

ENVIRONMENTAL SCIENCE

Department of Earth, Environment, and Physics

Environmental Science is an interdisciplinary science major for students interested in the exploration of human interactions with the natural world. Course work includes fundamental concepts in biology, chemistry, earth science, and physics and emphasizes an interdisciplinary approach to environmental science. The major provides a broad foundation, introducing students to scientific techniques, analyses, and tools for assessing human impacts on environmental systems and for mitigating or remediating environmental harm. Hands-on field and laboratory investigations of environmental systems are emphasized in course work and through opportunities for guided research with faculty mentors.

The Environmental Science major provides a pathway into a variety of careers and graduate programs. The major is appropriate for students interested in careers in education, environmental conservation, natural resource management, environmental consulting, planning, and a wide variety of specialized scientific disciplines. Environmental science majors are well prepared for graduate studies in the earth and environmental sciences as well as diverse fields such as business, law, environmental management, or sustainability studies. Students are encouraged to participate in study abroad opportunities to develop a global awareness of environmental issues and approaches to solving these issues.

- Environmental Science Major
- Geospatial Information Science Minor

Faculty

Miriam A. Cope, Visiting Instructor (2021), A.B., Bryn Mawr College; M.A., Clark University; Ph.D., University of Illinois at Urbana-Champaign

Meghna Dilip, Department Chair, Professor (2008), B.Sc. University of Madras India; M.Sc. Anna University India; M.S., Ph.D. University of Alabama

Allison Dunn, Professor (2007), B.A. Oberlin College; M.A., Ph.D. Harvard University

William J. Hansen, Professor (2005), B.A. State University of New York Albany; M.A. Hunter College; Ph.D. City University of New York Graduate Center

Margaret E. Kerr, Professor (2000), B.S. University of Maine; Ph.D. Wesleyan University

Robert S. Kolesnik, Visiting Instructor (2021), B.S., Worcester State College; M.N.S., Worcester Polytechnic Institute

Douglas E. Kowalewski, Department Chair, Associate Professor (2012), B.S. Virginia Polytechnic Institute; Ph.D. Boston University

Nabin K. Malakar, Assistant Professor (2017), M.S., Ph.D., University at Albany, State University of New York (SUNY)

Kathleen Murphy, Associate Professor (2014), B.S. College of William and Mary; M.S., Ph.D. University Of Massachusetts Amherst

Steven J. Oliver, Professor (2003), B.A. University of Montana; Ph.D. Boston University

Laura C. Reynolds, Assistant Professor (2020), B.A. Dartmouth College; Ph.D. University of California

Randall Tracy, Professor (2003), B.S., M.S. University of Connecticut; Ph.D. Arizona State University

Sebastian Velez, Associate Professor (2012), B.S. University of Puerto Rico; M.S. University of Notre Dame; Ph.D. Harvard University

Courses

EV-120 Integrated Environmental Science for Educators

LASC Categories: NSP, LAB

Introduction to the scientific method. Physical, biological and earth sciences as applied to problems in environmental science. Three lecture hours and Two laboratory hours per week.

Every year. 4 Credits

EV-130 Environmental Problems and Solutions

LASC Categories: NSP, WAC

Prerequisites: Writing II

The course is an introduction to human impacts on the earth and ecosystem processes. The complexity of these issues is examined through a series of case studies examining global, regional and local issues.

Every year. 3 Credits

EV-150 Environmental Science

LASC Categories: NSP

Interdisciplinary scientific study of human impacts on natural systems. Introduction to fundamental concepts and tools of environmental impact analysis.

Every year. 3 Credits

EV-199 Special Topics in Environmental Science

Lecture or laboratory course in selected areas of Environmental Science presented by departmental instructor. Topics will be announced in advance.

1-6 Credits

EV-202 Principles of Ecology

LASC Categories: NLL, WAC, NLL, WAC

Prerequisites: BI-140, EN-102, MA-150 or MA-180, or MA-190, or MA-200.

Basic ecological theory relating to organism-environment interactions; population dynamics, and ecosystems. Three hours of lecture and a three-hour laboratory per week.

Every year. 4 Credits

EV-210 Chemical Analysis: an Introduction to Modern Methods

LASC Categories: NLL, WAC

Prerequisites: CH-120, CH-121 (minimum grade C-), and EN-102.

Introduction to modern methods of chemical analysis including gravimetry, acid-base and redox titrations, potentiometry, UV-visible and atomic absorption spectrophotometry, and gas and HPLC chromatography. Three lecture hours and four laboratory hours per week. [Cross-listed with CH-210.]

Every year. 5 Credits

EV-218 Introduction to Remote Sensing

LASC Categories: NSP

Prerequisites: GS-101 or GS-140 or EV-150 or BI-101 or BI-140

Introduction to the use and analysis of remotely sensed images such as aerial photographs and satellite imagery. [Cross-listed with GS-218.]

Every year. 3 Credits

EV-225 Oceanography**LASC Categories:** QAC**Prerequisites:** GS-101 or GS-140 or GS-110 or EV-150

The principles of physical, chemical, biological, and geological oceanography. [Cross-listed with GS-225.]

Spring only and every year. 3 Credits

EV-230 Biogeography**Prerequisites:** GS-101 or GS-110 or BI-101 or BI-140

The distribution patterns of plants and animals, processes affecting this distribution, and how these patterns change in space and time. [Cross-listed with GS-230.]

Every 2-3 years. 3 Credits

EV-235 Contemporary Climate Change**Prerequisites:** GS-101 or GS-110 or EV-150 or CH-106.

The global climate system, factors influencing climate, recent climate change and the role of human activity. [Cross-listed with GS-235.]

Every 2-3 years. 3 Credits

EV-250 Hydrology**Prerequisites:** GS-101 or GS-140 or GS-110 or EV-150

Hydrologic processes, their estimation and measurement. Includes precipitation, evaporation, runoff, groundwater and water resources management. [Cross-listed with GS-250.]

Other or on demand. 3 Credits

EV-258 Global Environmental Change**Prerequisites:** GE-102 or GL/GE-102 or GS-101 or GL-150 or EV-150 or UR-101 or CH-106

An introduction to the science, political economy and ethics of global environmental change. [Cross-listed with GE-258.]

3 Credits

EV-260 Introduction to Soil Science**Prerequisites:** GS-101 or GS-140

The study of the formation, processes, classification and composition of soils with emphasis on environmental applications, including watershed delineation. [Cross-listed with GS-260.]

Every year. 3 Credits

EV-301 Topics in Invertebrate Zoology**LASC Categories:** NLL**Prerequisites:** BI-140 and BI-202 with a grade of C- or above.

Considers anatomy, taxonomy (including selected articles of the international code of zoological nomenclature), natural history, and evolutionary relationships of selected invertebrate phyla. Three hours of lecture and a three-hour laboratory per week. [Cross-listed with BI-301.]

Spring only and every 2-3 years. 4 Credits

EV-307 American Public Lands: Environmental Issues**Prerequisites:** GE-258 or permission of instructor.

Exploration of the environmental management issues on U.S. public lands such as national parks, national forests BLM lands. [Cross-listed with GE-307.]

Every year. 3 Credits

EV-320 Environmental Chemistry**LASC Categories:** NLL**Prerequisites:** CH-120 and CH-121 with a grade of C- or above.

Chemistry of the atmosphere, soil, and natural water systems, air and water pollution, water treatment, hazardous wastes and pollution control. Lab techniques including sampling and analysis of environmental media. Lecture 3 hours per week and Lab will meet once a week for 3 hours. [Cross-listed with CH-320.]

Fall only and every year. 4 Credits

EV-330 Environmental Toxicology**Prerequisites:** CH-201 or CH-320 with a grade of C- or above.

Topics include the pharmacological and biochemical properties of toxins and the effects of toxins on human health, including assessment of risk(s). [Cross-listed with CH-330.]

Every 2-3 years. 3 Credits

EV-331 Marine Biology**LASC Categories:** NLL**Prerequisites:** BI-140 and BI-202 with a grade of C- or above.

Considers the marine environment, its flora and fauna, distribution and production of plankton-nekton-benthos, zoogeography, bioeconomic factors and potential. Three lecture hours and a three-hour laboratory per week. [Cross-listed with BI-331.]

Every 2-3 years. 4 Credits

EV-333 Topics in Vertebrate Zoology**LASC Categories:** NLL**Prerequisites:** BI-140 and BI-202 with grade of C- or above.

Life histories, adaptations, distribution, systematics, and economic importance of selected vertebrates taxa. Each semester will focus on a particular taxon. Three hours of lecture and a three-hour laboratory per week. [Cross-listed with BI-333.]

Every 2-3 years. 4 Credits

EV-334 Wildlife Biology**LASC Categories:** NLL**Prerequisites:** BI-140 and BI-202 with grade of C- or above.

Theory and Practice of wildlife management. Considers procedures for collection and analysis of field and laboratory data on vertebrate game populations useful to wildlife biologists. Three hours of lecture and a three-hour laboratory per week. [Cross-listed with BI-334.]

Every 2-3 years. 4 Credits

EV-335 Hydrogeology**Prerequisites:** GS-140 or GS-250 and a math placement exam score of 3, or a college level math course.

Underground water and its movement. Aquifer identification and test; wells, contamination and remediation, ground water as a geologic agent. [Cross-listed with GS-335.]

Fall only and other or on demand. 3 Credits

EV-340 Plant Sciences**LASC Categories:** NLL**Prerequisites:** BI-140 and BI-202 with a grade of C- or above.

Morphology, anatomy, physiology of flowering plants with studies on life cycles, ecological relationships, biochemical processes and evolution of plant diversity. Three lecture hours and three laboratory hours per week. [Cross-listed with BI-340.]

Spring only and other or on demand. 4 Credits

EV-344 Soil Biology**LASC Categories:** NLL**Prerequisites:** BI-140, BI-141, BI-204, CH-120, and CH-121 with a grade of C- or above.

Includes study of nutrient cycling, relations between plants, animals, and microbes, ecology of polluted soils and soil biotechnology. Three lecture hours and three laboratory hours per week. [Cross-listed with BI-344.]

Fall and Spring and every year. 4 Credits

EV-345 Green Chemistry**LASC Categories:** NLL**Prerequisites:** CH-201 or CH-320 with a grade of C- or above.

This course will provide an understanding of the fundamentals of green chemical design that either eliminates or reduces the use of generation of hazardous substances. Three hours of lecture/lab per week. [Cross-listed with CH-335.]

Every year. 3 Credits

EV-348 Fundamentals of Earth Data Analytics**LASC Categories:** NSP, QR, QAC**Prerequisites:** GS-101 Take 1 course from Subject GS and level 200.

The theory and practice of data analytics using remote sensing and in-situ earth observations, and communicating the science.

Fall only and every year. 4 Credits

EV-360 Animal Behavior**LASC Categories:** NLL**Prerequisites:** BI-202 or PB-200 with a grade of C- or above.

Survey of ethology and behavioral ecology from an historical and evolutionary perspective. Laboratory involves observation, recording and analysis of animal behavior. Three lecture hours and three laboratory hours per week. [Cross-listed with BI-360.]

4 Credits

EV-370 Lakes & Environmental Change**LASC Categories:** WAC, NLL**Prerequisites:** GS-140 Take one earth science course at the 200-level or above.

Modern physical, biogeochemical, and sedimentary processes in lakes. Lake sediments as archives of past climate and environmental change. Includes fieldwork. [Cross-listed with GS-370.]

4 Credits

EV-380 Biodiversity and Conservation Biology**LASC Categories:** LAB**Prerequisites:** BI-140, BI-141, BI-202, and BI-203 with a grade of C- or above.

A theoretical and quantitative approach to species, genetic, ecosystem and community diversity in the context of modern conservation biology principles. Three lecture hours and three laboratory hours per week.

[Cross-listed with BI-380.]

Other or on demand. 4 Credits

EV-400 Environmental Science Seminar**LASC Categories:** CAP**Prerequisites:** 50 credits in the major. Students with senior standing who have completed the core courses.

Capstone course for Environmental Science majors. Creation and presentation of a review or research paper and career preparation.

Fall and Spring and every year. 3 Credits

EV-408 Directed Study: Environmental Science

Directed study offers students, who because of unusual circumstances may be unable to register for a course when offered, the opportunity to complete an existing course with an established syllabus under the direction and with agreement from a faculty member.

3-4 Credits

EV-410 Independent Study in Environmental Science

Opportunity for advanced students to pursue a topic of special interest involving extensive reading, experimentation, and research.

1-6 Credits

EV-412 Special Topics in Environmental Science

Intended for the undergraduate who wishes to undertake study of selected topics in Environmental Science of mutual interest to student and faculty.

1-6 Credits

EV-420 Advanced Geoscience Research and Fieldwork

Lab and or field-based research on a specific geoscience topic under supervision of a faculty member. [Permission of instructor.]

Fall and Spring and every year. 1-6 Credits