ENVIRONMENTAL SCIENCE

Interdepartmental Undergraduate Programs

Environmental Science provides an integrated, quantitative, and interdisciplinary approach to the study of environmental systems. The magnitude and complexity of environmental problems are creating a growing need for scientists with rigorous, interdisciplinary training in environmental science. The Environmental Science program is designed to prepare students for positions of leadership in this rapidly changing discipline. Environmental Science graduates have a solid foundation in biological and physical natural sciences and the specialized training necessary for integrated analysis of environmental systems.

Undergraduate Study

The Environmental Science undergraduate major is offered through both the College of Agriculture and Life Sciences and the College of Liberal Arts and Sciences. Environmental Science majors complete foundation courses in natural sciences and mathematics, plus a major consisting of an integrated core of Environmental Science courses and additional advanced course work in Environmental Science. Scientific rigor is stressed throughout the program, beginning with the foundation courses in the first two years of the curriculum. The upper level core courses emphasize a dynamic systems approach that provides a framework for integrating physical, chemical, and biological aspects of environmental systems. Beyond the required core, students select from a broad array of advanced courses to either develop greater breadth, or specialization in areas including, but not limited to, water resources, climate impacts and adaptation, environmental restoration and management, and geographic information systems (see https://www.ensci.iastate.edu/ for additional information on areas of specialization).

Student Learning Outcomes

Upon graduation, students should be able to:

- Demonstrate a broad understanding of environmental systems and issues utilizing an interdisciplinary framework to integrate ideas and concepts from biological and physical natural sciences
- Demonstrate proficiency in data analysis and problem-solving of relevant environmental systems/problems
- Use a systems approach to conduct integrated, quantitative, and interdisciplinary analyses and modeling of environmental systems and problems

College of Liberal Arts and Sciences

http://www.ensci.iastate.edu

Students seeking an Environmental Science major complete the following:

1. A foundation of approved supporting courses in science and mathematics including biology, chemistry, earth science, physics, mathematics, and statistics.

2. 33 credits of course work in the major, including a required core of 21 credits.

A combined average grade of C or higher is required in courses applied in the major.

1. Environmental Science: 33 credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENSCI 1100</td>
<td>Orientation to Environmental Science</td>
<td>1</td>
</tr>
<tr>
<td>ENGL 2010</td>
<td>Introduction to Literature</td>
<td>3</td>
</tr>
<tr>
<td>ENSCI 2020</td>
<td>Exploration of Environmental and Sustainability Issues</td>
<td>1</td>
</tr>
<tr>
<td>ENSCI 2030</td>
<td>Exploration of Environmental Science</td>
<td>1</td>
</tr>
<tr>
<td>ENSCI 2500</td>
<td>Environmental Geography</td>
<td>3</td>
</tr>
<tr>
<td>ENSCI 2510</td>
<td>Biological Processes in the Environment</td>
<td>3</td>
</tr>
<tr>
<td>ENSCI 3120</td>
<td>Ecology</td>
<td>4</td>
</tr>
<tr>
<td>ENSCI 3180</td>
<td>Introduction to Ecosystems</td>
<td>3</td>
</tr>
<tr>
<td>ENSCI 3190</td>
<td>Analysis of Environmental Systems</td>
<td>3</td>
</tr>
<tr>
<td>Addional ENSCI choice courses</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>34</strong></td>
<td></td>
</tr>
</tbody>
</table>

2. Mathematics & Statistics: 6-8 credits

Choose one of the following: 3-4

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1040</td>
<td>Introduction to Probability</td>
</tr>
<tr>
<td>MATH 1500</td>
<td>Discrete Mathematics for Business and Social Sciences</td>
</tr>
<tr>
<td>MATH 1510</td>
<td>Calculus for Business and Social Sciences</td>
</tr>
<tr>
<td>MATH 1600</td>
<td>Survey of Calculus</td>
</tr>
<tr>
<td>MATH 1650</td>
<td>Calculus I</td>
</tr>
<tr>
<td>COMS 1060</td>
<td>Introduction to Web Programming</td>
</tr>
<tr>
<td>COMS 1070</td>
<td>Windows Application Programming</td>
</tr>
<tr>
<td>DS 2010</td>
<td>Introduction to Data Science</td>
</tr>
<tr>
<td>DS 2020</td>
<td>Data Acquisition and Exploratory Data Analysis</td>
</tr>
</tbody>
</table>

Choose one of the following: 3-4

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 1010</td>
<td>Principles of Statistics</td>
</tr>
<tr>
<td>STAT 1040</td>
<td>Introduction to Statistics</td>
</tr>
</tbody>
</table>

| **Total Credits** | **6-8** |

3. Physical & Life Sciences: 21-24 credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 2110</td>
<td>Principles of Biology I</td>
<td>3</td>
</tr>
</tbody>
</table>

Choose from one of the following: 5-6
Environmental Science

CHEM 1630 & 1630L  
College Chemistry  
and Laboratory in College Chemistry

CHEM 1670 & 1670L  
General Chemistry for Engineering Students  
and Laboratory in General Chemistry for Engineering

CHEM 1770 & 1770L  
General Chemistry I  
and Laboratory in General Chemistry I

CHEM 2010 & 2010L  
Advanced General Chemistry  
and Laboratory in Advanced General Chemistry

Choose one of the following: 3-4

CHEM 2310 & 2310L  
Elementary Organic Chemistry  
and Laboratory in Elementary Organic Chemistry

CHEM 3310 & 3310L  
Organic Chemistry I  
and Laboratory in Organic Chemistry I

BBMB 2210  
Structure and Reactions in Biochemical Processes

AGRON 2590  
Organic Compounds in Plants and Soils

Choose 3 of the following: 9

AGRON 1820  
Introduction to Soil Science

AGRON 2820  
Soil Conservation and Land Use

GEOL 1000  
How the Earth Works

or GEOL 2011  
Geology for Engineers and Environmental Scientists

MTEOR 2060  
Introduction to Weather and Climate

BIOL 2120  
Principles of Biology II

CHEM 1780 & 1780L  
General Chemistry II  
and Laboratory in General Chemistry II

PHYS 1150  
Physics for the Life Sciences

or PHYS 1311  
General Physics I

or PHYS 2311  
Introduction to Classical Physics I

Total Credits 20-22

4. Communications: 7-10 credits

ENGL 1500  
Critical Thinking and Communication 3

ENGL 2500  
Written, Oral, Visual, and Electronic Composition 3

LIB 1600  
Introduction to College Level Research 1

Embedded communication coursework in ENSCI 2030 and ENSCI 3120

Total Credits 7

Additional communication courses required of majors in the College of Agriculture and Life Sciences

Choose 1 of the following: 3

SPCM 2120  
Fundamentals of Public Speaking

AGEDS 3110  
Presentation and Sales Strategies for Agricultural Audiences

COMST 2140  
Professional Communication

Total Credits 3

5. General Education: 15-21 credits

Additional general education requirements in the College of Agriculture and Life Sciences

Humanities 3

Social Science 3

Ethics 3

International Perspectives course from university approved list 3

US Diversity course from university approved list 3

Total Credits 15

additional general education requirements in the College of Liberal Arts and Sciences

Arts and Humanities courses from college approved list 12

Social Science courses from college approved list 9

(Select courses to include 3 cr. of International Perspectives and 3 cr. of US Diversity)

Students must have completed 3 years of a single world language in high school or take 4-8 credits of World Languages at the university level

LAS 2030  
Professional Career Preparation 1

Total Credits 22

Electives (28-35 credits)

As majors in the College of Liberal Arts and Sciences, Environmental Science students must meet College of Liberal Arts and Sciences (http://catalog.iastate.edu/collegeofliberalartsandsciences/#lascollegerequirementsetc) and University-wide requirements (http://catalog.iastate.edu/collegescurricula/) for graduation in addition to those stated above for the major.

LAS majors require a minimum of 120 credits, including a minimum of 45 credits at the 3000/4000 level. You must also complete the LAS world language requirement and career proficiency requirement.

Bachelor of Science B.S. (LAS)

Freshman

Fall  Credits  Spring  Credits

ENGL 1500  3  ENSCI 2030  1

ENGL 2500  3  ENSCI 3120  1

ENGL 1100  3  BIOL 2110  3

ENGL 2010  3  BIOL 2110L (or elective)  1

ENSCI 2020  1  CHEM 1780  3

CHEM 1770  4  CHEM 1780L  1

CHEM 1770L  1  Mathematics, Programming, 3  
Data Science choice

STAT 1010 or 1040  3-4  3  
Arts and Humanities choice

Total Credits 22
LIB 1600 1 17-18 15-16

**Sophomore**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENSCI 2500</td>
<td>3</td>
<td>ENSCI 2510</td>
<td>3</td>
</tr>
<tr>
<td>Social science choice</td>
<td>3</td>
<td>Organic chemistry choice</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 2500</td>
<td>3</td>
<td>Physical or Life Science choice</td>
<td>3</td>
</tr>
<tr>
<td>Physical or Life Science choice</td>
<td>3</td>
<td>Arts and humanities choice</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>1-2</td>
<td>Social science choice</td>
<td>3</td>
</tr>
<tr>
<td>LAS 2030</td>
<td>1</td>
<td>Summer: Consider field experience such as an internship or field station courses.</td>
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</table>

**Junior**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENSCI 3120</td>
<td>4</td>
<td>ENSCI 3180</td>
<td>3</td>
</tr>
<tr>
<td>Environmental science choice</td>
<td>3</td>
<td>ENSCI 3190</td>
<td>3</td>
</tr>
<tr>
<td>Arts and humanities choice</td>
<td>3</td>
<td>Arts and humanities choice</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>1-2</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
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</table>

**Senior**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental science choice</td>
<td>3</td>
<td>Environmental science choice</td>
<td>3</td>
</tr>
<tr>
<td>Social science choice</td>
<td>3</td>
<td>Environmental science choice</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>9</td>
<td>Electives</td>
<td>9</td>
</tr>
</tbody>
</table>

1 Students complete at least 32 credits in Environmental Science including ENSCI 1100, ENGL 2010, ENSCI 2500, ENSCI 3120, ENSCI 3180, ENSCI 3190 and 12 additional credits of approved ENSCI coursework.

2 Students complete at least 12 credits in arts and humanities and 9 credits in social science from approved lists. These credits can also be used to meet the U.S. Diversity and International Perspectives requirements.

3 Students choose one course from the following Physical or Life Science related courses: AGRON 1820, AGRON 2820, BIOL 2120, CHEM 1780 & CHEM 1780L, GEOL 1000, GEOL 2010, MTEOR 2060, PHYS 1150, PHYS 1310, PHYS 2310. Students choose from one of the following Organic Chemistry options: CHEM 2310 & CHEM 2310L, CHEM 3310 & CHEM 3310L, BBMB 2210, or AGRON 2590.

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**Graduate Study**

Contact information for the graduate program:

Lynette Edsall
camelot@iastate.edu (mstolt@iastate.edu)
515-294-1191
https://enscigrad.iastate.edu/

The Environmental Science graduate program offers an interdepartmental curriculum leading to M.S. and Ph.D. degrees with a major in Environmental Science. Faculty from the colleges of Agriculture and Life Sciences, Engineering, and Liberal Arts and Sciences cooperate to offer courses and research opportunities covering a broad array of environmental topics. Cooperating departments include Agricultural and Biosystems Engineering; Agronomy; Animal Science; Civil, Construction and Environmental Engineering; Ecology, Evolution and Organismal Biology; and Geological and Atmospheric Sciences.

Applicants should have completed an undergraduate or master's degree in one of the biological, chemical, physical, or engineering sciences or should have equivalent preparation.

The Environmental Science Graduate Program emphasizes fundamental concepts and research, which at the same time address major environmental issues. The curriculum is designed to provide the interdisciplinary approach needed in environmental science education and research. In addition to work in their chosen area of specialization, students are afforded a broad exposure to the biological, chemical and physical aspects of environmental systems and the specialized training necessary for integrated analysis of these systems.

Information on application procedures, curriculum requirements, and faculty research areas is available on the Environmental Science Graduate Program website (https://enscigrad.iastate.edu/).