

Minor in Environmental Modeling (SBIM)

Department of Biological Sciences
College of Science

Overview

The Environmental Modeling Minor is designed to introduce students to the process of spatial modeling as part of a toolset for investigating environmental issues and provide students with opportunities to apply these skills through advanced course work. The required core courses are designed to give students a solid foundation of environmental issues and concepts. Central to this minor are the development of geographic information system (GIS) and remote sensing techniques, problem solving skills, and an understanding of the multiple stakeholder perspectives often involved with environmental issues. Students interested in pursuing employment or an advanced degree with an environmental focus will find this minor beneficial.

Students eligible

Any student not majoring in Environmental Science is eligible for the minor.

Requirements

A student must successfully complete a minimum of **20 quarter credit hours** from the listings below with a 2.0 minimum GPA. A student must take all 12 credits of required courses listed below and at least 8 credits of courses from the elective listing. At least 12 credits of the minor must be in courses not required by the student's home program and must be completed in residency at RIT.

Before starting the minor, student should be aware that many of the advanced elective courses require prerequisites, such as the College Physics sequence (1017-211, 212, 213) or permission of the instructor. Students interested in this minor should consult with the Director of the Environmental Science Program to discuss course schedules and background.

Course Matrix

COURSE	FALL	WINTER	SPRING
0508-460 – Environment and Society*			X
1006-202 – Concepts of Environmental Science*	X		
1006-203 – Environmental Science Field Skills*			X
1006-350 – Application of Geographic Information Systems (GIS)	X		
1006-450 – Raster Application of GIS		X	
1006-750 – Ecological and Environmental Applications of GIS			X
1051-420 – Environmental Applications of Remote Sensing		X	

* Required Course for the Environmental Science Minor

Required Courses (3 courses – 12 credits)

0508-460 Environment and Society

This course introduces the interdisciplinary foundations of environmental science via an analysis of sustainability. It will consist of one lecture and one lab per week. Labs will emphasize non-classroom based learning activities such as field trips. Initial course for the environmental science degree program. Part of the environmental studies concentration; the science, technology and environmental studies minor; and may also be taken as an elective. **Class 2, Lab 4, Credit 4 (S).**

1006-202 Concepts of Environmental Science

Concepts of Environmental Science is part of a three-quarter course group (including Environment and Society and Environmental Science Field Studies) that when combined presents an integrated approach to the interrelated, interdisciplinary principles of environmental science through case studies, site visits, and field work. In this course, the focus will be on sustainability as the foundation for problem solving while investigating a number of environmental issues. Topics may include biodiversity, ecosystems, pollution, energy, and global climate change. To demonstrate the interdisciplinary methodology of environmental science, elements of government/political science/policy, ethics, economics, sociology, history and engineering are embedded in the scientific matrix used to present this course. **Class 3, Lab 3, Credit 4 (F)**

1006-203 Environmental Science Field Studies

Environmental Science Field Studies is part of a three-quarter course group (including Environment and Society and Concepts of Environmental Science) that when combined presents an integrated approach to the interrelated, interdisciplinary principles of environmental science through case studies, site visits, and field work. In this course, the focus will be on water resources, water quality, water quantity, and land use/land cover change. Students will learn specific analysis techniques, following a stressed stream analysis approach, that will help them create a water quality protection plan for the watershed (part of the problem solving approach in environmental science). Additional topics may include geographic information systems, soils, environmental education, and sustainable food production. To demonstrate the interdisciplinary methodology of environmental science, elements of government/political science/policy, ethics, economics, sociology, history and engineering are embedded in the scientific matrix used to present this course. **Class 3, Lab 3, Credit 4 (S)**

Note that a maximum of 4 Advanced Placement credits may be applied to the minor.

Elective Courses to Total 8 Credits Minimum

1006-350 Applications of GIS

Through hands-on projects and case studies, this course illustrates concepts and applications of raster and vector geographic information systems (GIS) in a variety of disciplines, such as environmental science, biology, geology, geography, and, sociology, and economics. Students will learn how to use GIS software, plan a project, create a database, and conduct an independent analysis. No official prerequisites, but students should be comfortable working with computers and experience with programming is also useful. **Class 3, Lab 3, Credit 4 (F)**

1006-450 Raster Applications of GIS

This course focuses on raster data and surfaces, digital imagery, and the integration of raster geographic information systems (GIS) data and analyses with vector GIS. Topics will include vector-to-raster conversions; managing raster layers, attributes, and databases; overlay analyses; neighborhood analyses; map algebra; surface modeling (2-D and 3-D); and basic remote sensing applications. Students will read and discuss case studies from a variety of disciplines using raster analyses, learn and apply similar tools and analyses in a series of lab exercises, and conduct an independent project based on a lab exercise or a topic of their own interest. No pre-requisites, but 1006-350 is strongly encouraged. **Class 3, Lab 3, Credit 4 (W).**

1006-750 Ecological and Environmental Applications of GIS

Aerial photography, satellite imagery, Global Positioning Systems (GPS) and Geographic Information Systems (GIS) are extremely useful tools in ecological and environmental applications such as biological monitoring, environmental assessment, habitat restoration, change analysis, resource management, and risk assessment. This course will: 1) introduce students to spatial analysis theories, techniques and issues associated with ecological and environmental applications; 2) provide hands-on training in the use of these spatial tools while addressing a real problem; 3) provide experience linking GIS analyses to field assessments and monitoring activities; and 4) enable students to solve a variety of spatial and temporal ecological and environmental problems. (Prerequisites 1006-350 or 1006-450 or Consent of Instructor) **Class 3, Lab 3, Credit 4 (S)**

1051-420 Environmental Applications of Remote Sensing

An introduction to the wide range of environmental applications of remote sensing. Systems for detecting physical phenomena and analysis techniques for extracting useful information are described for active and passive sensors operating throughout the electromagnetic spectrum from both airborne and spaceborne sensors. The Earth's atmospheric, hydrospheric and terrestrial processes are examined at a global scale. Application areas studied include monitoring vegetation health, identifying cultural features, assessing water resources, and detecting pollution and natural hazards. (1017-213 or permission of instructor) **Class 4, Credit 4 (W)**