

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

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	
Chemistry I:		
CHEM 403	General Chemistry I	

or CHEM 405	Chemical Principles for Engineers	
or CHEM 411	Introductory Chemistry for Life Sciences	
Chemistry II:		
NR 561	Chemistry of the Environment	
or CHEM 404	General Chemistry II	
Physics:		
PHYS 401	Introduction to Physics I	
or PHYS 407	General Physics I	
Biology/Physics II:		
BIOL 411	Introductory Biology: Molecular and Cellular	4
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 EREC 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	Geology and the Environment	
Aquatic Science:		
NR 504	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	
or MEFB 530	Evolution and Marine Diversity	
or MEFB 674	Ecology and Marine Environment	
Human Dimensions:		
NR 602	Natural Resources and Environmental Policy	
or NR 662	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	
or MEFB 702	Sustainable Marine Fisheries	
Environmental Toolkit (Methods - 2 Courses) 7-8		
Select two courses from the following:		
ESCI 534	Techniques in Environmental Sciences	
NR 658	Introduction to Geographic Information Systems	
or ESCI 777	GIS for Earth & Environmental Sciences	
or FORT 581	Applied Geospatial Techniques	
NR 757	Remote Sensing of the Environment	
or ESCI 778	Remote Sensing Earth & Environmental Sciences	
NR 707	Environmental Modeling	
NR 713	Quantitative Ecology	
MEFB 500	Coastal Habitat Field Research Methods	
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 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 ESCI 642	Biogeosciences in the Earth System	

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Advanced Soils and Watersheds:

NR 743	Ecology and Society in a Changing Arctic ¹
or ESCI 654	Fate and Transport in the Environment
or ESCI 705	Principles of Hydrology
or ESCI 710	Groundwater Hydrology
or ESCI 747	Aqueous Geochemistry
or CEE 796	Special Topics
or CEE 754	Engineering Hydrology

Integration and Research (The Capstone Experience) ²⁻³

Capstone:

NR 663	Applied Directed Research in New Zealand	4
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.

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 NR706 or NR761 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 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.