The Bachelor of Science program in Environmental Science is a broad, science-based curriculum designed to prepare students for a variety of environmentally-related technical careers, as well as for graduate programs in allied fields. The mission of the program includes: broadening the scientific literacy of Environmental Science majors and increasing their understanding of the scientific context of environmental problems and solutions to enable them to become informed participants and leaders in the current and future debates on the state of the environment. The program also seeks to provide a supportive environment which stimulates analytical thinking and encourages a broad perspective in learning for our majors and those taking our courses, challenging them to get the maximum benefit from their talents and skills.

The Program requires 193 credit hours and draws upon the faculty and resources of the Program and several other departments. Majors take a core of Biology, Chemistry, Environmental Science, Mathematics, Physics and other courses, four courses in an Area of Emphasis, three electives related to Environmental Science, and two University-wide electives. The Area of Emphasis enables the student to take a concentration in the area of environmental science most interesting to them, most suited to their talents, and most appropriate for their career goals.

**FACULTY**

**PROGRAM COMMITTEE**

THOMAS J. MURPHY, PH.D.,
Professor and Director (Chemistry)
Iowa State University

NANCY J. CLUM, PH. D.,
Assistant Professor (Environmental Science)
Cornell University

LIAM J. HENEGHAN, PH. D.,
Assistant Professor (Environmental Science)
University College Dublin

JAMES A. MONTGOMERY, PH.D.,
Associate Professor (Environmental Science)
Washington State University

JOHN V. DEAN, PH.D.,
Associate Professor (Biology)
University of Illinois

KATHLEEN HELM-BYCHOWSKI, PH.D.
Assistant Professor (Chemistry)
University of California, Berkeley

NINA HEWITT, PH. D.
Assistant Professor (Geography)
York University

SARA J. MELFORD, PH.D.,
Associate Professor (Chemistry)
Northwestern University

TIMOTHY E. SPARKES, PH.D.,
Assistant Professor (Biology)
University of Kentucky

JOHN R. THOMPSON, PH. D.
Associate Professor (Physics)
Georgia Institute of Technology

**BACHELOR OF SCIENCE**

**LIBERAL STUDIES PROGRAM**

In addition to the 28 quarter hours required in the liberal studies core, students are required to complete 48 quarter hours distributed through five learning domains as part of their Bachelor of Science degree in environmental science. The number and distribution of courses in each of the areas are as follows:

**Core:** 28 quarter hours required

**First Year Program:** (16 quarter hours required) Discover Chicago or Explore Chicago, Focal Point Seminar, and Composition and Rhetoric I and II.

**Sophomore Seminar:** (4 quarter hours required) Sophomore Seminar on Multiculturalism in the United States
ENVIRONMENTAL SCIENCE

Junior Year Experiential Learning: (4 quarter hours required) If your junior year experiential learning requirement also fulfills a major field requirement, you may substitute a liberal studies domain elective (from outside your major field area) or the third course in the modern language option for this requirement.

Senior Capstone: (4 quarter hours required) Environmental Sciences requires that all students majoring in Environmental Sciences complete the senior capstone in Environmental Sciences. If you are double majoring and/or in the Honors program you must also follow the capstone guidelines for that area.

Arts and Literature: 12 quarter hours required. At most 2 courses from the same department or program.

Philosophical Inquiry: 8 quarter hours required.

Religious Dimensions: 8 quarter hours required; 4 quarter hours in patterns and problems, and 4 quarter hours in traditions in context.

Scientific Inquiry: not required.

Self, Society and the Modern World: 12 quarter hours required. At most 2 courses from the same department or program.

Understanding the Past: 8 quarter hours required; 4 quarter hours of history pre-1800 and 4 quarter hours of history primarily between 1800-1945. In addition, courses must be from two different categories: 1) Asia, 2) Latin America, 3) Africa, 4) North America or Europe and 5) intercontinental or comparative.

Courses offered by the Environmental Sciences Program are not applied towards liberal studies requirements for the Environmental Science major. Exceptions to this rule can be the junior experiential learning and the senior capstone requirements.

DEPARTMENTAL PROGRAM REQUIREMENTS

CORE

Students must take the following 23 courses (81 quarter hours):

Biology: Biology 101, 102 and 103 General Biology I, II and III; and 215 Ecology.

Chemistry: Chemistry 111, 113 and 115 General and Analytical Chemistry I, II and III; 171, 173 and 175 Organic Chemistry I, II and III.

Environmental Sciences: 216 Earth System Science; 217 Human Impacts on the Environment; 260 Environmental Data Analysis; 294 Second Year Seminar; 360 Research Methods; 362 Senior Thesis; and 394 Environmental Seminar.

Mathematics: 150, 151 and 152 Calculus I, II and III.

Physics: 150, 151 and 152 General Physics I, II and III.

ADDITIONAL COURSES

Students must take two courses from the following, but not courses from the student's chosen area of emphasis:

Biology 365 Toxicology; Economics 105 Principles of Microeconomics; Public Policy Studies 202 Public Policy and Environmental Issues; Chemistry 240 Introduction to Biochemistry; Geography 242 Geographic Information Systems; English 204 Technical Writing.

AREAS OF EMPHASIS

Students must take four courses from one of the following Areas of Emphasis.

Biology: 210 Microbiology; 250 Cell Biology; 260 Genetics; 309 Plant Physiology; 317* Aquatic Biology; 365 Toxicology; Environment Science 320* Conservation Biology.

Chemistry: 127 Quantitative Analysis; 210 Physical Chemistry I; 240 Introduction to Biochemistry; 261 Instrumental Analysis; 265 Air Chemistry; 267 Water Chemistry; 269 Solid Waste Chemistry.

Earth Science: Physics 201 The Atmosphere and the Oceans, or Geography 225 Weather and Climate; Environmental Science 115 Environmental Geology or 220 Soil Science; Envi-
Environmental Science 224 Environment of the Chicago River; 330 Field Methods; Geography 242 Geographic Information Systems; or 243 Remote Sensing.

Ecology and Conservation Biology; Environmental Science 250 Applied Ecology; 270 Tropical Biology and Conservation; Biology 317* Aquatic Biology; Environmental Science 320; Conservation Biology; 330 Field Methods.

Geography; Geography 210 Environmental Conservation; 225 Weather & Climate; 241 Computer Cartography; 242 Geographic Information Systems; 243 Remote Sensing; Environmental Science 200 Cities and the Environment.

Public Policy: Public Policy 201 Public Policy and Urban Issues; 202 Public Policy and Environmental Issues; 320 Public Policy in Production and Use of Energy and Pollution Control; 324 Public Policy and Natural Resources.


SPECIAL PROGRAMS OR REQUIREMENTS

INTERNSHIP CREDIT

An internship program (Env 395) is available so that students may gain credit for career-related experience in environmental science. Internships consist of working for approximately three months in a real job situation. Internships can be arranged for any time following the sophomore year.

The normal internship is a carefully structured program which provides a valuable experience for the student. Prospective agencies will be monitored so that the student will gain professional experience. A written agreement will be required that is prepared by the intern and employer, and states the duties, responsibilities and goals of both parties. Interns will be required to prepare a written report that describes their experiences and professional development during the internship. Students will be allowed to seek either a letter grade or a pass/fail grade. Arrangements need to be made more than a quarter in advance.

COURSES

All courses carry 4 quarter hours of credit unless otherwise specified.

ENV 102 INTRODUCTION TO ENVIRONMENTAL SCIENCE A general introduction to the scientific background of some of the important environmental problems facing urban areas, the nation and the world. Its purpose is to make the student aware of these major problems, their causes, and their interrelationships as background for the student as he or she encounters these problems in other courses. The course includes a three-hour lab.

ENV 115 ENVIRONMENTAL GEOLOGY An examination of the earth's materials and structures, and the processes responsible for their formation; how geologic processes and hazards influence human activities (and vice versa); and a discussion of geologic resources and the geological aspects of waste disposal and pollution. The course includes a three-hour lab and a mandatory Saturday field trip.

ENV 200 CITIES AND THE ENVIRONMENT This course focuses on the interactions between urban areas and the environment. It is a discussion of the physical setting of cities; the water, energy, air and waste disposal needs of urban areas; and the effects of urban areas on the air, water and land environment.

ENV 202 RESOURCES, POPULATION, AND THE ENVIRONMENT A course on the relationship between the exploitation of the biological, mineral and energy resources of the earth to support an increasing population, and the environmental effects of this development.
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<tr>
<th>Course Code</th>
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<tr>
<td>ENV 216</td>
<td>EARTH SYSTEM SCIENCE This course uses a systems approach, to investigate the fundamental structure of functions, processes and changes within, and dynamic interactions (cycling) among Earth's living and non-living systems. This course is designed for students with fundamental grounding in biology, chemistry, ecology, and mathematics.</td>
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<tr>
<td>ENV 217</td>
<td>HUMAN IMPACTS ON THE ENVIRONMENT A science-based course that examines the interface between humans and the living and non-living environment, the consequences of these interactions, and options for mitigating environmental impacts.</td>
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<tr>
<td>ENV 220</td>
<td>ENVIRONMENTAL SOIL SCIENCE An examination of the physical, chemical, biological and engineering properties of soils, their genesis and classification, how they function as sites of waste disposal, and their role in global agricultural production. The course includes a three-hour lab and a mandatory Saturday field trip.</td>
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<tr>
<td>ENV 224</td>
<td>ENVIRONMENT OF THE CHICAGO RIVER This course focuses on the natural environment of the Chicago River watershed. It is a discussion of the physical geography, geology, ecology, and water quality of the river. The course includes a three-hour laboratory.</td>
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<tr>
<td>ENV 250</td>
<td>APPLIED ECOLOGY An examination of how ecological principles are applied in order to understand and improve the relationship between humans and the natural environment.</td>
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<td>ENV 260</td>
<td>ENVIRONMENTAL DATA ANALYSIS This course provides an overview of the biometrical techniques employed in the analysis of environmental data. Topics include: handling of data, experimental designs, testing for differences between an experimental and a control group, testing for differences among many groups, and determining trends in data. Data from the environmental sciences is used throughout, and students are introduced to appropriate software for data analysis. PREREQUISITE(S): MAT 150 or permission.</td>
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<tr>
<td>ENV 270</td>
<td>TROPICAL BIOLOGY AND CONSERVATION This field-oriented course examines the ecology of tropical terrestrial and marine ecosystems in the Bahamas and the history and impact of human use of these environments. December Quarter course.</td>
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<tr>
<td>ENV 294</td>
<td>SECOND YEAR SEMINAR (1 credit hour) The purpose of this course is to improve the environmental literacy of our students, and to begin to introduce them to the department and their fellow students. This class will meet once per week. Readings and articles on environmental science and the environment will be assigned and discussed in class.</td>
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<tr>
<td>ENV 320</td>
<td>CONSERVATION BIOLOGY The purpose of this course is to provide a thorough understanding of biodiversity, human impacts on biodiversity, and the theory and practice of maintaining biodiversity in a developing world. PREREQUISITE(S): BIO 215 or permission.</td>
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</table>
ENV 322 ECOSYSTEM ECOLOGY This course will introduce students to the conceptual and methodological tools of ecosystem ecology. The course will focus on understanding the fundamental structure and function of ecosystems but will also address very recent debates on the economic value of ecosystem services, the role of biological diversity in maintaining ecosystem processes, and the consequences of stressed and degraded ecosystems for human welfare. The course includes a weekly lab.

ENV 324 FOREST ECOLOGY Forest ecology.

ENV 330 FIELD METHODS A laboratory course designed to educate students in the execution and application of field techniques used in environmental science. Emphasis on the areas of ecology, earth science, and urban forestry.

ENV 340 ISSUES IN URBAN FORESTRY There is a growing awareness of the functional importance of trees contributing to improved air quality, minimizing noise pollution, protecting rivers from nutrient pollutant runoff, and in maintaining biodiversity. This course will discuss this broad spectrum of notions concerning urban forestry. The class will include some field days.

ENV 342 NATURAL HISTORY OF FORESTS This course is designed to give a comprehensive introduction to the natural history of one particular biome, namely forests. It will provide a comprehensive overview of world forests from both a botanical and zoological perspective. Objectives will be: 1) to provide a systems level understanding of the physical and biological forces which determine the structure of forest plant and animal communities; and 2) to survey the natural history of selected biological groups. It will include a field component and trips to areas of botanical interest in Chicago.

ENV 350 ENVIRONMENTAL IMPACT ANALYSIS: CAPSTONE Students are introduced to the public policy-making process, with particular emphasis on the evolution of the National Environmental Policy Act (NEPA) of 1969. The students conduct an environmental analysis and then prepare an environmental impact statement (EIS) following NEPA guidelines. There is a mandatory two-hour discussion section.

ENV 360 RESEARCH METHODS (1 credit hour) The purpose of this course is to improve the skills of environmental science majors in using various forms of information technology (e.g., indexes and databases, journals, Internet, WWW, etc.), and in writing research proposals. Students will select a topic and then write a thorough and detailed research proposal.

ENV 362 SENIOR THESIS The student will choose a faculty mentor and a project. The project may be based on lab, field, or library research. The grade for the thesis will be based on the thesis and on a seminar on the thesis presented to the ES students and faculty. This course may be taken more than one time for credit. PREREQUISITE(S): ENV 360. Variable credit.

ENV 390 SPECIAL TOPICS IN ENVIRONMENTAL SCIENCE Variable topics. Consult schedule or our web-site for offering.

ENV 394 THIRD YEAR SEMINAR (1 credit hour) Students enrolled in the course will present a seminar on an environmental topic.