

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

Degree Requirements

Minimum Credit Requirement: 128 credits

Minimum Residency Requirement: 32 credits must be taken at UNH

Minimum GPA: 2.0 required for conferral*

Core Curriculum Required: Discovery & Writing Program Requirements

Foreign Language Requirement: No

All Major, Option and Elective Requirements as indicated.

*Major GPA requirements as indicated.

Major Requirements

Code	Title	Credits
Scope of the Major (Introduction - 3 Courses)		
NR 400	Professional Perspectives in Natural Resources	1
NR 403	Introduction to Environmental Science	4
NR 435 or NR 437	Contemporary Conservation Issues and Environmental Awareness Principles of Sustainability	4
The Scientific Basis (Foundation - 7 Courses)		
Biology I		
BIOL 412	Introductory Biology: Evolution, Biodiversity and Ecology	4
Biology II		
BIOL 411 or NR 439	Introductory Biology: Molecular and Cellular Environmental Biology	4
Chemistry I		
CHEM 403 or CHEM 405 or CHEM 411	General Chemistry I Chemical Principles for Engineers Introductory Chemistry for Life Sciences	4
Chemistry II		
NR 561 or CHEM 404	Chemistry of the Environment General Chemistry II	4
Physics		
PHYS 401 or PHYS 407	Introduction to Physics I General Physics I	4
Calculus		
MATH 424B or MATH 425	Calculus for Life Sciences Calculus I	4
Statistics		
BIOL 528 or EREC 525	Applied Biostatistics I Statistical Methods and Applications	4
Earth and its Systems (Core - 6 Courses)		
Earth Science		
ESCI 401 or ESCI 402 or ESCI 409	Dynamic Earth Earth History Geology and the Environment	4
Aquatic Science		
NR 504	Freshwater Resources	4
Soils		
NR 501	Studio Soils	4
Climate/Weather		
ESCI 514 or GEOG 473 or GEOG 670	Introduction to Climate Elements of Weather Climate and Society	3-4
Ecology		
NR 527 or NR 660 or BIOL 541W or MEFB 530 or MEFB 674	Forest Ecology Ecology and Biogeography of New Zealand Ecology Evolution and Marine Diversity Ecology and Marine Environment	4
Human Dimensions		
NR 602 or NR 662 or NR 507 or NR 784 or MEFB 702	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 Sustainable Marine Fisheries	4
Environmental Toolkit (Methods - 2 Courses)		
Select two courses from the following:		7-8
ESCI 534	Techniques in Environmental Sciences	
NR 658 or ESCI 777 or FORT 581	Introduction to Geographic Information Systems GIS for Earth & Environmental Sciences Applied Geospatial Techniques	
NR 757 or ESCI 778	Remote Sensing of the Environment Remote Sensing Earth & Environmental Sciences	
NR 713	Quantitative Ecology	
MEFB #500	Coastal Habitat Field Research Methods	

Ecosystem Integration (Advanced Topics - 4 Courses)	
Select four courses from the following: 16	
Population and Community Ecology	
NR 765	Community Ecology
or NR 734	Tropical Ecology
or NR 706	Soil Ecology
or NR 660	Ecology and Biogeography of New Zealand
or NR 640	Wildlife Population Ecology
or NR 642	Introduction to Biogeography
or NR #603	Landscape Ecology
or BIOL 720	Plant-Animal Interactions
Ecosystems	
NR 730	Terrestrial Ecosystems
or NR 751	Aquatic Ecosystems
or NR 661	Restoration Ecology and Ecosystem Management in New Zealand
or MEFB 508	Marine Ecosystem Research and Management
Biogeochemistry	
NR 744	Biogeochemistry
or NR 761	Environmental Soil Chemistry
or NR 703	Watershed Water Quality Management
or ESCI 642	Biogeosciences in the Earth System
Environmental Problem Solving	
ESCI 654	Fate and Transport in the Environment
or NR 707	Environmental Modeling
or NR 749	Forest Inventory and Modeling
or NR 743	Addressing Arctic Challenges
Integration and Research (The Capstone Experience) ¹	
Capstone:	
NR 663	Applied Directed Research in New Zealand
or NR 795	Investigations
or NR 799	Honors Senior Thesis
Total Credits	83-85

Capstone Experience

NR 663 Applied Directed Research in New Zealand (EcoQuest if Senior Year), or NR 795 Investigations, or NR 799 Honors Senior Thesis, 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.

1) A contract form provided by the program must be completed and signed by the student, the advisor, the program coordinator, and the capstone mentor (faculty or off-campus) before the capstone experience, by the end of the junior year.

2) A signed Capstone Experience Evaluation form must be submitted to your advisor by the end of the senior year in order to graduate.

Preparation for Capstone: Please discuss with your faculty advisor regularly what kind of capstone experience you would like to pursue. If you remain uncertain during the junior year, the Earth Science department offers a Capstone Preparation course, ESCI 796 Topics in the spring, but this is not required.

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.

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.

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 will have:

- Knowledge of how physical, chemical, and biological factors interact with human activities to shape the environment;
- Proficiency with environmental techniques including field, lab, GIS, or modeling;
- The ability to solve environmental problems;
- The ability to communicate orally or in writing about environmental dynamics.