many graduates pursue graduate or professional degrees; others enter employment in public and private sectors as consultants, educators, ecologists, planners, analysts, field or laboratory researchers, writers and activists. Common choices include environmental education, biodiversity and endangered species, natural areas management, environmental policy and law, mediation, landscape restoration, wetlands protection, land conservation and land use planning, sustainable development, gender studies, ecotourism, and environmental communication.

Program Director:	TBD	Bittersweet	802-656-4055
Program Administrative Support:	Cathy Trivieres	Bittersweet	802-656-4055
Student Services Coordinator:	Ibit Wright	Bittersweet	802-656-0176

DEGREE REQUIREMENTS

All students who enroll in the Environmental Studies major in the Rubenstein School must fulfill the following requirements for graduation:

1. Complete the Rubenstein School's core curriculum.
2. Complete the Rubenstein School's general education requirements.
3. Complete a minimum of 120 credit hours of courses.
4. Complete the Environmental Studies major core courses:
 - ENVS 1, Introduction to Environmental Studies (4 cr.)
 - ENVS 2, D2: International Environmental Studies (4 cr.)
 - ENVS 151, Intermediate Environmental Studies (3 cr.)
 - Senior Capstone (9 cr.)
5. Complete an individually-designed program:
Thirty credits of approved environmentally-related courses at the 100- or 200-level, including three credits at the 200-level, with at least one environmentally-related course in each of these areas: natural sciences, humanities, social sciences, and international studies (may be fulfilled by a Study Abroad experience). These courses are in addition to the Rubenstein School's core and general education requirements.

Visit the *Environmental Program website for useful academic planning tools:* www.uvm.edu/envprog

ENVIRONMENTAL STUDIES MINOR REQUIREMENTS

A minimum of 17 credit hours is required. Students must earn at least a 2.0 cumulative GPA in their Environmental Studies minor courses to earn a minor in Environmental Studies. Courses required are:

- ENVS 1, Introduction to Environmental Studies (4 cr.)
- ENVS 2, International Environmental Studies (4 cr.)

9 credits of ENVS at the 100-level or above. Of the 9 credits, one non-ENVS course at the appropriate level may be substituted with the approval of the student's advisor and the Environmental Program.

FORESTRY

The Forestry Major trains students to meet the needs of the 21st century, which include managing forests for resilience, adaptation, and climate mitigation. Guided by the Green Forestry Education Initiative principles (<http://www.uvm.edu/rsenr/greenforestry/>), students learn how to tackle the ever increasing demands and pressures placed on the world's forests while sustaining the many services forest ecosystems provide. The program attracts students who want a career working outdoors, excel at math and science, learn by doing, and can embrace both the fundamentals of traditional forestry and emerging perspectives in the field. The Forestry major provides students with an education in ecologically responsible forestry, emphasizing the complex landscapes of the northeastern United States, while also stressing global context and change. Students develop the ability to coordinate and manage all aspects of sustainable forestry through an education that combines a strong foundation in natural and social sciences with hands-on field classes, internships, research experience, and forest management projects.

A student-proposed, faculty-approved, **area of concentration** provides curricular flexibility and addresses the individual interests of the Forestry major. This concentration may be an **individually designed area of emphasis** such as forest ecosystem health, forest ecology, consulting forestry, or urban forestry; or **a professionally appropriate University minor** such as wildlife biology, botany, or international development; or **a study abroad experience** that has a clear environmental and natural resources emphasis.

We emphasize experiential learning through extensive field instruction on University-owned forestland near the campus, the Green Mountain National Forest, and other public as well as private forests throughout Vermont. We strongly encourage students to gain valuable career-oriented experience while earning academic credit by assisting with ongoing forestry field or laboratory research, or through internship opportunities with public agencies and private organizations.

Graduates may be employed as resource professionals on public forests, consultants to private forest landowners, or managers of industrial forest lands; or they may choose related employment with organizations such as the Peace Corps, or land conservation groups; or they may pursue certification for secondary school education in biological and natural sciences; or they may decide to continue their education at the master's or doctoral level. To enhance their professional employability, students are strongly encouraged to pursue, and are assisted in finding, forestry internship and summer employment opportunities.

Program Chair: Professor William Keeton, 308B Aiken, 802-656-2518

DEGREE REQUIREMENTS

All students who enroll in the Forestry curriculum must fulfill the following requirements for graduation:

1. Complete the Rubenstein School's core curriculum.
2. Complete the Rubenstein School's general education requirements.
3. Complete a minimum of 124 credit hours of courses.
4. Complete the required Forestry courses:

PBIO 4, Introduction to Botany (4 cr.)
- or - BIOL 1 and 2, Principles of Biology (8 cr.)
CHEM 23, General Chemistry (4 cr.)
MATH 18, Basic Mathematics* (3 cr.)
NR 140, Applied Environmental Statistics* (4 cr.)

(cont. on p. 29)

FOR 195, Natural Resource Ecology and Assessment 1 and 2 (8 cr.)
PSS 161, Introduction to Soil Science (4 cr.)
A course in Economics or Ecological Economics (3 cr.)
NR 143, Introduction to Geographic Information Systems (3 cr.)
FOR 21, Dendrology (4 cr.)
FOR 122, Forest Ecosystem Analysis** (4 cr.)
FOR 223, Multi-Resource Silviculture (4 cr.)
FOR 235, Forest Ecosystem Health (4 cr.)
FOR 182, Advanced Forestry Seminar (1 cr.)
FOR 295, Management of Forest Woodlots (3 cr.)
FOR 272, Sustainable Management of Forest Ecosystems (4 cr.)

* Also fulfills general education requirement.

** Field intensive course **OFFERED ONLY DURING THE SUMMER SESSION—ADDITIONAL TUITION & FEES CHARGED.**

5. Complete a Forestry area of concentration:

Twelve additional credit hours of student-proposed, faculty-approved¹ course work addressing individual interests of the student. The concentration may be **self-designed**² such as forest ecosystem health, forest ecology, consulting forestry, public forestry administration, or international development; an appropriate University **minor**, or a natural resource oriented **study abroad** experience.

¹ Must be endorsed by the student's advisor and approved by the Forestry faculty prior to the last 3 semesters of study.

² At least 9 credits are to be at the 100-level or higher.

FORESTRY MINOR REQUIREMENTS

A minimum of 16 credit hours is required, with at least 9 at the 100-level or higher. Applications for the minor must be filed no later than June 1 of the year preceding graduation. Students must earn at least a 2.0 cumulative GPA in their Forestry minor courses to earn a minor in Forestry. Required courses:

FOR 21, Dendrology (4 cr.)
FOR 195, Natural Resource Ecology and Assessment 1 (4 cr.)
FOR 223, Multi-Resource Silviculture (4 cr.)
Additional FOR courses to total 16 credit hours.*

*Note: Rubenstein School students may not count FOR 1 towards completion of Forestry minor.

GEOSPATIAL TECHNOLOGIES

With the advent of high resolution satellite imagery, desktop software for GIS and remote sensing, and inexpensive GPS receivers, geospatial technologies are currently on the forefront of a revolution which incorporates huge volumes of data from a multitude of sources tied to a location on the Earth and analyzes that data using new and innovative methods which incorporate relationships in time and space. The application of these technologies is no longer limited to the military and federal government; the applications are unlimited and the market for this technology is booming. Geospatial technologies provide new and evolving expertise for addressing the major environmental issues of our time by transforming data into geographically-referenced information.

A minor in Geospatial Technologies provides knowledge of Geographic Information Systems (GIS), remote sensing, Global Positioning Systems (GPS), and spatial analyses. The tools offered by these technologies are essential in the

acquisition, integration, and analysis of geographically-referenced data and applicable to a wide array of environmental issues at local to global scales. Complementing their major field of study, an enhanced understanding of geospatial technology will provide students with the expertise necessary to meet the demands of their diverse careers in the global workplace.

Participating Faculty:

RSENR – Jarlath O’Neil-Dunne, Ernie Buford, and Walter Poleman

GEOGRAPHY – Beverley Wemple, Lesley-Ann Dupigny-Giroux, Shelly Rayback, and Meghan Cope

GEOLOGY – Paul Bierman

CIVIL ENGINEERING - Donna Rizzo

COMPUTER SCIENCE – Alison Pechenick

GEOSPATIAL TECHNOLOGIES MINOR REQUIREMENTS

The courses for the minor include three required courses and at least two elective courses for a minimum of 15 required credits. At least 9 credit hours must be at the 100-level or above. At least half of the courses (8 credits) used to satisfy the minor must be taken at UVM. Students must earn at least a 2.0 cumulative GPA in their Geospatial Technologies minor courses to earn a minor in Geospatial Technologies. The courses for the minor include:

Required Courses (3):

1) Introduction to Geospatial Technologies (select one course)

CE 10, Geomatics (4 cr.)

GEOG 81, Geotechniques (3 cr.)

ENSC 130, Global Environmental Assessment (3 cr.)

GEOL 151, Geomorphology (3 cr.) – cross listed as GEOG 144

2) Geographic Information Systems (select one course)

NR 143, Introduction to Geographic Information Systems (3 cr.)

GEOG 184, Geographic Information: Concepts and Applications (3 cr.)

3) Remote Sensing (select one course)

NR 146, Remote Sensing of Environment (3 cr.)

GEOG 185, Remote Sensing (3 cr.)

Elective Courses (2):

Select either two courses from Group A or one course each from Group A and Group B.

Group A

GEOG 287, Spatial Analysis (3 cr.)

NR 243, GIS Practicum (3 cr.)

NR 245, Integrating GIS and Statistics (3 cr.)

GEOG 281a, Satellite Climatology/Land Surface Applications (3 cr.)

GEOG 281b, Advanced GIS Applications (3 cr.)

NR 242, Advanced Spatial Techniques (1-3 cr.)

Group B

CS 21, Programming in Python (3 cr.)

CS 8, Intro to Web Site Development (3 cr.)

CS 148, Database Design for the Web (3 cr.)

CS 189, Computer Science for Geospatial Technologies (3 cr.)

ENGR 2, Graphical Communication (2 cr.)

CDAE 101, Computer Aided Drafting and Design (3 cr.)

NATURAL RESOURCES

The Natural Resources Curriculum combines course work from disciplines inside and outside the Rubenstein School to produce an individualized major focused on an ecological theme or the human-environment relationship. Students concentrate in Resource Ecology, Resource Planning, or Integrated Natural Resources. They take foundational courses in natural or social sciences and then tap into upper-level and field-based courses to focus in areas such as aquatic ecology; terrestrial ecology; environmental policy, economics and law; community-based resource planning; environmental education; sustainability and resource management; and energy and environmental systems. Most students incorporate internship, research, and/or study abroad experiences into their academic program. Graduates are competitive for positions in the environmental field in a range of settings. They also are prepared to pursue graduate studies in environment and natural resources including advanced study in the natural sciences and in law, urban, regional and community planning, and public administration. Students may choose to concentrate their studies in **Resource Ecology** or **Resource Planning**, or to develop an individualized program of study in **Integrated Natural Resources**.

The **Resource Ecology** option explores the biology and ecology of plants and animals in both aquatic and terrestrial systems and allows students to select courses around specific individual interests. Students can concentrate their studies on areas such as conservation biology, ecosystem analysis, or ecological dimensions of environmental quality.

The **Resource Planning** option explores interactions among individuals, communities, and society with nature, resources and the environment. It allows students to select courses around specific individual interests such as natural resource planning and community, policy and economic dimensions of resource planning, and international dimensions of resource planning.

The **Integrated Natural Resources** (INR) option provides a broad natural resources education, giving students considerable flexibility in selecting courses. It 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. Students in INR have developed concentrations in Environmental Education, Sustainable Resource Management, Resource Conservation, International Resource Issues, and Spatial Analysis of Natural Resources.

Program Chair: Professor Clare Ginger, 308F Aiken, 802-656-2698

DEGREE REQUIREMENTS

All students who enroll in the Natural Resources curriculum must fulfill the following requirements for graduation:

1. Complete the Rubenstein School's core curriculum.
2. Complete the Rubenstein School's general education requirements.
3. Complete a minimum of 120 credit hours of courses.
4. Complete option requirements for **Resource Ecology, Resource Planning, or Integrated Natural Resources**.

Resource Ecology option:

Required Basic Science courses (31-34 credits, depending on Chemistry courses taken):

BIOL 1 and 2, Principles of Biology (8 cr.)

GEOL 1, Earth System Science (4 cr.)

- or - PSS 161, Introduction to Soil Science (4 cr.)

MATH 19, Fundamentals of Calculus I * (3 cr.)

(cont. on p. 32)

NR 140, Applied Environmental Statistics * (4 cr.)
CHEM 23, Outline of General Chemistry (4 cr.)
- or - CHEM 31 and 32, General Chemistry 1 and 2 (8 cr.)
CHEM 26, Outline of Organic and Biochemistry (4 cr.)
- or - CHEM 42, Introduction to Organic Chemistry (4 cr.) - or - CHEM 141 and 142, Organic Chemistry (8 cr.)
FOR 195, Natural Resource Ecology and Assessment 1 (4 cr.)
NR 143, Introduction to Geographic Information Systems (3 cr.)
- or - NR/FOR 146, Remote Sensing of Natural Resources (3 cr.)

*Also fulfills general education requirement.

Option Electives -- ecology or ecology-related courses (27 credits): In consultation with an academic advisor, student chooses 27 additional credits from an approved list of courses available on the RSENR website, www.uvm.edu/rsenr, at the link for the *Natural Resources* major under *Undergraduate Programs*. In choosing courses, students pursue interests in the biology and ecology of plants and animals in aquatic and terrestrial systems. They may concentrate their studies in areas such as conservation biology, ecosystem analysis, or ecological dimensions of environmental processes and quality.

Any course substitution request should be approved prior to the end of the add/drop period for the semester in which the student enrolls in the substitution course.

Resource Planning option:

Required distribution courses (21-22 credits):

PSYS 1, General Psychology
- or - PSYS 111, Learning, Cog. & Beh. - or - PSYS 130, Social Psyc. - or - PSYS 150 Develop. Psyc. (3 cr.)
CDAE 2, D2: World Food, Pop., & Develop. (3 cr.)
- or - ENVS 2, D2: International Environmental Studies (4 cr.)
POLS 21, American Political System
- or - POLS 41, Introduction to Political Theory - or - POLS 51, Intro International Relations (3 cr.)
SOC 1, Introduction to Sociology
- or - SOC 11, Social Problems (3 cr.)
PHIL 10, Introduction to Philosophy (Ethics or Ethics of Eating)
- or - CDAE 208, Agricultural Policy and Ethics - or - ENVS 178, Environmental Ethics (3 cr.)
ANTH 21, D2: Cultural Anthropology
- or - GEOG 50, D2: World Regional Geography (3 cr.)
EC 11, Principles of Macroeconomics
- or - EC 12, Principles of Microeconomics - or - CDAE 61, Principles of Community Development (3 cr.)

Option Electives (27 credits): In consultation with an academic advisor, student chooses a minimum of 27 additional credits from an approved list of courses available on the RSENR website, www.uvm.edu/rsenr, at the link for the *Natural Resources* major under *Undergraduate Programs*. In choosing these courses, students pursue interests in interactions among individuals, communities, and society with nature, resources, and the environment. They may concentrate their studies in areas such as natural resource planning and community, policy and economic dimensions of resource planning, and international dimensions of resource planning.

Any course substitution request should be approved prior to the end of the add/drop period for the semester in which the student enrolls in the substitute course.

Integrated Natural Resources option:

Option Required courses (minimum of 9 credits):

Students select from a list of approved courses, at least one course in each of three areas: *biology/ecology*; *NR courses in social sciences and communications*; and *quantitative and analytical methods*. These courses are IN ADDITION to those taken to fulfill RSENR's general education requirements. The list of approved courses is available on the RSENR website, www.uvm.edu/rsenr, at the link for the *Natural Resources* major under *Undergraduate Programs*.

Individualized Program of Study (minimum of 39 credits):

The student develops an Individualized Program of Study composed primarily of intermediate level RSENR courses (ENVS, ENSC, FOR, NR, PRT or WFB prefix). This must include at least twenty-four credits inside the School and no more than six credits below the 100-level. With careful selection of courses, students develop concentrations such as ***Environmental Education, Sustainable Resource Management, Environmental Health, and Spatial Analysis of Natural Resources***.

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 sixty credits must have a program of study approved as part of the transfer application. It is expected that transfer students will be active in the Program for at least two years (four semesters) after transferring into the INR option. Any course substitution request should be approved prior to the end of the add/drop period for the semester in which the student plans to enroll in the substitute course.

PARKS, RECREATION, AND TOURISM

The field of Parks, Recreation and Tourism is growing! People are increasingly interested in the health benefits of recreation, leisure, and sports – and are also concerned about balancing the public's desire for recreation and tourism provision with the need for both economic and environmental sustainability. Parks, Recreation and Tourism blends studies of the environment, environmentally-based tourism, and outdoor recreation to train students to become leaders in the diverse fields of Parks, Recreation, and Tourism. The Parks, Recreation, and Tourism program offers students professional preparation in planning and managing outdoor recreation and tourism resources in combination with a well-rounded liberal education.

Required courses include a balanced mix of Public Outdoor Recreation and Private Outdoor Recreation and Tourism courses. Public recreation resources include parks, forests, wilderness areas, and other outdoor recreation environments at the local, regional, state, and federal government levels. Private resources include entrepreneurial settings like ski areas, campgrounds, hotels and resorts, and natural resource-based recreation facilities. An internship is a required part of the PRT program at UVM. Internship opportunities provide valuable work experiences and assist students with career planning, provide education not offered in campus course work, often lead to professional contacts, and sometimes transition to full time jobs. Past PRT graduates are employed in the management of ski areas, private campgrounds, marinas, four-season resorts, travel businesses, and local, state, and national parks and outdoor recreation places.

Program Chair: Dave Kaufman, 204B Aiken, 802-656-9877

DEGREE REQUIREMENTS

All students who enroll in the Parks, Recreation, and Tourism Program must fulfill the following requirements for graduation:

1. Complete the Rubenstein School's core curriculum.
2. Complete the Rubenstein School's general education requirements.
3. Complete a minimum of 120 credit hours of courses.
4. Complete Parks, Recreation, and Tourism foundation courses:
 - One 3-credit course in humanities (Classics, History, Philosophy, Religion)
 - One 3-credit course in communications (Art, Art History, English Literature, Foreign Language, Music, Theater, World Literature)
 - One 3-credit course in social sciences (Anthropology, Economics, Geography, Political Science, Psychology, Sociology)
 - One 4-credit laboratory course in natural sciences (Astronomy, Biology, Chemistry, Geology, Physics, Plant Biology)
5. Complete the following Parks, Recreation, and Tourism (PRT) courses and internship requirements:

The PRT curriculum encompasses a balanced mix of classes appropriate to Public Outdoor Recreation, as well as Private Outdoor Recreation and Tourism, as shown in the lists that follow. Courses provide students with the educational tools necessary to enter the field in either the public domain or private enterprise. **Students take all 12 of the courses listed below, including the mandatory internship, plus three professional electives.**

General required courses:

PRT 1, Introduction to Recreation and Tourism (3 cr.)

PRT 191, Parks, Rec, and Tourism Practicum (3-6 cr.)

Internship must be approved by your adviser in advance with required documentation complete.

THREE PROFESSIONAL ELECTIVE COURSES chosen in consultation with an advisor. (9 cr.)

Public Outdoor Recreation required courses (5 courses):

PRT 138, Park and Recreation Design (4 cr.)

PRT 149, Wilderness Education and Leadership (3 cr.)*

PRT 235, Outdoor Recreation Planning (3 cr.)

PRT 240, Park and Wilderness Management (3 cr.)

PRT 255, Environmental Interpretation (3 cr.)

Private Outdoor Recreation required courses (5 courses):

PRT 50, Tourism Planning (3 cr.)

PRT 157, Ski Area Management (4 cr.)**

PRT 158, Resort Marketing and Management (3 cr.)

PRT 230, Ecotourism (3 cr.)

PRT 258, Entrepreneurship in Recreation and Tourism (3 cr.)

*PRT 149 includes an additional course fee to cover travel expenses.

**PRT 157 includes a required week of class during the Winter Session, prior to the start of the Spring semester.

PARKS, RECREATION, AND TOURISM MINOR REQUIREMENTS

A minimum of 15 credit hours is required, including:

- at least 9 credits to be selected from PRT 1, 50, 138, 149, 157, 158; and
- at least 6 credits to be selected from PRT 230, 235, 240, 255, 258.

Students must earn at least a 2.0 cumulative GPA in their Parks, Recreation, and Tourism minor courses to earn a minor in Parks, Recreation, and Tourism.

SPORTS MANAGEMENT

The Sports Management minor is sponsored by the Rubenstein School of Environment and Natural Resources, in collaboration with the College of Agriculture and Life Sciences, the College of Education and Social Services, and the Grossman School of Business. The minor is for students who aspire to include the management of sporting endeavors, including entrepreneurial sports ventures, professional, amateur, interscholastic, intercollegiate, community recreation, and youth sport organizations into their majors. Career paths may lead students to minor or major league sport management or marketing, working as an administrator in college or high school sports, owning or managing a fitness club, working in event facilities management, etc. The Rubenstein School, as the sponsoring unit on campus, seeks to cultivate an awareness and enhanced understanding of the interaction between human activities, like sports and recreation, and the natural environment.

SPORTS MANAGEMENT MINOR REQUIREMENTS

The courses for the minor include three required courses and at least three elective courses, one from each category, for a minimum of 18 required credits. At least half the courses must be taken at UVM. Students must earn at least a 2.0 cumulative GPA in their Sports Management minor courses to earn a minor in Sports Management. The courses for the minor include:

Required Courses (3): 9 credits total (no prerequisites)

EDPE 220, Sport in Society (3 cr.)

EDPE 101, Sports Management (3 cr.)

– or – EDPE 241 at 3 credits (EDPE 241 is a fee-based spring break travel course)

PRT 235, Outdoor Recreation Planning (3 cr.)

One of the following Management courses, 3 credits total

BSAD 120, Organizational Behavior and Leadership (3 cr.)

EDPE 055, Careers in College Athletics (3 cr.)

EDPE 230, Philosophy of Coaching (3 cr.)

PRT 157, Ski Area Management (3 cr.)

One of the following Marketing/Communications courses, 3 credits total

BSAD 150, Marketing Management (3 cr.)

CDAE 168, Marketing: Community Entrepreneurs (3 cr.)

CDAE 119, Event Planning for Athletics (3 cr.)

CDAE 024, Fundamentals of Public Communication (3 cr.)

PRT 158, Resort Management and Marketing (3 cr.)

One of the following Entrepreneurship courses, 3 credits total

BSAD 137, Entrepreneurial Leadership (3 cr.)

BSAD 138, Entrepreneurship: Business Planning (3 cr.)
CDAE 166, Introduction to Community Entrepreneurship (3 cr.)
CDAE 267, Strategic Planning: Community Entrepreneurs (3 cr.)
PRT 258, Entrepreneurship, Recreation and Tourism (3 cr.)

(cont. on p. 36)

OTHER INFORMATION

Consult your major advisor for any applicable course/major restrictions and information regarding the use of one course to meet multiple degree requirements. Majors in Parks, Recreation and Tourism, or Business Administration may double count at most two courses from the Sports Management minor towards the major.

WILDLIFE AND FISHERIES BIOLOGY

The Wildlife and Fisheries Biology curriculum focuses on the biology, ecology, management, and conservation of animal populations that range from species common enough to be hunted/fished to species that are endangered. Management strategies include direct manipulation of populations or indirect manipulation through alteration of habitat. Courses emphasize applied ecology and techniques for bringing populations into balance, and provide hands-on experience in labs and field trips. All Wildlife and Fisheries Biology majors complete the same core of courses during the first year. As sophomores, students elect either the Wildlife Biology or the Fisheries Biology option.

Since competition for jobs in this profession is high nationwide, students are encouraged to continue their studies at the graduate level. The four-year curriculum does provide an excellent background for many wildlife and fisheries-related positions. These employment possibilities range from traditional game and fish management careers to administrative, interpretative and research positions in private conservation organizations, state conservation agencies, or federal agencies such as the U.S. Fish and Wildlife Service, National Biological Survey, Bureau of Land Management, National Park Service, Department of Defense, or the Peace Corps. Privately-owned environmental consulting firms and planning agencies also employ wildlife and fisheries biologists to carry out environmental impact assessments.

Program Chair: Professor Ellen Marsden, 308D Aiken, 802-656-0684

DEGREE REQUIREMENTS

All students who enroll in the Wildlife and Fisheries Biology curriculum must fulfill the following requirements for graduation:

1. Completion of the Rubenstein School's core curriculum.
2. Completion of the Rubenstein School's general education requirements.
3. Completion of a minimum of 120 credit hours of courses.
4. Completion of the Wildlife and Fisheries Biology professional core courses:
 - MATH 19, Fundamentals of Calculus I (3 cr.)
 - or - MATH 21, Calculus I* (4 cr.)
 - NR 140, Applied Environmental Statistics * (4 cr.)
 - BIOL 1 and 2, Principles of Biology (8 cr.)
 - or - BCOR 11 and 12, Exploring Biology (8 cr.)
 - CHEM 23, Outline of General Chemistry (4 cr.)
 - CHEM 26, Outline of Organic and Biochemistry (4 cr.)
 - or - CHEM 42, Introduction to Organic Chemistry (4 cr.)

FOR 195, Natural Resource Ecology and Assessment 1 (4 cr.)
NR 143, Introduction to Geographic Information Systems (3 cr.)
WFB 117, Scientific Writing and Interpretation (3 cr.)
WFB 161, Fisheries Biology (4 cr.)
WFB 174, Principles of Wildlife Management (3 cr.)
WFB 224, Conservation Biology (4 cr.)

(cont. on p. 37)

* Also fulfills general education requirement

5. Completion of option requirements in **Wildlife Biology** or **Fisheries Biology**.

Wildlife Biology option courses:

FOR 21, Dendrology (4 cr.)
WFB 130, Ornithology (3 cr.)
WFB 131, Field Ornithology** (2 cr.)
WFB 150, Wildlife Habitat and Population Measurements** (1 cr.)
BIOL 217, Mammalogy (4 cr.)

Two courses (one must have a lab[§]) selected from:

PBIO 109, Plant Systematics[§] (4 cr.)
WFB 271, Wetlands Wildlife and Ecology[§] (4 cr.)
WFB 283, Terrestrial Wildlife[§] (4 cr.)
WFB 195, Herpetology: VT Reptiles[§] (3 cr.)
WFB 195, Herpetology: VT Amphibians[§] (3 cr.)
WFB 275, Wildlife Behavior (3 cr.)
WFB 279, Marine Ecology (3 cr.)

A relevant study abroad, internship, or research experience may potentially count towards this requirement with approval of the Program Chair.

** Field intensive courses **OFFERED ONLY DURING SUMMER SESSION—ADDITIONAL TUITION & FEES CHARGED.**

Fisheries Biology option courses:

WFB 261, Fisheries Management (3 cr.)
WFB 232, Ichthyology (3 cr.)
NR 250, Limnology (4 cr.)
NR 280, Stream Ecology (4 cr.)

Two courses selected from:

WFB 271, Wetlands Wildlife (4 cr.)
-- or -- NR 260, Wetlands Ecology and Management (3 cr.)
WFB 279, Marine Ecology (3 cr.)
BIOL 264, Community Ecology (3 cr.)
WFB 195, Herpetology: VT Reptiles (3 cr.)
WFB 195, Herpetology: VT Amphibians (3 cr.)

A relevant study abroad, internship, or research experience may potentially count towards this requirement with approval of the Program Chair.

WILDLIFE BIOLOGY MINOR REQUIREMENTS

A minimum of 15 credit hours is required. Students must earn at least a 2.0 cumulative GPA in their Wildlife Biology minor courses to earn a minor in Wildlife Biology. Required courses:

WFB 130, Ornithology
WFB 174, Principles of Wildlife Management
WFB 271, Wetlands Wildlife
-or- WFB 283, Terrestrial Wildlife

Choose additional courses to total at least 15 credits:

WFB 131**, 150**, 176, 177, 187, 191, 192, 195, 224, 271, 275, 279, 283, 287, 295

** Field intensive courses **OFFERED ONLY DURING SUMMER SESSION—ADDITIONAL TUITION & FEES CHARGED.**

Pre / co-requisites: BIOL 1 and 2, Principles of Biology (8 cr.) - or - BCOR 11 and 12, Exploring Biology (8 cr.) and NR 103 Ecology, Ecosystems & Environ (3 credits) - or - BCOR 102 Ecology and Evolution (3 – 4 credits)

HONORS COLLEGE REQUIREMENTS

If students complete all four years of Honor College requirements (or three years for students accepted as sophomores) in addition to their school or college major requirements, they will graduate as an Honors College Scholar. The following requirements should be discussed with your academic advisor.

First Year and Sophomore Year

The Honors College experience begins with a three-credit seminar in the fall of the first year, **HCOL 85: The Pursuit of Knowledge**, and continues with a three-credit special topics seminar in the spring, **HCOL 86**. Each semester of the second year, students take a three-credit honors seminar (**HCOL 185** and **HCOL 186**), choosing from an extensive slate of offerings created for Honors College students by schools and colleges throughout the university. In the junior and senior year, the Honors College requirements are determined within the home school or college to focus more intensively on a field of study related to your major.

Junior Year

- **HCOL 101: Honors College Thesis Preparation Seminar** (0-1 cr.--recommended) -- *A course designed to assist students in the production and submission of an Honors College Thesis Proposal*
- **NR 199: Honors Seminar** (1 cr., Spring Semester--**required**) – *A discussion and readings seminar that features guest speakers as part of the Rubenstein School Spring Seminar Series*
- **ENVS 201: Research Methods** (3 cr.) –*OR--* **NR 298: Honors Project Planning** (2 cr.) – **required** *Process, procedures, and strategies leading to the development of an individual or group Honors Project Proposal*

Senior Year

During the final year, students carry out their senior thesis or research project. A total of 6 credits will be earned for this work between fall and spring semester through registration in one of the following discipline areas:

- ENSC 299 Environmental Sciences Honors
- ENVS 202/203 Honors Thesis
- FOR 299 Honors
- NR 299 Honors
- PRT 299 Parks, Rec and Tourism Honors

- WFB 299 Wildlife & Fisheries Honors