ENVIRONMENTAL SCIENCES
MAJOR: SOIL AND WATERSHEDS OPTION (B.S.)

https://colsa.unh.edu/natural-resources-environment/program/bs/environmental-sciences-major-soil-watersheds-option

Description

The College of Life Sciences and Agriculture (COLSA) and the College of Engineering and Physical Sciences (CEPS) jointly offer a bachelor of science degree in environmental sciences. Environmental science is an interdisciplinary field concerned with the interaction of biological, chemical, and physical processes that shape the environment, and control the response of natural systems to human activities. Students graduating with a degree in environmental sciences will have an understanding of these interacting processes, experience working in interdisciplinary teams to apply this understanding, and the ability to communicate effectively with both scientific and lay audiences. While in this program, students will acquire significant experience with field, laboratory and analytical methods appropriate for employment in professional environmental science positions as well as a basic understanding of environmental policy. The University of New Hampshire is a recognized leader in environmental sciences research, and the environmental sciences program capitalizes on faculty expertise in this area. Program faculty emphasize teaching and research in the areas of biogeochemical cycling, environmental chemistry, ecosystem science, global change, hydrology, plant ecology, soil science, and water resource management among many other fields.

Employment opportunities include environmental consulting firms; educational facilities (e.g., science centers), environmental monitoring laboratories (e.g., water treatment plants, the Environmental Protection Agency), government agencies (e.g., the U.S. Geological Survey, Bureau of Land Management, Natural Resource Conservation Service), university and government research laboratories, and nongovernment environmental organizations. The environmental sciences program also constitutes an excellent preparation for graduate programs in several areas relating to the environment.

The Program has four options, and specific course requirements for the major vary by option. The ecosystems and soils and watersheds options are both managed by the Department of Natural Resources and the Environment in COLSA, and the geosystems and hydrology options are both managed by Earth Sciences in CEPS.

Requirements

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>Scope of the Major (Introduction - 3 Courses)</td>
<td>9</td>
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<tr>
<td>NR 400</td>
<td>Professional Perspectives in Natural Resources</td>
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<tr>
<td>NR 403</td>
<td>Introduction to Environmental Science</td>
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<tr>
<td>NR 435</td>
<td>Contemporary Conservation Issues and Environmental Awareness</td>
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<tr>
<td>or NR 437</td>
<td>Principles of Sustainability</td>
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The Scientific Basis (Foundation - 7 Courses) 28

Biology I

BIOL 412 Introductory Biology: Evolution, Biodiversity and Ecology

Chemistry I

CHEM 403 General Chemistry I

Chemistry II

or CHEM 405 Chemical Principles for Engineers
or CHEM 411 Introductory Chemistry for Life Sciences

Physics

PHYS 401 Introduction to Physics I
or PHYS 407 General Physics I

Biological/Physics II

BIOL 411 Introductory Biology Molecular and Cellular 
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or PHYS 402 Introduction to Physics II
or PHYS 408 General Physics II

Calculus

MATH 424B Calculus for Life Sciences
or MATH 425 Calculus I

Statistics

BIOL 528 Applied Biostatistics I
or ERRC 525 Statistical Methods and Applications

Earth and its Systems (Core - 6 Courses) 24

Earth Science

ESCI 401 Dynamic Earth
or ESCI 402 Earth History
or ESCI 409 Geography and the Environment

Aquatic Science

NR 564 Freshwater Resources

Soils

NR 501 Studio Soils

Climate/Weather

ESCI 514 Introduction to Climate
or GEOG 473 Elements of Weather
or GEOG 670 Climate and Society

Ecology

BIOL 541 Ecology
or NR 660 Ecology and Biogeography of New Zealand
or NR 527 Forest Ecology

Human Dimensions

NR 662 Natural Resources and Environmental Policy
or NR 663 Environmental Policy, Planning and Sustainability in New Zealand
or NR 507 Introduction to our Energy System and Sustainable Energy
or NR 784 Sustainable Living - Global Perspectives

Environmental Toolkit (Methods - 2 Courses) 7-8

Select two courses from the following:

ESCI 534 Techniques in Environmental Sciences

NR 668 Introduction to Geographic Information Systems
or ESCI 777 GIS for Earth & Environmental Sciences
or FORT 581 Applied Geospatial Techniques

NR 777 Remote Sensing of the Environment
or ESCI 778 Remote Sensing Earth & Environmental Sciences

NR 710 Environmental Modeling

NR 713 Quantitative Ecology

Soil and Watershed Systems (Advanced Topics ~5 courses ~20 credits) 16

Advanced Soils

NR 761 Environmental Soil Chemistry
or NR 706 Soil Ecology

Watersheds

NR 703 Watershed Water Quality Management

Ecosystems

NR 730 Terrestrial Ecosystems
or NR 791 Aquatic Ecosystems
or NR 661 Restoration Ecology and Ecosystem Management in New Zealand

Biogeochemistry

NR 744 Biogeochemistry
or ESCI 643 Biogeochemicals in the Earth System

Advanced Soils and Watersheds

NR 743 Ecology and Society in a Changing Arctic

or ESCI 654 Fate and Transport in the Environment
or ESCI 705 Principles of Hydrology
or ESCI 710 Groundwater Hydrology
Environmental Sciences Major: Soil and Watersheds Option (B.S.)

or ESCI 747 or CEE 796 or CEE 754
Aqueous Geochemistry
Special Topics
Engineering Hydrology

Integration and Research (The Capstone Experience) 2-3

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<th>Capstone:</th>
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<tr>
<td>NR 663</td>
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<td>or NR 786</td>
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<td>or NR 795</td>
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<td>or NR 799</td>
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Capstone: NR 663 (EcoQuestif Senior Year)(WI), or NR 786, or NR 795, or NR 799, or approved research experience, or approved internship. Every student must complete a capstone experience senior year, or during the summer before senior year if at least 90 credit hours have been completed.

NR 791 – Preparation for Capstone (1 credit, pass/no credit) is offered every spring. While not required for graduation, it is recommended for second semester juniors who need guidance in terms of developing a capstone project and completing the Capstone Contract.

a. A Contract form provided by the Program must be completed and signed by the student, the adviser, the program coordinator, and the capstone mentor (faculty or off-campus) before the capstone experience by the end of Junior Year.

b. A signed Capstone Experience Evaluation form must be handed in to your advisor by the end of Senior year in order to graduate.

Individualization Your Education (19 Credits)
Program Advisors will help students select additional courses from across the campus that relate to that student’s areas of intellectual interest, and assist with the completion of minors, dual majors, study abroad programs, research projects, internships, etc.

Total Credits 92-93

1 NR 706 or NR 761 if not already taken.

2 Many students enroll in the EcoQuest program (a study abroad opportunity in New Zealand), which satisfies the policy requirement, and capstone requirement if taken senior year.

3 NR 791 Preparation for Capstone - is offered every spring. While not required for graduation, it is recommended for second semester juniors who need guidance in terms of developing a capstone project and completing the Capstone Contract.

Student Learning Outcomes

Key Learning Objectives: The primary Learning Outcome for the Environmental Science Program will be that students will master the content offered in the courses specified in the curriculum as assessed by performance on exams, labs and written assignments. This will include an understanding of the physical, chemical and biological processes central to the function of environmental systems, the mathematical concepts required to understand, explain and predict those processes, and the ability to determine the significance of results, both in terms of statistical probability and impact on the larger world.

The learning process leading to this mastery will require that students can:

- Evaluate the quality of information sources and the validity of scientific theories and data presented in those sources
- Describe and explain the interactions among physical, biological, chemical, and human components of the environment, especially in terms of feedbacks embedded in environmental system that often control their trajectory
- Formulate tests of environmental questions, acquire data, and apply scientific methods to answer these questions;
- Establish protocols for collecting, transcribing, storing and analyzing data collected during field, laboratory or modeling experiments
- Communicate effectively to peers within the environmental community and with audiences outside of the discipline.

Master mathematical, statistical, and study design knowledge and skills, and use state-of-the-art software, hardware, and analytical techniques relevant to environmental conservation and sustainability.