

Environmental and Health Sciences Program

Majors

Environmental Science
Environmental Studies and Health Sciences

Department Location

Science Center – 331
Chair's Office: Science Center – 377

Special Requirements

None

Placement Examinations

None

Requirements for Completion

Students must complete all core requirements and major cognate courses as well as 12 approved electives with a grade of “C” or better. A minimum of 120 course credits must be completed upon graduation.

Goals

Consistent with the College's mission, the Environmental Science and Health Sciences Program at Spelman recognizes the global changes and responses for attaining a more sustainable environment. The Program seeks to create a learning environment in which our students can better understand these changes and be given a greater voice in planning for conservation through an interdisciplinary environmental science curriculum that is designed to enhance scientific inquiry and to strengthen scientific competence. Through these efforts, the Program aims at preparing students for graduate studies in STEM disciplines, and provide opportunities for careers in environmental sciences, environmental health, public health, and medical schools.

Objectives

Through the course sequences students will be able to

- recognize major concepts in environmental sciences and demonstrate in-depth understanding of the environment and its impact.
- develop analytical and critical thinking skills, and demonstrate problem-solving skills using scientific techniques.
- demonstrate the knowledge and training needed for graduate or professional schools, or the job market.

International/Women's Studies Requirement

Courses that satisfy the International/Women's Studies requirement are listed in the Course Sequence Booklet or on the Spelman Web page.

Major Requirements

- ES 211 Introduction to Environmental Sciences and labs (4)
- BIO/ES 225 Ecology (includes Group Projects) (4)
- ES 403 Environmental Science Seminar (2)

- ES 435 Research in Environmental Sciences (3)
- CHEM/ES 453 Environmental Chemistry (3)

Major Cognate Courses

Courses other than those listed as ESS with the appropriate department listings:

- BIO 115 Organismal Form and Function and Biology of the Cell (8)
- BIO 120 Cellular Dynamics (4)
- CHEM 111 and 112 General Chemistry and Labs (8)
- CHEM 231 and 232 Organic Chemistry I and II and Labs (10)
- CIS 111 Discovering Computer Science and Lab
- CIS 121 Introduction to Computer Programming (4)
- MATH 231 and 232 Calculus I and II (8) or
- MATH 211 and 212 Applied Calculus I and II
- MATH 205 General Statistics (4) or
- MATH 355 Biostatistics (4)
- PHY 111 and 112 General Physics I and II (4) OR
- PHY 151 & 241 Physics I & II (8)
- CHEM/ES 411 Toxicology (3)

Electives

Students must select at least 12 credit hours from courses listed below.

- BIO 314/ES 314 Environmental Biology (includes group projects) (4)
- BIO 233 Microbiology (4)
- BIO 312 Genetics (4)
- BIO 471 Cell and Molecular Biology (4)
- CHEM 311 Biochemistry (4)
- CHEM 301 Analytical Chemistry and Lab (4)
- CIS/ES 437 Computer Simulation (4)
- ES200 Introduction to Environmental Health (4)
- ES252 Introduction to Geosciences (4)
- ES 384 Industrial Ecology (4)
- ES 251 Soil and Atmospheric Science (laboratory module) (4)
- MATH 353 Decision Sciences (4)
- MATH 358 Mathematical Models (4)
- MATH 455 Probability and Statistics (4)
- MATH 470 Special Topic: Environmental Statistics Practicum (2)
- PSC 320 Environmental Policy and Politics (4)

Free Electives

Free electives may be chosen in order to complete the 120 hours for graduation.

Course Descriptions

Environmental Science Only

ES 211 – INTRODUCTION TO ENVIRONMENTAL SCIENCES (4)

This course presents a global perspective for understanding the complex relationships among living organisms and how they interact with their biotic and abiotic environments. The topics are covered under six broad areas of environmental science and ecological principles: population and environmental health, food, land, and biological resources; environmental pollution; physical resources; and society and environment.

ES 225 – ECOLOGY (4)

The study of ecology is one that is central to an understanding of major areas of science, especially in biology and environmental sciences, and is increasingly included in national exams such as the GRE for graduate

school. The course offers a unique opportunity for students to explore the great diversity of species and their interrelatedness. At the core of this course is an in-depth view of ecology through an integrated approach that focuses on the importance of individual species in their respective ecosystems. Central to this approach are six distinct areas that begin with (1) Ecology: Its meaning and scope, including experimentation models; (2) the organism and its environment; (3) the ecosystem; (4) comparative ecosystem ecology; (5) population ecology; and (6) the community.

ES 252 – INTRODUCTION TO GEOSCIENCES (4)

This course provides the fundamentals of geosciences, presenting key concepts and generalizations such as soil and rock formation, interactions with air and water, and conservation. Prerequisite: ES 211

BIO/ES 314 – ENVIRONMENTAL BIOLOGY (4)

The primary goal of this course is to present the scientific information that will allow students to understand the complex environmental issues facing the global ecosystem. With the continuing growth of the human population and its impact on natural resources, and the resulting discharge of both municipal and industrial wastes, we are faced today with the global challenge of managing our dwindling resources and protecting the quality of the environment. Central to this course are concepts and applications that focus on Conservation Biology. Due to its complexity, this course will draw knowledge and methods from biology, physical sciences, economics, engineering, and sociology. The lecture topics fall under six broad categories of ecosystems: biodiversity, pollution, hazardous waste management, toxicology and human health, and energy conservation.

ES 384 – INDUSTRIAL ECOLOGY (4)

Industrial ecology is an emerging field of study requiring that industrial systems and activity be viewed from an environmental impact perspective. This system-based approach supports the integration of technological and environmental issues in all industrial activities. This course encompasses aspects of the natural sciences. It includes aspects of economics, political science, and sociology. There are seven lecture modules that range from microbial ecology, biology, chemistry, economics, mathematics, and political science to sociology and anthropology. Students are required to complete a group project, report, and presentation, which incorporates each aspect of the lecture module.

CHEM/ES 411 – TOXICOLOGY (4)

This course is the study of the adverse effects of chemicals and physical agents on living organisms. It also examines the probability of hazardous materials and their effects on individuals, populations, and ecosystems ranging from acute to long-term exposures. The course is structured around the textbook selected. Appropriate supplementary texts and journals will be identified. Library research and extensive writing will be required.

CHEM/ES 453 – ENVIRONMENTAL CHEMISTRY (3)

This course will expose students to concepts in environmental chemistry and their relationship to the sources, reactions, transport effects, and fates of chemical species in water, soil, and air. In addition, through reading assignments, problem solving, and group projects, students will learn the use of technology and its impact on the environment.

CIS/ES 437 – COMPUTER SIMULATION (4)

Simulation of real-world testing is expensive, too dangerous, and time consuming. This course presents simulation techniques in many areas of science as a way of modeling understanding and predicting the behavior of complex systems. In addition, the course studies simulation in a variety of guises, using simulation software, including commercial software, building models of systems and investigating their behavior. The prerequisites are CIS 121 and MATH 205 (Statistics). The course is open to all science students, particularly science majors. It counts as an elective in the Computer Science and Environmental Science concentrations.

Environmental Science minor

A total of six courses (24 credits) are required for Environmental Science Minor, which include a minimum of three environmental science courses, and three courses selected from the approved lists of elective courses, and a research project in Environmental Science.

The Minor consists of three sets of requirements:

1. Major Requirements (three courses required)

Students must complete the following courses:

- ES 211 Introduction to Environmental Science & Lab (4)
- ES 251 Air and Atmospheric Sciences (4)
- ES 252 Introduction to Geosciences

2. Three (3) elective courses

The courses below are approved to meet the requirements for Environmental Science Minors. They are subject to revision and this list may be updated when new courses are offered. Course substitutions may also be approved by the Department chair or Dean. Courses cannot be double-counted within the major/minor or core curriculum.

- ES 200 Environmental Health
- ES 215 Introduction to Toxicology
- ES 250 Food and Energy
- ES 312 Water Resources and Management (4)
- ES 325 Global Environmental Changes (4)
- ES 403 Environmental Science Seminar (2)
- ES 420 Risk Management and Containment Systems
- ES 499 Independent Study
- BIO 110 Population Biology

3. Research Project/Independent Study

The research project may be a 4-hour Independent Study/Research course, or an approved research.

Environmental Studies Major

Environmental Studies is an interdisciplinary major that focuses on the natural environment and the myriad of ways in which human interact and connect with environment. The major is designed to provide students with skill sets and knowledge from various disciplinary perspectives to address environmental challenges and affect positive social change through local, national and global stewardship that fosters sustainability.

The environmental studies curriculum combines interdisciplinary breadth and depth and prepares students for graduate school, professional school, and a wide array of environmental careers.

The major consist of seven major requirements, two (2) intermediate breadth electives and three (3) upper level breadth electives for a total of forty-eight (48) credit hours.

Major Requirements – 28 hours

- ES 211 Introduction to Environmental Science with Lab (4)
- ES 252 Introduction to Geosciences with Lab (4)
- SOC 242 Health: Sociological and Economics Perspectives (4)
- ES 315 Sustainable Development (4)
- PSC 320 Environmental Politics and Policy (4)
- Math 355 Biostatistics (4) or MAT205 Introduction to Statistics (4)
- Capstone/Research Seminar (4)

Major Electives*

Intermediate Breadth Electives – Select 2**

- ART 130 New Genre Art Forms
- BIO 110 Biological Communities, Evolution and Biodiversity
- CHEM 111, 111L General Chemistry with Lab
- CHEM 159 Food Chemistry
- ES 200 Introduction to Environmental Health
- ES 215 Introduction to Toxicology
- ES 255 Ecology
- ES 251 Air and Atmospheric Science with Lab
- ES 312 Water Resource Management
- ES 314 Environmental Biology
- REL 285 Religion, Women, and Violence in Global Perspective
- SOC 321 Community Organizing

Upper Level Breadth Electives – Select 3*** ****

- ANTH 330 Special Topic: Food and the City
- ANTH 404 The Anthropology of Globalization
- CHEM/ES 453 Environmental Chemistry
- CHEM/ES 411 Toxicology
- CWS 370 Women & Social Resistance Movements
- ECO 369 Urban Economics
- ECO 379 Health Economics
- ECON 385 Environmental Economics*****
- ES 384 Industrial Ecology
- ES 420 Risk Management and Containment
- ES 425 Global Environmental Change
- HIS 380 History of Science
- PSC 420 Environmental Law
- PSC 420a Current Issues in International Politics
- Math 470 Environmental Statistics Practicum
- SOC 340 Urban Sociology
- SOC 402 Sociology of Health

Departmental Honors

To qualify for the departmental honors, a student must meet all of the following criteria

1. Minimum overall GPA of 3.0
2. Minimum GPA of 3.2 in major
3. No grade lower than “B” in the major
4. Completion of a senior thesis or research project

Environmental Studies Minor

Goals

The curriculum in Environmental Studies recognizes that global changes and responses for attaining a more sustainable environment are implemented using multiple disciplines. The Environmental Studies minor is designed to respond to this requirement through our interdisciplinary curriculum that has the capacity to add and infuse associated policies and socio-economic issues.

* Some listed electives may have prerequisites. Please check the catalog.

** One of the Intermediate Breadth Electives (IBE) MUST be a science course other than Environmental Science (i.e, Chemistry or Biology).

*** One elective must be from humanities, social science, humanities, or Fine Arts

**** Other electives added as approved. Check with the Department Chair.

***** Pending approval

Minor Requirements

Six course minimum requirement

Core courses (2 Courses)

- ES 211 Introduction to Environmental Sciences (course description shown above)
- PSC 320 Environmental Policy and Politics. (See Political Science listing for course description)
- Research Experience (One 4-credit hour course)
The Research Experience may be a 4-credit hour independent study/research course, field research, or an approved seminar
- ES 499 Independent Study
- Electives (3 Courses)

Electives include, but are not limited to, the following. Other electives may be approved by the chair.

- ART 131 Sculpture I (4)
- ANTH 203 Introduction to Anthropology (4)
- ANTH 322 Urban Anthropology (4)
- ANTH 430 Special Topic: Food and Culture (4)
- BIO/ES 314 Environmental Biology (4)
- CIS/ES 437 Computer Simulation (4)
- ECON 324 Economic Development of Emerging Nations (4)
- ES 225 Ecology (4)
- ES 384 Industrial Ecology (4)
- ES/CHEM 411 Toxicology (4)
- ES 252 Introduction to Geosciences
- ES 200 Introduction to Environmental Health
- ES 215 Introduction to Toxicology
- MATH 470 Special Topic: Environmental Statistics Practicum (2)
- PHI 295 Biomedical Ethics (4)
- PSC 480 Seminar in International Studies or Special Topic: The Politics of Global Environment (4)
- SOC 352 Urban Sociology (4)
- SOC 402 Medical Sociology (4)

Health Sciences Major

The major in Health Sciences provides an interdisciplinary approach to recognizing, evaluating and understanding key theories and concepts associated with individual health, wellness and various pathophysiological conditions and their global impact on society.

It includes courses from the natural sciences, social sciences, humanities and fine arts to educate students and enhance their critical analysis of disease processes using both quantitative and qualitative problem-solving skills. The major will also give a comprehensive overview of the career options available in the health sciences.

Upon successful completion of the major, students will be able to

1. Understand the issues of health equity, health disparity, mental health; as well as, emerging and zoonotic diseases;
2. Compare and contrast the diversity of careers in the health professions and appreciate the role of a liberal arts education in the context of the health sciences.

3. Discuss historical foundations of healthcare in the United States and the contributions of women and African Americans in the healthcare field.
4. Explain the role of health professionals on an interdisciplinary healthcare team.
5. Develop community based health literacy interventions to address health disparities in an underserved community.
6. Articulate the meaning and correctly pronounce common medical terminology during scientific presentations and other formal oral and written communication activities.
7. Analyze the effectiveness of current traditional and non-traditional treatment models using a statistical review of data obtained from the Centers of Disease Control and the Health and Human Services Administration.

Major Requirements (28 hours)

- HS 201 Introduction to the Health Sciences
- Introduction to Public Health
- BIO 472 Mammalian Physiology
- BIO 233 Microbiology
- MATH 205 General Statistics
- Research and Evaluation in the Health Sciences
- Health Science Internship/Practicum

Major Electives (16 hours)

Four (4) Health Science courses

Cognate Courses for the Major

- MATH 211 Applied Calculus I
- BIO 115 Organismal Form and Function
- BIO 120 Cellular Dynamics
- CHEM 111 General Chemistry I and Lab
- CHEM 112 General Chemistry II and Lab
- CHEM 231 Organic Chemistry I and Lab
- CHEM 232 Organic Chemistry II and Lab