

# ACADEMIC PROGRAM

## DEGREE REQUIREMENTS

2010 – 2011 UVM CATALOGUE

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

### ■ UNIVERSITY REQUIREMENTS

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

1. University Diversity Requirement – Six credits from the list of approved diversity courses
2. Minimum cumulative grade point average of 2.00
3. 30 of the last 45 hours of academic credit applied toward the degree must be earned at UVM

### ■ GENERAL EDUCATION REQUIREMENTS

The Rubenstein School of Environment and Natural Resources 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. Your faculty advisor will help you consider these possibilities as you plan your schedule.

In selecting courses to meet general education requirements, we have two additional pieces of advice: take a variety of courses; take courses that interest you. You will do better and have more fun. The classes you elect to fulfill these requirements are offered by departments all across campus. You will be meeting and interacting with students and faculty with very different interests and backgrounds. This too is an important part of a broad-based education. All students must complete each of the following general education requirements\*:

1. **WRITING**  
ENGS 1, ENGS 50 or ENGS 53
2. **SPEAKING**  
SPCH 11, CALS 183, or NR 185: Speaking and Listening
3. **RACE AND CULTURE IN NATURAL RESOURCES\*\***  
NR 6, NR 207, and 3 credits from the approved list of D1 or D2 diversity courses (6 credits)
4. **MATHEMATICS\*\*\***  
MATH 9 or higher (but not MATH 17)

5. **STATISTICS\*\*\***  
NR 140, STAT 111, STAT 141 or STAT 211

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).

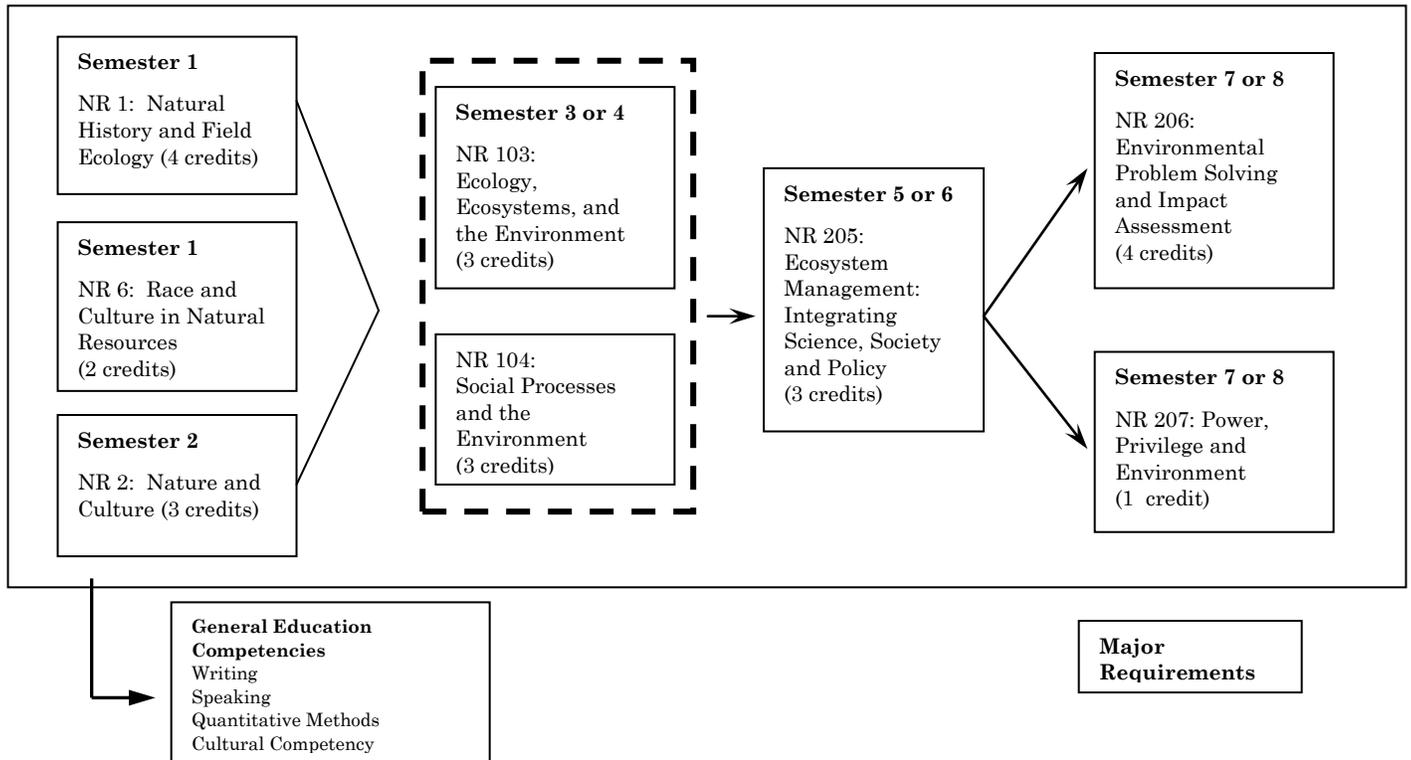
\* No single course may be used to satisfy more than one of the above requirements with the exception of the 3 additional Diversity credits.

\*\* Due to space or scheduling limitations, transfer students may be unable to take NR 6 and/or NR 207. In these cases, students may be allowed to take one course from Category D1 and a second course from Category D1 or D2 to fulfill the Race and Culture requirement in the Rubenstein School and the University Diversity Requirement

\*\*\* Requirement varies depending on major choice.

## ■ 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**) 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:



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.

## **Core Curriculum Course Descriptions**

### **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*  
*Environmental Resources*  
*Water Resources*

#### **Environmental Studies**

#### **Forestry**

#### **Natural Resources**

*Integrated Natural Resources*  
*Resource Ecology*  
*Resource Planning*

#### **Recreation Management**

*Private Outdoor Recreation and Tourism*  
*Public Outdoor Recreation*

#### **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, Recreation Management, and Wildlife Biology**. These minors are available to students from any academic unit on campus. The student must submit an application to the appropriate Program Chair no later than June 1 of the year preceding graduation. 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 Environmental Sciences curriculum offers a science-based education providing both the fundamental knowledge and hands-on experience needed to identify, analyze and solve environmental problems. Prior to the junior year, the student selects 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, Environmental Resources, 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. An Environmental Sciences Internship Coordinator oversees the program.

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. Those majoring in Environmental Sciences through The Rubenstein School of Environment and Natural Resources complete The Rubenstein School's general education and core requirements.

Program Chair:	Professor Alan McIntosh	26 Hills Building	656-8885
Program Staff Assistant:	Marcie Newland	11 Hills Building	656-2911

## ***DEGREE REQUIREMENTS***

All students who enroll in the Environmental Sciences major in The Rubenstein School 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 Environmental Sciences minimal basic science/quantitative coursework:
  - BCOR 11 and 12, Exploring Biology
  - CHEM 31 and 32, Introductory Chemistry
  - CHEM 42, Introduction to Organic Chemistry\*
  - GEOL 55, Environmental Geology -or- PSS 161, Introduction to Soil Science
  - MATH 19 and 20, Calculus I and Calculus II\*\*
  - NR 140, Natural Resources Biostatistics
  - or - STAT 141, Basic Statistics\*\*

\*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. Completion of Environmental Sciences foundation courses:
  - ENSC 1, Introduction to Environmental Sciences
  - ENSC 185, Orientation to the Environmental Sciences\*
  - ENSC 130, Global Environmental Assessment
  - ENSC 160, Pollutant Movement through Air, Land, and Water
  - ENSC 201, Recovery and Restoration of Altered Ecosystems
  - ENSC 202, Ecological Risk Assessment

\*Internal and External Transfer students to ENSC are exempt from ENSC 185

6. Completion of 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, Environmental Resources, 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/](http://www.uvm.edu/~ensc/). Students may also elect a self-designed track in a particular area of interest.

## **ENVIRONMENTAL STUDIES**

The Environmental Program serves a wide range of environmental interests, with its primary mission being undergraduate education, and its primary focus the individual student. Students in Environmental Studies learn interdisciplinary skills to seek solutions to environmental problems and to enhance the quality of human life and the health of the planet.

Required courses combine the perspectives of the sciences, social studies, and humanities in local, national, and global contexts. Working closely with the faculty, each student plans a personalized program of coursework that combines a broad, comprehensive understanding of the environment with depth in a specific concentration of study. Major concentrations can be in the natural sciences, the humanities, the social sciences, or broadly interdisciplinary around a specific focus. Many students earn credits through internships or projects in the community or beyond; most spend a semester overseas; and all do a six-credit senior thesis or project.

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, women's studies, ecotourism, and environmental communication.

The Environmental Studies major is actually offered through three different schools and colleges at the University. All students in the program complete the same Environmental Studies Core and major requirements, but general education and other school-based requirements differ. Students majoring in Environmental Studies through The Rubenstein School of Environment and Natural Resources complete The Rubenstein School's general education and core requirements.

Program Director:	Professor Stephanie Kaza	Bittersweet	656-4055
Program Secretary:	Susan Bean	Bittersweet	656-4055
Student Services Coordinator:	Ibit Getchell	Bittersweet	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. 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 Environmental Studies major core courses:

ENVS 1, Introduction to Environmental Studies

ENVS 2, International Environmental Studies

ENVS 151, Intermediate Environmental Studies

ENVS 201, Research Methods

ENVS 202, Senior Project and Thesis (6-12 credits)

5. Completion of individually-designed program:

Thirty hours of approved environmentally-related courses at the 100- or 200-level, including three hours 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.

### ***ENVIRONMENTAL STUDIES MINOR REQUIREMENTS***

A minimum of 17 credit hours is required. Courses required are:

ENVS 1, Introduction to Environmental Studies

ENVS 2, International Environmental Studies

9 hours of ENVS at the 100-level or above, including 3 hours at the 200-level. Of the 9 hours, 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 Program educates students to excel at planning and implementing sustainable forestry, with an emphasis on the complex social and natural landscapes of the northeastern United States. Students develop an ability to coordinate and manage all aspects of sustainable forestry through educational experiences combining a strong foundation in natural and social sciences with field-based classes, internships, research experiences, and forest management projects.

This major is for students who have a sincere interest in, and commitment to, the forests around us. The program of study is designed to prepare students to become actively involved in maintaining and enhancing the long-term viability of forest ecosystems and in meeting society's diverse forest-based needs. The required core of Forestry courses builds directly on The Rubenstein School's core curriculum and provides an interdisciplinary, field-oriented understanding of the fundamental forestry knowledge and skills.

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:	Check with Dean's Office	101 Hills Building	656-4280
Program Staff Assistant:	Marcie Newland	11 Hills Building	656-2911

## ***DEGREE REQUIREMENTS***

All students who enroll in the Forestry 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 124 credit hours of courses.
4. Completion of Forestry required courses:

PBIO 4, Introduction to Botany  
CHEM 23, General Chemistry  
MATH 18, Basic Mathematics\*  
NR 25, Natural Resources Measurements and Mapping  
NR 140, Natural Resources Biostatistics\*  
WFB 224, Conservation Biology  
PSS 161, Introduction to Soil Science  
A course in Economics or Ecological Economics  
FOR 21, Dendrology  
FOR 73, Small Woodlot Management  
FOR 81, Forestry Seminar\*\*  
FOR 121, Forest Ecology Laboratory  
FOR 122, Forest Ecosystem Analysis\*\*\*  
FOR 223, Silviculture  
FOR 235, Forest Ecosystem Health  
FOR 182, Advanced Forestry Seminar  
FOR 272, Forest Management

\* Also fulfills general education requirement.

\*\*Transfer students with 45 or more credit hours are exempt from FOR 81.

\*\*\*Field intensive course OFFERED ONLY DURING THE SUMMER SESSION.

5. Completion of Forestry area of concentration:

Twelve additional credit hours of student-proposed, faculty-approved<sup>1</sup> course work addressing individual interests of the student. The concentration may be *self-designed*<sup>2</sup> 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*

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

<sup>2</sup> 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.

Required courses: FOR 1, Forest Conservation\* - or - FOR 73, Small Woodlot Management  
FOR 21, Dendrology  
Additional FOR courses to total 16 credit hours.

\*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 – Leslie A. Morrissey, Austin Troy, David Capen, Jarlath O'Neil-Dunne, Ernie Buford, and Walter Poleman

GEOGRAPHY – Glen Elder, Beverley Wemple, Lesley-Ann Dupigny-Giroux, Shelly Rayback, Sasha Davis, and Meghan Cope

GEOLOGY – Paul Bierman

CIVIL ENGINEERING - Donna Rizzo

### **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. The courses for the minor include:

Required Courses (3):

1) Introduction to Geospatial Technologies (select one course)

CE 10/12, Geomatics/Lab (5 credits)

NR 25, Measurement and Mapping of Natural Resources (4 credits)

GEOG 81, Geotechniques (3 credits)

ENSC 130, Global Environmental Assessment (3 credits)

- GEOL 151, Geomorphology (3 credits) – cross listed as GEOG 144
- 2) Geographic Information Systems (select one course)
  - NR 143, Introduction to Geographic Information Systems (3 credits)
  - GEOG 184, Geographic Information: Concepts and Applications (3 credits)
- 3) Remote Sensing (select one course)
  - NR 146, Remote Sensing of Environment (3 credits)
  - GEOG 185, Remote Sensing (3 credits)

Elective Courses (2):

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

**Group A**

- GEOG 204, Spatial Analysis (3 credits)
- NR 243, GIS Practicum (3 credits)
- NR 245, Advanced Spatial Methods (2 credits)
- GEOG 281a, Satellite Climatology/Land Surface Applications (3 credits)
- GEOG 281b, Advanced GIS Applications (3 credits)

**Group B**

- CS 14, Visual Basic Programming (3 credits)
- CS 16, MATLAB Programming (3 credits)
- CDAE 101, Computer Aided Drafting and Design (3 credits)

## NATURAL RESOURCES

The Natural Resources curriculum combines coursework from disciplines within and outside The Rubenstein School of Environment and Natural Resources to produce an individualized major focused on an ecological theme or human/environment relationship. 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	9 Hills Building	656-2698
Program Staff Assistant:	Marcie Newland	11 Hills Building	656-2911

## **DEGREE REQUIREMENTS**

All students who enroll in the Natural Resources 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 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  
GEOL 1, Introduction to Geology  
-or- PSS 161, Introduction to Soil Science  
MATH 19, Fundamentals of Calculus I \*  
NR 140, Natural Resources Biostatistics \*

*(required courses continued on p. 28)*

CHEM 23, Outline of General Chemistry - or - CHEM 31 and 32, Introductory Chemistry  
CHEM 26, Organic and Biochemistry - or - CHEM 42, Introduction to Organic Chemistry  
-or- CHEM 141 and 142, Organic Chemistry  
NR 25, Natural Resources Measurements and Mapping  
NR 143, Introduction to Geographic Information Systems - or - FOR 146  
Remote Sensing of Natural Resources

\*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 in Aiken 350. 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 (24 credits):

PSYC 1, General Psychology - or - PSYC 104, Learning, Cognition, and Behavior,  
- or - PSYC 130, Social Psychology - or - PSYC 161 Developmental Psychology  
CDAE 2, World Food, Population, and Development - or- ENVS 2, International Environmental Studies  
POLS 21, American Political System  
- or - POLS 41, Introduction to the Problems of Political Thought  
SOC 1, Introduction to Sociology  
- or - SOC 11, Social Problems  
PHIL 4, Introduction to Philosophy: Ethics  
- or - CDAE 156, Law, Ethics, and Responsibility - or - ENVS 178, Environmental Ethics  
ANTH 21, Human Cultures

- or - GEOG 50, World Regional Geography
- EC 11, Principles of Macroeconomics – or- 12, Principles of Microeconomics
- or – CDAE 61, Principles of Agriculture and Resource Economics

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 in Aiken 350. 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 elect at least one course in each of three areas from a list of approved courses available in Aiken 350. The areas are: (1) biology/ecology; (2) natural resources, social sciences and communication; (3) quantitative and analytical methods. These courses are IN ADDITION to those taken to fulfill general education requirements.  
*(required courses continued on p. 29)*

Individualized Program of Study (minimum of 39 credits):

The student develops an individualized Program of Study that establishes objectives and defines 39 credits of course selection for the last four semesters. Courses must be consistent with objectives established in the program of study and have an ENVS, ENSC, FOR, NR, RM or WFB prefix. This may include no more than 15 credits outside the School and not more than 6 credits below the 100 level. With careful selection of courses, students have developed such concentrations as **Environmental Education, Sustainable Resource Management, Resource Conservation, International Resource Issues, 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 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. 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.

## RECREATION MANAGEMENT

The Recreation Management program offers students professional preparation in the planning and management of outdoor recreation and tourism resources in combination with a well-rounded liberal education. The program stresses the development of recreation and leisure opportunities integrated with the wise use and protection of natural resources. Emphasis is placed on maintaining the integrity of recreation and tourism resources, balancing public and private interests in land, and creating recreation opportunities as a component of planned land use.

In their advanced work, students have the opportunity to emphasize either Private Outdoor Recreation and Tourism or Public Outdoor Recreation as they prepare for professional careers in a variety of outdoor recreation enterprises and agencies. Past graduates are employed in the management of ski areas, private campgrounds, marinas, four-season resorts, travel businesses, and national, state and community parks. Internships and cooperative education opportunities provide valuable work experiences. These courses assist students with career planning, provide education not offered in campus course work, and often lead to useful professional contacts.

Program Chair:	Professor Walter Kuentzel	8 Hills Building	656-0652
Program Staff Assistant:	Marcie Newland	11 Hills Building	656-2911

## ***DEGREE REQUIREMENTS***

All students who enroll in the Recreation Management Program 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 124 credit hours of courses.
4. Completion of Recreation Management foundation courses:
  - One course in humanities (History, Philosophy, Religion, Classics)
  - One course in communications (Art, Music, Theater, Art History, Foreign Language, English Literature)
  - One course in social sciences (Anthropology, Economics, Geography, Political Science, Psychology, Sociology)
  - One laboratory course in natural sciences (Biology, Physics, Chemistry, Plant Biology, Zoology, Geology)
5. Completion of requirements for either the **Public Outdoor Recreation** or **Private Outdoor Recreation and Tourism** option (see below).

### **Public Outdoor Recreation** option requirements:

Completion of Public Outdoor Recreation core courses:

RM 1, Introduction to Recreation Management  
RM 138, Park and Recreation Design  
RM 153, Recreation Administration and Operation  
RM 191, Recreation Management Practicum  
RM 235, Outdoor Recreation Planning  
RM 240, Park and Wilderness Management  
RM 255, Environmental Interpretation

Completion of **3 courses** selected from the following list:

RM 50, Tourism Planning  
RM 157, Ski Area Management  
RM 158, Resort Marketing and Management  
RM 230, Ecotourism  
RM 258, Entrepreneurship in Recreation and Tourism

Completion of nine credits of professional electives chosen in consultation with an advisor.

### **Private Outdoor Recreation and Tourism** option requirements:

Completion of Private Outdoor Recreation and Tourism core courses:

RM 1, Introduction to Recreation Management  
RM 50, Tourism Planning  
RM 157, Ski Area Management  
RM 158, Resort Marketing and Management  
RM 191, Recreation Management Practicum  
RM 230, Ecotourism

RM 258, Entrepreneurship in Recreation and Tourism

Completion of **3 courses** from the following list:

- RM 138, Park and Recreation Design
- RM 153, Recreation Administration and Operations
- RM 235, Outdoor Recreation Planning
- RM 240, Park and Wilderness Management
- RM 255, Environmental Interpretation

Completion of nine credits of professional electives chosen in consultation with an advisor.

### ***RECREATION MANAGEMENT MINOR REQUIREMENTS***

A minimum of 15 credit hours is required, including:

- at least 9 semester hours to be selected from RM 1, 50, 138, 153, 157, 158; and
- at least 6 semester hours to be selected from RM 230, 235, 240, 255, 258.

## **WILDLIFE AND FISHERIES BIOLOGY**

The Wildlife and Fisheries Biology program focuses on research and management of wildlife, fish and people in the total environment. The curriculum includes summer field courses in ornithology and habitat and population measurements as well as extensive laboratory and field work during the regular year. 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. Two program options are available: Fisheries Biology and Wildlife Biology.

Program Chair:	Professor Allan Strong	7 Hills Building	656-2910
Program Staff Assistant:	Marcie Newland	11 Hills Building	656-2911

### ***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 – or - 21, Calculus I\*  
NR 140, Natural Resources Biostatistics\*

BIOL 1 and 2, Principles of Biology  
CHEM 23, General Chemistry  
CHEM 26, Outline of Organic and Biochemistry – or- 42, Introduction to Organic Chemistry  
NR 25, Measurements and Mapping  
– or – NR 143, Introduction to Geographic Information Systems  
FOR 121, Forest Ecology Laboratory  
WFB 161, Fisheries Biology  
WFB 174, Principles of Wildlife Management  
WFB 224, Conservation Biology

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

**Wildlife Biology** option courses:

FOR 21, Dendrology  
WFB 130, Ornithology  
WFB 131, Field Ornithology\*\*  
WFB 150, Wildlife Habitat and Population Measurements\*\*  
PBIO 109, Plant Taxonomy  
BIOL 217, Mammalogy

*(required courses continued on p. 32)*

**Two** courses (one must have a lab<sup>s</sup>) selected from:

WFB 141, Field Herpetology<sup>s</sup>  
WFB 271/272, Wetlands Wildlife, Wetlands Ecology and Management Lab<sup>s</sup>  
WFB 273/274, Terrestrial Wildlife, Terrestrial Wildlife Lab<sup>s</sup>  
WFB 275, Wildlife Behavior  
WFB 279, Marine Ecology

**Fisheries Biology** option courses:

WFB 285, Fisheries Management  
WFB 232, Ichthyology  
NR 250, Limnology  
-- or – WFB 280, Stream Ecology  
NR 260 / WFB 272, Wetlands Ecology and Management  
WFB 279, Marine Ecology

**Two** courses selected from:

NR 256 Ecology of a Large Lake \*\*  
NR 270, Toxic and Hazardous Substances in Surface Waters  
NR 280, Stream Ecology  
BIOL 264, Community Ecology  
WFB 271, Wetlands Wildlife  
WFB 285: Advanced Special Topics  
CE 260, Hydrology  
-- or -- NR 285, Environmental Hydrology

***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; WFB 174; WFB 271 -or- 273.

Elective courses:

- WFB 131\*\*, 141, 150\*\*, 176, 177, 185, 187, 224, 271, 272, 273, 274, 275, 279, 285, 287.

\*Also fulfills general education requirement.

\*\*Field intensive courses OFFERED ONLY DURING SUMMER SESSION

## 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.

The Honors College experience begins with a six-credit seminar (three credits taken each semester of the first year), HCOL 95: The Pursuit of Knowledge. Each semester of the second year, students take a three-credit honors seminar, 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. The requirements for students in The Rubenstein School are as follows:

### Junior Year

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

\* Environmental Studies majors or students in other majors with scheduling challenges, such as Study Abroad conflicts, may choose to take **ENVS 201: Research Methods** (3 credits) in place of **NR 298: Honors Project Planning**.

### 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 203 Honors Thesis
- FOR 299 Honors
- NR 299 Honors
- RM 299 Recreation Management Honors
- WFB 299 Wildlife & Fisheries Honors