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:

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

College of Agriculture and Life Sciences

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 20 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>ENSCI 2010</td>
<td>Introduction to Environmental Issues</td>
<td>2</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>ENSCI choice courses</td>
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<td>12</td>
</tr>
</tbody>
</table>

Total Credits: 33

2. Mathematics & Statistics: 6-8 credits

Choose one of the following: 3-4

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

Choose one of the following: 3-4

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

Total Credits: 6-8

3. Physical & Life Sciences: 21-24 credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>BIOL 2110</td>
<td>Principles of Biology I</td>
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Choose from one of the following: 5

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>CHEM 1630</td>
<td>College Chemistry</td>
</tr>
<tr>
<td>&amp; 1630L</td>
<td>and Laboratory in College Chemistry</td>
</tr>
</tbody>
</table>
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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 from 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 201 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 College Chemistry II

PHYS 1150 Physics for the Life Sciences

or PHYS 131 General Physics I

or PHYS 231 Introduction to Classical Physics I

Total Credits 20-21

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 (Embedded communication coursework in ENSCI 2030 and ENSCI 3120) 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 one of the following: 3

SPCM 2120 Fundamentals of Public Speaking

AGEDS 3110 Presentation and Sales Strategies for Agricultural Audiences

COMST 2140 Professional Communication 3

Total Credits 3

5. General Education: 15-21 credits

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

U.S. Cultures and Communities (formerly U.S. Diversity) course from university approved list 3

Total Credits 15

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 U.S. Cultures and Communities (formerly U.S. 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

Total Credits 21

Electives (28-35 credits)

LAS students must earn a minimum of 45 credits at the 3000-/4000-level.

A minimum of 120.0 Total Credits are needed for graduation

Environmental Science, B.S. (AGLS)

Freshman

Fall Credits Spring Credits

ENGL 1500 3 3 ENSCI 2030
ENSCI 1100 1 1 BIOL 2110
ENGL 2010 3 3 BIOL 2110L
ENSCI 2020 1 1 Physical or Life Science Choice 3 or 4
CHEM 1770 4 Social Science or Humanities Choice 2
CHEM 1770L 1 Mathematics, Programming, or Data Science choice
LIB 1600 1
STAT 1010 or 1040 3-4

Total Credits 17-18 14-16

Sophomore

Fall Credits Spring Credits

ENSCI 2500 3 3 ENSCI 2510
Environmental Science

Social Science or Humanities Choice\(^2\) 3
ENGL 2500 3 Social Science or Humanities Choice\(^2\) 3
Physical or Life Science choice\(^3\) 3
Elective 3 Communications (Speech) 3

<table>
<thead>
<tr>
<th>Junior</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENSCI 3120</td>
<td>4</td>
<td>ENSCI 3180</td>
<td>3</td>
</tr>
<tr>
<td>Environmental Science Choice(^1)</td>
<td>3</td>
<td>ENSCI 3190</td>
<td>3</td>
</tr>
<tr>
<td>Social Science or Humanities Choice(^2)</td>
<td>3</td>
<td>Social Science or Humanities Choice(^2)</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>6</td>
<td>Electives</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Science Choice(^1)</td>
<td>3</td>
<td>Environmental Science Choice(^1)</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>12</td>
<td>Elective</td>
<td>9</td>
</tr>
</tbody>
</table>

1 Students complete at least 32 credits in Environmental Science including ENSCI 1100, ENGL 2010, ENSCI 2020, ENSCI 2030, ENSCI 2500, ENSCI 2510, ENSCI 3120, ENSCI 3180, ENSCI 3190 and 15 additional credits of approved ENSCI coursework.

2 Students complete at least 15 credits in humanities and social science including at least 3 credits each in ethics, humanities, social science, U.S. Cultures and Communities, and International Perspectives from approved lists.

3 Students choose one course from the following Physical and Life Science related courses: AGRON 1820, AGRON 2820, BIOL 2120, CHEM 1780, 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.

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 Earth, Atmosphere, and Climate.

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/).