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 biology, chemistry, earth science, geology, physics 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.

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

From the 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, calculus, and statistics.
2. 32 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: 32 credits

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENSCI 110</td>
<td>Orientation to Environmental Science</td>
<td>1</td>
</tr>
<tr>
<td>ENSCI 201</td>
<td>Introduction to Environmental Issues</td>
<td>2</td>
</tr>
<tr>
<td>ENSCI 202</td>
<td>Exploration of Environmental and Sustainability Issues</td>
<td>1</td>
</tr>
<tr>
<td>ENSCI 203</td>
<td>Exploration of Environmental Science</td>
<td>1</td>
</tr>
<tr>
<td>ENSCI 250</td>
<td>Environmental Geography</td>
<td>3</td>
</tr>
<tr>
<td>ENSCI 251</td>
<td>Biological Processes in the Environment</td>
<td>3</td>
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<tr>
<td>ENSCI 381</td>
<td>Environmental Systems I: Introduction to Environmental Systems</td>
<td>3</td>
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<tr>
<td>ENSCI 382</td>
<td>Environmental Systems II: Analysis of Environmental Systems</td>
<td>3</td>
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<tr>
<td>ENSCI 384</td>
<td>Introduction to Ecosystems</td>
<td>3</td>
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Addional ENSCI choice courses: 12 credits

Total Credits: 32

2. Mathematics & Statistics: 7-8 credits

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<tr>
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<tbody>
<tr>
<td>MATH 160</td>
<td>Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH 165</td>
<td>Calculus I</td>
<td></td>
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Choose one of the following:

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<tr>
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<tr>
<td>STAT 101</td>
<td>Principles of Statistics</td>
<td>3-4</td>
</tr>
<tr>
<td>STAT 104</td>
<td>Introduction to Statistics</td>
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</table>

Total Credits: 7-8

3. Physical & Life Sciences: 21-24 credits

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<tr>
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<th>Credits</th>
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<tbody>
<tr>
<td>BIOL 101</td>
<td>Introductory Biology</td>
<td>3</td>
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<tr>
<td>or BIOL 211</td>
<td>Principles of Biology I</td>
<td></td>
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Choose from the following:

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<th>Credits</th>
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<tbody>
<tr>
<td>CHEM 163 &amp; 163L</td>
<td>College Chemistry and Laboratory in College Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 167 &amp; 167L</td>
<td>General Chemistry for Engineering Students and Laboratory in General Chemistry for Engineering</td>
<td></td>
</tr>
<tr>
<td>CHEM 177 &amp; 177L</td>
<td>General Chemistry I and Laboratory in General Chemistry I</td>
<td></td>
</tr>
<tr>
<td>CHEM 201 &amp; 201L</td>
<td>Advanced General Chemistry and Laboratory in Advanced General Chemistry</td>
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<th>Credits</th>
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<tbody>
<tr>
<td>CHEM 231 &amp; 231L</td>
<td>Elementary Organic Chemistry and Laboratory in Elementary Organic Chemistry</td>
<td></td>
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</tbody>
</table>
CHEM 331 Organic Chemistry I
& 331L and Laboratory in Organic Chemistry I
BBMB 221 Structure and Reactions in Biochemical Processes
AGRON 259 Organic Compounds in Plants and Soils

Choose from one of the following: 4-5

PHYS 131 General Physics I
& 131L and General Physics I Laboratory
PHYS 115 Physics for the Life Sciences
PHYS 231 Introduction to Classical Physics I
& 231L and Introduction to Classical Physics I Laboratory

Choose 2 of the following: 6

AGRON 182 Introduction to Soil Science
GEOL 100 How the Earth Works
or GEOL 201 Geology for Engineers and Environmental Scientists
MTEOR 206 Introduction to Weather and Climate
BIOL 212 Principles of Biology II
CHEM 178 General Chemistry II
& 178L and Laboratory in College Chemistry II

Total Credits: 21-24

4. Communications: 7-10 credits

ENGL 150 Critical Thinking and Communication 3
ENGL 250 Written, Oral, Visual, and Electronic Composition 3
LIB 160 Introduction to College Level Research 1

Embedded communication coursework in ENSCI 203, ENSCI 381 and ENSCI 382

Total Credits: 7

Additional communication Courses required of majors in the College of Agriculture and Life Sciences
SP CM 212 Fundamentals of Public Speaking 3
or AGEDS 311 Presentation and Sales Strategies for Agricultural Audiences

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

Electives (28-35 credits)
LAS students must earn a minimum of 45 credits at the 300-/400-level.
A minimum of 120.0 Total Credits are needed for graduation Bachelor of Science B.S.

Freshman
Fall Credits Spring Credits
ENGL 150 3
ENGL 250 3
LIB 160 1

Sophomore
Fall Credits Spring Credits
ENSCI 250 3
ENSCI 110 1
ENSCI 201 2
ENSCI 177 4
ENSCI 177L 1
STAT 101 or 104 3
LIB 160 1

Junior
Fall Credits Spring Credits
ENSCI 381 3
ENSCI 382 3
ENSCI 384 3
Elective 3

Summer: Consider field experience such as an internship or field station courses.

Total Credits: 15

Elective
Fall Credits Spring Credits
ENSCI 381 3
Environmental science choice
Elective 3

Total Credits: 21

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

Total Credits: 21

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

Total Credits: 21

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

Total Credits: 21
Elective 3 Elective

Summer: Consider field experience such as an internship or field station courses.

15-16 15

Senior

Fall Credits Spring Credits

Environmental science choice\(^1\) 3 Environmental science choice\(^1\) 3

Social science choice\(^2\) 3 Environmental science choice\(^1\) 3

Electives 9 Electives 9

15 15

Students in all ISU majors must complete a 3 credits in U.S. diversity and a 3 credits in international perspectives. Check the Environmental Science website (http://www.ensci.iastate.edu) for a list of approved courses.

Minimum of 120 credits required, including a minimum of 45 credits at the 300/400 level.

1 Students complete at least 2-7 credits in Environmental Science including ENSCI 110, 201, 250, 381, 382 and 15 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 Earth Science related courses: AGRON 182, BIOL 212, GEOL 100, GEOL 201, MTEOR 206. Students choose from one of the following Organic Chemistry options: CHEM 231 & 231L, BBMB 2221, or AGRON 259.

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/).