

Environmental science

More about on-campus opportunities, career paths and internship options in your area of interest as well as stories about program events, faculty and alumni, online at

www.goshen.edu/biology

Understanding human society and ecosystems

Complex problems often require solutions from understanding gained in a variety of disciplines. For environmental problems, all of the sciences – from chemistry to biology to meteorology – are used to evaluate the health of our environment and the impact of human society on our environment. Equally important are sociology, anthropology, political science, law, history, economics, theology, ethics and the creative arts, since these define the human relationship with – and responsibility toward – the ecosystems in which humans live.

In a 1998 letter to the journal *Science*, 20 prominent ecologists insisted that all scientists, particularly ecologists, spend part of their career focusing on local and global environmental problems. When our minds bend toward these issues, we can create a new vision of a sustainable and just human ecology in an era of burgeoning human populations.

Environmental scientists at GC will draw on the college's particular strengths to train for their work in the sustainable human communities of the future: GC's science education, excellent outdoor ecosystem resources, excellence in conservation biology, national resource stewardship and environmental analysis of resource quality.

Components of the major

The core

The environmental science (ES) major contains a 31-credit-hour core of science and social science courses, including 3-6 hours of senior activities (senior seminar and internship). Ecosystem knowledge and analysis skills are gained in Biological Principles, Principles of Environmental Science and General Ecology. Understanding of human systems is attained in Principles of Economics, Introduction to Public Policy, Natural Resources Policy Seminar and Principles of Environmental Science.

Areas of focus

Personal, academic and career goals and interests determine the student's final course of study. ES students, in consultation with their faculty adviser, select one of four areas of emphasis. Each area of focus has required and elective courses for a total of 28 hours.

Agroecology – addresses ecologically-based management of cropping systems, stewardship of the environment and sustainable food production systems. The intersection between crop plants and their environment is emphasized in this concentration.

General Chemistry I	Botany of Seed Plants
Vegetable Crops	Agroecology
Entomology	Land Management
Properties and Management of Soils	
Small Farm Management and Produce Marketing	

Conservation biology – Field biology with the social science skills to work with areas of direct human impact on the natural world, i.e., preservation of endangered species and ecosystems. Students will also be prepared to work for the many federal, state and local government agencies, as well as private agencies such as The Nature Conservancy.

General Chemistry I and II Organic	Chemistry I
Land Management	Genetics
Selected field biology courses	

Environmental analysis – Interdisciplinary science curriculum for gaining skills and knowledge necessary for resource quality analysis and monitoring.

General Chemistry I and II	Analytical Chemistry
Organic Chemistry I	Microbial Biology
Two biology or chemistry courses approved by adviser	

Resource management – Pragmatic natural resource training. Useful for restoration of damaged ecosystems or management of a resource to minimize human impact while maximizing sustainable human use and enjoyment of a resource.

General Chemistry I and II Land Management
Forest Resources
Field courses approved by adviser

Practical experience

All environmental science (ES) students will have the chance to apply what they have learned by working in the field they have chosen (senior practicum). Many ES students conduct research in their chosen area of focus in the Elkhart County area. Others benefit from the mentoring by a local environmental science professional as an intern. ES students have worked with the Indiana Department of Natural Resources, Elkhart Wastewater Treatment facility, City of Elkhart environmental engineers in wetland construction, Merry Lea Environmental Learning Center in conservation and stewardship and various community supported agriculture groups promoting organic and sustainable agriculture. Environmental education opportunities are found with many area and national organizations.

Career opportunities

Graduates in environmental science (ES) may work in a wide variety of areas, such as sustainable agriculture, conservation biology, water/air quality analysis, environmental education, recovery of threatened or endangered species, and as consultants for local, regional, or national parties interested in sustainable development. Potential employers include church and community agencies, local, state and federal government, private advocacy, stewardship and land trust organizations.

Facilities

Science Building and Schrock Annex – Completed in 1992, this facility provides modern laboratory and research facilities for biology, chemistry, physics and mathematics.

Merry Lea Environmental Learning Center – Merry Lea is among the best-assembled land preserves in Indiana and contains a diverse group of Indiana ecosystems. The 1,150-acre preserve contains a wonderful combination of wetlands, bogs, lakeshores, upland and lowland forests, prairies and meadows. This facility, located 30 miles south of the campus, is the site for fieldwork in a variety of courses.

Witmer Woods – This 18-acre site near the main campus is an arboretum of plants native to Indiana, constituting a unique resource to naturalists and an invaluable botanical teaching tool.

Marine Biology Station at Layton, Fla. – A housing-laboratory structure provides a permanent home for the marine biology program. The facility houses 24 students during intensive learning experience in the Marine Biology in the Florida Keys course.

Typical plan of study

First year

- General education
- Biological Principles I & II
- General Chemistry
- Principles of Economics
- Human Origins/Human Nature (social science gen.ed.)

Second and third years

- General education
- SST
- Principles of Environmental Science
- Introduction to Statistics
- Introduction to Public Policy
- Natural Resources Policy Seminar
- General Ecology
- Courses in concentration area

Fourth year

- Courses in concentration area
- Balance of general education
- Internship
- Senior Seminar

Faculty

LisaRenee English, Ph.D., director of environmental studies, Lindsey Fellow, assistant professor of biology. B.S., University of Arkansas-Little Rock, 1995; M.S., 1999, Ph.D., 2003, University of Arkansas-Fayetteville.

Dale Hess, Ph.D., assistant professor of environmental science, collegiate program director at Merry Lea Environmental Learning Center. B.A., Millersville State College, 1976; M.S., 1984, Ph.D., 1989, Purdue University.

David J. Miller, Ph.D., associate professor of biology, program director at Merry Lea. B.A., Eastern Mennonite College, 1964; M.S., University of Delaware, 1972; Ph.D., Michigan State University, 1977.

William F. Minter, M.S.F., director of land management. B.S., Colorado State University, 1980; M.S.F., Purdue University, 1989.

