

# 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 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

ENSCI 110	Orientation to Environmental Science	1
ENSCI 201	Introduction to Environmental Issues	2
ENSCI 202	Exploration of Environmental and Sustainability Issues	1
ENSCI 203	Exploration of Environmental Science	1
ENSCI 250	Environmental Geography	3
ENSCI 251	Biological Processes in the Environment	3
ENSCI 312	Ecology	4
ENSCI 318	Introduction to Ecosystems	3
ENSCI 319	Analysis of Environmental Systems	3
Additional ENSCI choice courses		12
<b>Total Credits</b>		<b>33</b>

### 2. Mathematics & Statistics: 6-8 credits

Choose one of the following:		3-4
MATH 104	Introduction to Probability	
MATH 150	Discrete Mathematics for Business and Social Sciences	
MATH 151	Calculus for Business and Social Sciences	
MATH 160	Survey of Calculus	
MATH 165	Calculus I	
COM S 106	Introduction to Web Programming	
COM S 107	Windows Application Programming	
DS 201	Introduction to Data Science	
DS 202	Data Acquisition and Exploratory Data Analysis	
Choose one of the following:		3-4
STAT 101	Principles of Statistics	
STAT 104	Introduction to Statistics	
<b>Total Credits</b>		<b>6-8</b>

### 3. Physical & Life Sciences: 21-24 credits

BIOL 211	Principles of Biology I	3
Choose from one of the following:		5
CHEM 163 & 163L	College Chemistry and Laboratory in College Chemistry	

CHEM 167 & 167L	General Chemistry for Engineering Students and Laboratory in General Chemistry for Engineering	
CHEM 177 & 177L	General Chemistry I and Laboratory in General Chemistry I	
CHEM 201 & 201L	Advanced General Chemistry and Laboratory in Advanced General Chemistry	
Choose from one of the following:		3-4
CHEM 231 & 231L	Elementary Organic Chemistry and Laboratory in Elementary Organic Chemistry	
CHEM 331 & 331L	Organic Chemistry I and Laboratory in Organic Chemistry I	
BBMB 221	Structure and Reactions in Biochemical Processes	
AGRON 259	Organic Compounds in Plants and Soils	
Choose 3 of the following:		9
AGRON 182	Introduction to Soil Science	
AGRON 282	Soil Conservation and Land Use	
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 & 178L	General Chemistry II and Laboratory in College Chemistry II	
PHYS 115	Physics for the Life Sciences	
	or PHYS 131 General Physics I	
	or PHYS 231 Introduction to Classical Physics I	
<b>Total Credits</b>		<b>20-21</b>

**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 (Embedded communication coursework in ENSCI 203 and ENSCI 312)	1

Embedded communication coursework in ENSCI 203 and ENSCI 312

**Total Credits** 7

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

Choose one of the following:		3
SP CM 212	Fundamentals of Public Speaking	
AGEDS 311	Presentation and Sales Strategies for Agricultural Audiences	
COMST 214	Professional Communication	
<b>Total Credits</b>		<b>3</b>

**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
US Diversity course from university approved list	3
<b>Total Credits</b>	<b>15</b>

**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

**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**

Environmental Science, B.S. (AGLS)

**Freshman**

Fall	Credits Spring	Credits
ENGL 150	3 ENSCI 203 <sup>1</sup>	1
ENSCI 110 <sup>1</sup>	1 BIOL 211	3
ENSCI 201 <sup>1</sup>	2 BIOL 211L	1
ENSCI 202 <sup>1</sup>	1 Physical or Life Science Choice <sup>3</sup>	3 or 4
CHEM 177	4 Social Science or Humanities Choice <sup>2</sup>	3
CHEM 177L	1 Mathematics, Programming, or Data Science choice	3-4
LIB 160	1	
STAT 101 or 104	3-4	
<b>16-17</b>		<b>14-16</b>

**Sophomore**

Fall	Credits Spring	Credits
ENSCI 250 <sup>1</sup>	3 ENSCI 251	3
Social Science or Humanities Choice <sup>2</sup>	3 Organic Chemistry Choice <sup>3</sup>	3
ENGL 250	3 Social Science or Humanities Choice <sup>2</sup>	3

Physical or Life Science choice <sup>3</sup>	Physical or Life Science choice <sup>3</sup>	
Elective	3 Communications (Speech)	3
	<b>12</b>	<b>12</b>
<b>Junior</b>		
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
ENSCI 312	4 ENSCI 318	3
Environmental Science Choice <sup>1</sup>	3 ENSCI 319	3
Social Science or Humanities Choice <sup>2</sup>	3 Social Science or Humanities Choice <sup>2</sup>	3
Elective	6 Electives	6
	<b>16</b>	<b>15</b>
<b>Senior</b>		
<b>Fall</b>	<b>Credits Spring</b>	<b>Credits</b>
Environmental Science Choice <sup>1</sup>	3 Environmental Science Choice <sup>1</sup>	6
Elective	12 Elective	9
	<b>15</b>	<b>15</b>

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/>).

<sup>1</sup> Students complete at least 32 credits in Environmental Science including ENSCI 110, ENSCI 201, ENSCI 202, ENSCI 203, ENSCI 250, ENSCI 251, ENSCI 312, ENSCI 318, ENSCI 319 and 15 additional credits of approved ENSCI coursework.

<sup>2</sup> Students complete at least 15 credits in humanities and social science including at least 3 credits each in ethics, humanities, social science, U.S. Diversity, and International Perspectives from approved lists.

<sup>3</sup> Students choose one course from the following Physical and Life Science related courses: AGRON 182, AGRON 282, BIOL 212, CHEM 178, GEOL 100, GEOL 201, MTEOR 206, PHYS 115, PHYS 131, PHYS 231. Students choose from one of the following Organic Chemistry options: CHEM 231 & CHEM 231L, CHEM 331 & CHEM 331L, BBMB 221, or AGRON 259.

## Graduate Study

Contact information for the graduate program:

**Lynette Edsall**

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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