
Environmental Science

Department of Biology and Environmental Science

Website: <http://www.marietta.edu/~envr/>

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Environmental Science and Environmental Studies are emergent fields in the global marketplace. The Environmental Science Program at Marietta College enables students to study the scientific foundations of environmental problems and their solutions as well as the roles that people and institutions play in creating and solving those problems. The program includes majors in Environmental Science (Bachelor of Science) and Environmental Studies (Bachelor of Arts) and minors in Environmental Science and Environmental Studies.

Environmental Science

Environmental Science is an applied interdisciplinary field that draws heavily upon the Natural Science disciplines with input from the Social Sciences and the Humanities to address problems that arise in interaction between Human activity and the Environment.

Requirements for a major in Environmental Science:

Biology 102, 111; Chemistry 131, 132, 133, 134; Computer Science 210; Environmental Science 210, 391, 491, 492; Environmental Studies 310, 315; Geology 101; Mathematics 123. One course in Social and Economic Issues from Economics 350; Engineering 425; Environmental Studies 320; Leadership 308, 333; Philosophy 321, and Political Science

305. {Note: Economics 350 and Political Science 305 require prerequisite course work or permission of the instructor.} Students entering the major are expected to have Mathematics 121 or the equivalent.

Tracks: Within the Environmental Science major, students must elect one of three tracks: Waste Management, Biological Resource Management, or Energy and Mineral Management. Students choose a track to focus their study in one sub-field (category) of the larger field of Environmental Science. Courses have been chosen for each track with the express purpose of providing students with knowledge and understanding of basic environmental processes and subjects necessary to be a practitioner in each of these areas. Students may also submit proposals for individualized tracks, and may pursue them with permission of the program director.

The Waste Management track course work consists of Biology 318; Chemistry 377; Environmental Science 305, 330; Physics 376; and one course from Biology 202; Environmental Science 325; Environmental Studies 350; Geology 201, and Environmental Science 335.

The Biological Resource Management track course work consists of Biology 318 and a combination of 15 to 16 hours of course work selected from Biology 202, 220, 221, 222, 223, 311, 312, 319, 450; Environmental Studies 350; Geology 201, and Environmental Science 335.

The Energy and Mineral Management track course work consists of Chemistry 377; Environmental Science 305; Geology 203; Physics 376; and one course from Environmental Studies 350 and Geology 304.

Computational and Problem-Solving Skills 6 Hours

MATH 123 CSCI 210

Introductory Environmental Science 21 Hours

GEOL 101 BIOL 102 BIOL 111
ENVR 210 CHEM 131 CHEM 132
CHEM 133 CHEM 134

Environmental Studies 6 Hours

ENVS 310 ENVS 315

Social and Economic Issues Elective: One of the following 3 Hours

ECON 350 EGRG 425 ENVS 320
POLS 305 LEAD 308 LEAD 333
PHIL 321

Intermediate Environmental Science and Technology: Elect one track 17-20 Hours

Waste Management Track 19-20 Hours
BIOL 318 CHEM 377 ENVR 305
ENVR 330 PHYS 376

Elective: Choose one of the following
BIOL 202 GEOL 201 ENVR 325
ENVR 335 ENVS 350

Biological Resource Management Track 18-19 Hours

BIOL 318

Electives: Choose 15-16 Hours from the following

BIOL 202 BIOL 220 BIOL 221
BIOL 222 BIOL 223 BIOL 311
BIOL 312 BIOL 319 BIOL 450
ENVS 350 GEOL 201 GEOL 301
GEOL 304 ENVR 335

Energy and Mineral Resource Management Track 17-18 Hours
CHEM 377 ENVR 305 GEOL 202
PHYS 376

Elective: Choose one of the following
ENVS 350 GEOL 304 ENVR 335

Water Resource Management Track 18-20 Hours
ENVR 335 ENVR 325 CHEM 377

Elective: Choose 8-10 hours from the following
ENVR 305 BIOL 202 BIOL 220
BIOL 318 BIOL 319 BIOL 450
GEOL 304

Environmental Professional Practice and Experiential Learning 4 Hours
Experiential Learning 1 Hour

ENVR 391

Senior Capstone 3 Hours
ENVR 491 ENVR 492

Total 57-60 Hours

Requirements for a minor in Environmental Science: Biology 102, 111; Chemistry 101; Environmental Science 210; Environmental Studies 310; Geology 101. Choose one course from among Biology 318; Computer Science 210; Environmental Science 305; Environmental Studies 315, 350; Geology 201, 301.

Students entering the minor are expected to have Math 121 or the equivalent.

Environmental Studies

Environmental Studies is an applied interdisciplinary field which draws heavily upon the Social Science disciplines with inputs from the Natural Sciences and Humanities to address problems that arise in the interaction of Social, Political and Cultural systems and the Environment.

Requirements for a major in Environmental Studies: Biology 102, 111; Chemistry 101; Computer Science 210; Economics 211, 350; English 406; Environmental Science 210, 491, 492; Environmental Studies 310, 315, 391; Geology 101; Mathematics 123; Philosophy 321; Political Science 103, 305; and three courses from Engineering 425; Environmental Studies 320, 350; Leadership 308, 333; and Political Science 106.

Foundations in Environmental Science 17 Hours
GEOL 101 BIOL 102 BIOL 111
CHEM 101 ENVR 210

Computational and Problem-Solving Skills	6 Hours
MATH 123 <input type="checkbox"/> CSCI 210 <input type="checkbox"/>	
Environmental Social Science	24 Hours
ECON 211 <input type="checkbox"/> ECON 350 <input type="checkbox"/> PHIL 321 <input type="checkbox"/>	
POLS 103 <input type="checkbox"/> POLS 305 <input type="checkbox"/>	
Elective (Choose Three):	
LEAD 308 <input type="checkbox"/> LEAD 333 <input type="checkbox"/> ENVS 320 <input type="checkbox"/>	
EGRG 425 <input type="checkbox"/> POLS 106 <input type="checkbox"/> ENVS 350 <input type="checkbox"/>	
Environmental Studies	6 Hours
ENVS 310 <input type="checkbox"/> ENVS 315 <input type="checkbox"/>	
Environmental Professional Practice and Experiential Learning	7 Hours
ENGL 406 <input type="checkbox"/> ENVS 391 <input type="checkbox"/>	
Senior Capstone	3 Hours
ENVR 491 <input type="checkbox"/> ENVR 492 <input type="checkbox"/>	
Total	60 Hours

Requirements for a minor in Environmental Studies: Economics 211, 350; Environmental Studies 310, 315; Philosophy 321. Students choose three courses from the following list of electives: Engineering 425; English 406; Environmental Studies 320, 350; Leadership 308, 333; Political Science 305 {Note: Political Science 305 has as a prerequisite Political Science 103 or permission of the instructor}.

Environmental Science Courses

ENVR 210 Introduction to Environmental Science

As a gateway to the Environmental Science and Environmental Studies degree programs, this course is intended for students who have two semesters of introductory level Biology, Geology or Chemistry. The course covers sustainable development, demography and the impact of population on the environment, nonrenewable and renewable energy, toxicology, and risk analysis from social, economic, public policy and scientific perspectives.

Credit: 3 Hours.

ENVR 305 Environmental Engineering and Technology

This course provides an introduction to the principles and practices of Environmental Engineering. Nature and scope of environmental control technologies, Pollution Prevention, Life Cycle Analysis and Industrial Ecology are examined.

Credit: 3 Hours.

ENVR 325 Air and Water Pollution Control and Prevention

Technologies and techniques for control and prevention of pollution to ambient air and surface and ground waters are examined and evaluated. This course specifically focuses on control of indoor air quality, wastewater technology and air pollution control technologies. Offered alternate years.

Credit: 3 Hours.

ENVR 330 Solid and Hazardous Waste Management

Waste management definitions, techniques, technologies, and strategies are examined. This course takes an integrative approach to waste management as an environmental, social, and political subject. Offered alternate years.

Credit: 3 Hours.

ENVR 335 Hydrology

This course provides a quantitative study of hydrology encompassing the occurrence, distribution, movement and properties of water as it interacts with the environment during each stage of the hydrologic cycle. Additional emphasis will be placed on water quality monitoring, groundwater contamination and remediation, and the measurement of aquifer properties using pressure transient testing methods.

Prerequisites: Math 126, Geology 101 or 111.

Recommended: Computer Science 210 and Geology 321.

Credit: 3 Hours.

ENVR 391 Experiential Learning

P-I-R option [Practicum, Internship or Research] credit assessed under this course. Each student's proposed field experience/research is to be approved by the program director and the student's advisor. Field supervision is to be performed by the program director, faculty advisor or another faculty member in conjunction with the host firm, agency or department.

Credit: 1 Hour.

ENVR 491 Environmental Problem-Solving I

Students (normally working in teams) pursue "original" hands-on research related to a local environmental problem. Students apply interdisciplinary knowledge to research the problem and recommend possible solutions. This portion of the course is largely devoted to investigating the problem both in the field and in the literature. Culmination of this experience is in ENVR 492. This course is required of all Senior Environmental Science and Environmental Studies.

Prerequisites: Environmental Science and Environmental Studies major and senior status.

Credit: 1 Hour.

ENVR 492 Environmental Problem-Solving II

Research performed in Environmental Science 491 is completed and presented in a formal seminar and in a written report. This course is required of all Senior Environmental Science and Environmental Studies majors. (Continuation of Environmental Science 491)

Prerequisite: Environmental Science 491.

Credit: 2 Hours.

Environmental Studies Courses

ENVS 310 Environmental Policy and Law

Policies and politics of environmental protection and natural resource use are explored in this course. Origin and development of environmental law are examined with special emphasis on the role of the Public Trust Doctrine, Police Power, and traditions of Preservation and Conservation under law. The development and implementation of the National Environmental Policy Act and other key federal statutes are addressed. Principles governing regulatory compliance and execution of key natural resource and environmental management tasks at the federal and state levels are considered.

Credit: 3 Hours.

ENVS 315 Environmental Impact and Resource Assessment

History, philosophy and legal authority for the environmental impact assessment process are reviewed in this course. Environmental site assessment and auditing are examined. Linkages between federal and state regulatory matrices and impact assessment are addressed. Methods and techniques for conducting analyses are discussed. Risk analysis, social and economic impact assessment, technology assessment, and other assessment techniques are explored. Project management and data use are considered.

Credit: 3 Hours.

ENVS 320 Science, Technology and Society

This course examines the meaning and impact of scientific discovery and technological innovation upon society. Economic and sociological issues and impacts will be examined as well, with special emphasis on the theory of scientific revolution and diffusion of innovation. Political, managerial/economic and social leadership regarding science and technology will be examined.

Credit: 3 Hours.

ENVS 350 Land-Use Planning

This course is designed to provide students with a survey of issues in planning theory, practice and application. Programmatic and regulatory factors surrounding land-use are described and related to preservation, conservation and management of land resources. Design and implementation of the built human environment and infrastructure, and its relationship to land will be explored. Students will be shown how governments deal with environmental quality, economic development, growth management, coastal zone management and related issues in the context of land resources. Students will be exposed to principles governing regulatory compliance and execution of key land-use management tasks at the local, regional, state and national levels. To effectively accomplish this, class periods will be split between lecture and discussion. Offered alternate years.

Credit: 3 Hours.

ENVS 391 Experiential Learning

P-I-R option [Practicum, Internship or Research] credit assessed under this course. Each student's proposed field experience/research is to be approved by the program director and the student's advisor. Field supervision is to be performed by the program director, faculty advisor or another faculty member in conjunction with the host firm, agency or department.

Credit: 1 Hour.

Courses Taught in Other Departments Used in the Environmental Science Program

BIOL102 Environmental Biology

Lecture course in the applications of the scientific method as developed in Geology 101 to the study of organisms, their physical environment, and the interactions of organisms and environment. Topics of study include major world habitats and the environmental problems facing them, the diversity of life, and the principle of homeostasis. (Students must also complete Biology 111 in order to receive Laboratory Science credit.)

Prerequisite: Geology 101.

Credit: 3 Hours.

BIOL 111 Organisms and Environment

A laboratory course in which students apply the scientific method to a variety of topics in biology and environmental science. Students design and carry out experiments using various scientific tools and techniques, including computers and sensors to gather and analyze data. There will be a rigorous writing component, e.g. lab reports.

Prerequisite: Geology 101 and concurrent registration in Biology 102.

Credit: 1 Hour.

CHEM 377 Environmental Chemistry

Study of the resources, reactions, transport, effects, and fates of chemicals in water, soil, and air. Also emphasis on toxicology and hazardous waste treatment and disposal. Laboratory exercises include sampling methods and detection and analysis of chemical pollutants using both wet chemical and instrumental methods. Field trips to local industry.

Prerequisites: Chemistry 131-134, Geology 101, and Biology 102, or written permission of the instructor; Computer Science 210 recommended.

Credit: 4 Hours.