

ENVIRONMENTAL SCIENCES MAJOR: ECOSYSTEMS OPTION (B.S.)

<https://colsa.unh.edu/natural-resources-environment/program/bs/environmental-sciences-major-ecosystems-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

Code	Title	Credits
Scope of the Major (Introduction - 3 Courses) 9		
NR 400	Professional Perspectives in Natural Resources	
NR 403	Introduction to Environmental Science	
NR 435 or NR 437	Contemporary Conservation Issues and Environmental Awareness Principles of Sustainability	
The Scientific Basis (Foundation - 7 Courses) 28		
Biology I:		
BIOL 412	Introductory Biology: Evolution, Biodiversity and Ecology	
Biology II:		
BIOL 411	Introductory Biology: Molecular and Cellular	

or NR 439	Environmental Biology	
Chemistry I:		
CHEM 403 or CHEM 405 or CHEM 411	General Chemistry I Chemical Principles for Engineers Introductory Chemistry for Life Sciences	
Chemistry II:		
NR 561 or CHEM 404	Chemistry of the Environment General Chemistry II	
Physics:		
PHYS 401 or PHYS 407	Introduction to Physics I General Physics I	
Calculus:		
MATH 424B or MATH 425	Calculus for Life Sciences Calculus I	
Statistics:		
BIOL 528 or EREC 525	Applied Biostatistics I Statistical Methods and Applications	
Earth and its Systems (Core - 6 Courses) 24		
Earth Science:		
ESCI 401 or ESCI 402 or ESCI 409	Dynamic Earth Earth History Geology and the Environment	
Aquatic Science:		
NR 504	Freshwater Resources	
Soils:		
NR 501	Studio Soils	
Climate/Weather:		
ESCI 514 or GEOG 473 or GEOG 670	Introduction to Climate Elements of Weather Climate and Society	
Ecology:		
NR 527 or NR 660 or BIOL 541	Forest Ecology Ecology and Biogeography of New Zealand Ecology	
Human Dimensions:		
NR 602 or NR 662 or NR 507 or NR 784	Natural Resources and Environmental Policy Environmental Policy, Planning and Sustainability in New Zealand Introduction to our Energy System and Sustainable Energy Sustainable Living - Global Perspectives	
Environmental Toolkit (Methods - 2 Courses) 7-8		
Select two courses from the following:		
ESCI 534 NR 658 or ESCI 777 or FORT 581 NR 757 or ESCI 778 NR 713	Techniques in Environmental Sciences Introduction to Geographic Information Systems GIS for Earth & Environmental Sciences Applied Geospatial Techniques Remote Sensing of the Environment Remote Sensing Earth & Environmental Sciences Quantitative Ecology	
Ecosystem Integration (Advanced Topics - 4 Courses) 16		
Population and Community Ecology:		
NR 765 or NR 734 or NR 706 or NR 660 or NR 640 or NR 642 or NR 603 or BIOL 720	Community Ecology Tropical Ecology Soil Ecology Ecology and Biogeography of New Zealand Wildlife Population Ecology Introduction to Biogeography Landscape Ecology Plant-Animal Interactions	
Ecosystems:		
NR 730 or NR 751 or NR 661	Terrestrial Ecosystems Aquatic Ecosystems Restoration Ecology and Ecosystem Management in New Zealand	
Biogeochemistry:		
NR 744 or NR 761 or NR 703 or ESCI 642	Biogeochemistry Environmental Soil Chemistry Watershed Water Quality Management Biogeosciences in the Earth System	
Environmental Problem Solving:		

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ESCI 654	Fate and Transport in the Environment
or NR 707	Environmental Modeling
or EREC 760	Ecological-Economic Modeling for Decision Making
or NR 749	Forest Inventory and Modeling
or NR 743	Ecology and Society in a Changing Arctic

Integration and Research (The Capstone Experience)¹⁻²

Capstone:

NR 663	Applied Directed Research in New Zealand
or NR 786	Leadership for Sustainability
or NR 795	Investigations
or NR 799	Honors Senior Thesis

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.

NR791 –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.

Individualizing Your Education (Electives)

One goal of this program is to allow students the opportunity to pursue minors, dual majors, research and study abroad opportunities, while still completing the degree in four years of full-time enrollment. To this end, the program requires a total of 85 credit hours. The University Discovery program includes 5 areas (20 credit hours) not covered by this major. These include English 401, Fine and Performing Arts, Humanities, Historical Perspectives, World Cultures (NOTE: The World Cultures category can be met by certain study abroad programs, including EcoQuest). Combined, Major and Discovery requirements total 105 credit hours. With a total of 128 credit hours required by the University for graduation, this leaves 23 credit hours that can be put towards minors, dual majors, study abroad, Directed Research, etc.

Total Credits

84-85

- 1 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.
- 2 [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

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:

- Communicate effectively to peers within the environmental community and with audiences outside of the discipline.