

ENVIRONMENTAL SCIENCE (BS)

Director: Katie Costanzo, PhD

Introduction

The Environmental Science major is an interdisciplinary program that prepares students for diverse careers in the environmental sciences, e.g., environmental and wildlife conservation, ecology, environmental consulting, environmental regulation and monitoring, and environmental health sciences (toxicology, occupational health, water quality industry), and environmental education. In addition, the curriculum facilitates entry into graduate programs in the ecological, environmental health and environmental sciences.

The Environmental Science program has an interdisciplinary focus with courses in the areas of biology, chemistry, ecology and conservation, geology, philosophy and social sciences. In addition, it is designed to provide job experiences through the completion of two required internships. For students interested in graduate study in the environmental sciences, one internship may be replaced with independent research in the environmental sciences.

Qualifications

Students must maintain a 2.0 GPA in their major and support courses and a 2.0 overall average to graduate with a degree in Environmental Science.

Advisement

All students should have an advisor in the major and should contact the department directly to have an advisor assigned if they do not already have one. Meetings with academic advisors are required prior to students receiving their PIN for course registration each semester. All majors should work closely with their advisor in discussing career expectations, choosing their major electives, developing their entire academic program and planning their co-curricular or supplemental academic experiences.

The advisor may be changed at the student's request.

Double Majors

Students who wish to expand their educational opportunities may decide to declare a double major. This decision may be based on career goals, planned graduate studies, and/or other student interests. Before a student declares a double major, it is important to meet with the appropriate academic departments for advisement. In order to declare a double major, the student must complete the Major/Minor Declaration form. This form will be submitted electronically and reviewed and approved by each department chairperson as well as the appropriate associate dean.

Per university policy, each additional major requires a minimum of 15 credits that do not apply to the student's first or subsequent major. Some double major combinations can be completed within the minimum 120 credit hour degree requirement, but in other cases, additional coursework may be required. Please note that students will only receive **one** degree unless completing the dual degree (<https://catalog.canisius.edu/undergraduate/academics/curricular-information/>) requirement, including at least 150 undergraduate credit hours, regardless of the number of majors they complete. Both (all) majors appear on a student's transcript.

Your advisor will be able to assist with course planning to facilitate a second major, so please let your advisor know if you are considering a dual major

Minors in Other Disciplines

Minors provide students the opportunity to pursue additional interests but generally do not require as many courses as a major. Minors generally range from five to eight required courses. To receive a minor, the student must complete at least 9 credit hours of coursework distinct from their other credentials (i.e., majors, other minors). The complete list of minors is available on the Canisius website (<https://www.canisius.edu/academics/programs/undergraduate/?type%5B%5D=17>) and in the catalog (<https://catalog.canisius.edu/undergraduate/minors/>) and provides links to each minor. Some majors and minors can be completed within the minimum 120 credit hour degree requirement, but in some cases additional coursework may be required. Students must complete the appropriate minor request form.

Major Experiences

All environmental science majors must complete two internship experiences. Recent internships have included New York State Department of Environmental Conservation, U.S. Fish and Wildlife Service, Fisheries and Oceans Canada, Environmental Protection Bureau, FORCES with NY State Office of Parks, TestAmerica Laboratories, Student Conservation Association of AmeriCorps, Erie County Department of Environmental Planning, Tiffet Nature Preserve, Reinstein Nature Preserve and the Buffalo Museum of Science. We encourage students to work with any faculty member in the program to find internships that will best meet their goals and needs.

Curriculum

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All undergraduate students must complete either the Canisius Core Curriculum (<http://catalog.canisius.edu/undergraduate/academics/curricular-information/core-curriculum/>) or the All-College Honors Curriculum (<http://catalog.canisius.edu/undergraduate/academics/curricular-information/all-college-honors-program/>). Many schools refer to their college-wide undergraduate requirements as "general education" requirements. We believe that the core curriculum and the honors curriculum are more than a series of required classes; they provide the basis for a Jesuit education both with content and with required knowledge and skills attributes that are central to our mission.

Free Electives

Students may graduate with a bachelor's degree with more but not less than 120 credit hours. Free electives are courses in addition to the Canisius Core Curriculum or All-College Honors Curriculum and major requirements sufficient to reach the minimum number of credits required for graduation. The number of credits required to complete a bachelor's degree may vary depending on the student's major(s) and minor(s).

Major Requirements

Code	Title	Credits
BIO 111 & 111L	Introductory Biology I and Introductory Biology Laboratory I	4
BIO 320 & 320L	Field Ecology and Field Ecology Lab	4
BIO 113 & BIO 112L	Introductory Biology II: Organismal Biology and Introductory Biology Laboratory II	4
BIO 360	Environmental Health	3

CHM 111 & 111L	General Chemistry I and General Chemistry I Laboratory ¹	4	BIO 335 & 335L	Plant Biology and Plant Biology Lab (lab optional)	4
CHM 112 & 112L	General Chemistry II and General Chemistry II Laboratory	4	BIO 343 & 343L	Entomology and Entomology Lab (lab required)	4
CHM 227 & 227L	Organic Chemistry I and Organic Chemistry I Laboratory	4	BIO 364	Zoology: Diversity of Animal Life	3
CHM 232 & 232L	Environmental Analytical Chemistry and Environmental Analytical Chemistry Laboratory	4	BIO 366 & 366L	Ornithology and Ornithology Laboratory (lab required)	4
GEOL 120 & 120L	Introductory Geology and Introductory Geology Laboratory	4	BIO 375 & 375L	Community Ecology and Community Ecology Laboratory (lab optional)	4
ENV 200	Introductory Hydrology	3	BIO 377 & 377L	Freshwater Biology and Freshwater Biology Laboratory (lab required)	4
ENV 352	Environmental Science Seminar I	1	BIO 378 & 378L	Wetlands and Wetlands Laboratory (lab optional)	4
ENV 354	Environmental Science Seminar II	1	BIO 406 & 406L	Population and Conservation Genetics and Population and Conservation Genetics Laboratory (lab optional)	4
ENV 498 & ENV 499	Environmental Science Internship I and Environmental Science Internship II ²	6	CHM 301 & 301L	Fundamental Physical Chemistry and Fundamental Physical Chemistry Laboratory (lab optional)	4
Choose two of the following math courses		6-8	EVST 235	Environmental Policy	3
PSY 201	Basic Statistics for Behavioral Sciences		PHY 201 & 201L	College Physics I and College Physics I Laboratory (lab required)	4
or MAT 141	Inferential Statistics and Computers for Science		SOC 315	Geographical Information Systems (GIS) for the Social Sciences	3
PSY 401	Advanced Statistics Seminar		or ECO 310	Introduction to Geographic Information Systems	
MAT 111	Calculus I		ABEC 348	Wildlife & Climate Change	3
MAT 112	Calculus II				
Two additional Environmental Science Electives with lab (see list below)		8			
Two additional Environmental Science elective (may be taken with or without the lab)		6-8			
Social Science or Humanities Requirement (select one of the following courses)		3			
EVST 235	Environmental Policy				
SOC 234	Environment and Society				
PHI 244	Environmental Ethics				
Total Credits		69-73			

² Students may choose 3 semesters of BIO 301, or BIO 401 or ENV 401 in lieu of their second internship. This option is recommended for students considering graduate school or a career in research.

Environmental Science Electives

Students must complete four of the following (at least three with labs):

Code	Title	Credits
ABEC 341 & 341L	Urban Ecology and Urban Ecology Lab (lab optional)	4
ABEC 345 & 345L	Herpetology and Herpetology Lab (lab optional)	4
ABEC 347	Avian Conservation and Management	3
BIO 211 & 211L	Biochemistry and Cell Biology I and Biochemistry and Cell Biology Lab I (lab required)	4
BIO 212 & 212L	Biochemistry and Cell Biology II and Biochemistry and Cell Biology Lab II (lab required)	4
BIO 305 & 305L	Medical Microbiology and its Ecological Basis and Medical Microbiology and its Ecological Basis Lab (lab optional)	4
BIO 307 & 307L	Microbiology and Microbiology Laboratory (lab optional)	4
BIO 322	Conservation Biology	3

NOTE: Most classes are offered every other year. Please check the advisement guide each semester to see which classes are being offered. The advisement guide will be used to indicate which courses students in each class year should be taking and when internship applications need to be submitted.

We encourage Environmental Science majors to take humanities classes that combine social and environmental issues like Environmental Ethics (PHI 244), Environment and Society (SOC 234), and Ecotheology (RST 347).

Learning Goals and Objectives

Learning Goal 1

Students will develop competency with respect to knowledge having a firm grasp of the basic concepts in environmental science.

Students will:

- Objective A: Demonstrate an understanding of general environmental concepts from ecology, geology, hydrology, and analytical chemistry;
- Objective B: Demonstrate detailed knowledge within at least two areas of environmental science;
- Objective C: Connect previously learned material with real-life environmental situations.

Learning Goal 2

Students will develop problem-solving skills being able to perform the following.

Students will:

- Objective A: Read and interpret data;
- Objective B: Design an experiment to address a specific hypothesis;

- Objective C: Critically analyze an article from the original scientific literature or a professional report.

Learning Goal 3

Students will demonstrate mastery with respect to technical skills.

Students will:

- Objective A: Effectively communicate scientific material in written form;
- Objective B: Draw a graph;
- Objective C: Design a table.

Courses

Environmental Science Courses

ENV 200 Introductory Hydrology 3 Credits

Introduction to hydrologic processes, methods for quantifying hydrologic parameters and processes, and practical exposure to conducting and reporting hydrological studies.

Offered: Every other Spring.

ENV 352 Environmental Science Seminar I 1 Credit

Designed to provide environmental science students the opportunity to learn various methods of preparing scientific/experimental information for written format and oral presentation. Career preparations are also included.

Offered: every spring.

ENV 354 Environmental Science Seminar II 1 Credit

This course will provide Information about a variety of careers in the field of environmental science. Students will also give presentations on their internship experiences. Required in junior or senior year.

Prerequisite: ENV 352.

Offered: Every other year.

ENV 401 Independent Research 1-3 Credits

Independent laboratory research in environmental science conducted under the supervision of a faculty member. Arrangements must be made prior to registration.

Prerequisite: written permission of faculty member & program director.

Offered: fall & spring.

ENV 498 Environmental Science Internship I 1-3 Credits

Practical experiences in the environmental sciences. Students must complete two internships in different areas of environmental sciences. Internships require an application and approval by the associate dean.

Prerequisite: junior or senior standing, minimum GPA of 2.0 in the major, a positive recommendation from a faculty member, & a completed & approved internship application.

Offered: fall & spring.

ENV 499 Environmental Science Internship II 1-3 Credits

Practical experiences in the environmental sciences. Students must complete two internships in different areas of environmental sciences. Internships require an application and approval by the associate dean.

Prerequisite: junior or senior standing, minimum GPA of 2.0 in the major, a positive recommendation from a faculty member, & a completed & approved internship application.

Offered: fall & spring.

Geology Course

GEOL 120 Introductory Geology 3 Credits

Basic concepts, including uniformitarianism, the rock cycle, the hydrologic cycle, tectonics and surface processes. Also covers how humans affect and are affected by their environment. Lab required. Students may not receive credit for both GEOL 120 and PHY 130.

Corequisite: GEOL 120L.

Fulfills College Core: Field 6 (Natural Sciences)

Offered: Every other year.

GEOL 120L Introductory Geology Laboratory 1 Credit

Required lab for GEOL 120.

Corequisite: GEOL 120.

Offered: Every other year.

Other Major Requirement and Elective course descriptions can be found under listed under BIO or ABEC courses