Environmental Sciences, BS

Requirements

The Bachelor of Science with a major in environmental sciences requires a minimum of 120 s.h., including 76–81 s.h. of work for the major. Students must maintain a grade-point average of at least 2.00 in all courses for the major and in all UI courses for the major. They also must complete the College of Liberal Arts and Sciences GE CLAS Core; some courses required for the major in environmental sciences may be used to satisfy GE CLAS Core requirements.

Bachelor of Science students majoring in environmental sciences must complete requirements in three areas: science and mathematics foundation; environmental sciences foundation; and one of four environmental sciences tracks.

During their third year of study, students are assigned a faculty advisor who specializes in their track.

The science and mathematics foundation develops fundamental skills and comprehension in biology, chemistry, geology, mathematics, and statistics. The environmental sciences foundation includes an introductory course in environmental science and additional courses that focus on remote sensing techniques, design and use of geographic information technologies, the geomorphic and environmental processes that shape the earth's surface, and ecological factors that influence the distribution and abundance of organisms.

Each of the program's four tracks focuses on areas of specialization within environmental sciences:

- biosciences (green) track—biological systems and ecological approaches;
- chemical sciences (yellow) track—environmental systems and chemistry;
- geosciences (brown) track—earth materials and surficial geologic processes; and
- hydrosciences (blue) track—hydrogeology and hydrogeologic systems, and water chemistry.

The tracks aim to prepare scientists who can tackle problems that require particular areas of expertise, and to help students develop the skills needed for future employment or graduate study.

The BS with a major in environmental sciences requires the following coursework.

Requirements	Hours
Science and Mathematics Foundation Courses	27
Environmental Sciences Foundation Courses	16
Environmental Sciences Track Courses	33-38

Science and Mathematics Foundation

Students must complete at least 27 s.h. of coursework, as follows.

Course #	Title	Hours
All of these:		
BIOL:1411	Foundations of Biology	4
BIOL:1412	Diversity of Form and Function	4
CHEM:1110	Principles of Chemistry I	4
CHEM:1120	Principles of Chemistry II	4
EES:1050	Introduction to Geology	4
MATH:1850	Calculus I	4
One of these:		
CHEM:2021	Fundamentals of Chemical Measurements (must be taken by chemical sciences track students)	3
STAT:3510/ IGPI:3510	Biostatistics	3
STAT:4200/ IGPI:4200	Statistical Methods and Computing	3

Environmental Sciences Foundation

Students must complete 16 s.h. of coursework, as follows.

Course #	Title	Hours
All of these:		
ENVS:1085/ EES:1085	Fundamentals of Environmental Science	4
ENVS:2010/ EES:2010/ GEOG:2010	Interdisciplinary Environmental Seminar	1
ENVS:2673/ BIOL:2673	Ecology	3
ENVS:3010/ EES:3010/ GEOG:3003	Interdisciplinary Environmental Seminar	1
ENVS:3020/ EES:3020/ GEOG:3020	Earth Surface Processes	3
GEOG:2050	Foundations of GIS	4

Environmental Sciences Track Courses

Students majoring in environmental sciences must choose one of the following four tracks. Each track includes required general sciences courses, track foundation courses, field study courses, and elective courses.

Biosciences (Green) Track

The biosciences track provides the essential skills for entry-level positions that require a good knowledge of biotic systems and the ability to inventory biologic resources. The track's aim is to produce scientists who are capable of tackling environmental problems in which links and interactions with life sciences are crucial and in which a substantial knowledge of biological/ecological sciences is required. The track also provides a strong foundation for graduate or professional training in disciplines such as ecology, wildlife management, and natural resource management.

Students must complete at least 33 s.h., including one field study course, as follows.

Course #	Title	Hours
Foundation		
These three courses:		
BIOL:2512	Fundamental Genetics	4

BIOL:3172	Evolution	4
GEOG:2374/ BIOL:2374	Biogeography	3
At least 9 s.h. from these:		
BIOL:2246	Entomology Lab	4
EES:3070	Marine Ecosystems and Conservation	3
EES:3220	Evolution of the Vertebrates	4
GEOG:2950	Environmental Conservation	4
GEOG:3315	Ecosystem Ecology	3
GEOG:3350	Urban Ecology	3
GEOG:4470	Ecological Climatology	3
Iowa Lakeside Laboratory courses (prefix IALL) may be approved in consultation with an environmental sciences advisor		
Field Study		
At least 3-4 s.h. from these:		
ENVS:3095	Field Ecology	4
ENVS:3096	Winter Ecology	2
ENVS:3097	Introduction to Bird Study	2
ENVS:3230	Special Topics	0-4
IALL:3034	Topics in Ecology and Sustainability	1-4
IALL:3103	Aquatic Ecology	2,4
IALL:3109	Ecology and Systematics of Algae	2,4
IALL:3117	Ecology and Systematics of Diatoms	2,4
IALL:3123	Prairie Ecology I	2
IALL:3125	Prairie Ecology II	2
IALL:3126	Ornithology	2-4
Other Iowa Lakeside Laboratory courses (prefix IALL) may be approved in consultation with an environmental sciences advisor		
Policy		
One of these:		
BIOL:1260	Plants and Human Affairs	2-3
ECON:3625/ URP:3135	Environmental and Natural Resource Economics	3
EES:1115/ ENVS:1115/ GEOG:1115/ HIST:1115	The History of Oil	3
GEOG:1070	Contemporary Environmental Issues	3
GEOG:3340	Ecosystem Services	3
GEOG:3780/ GHS:3780/ HIST:3240	U.S. Energy Policy in Global Context	3
GEOG:4770/ AFAM:4770/ GHS:4770	Environmental Justice	3
PBAF:2020/ URP:2020	Environment and Society: Sustainability, Policy, and Politics	3

Biosciences Track: Electives

Biosciences track students must complete at least 6 s.h. of elective coursework; additional field study and foundation courses may be approved for elective credit.

Course #	Title	Hours
BIOL:1261	Introduction to Botany	4
BIOL:2663	Plant Response to the Environment	3
BIOL:3244	Animal Behavior	3
BIOL:3676	Evolution Lab	4
BIOL:3994	Introduction to Research (no more than 6 s.h. of research credit may count toward the major)	2-3
BIOL:4999	Honors Research in Biology (no more than 6 s.h. of research credit may count toward the major)	arr.
CEE:5440	Foundations of Environmental Chemistry and Microbiology	3
CHEM:2210	Organic Chemistry I	3
CHEM:3110	Equilibria and Electrochemistry	3
CHEM:3120	Spectroscopy and Separations	3
EES:2020/ ENVS:2020	Earth's Climate System	3
EES:2200/ ENVS:2200	Historical Geology	4
EES:3080	Introduction to Oceanography	2
EES:3110/ ENVS:3110	Chemical Evolution of the Oceans	3
EES:3210	Principles of Paleontology	3
EES:4630	Hydrogeology	4
EES:4790	Applied Environmental Geology	3
ENVS:3230	Special Topics	1-4
GEOG:2310/ EES:2310	Introduction to Climatology	3
GEOG:3570	Light Detection and Ranging (LiDAR): Principles and Applications	3
GEOG:3992	Undergraduate Research (no more than 6 s.h. of research credit may count toward the major)	arr.
GEOG:4310	Climate Change	3

Chemical Sciences (Yellow) Track

The chemical sciences track provides the essential skills for entry-level positions that require a basic understanding of chemical principles and a working knowledge of basic chemical concepts as applied in the environment. The track's aim is to produce scientists who are capable of tackling environmental problems in which chemical and molecular processes play an important role. The track also provides a strong foundation for graduate or professional training in environmental chemistry.

Students must complete at least 33 s.h. of coursework, as follows.

Course #	Title	Hours
Foundation		
These three courses:		

CHEM:2210	Organic Chemistry I	3
CHEM:3120	Spectroscopy and Separations	3
CHEM:3250	Inorganic Chemistry	3
And 9 s.h. from this list (at least 3 s.h. must be lab hours):		
CEE:4150/CBE:4420	Environmental Chemistry	3
CHEM:2220	Organic Chemistry II	3
CHEM:2410	Organic Chemistry Laboratory	3
CHEM:3110	Equilibria and Electrochemistry	3
CHEM:3440	Physical Measurements	3
CHEM:3530	Inorganic Chemistry Laboratory	3
CHEM:4430	Principles of Physical Chemistry	3
CHEM:4431	Chemical Thermodynamics	3
CHEM:4432	Quantum Mechanics and Chemical Kinetics	3
CHEM:4450	Synthesis and Measurement	3
Lab and Field Study		
This course:		
CHEM:3430	Analytical Measurements	3
Policy		
At least one of these:		
BIOL:1260	Plants and Human Affairs	2-3
ECON:3625/ URP:3135	Environmental and Natural Resource Economics	3
EES:1115/ ENVS:1115/ GEOG:1115/ HIST:1115	The History of Oil	3
GEOG:1070	Contemporary Environmental Issues	3
GEOG:2930	Water Resources	3
GEOG:3340	Ecosystem Services	3
GEOG:3780/ GHS:3780/ HIST:3240	U.S. Energy Policy in Global Context	3
GEOG:4770/ AFAM:4770/ GHS:4770	Environmental Justice	3
PBAF:2020/ URP:2020	Environment and Society: Sustainability, Policy, and Politics	3

Chemical Sciences Track: Electives

Chemical sciences track students must complete at least 9 s.h. of elective coursework chosen from the following list. Students may petition the chemistry department's environmental sciences advisor to use appropriate Department of Chemistry courses numbered 3000 and above as electives; additional foundation courses may be approved for elective credit.

Course #	Title	Hours
BMB:3110	Biochemistry	3
CEE:4158/ OEH:4920	Solid and Hazardous Wastes	3
CHEM:3994	Undergraduate Research (no more than 6 s.h. of research credit may count toward the major)	1-4
CHEM:4760	Radiochemistry: Energy, Medicine, and the Environment	3
CHEM:4873	Atmospheric and Environmental Chemistry	3
EES:2020/ ENVS:2020	Earth's Climate System	3
EES:2200/ ENVS:2200	Historical Geology	4
EES:4490	Elements of Geochemistry	3
EES:4520	Isotope Geochemistry	3
EES:4630	Hydrogeology	4
EES:4640	Contaminant Hydrogeology	3
EES:4790	Applied Environmental Geology	3
ENVS:3110/ EES:3110	Chemical Evolution of the Oceans	3
ENVS:3230	Special Topics (no more than 6 s.h. may count toward the major)	1-4
GEOG:2310/ EES:2310	Introduction to Climatology	3
GEOG:2950	Environmental Conservation	4
GEOG:3500/ IGPI:3500	Introduction to Environmental Remote Sensing	3
GEOG:4310	Climate Change	3

Geosciences (Brown) Track

The geosciences track provides the essential skills for entry-level positions that require a basic understanding of geologic principles and a working knowledge of basic geologic concepts applied in the environmental industry. The track's aim is to produce scientists who are capable of tackling environmental problems in which earth materials and surficial geologic processes are of primary importance. The track also lays a strong foundation for graduate study in environmental geology, engineering geology, and natural hazards assessment.

Students must complete at least 38 s.h. of coursework, as follows.

Course #	Title	Hours
General Sciences		
These two courses:		
MATH:1860	Calculus II	4
PHYS:1400	Basic Physics	4
Students are strongly encouraged to take additional coursework in physics		
Foundation		
These three courses:		
EES:2410	Mineralogy	4
EES:3300	Sedimentary Geology	4
EES:4630	Hydrogeology	4
At least 6 s.h. from these:		
EES:2200/ ENVS:2200	Historical Geology	4

EES:3360/ GEOG:3360	Soil Genesis and Geomorphology	3
EES:3500	Igneous and Metamorphic Petrology	4
EES:3840	Structural Geology	4
EES:4790	Applied Environmental Geology	3
Field Study		
One of these:		
EES:2831	Geologic Field Methods	3
EES:4680	Field Methods in Hydrologic Science	3
GEOG:4010	Field Methods in Physical Geography	3
Iowa Lakeside Laboratory courses (prefix IALL) may be approved in consultation with environmental sciences advisor		
Policy		
At least one of these:		
BIOL:1260	Plants and Human Affairs	2-3
ECON:3625/ URP:3135	Environmental and Natural Resource Economics	3
ENVS:1115/ EES:1115/ GEOG:1115/ HIST:1115	The History of Oil	3
GEOG:1070	Contemporary Environmental Issues	3
GEOG:3340	Ecosystem Services	3
GEOG:3760/ GHS:3760	Hazards and Society	3
GEOG:3780/ GHS:3780/ HIST:3240	U.S. Energy Policy in Global Context	3
GEOG:4770/ AFAM:4770/ GHS:4770	Environmental Justice	3
PBAF:2020/ URP:2020	Environment and Society: Sustainability, Policy, and Politics	3

Geosciences Track: Electives

Geosciences track students must complete at least 6 s.h. of elective coursework chosen from the following list; additional field study or foundation courses may be approved for elective credit.

Course #	Title	Hours
CEE:4158/ OEH:4920	Solid and Hazardous Wastes	3
EES:1290	Energy and the Environment	3
EES:2020/ ENVS:2020	Earth's Climate System	3
EES:3070	Marine Ecosystems and Conservation	3
EES:3080	Introduction to Oceanography	2
EES:3190	Directed Study (no more than 6 s.h. may count toward the major)	arr.
EES:3380/CEE:3328	Fluvial Geomorphology	3
EES:3390	Integrated Watershed Analysis	3
EES:3770	Global Stratigraphy	3
EES:4490	Elements of Geochemistry	3
EES:4520	Isotope Geochemistry	3
EES:4640	Contaminant Hydrogeology	3
EES:4720	Paleoclimatology	3
EES:4820	Tectonics and Basin Analysis	3
ENVS:3110/ EES:3110	Chemical Evolution of the Oceans	3
ENVS:3230	Special Topics	1-4
GEOG:2310/ EES:2310	Introduction to Climatology	3
GEOG:2950	Environmental Conservation	4
GEOG:3500/ IGPI:3500	Introduction to Environmental Remote Sensing	3
GEOG:3570	Light Detection and Ranging (LiDAR): Principles and Applications	3
GEOG:4310	Climate Change	3

Hydrosciences (Blue) Track

The hydrosciences track provides the essential skills for entry-level positions that require a basic understanding of geologic principles and a working knowledge of hydrogeology and hydrogeochemistry. The track's aim is to produce scientists who are capable of tackling environmental problems that emphasize hydrogeologic systems and for which substantial knowledge of hydrogeology and water chemistry are essential. The track also lays a strong foundation for graduate education in hydrogeology, hydrology, geochemistry, and aqueous chemistry.

Students must complete at least 37 s.h. of coursework, as follows.

Course #	Title	Hours
General Sciences		
These three courses:		
MATH:1860	Calculus II	4
PHYS:1511	College Physics I	4
PHYS:1512	College Physics II	4
Foundation		
These two courses:		
EES:4630	Hydrogeology	4
EES:4790	Applied Environmental Geology	3
And 6 s.h. from these:		
EES:3380/CEE:3328	Fluvial Geomorphology	3
EES:3390	Integrated Watershed Analysis	3
EES:4490	Elements of Geochemistry	3
EES:4640	Contaminant Hydrogeology	3
ENVS:3110/ EES:3110	Chemical Evolution of the Oceans	3
Field Study		
One of these:		
EES:4680	Field Methods in Hydrologic Science	3
GEOG:4010	Field Methods in Physical Geography	3

Policy		
At least one of these:		
BIOL:1260	Plants and Human Affairs	2-3
ECON:3625/ URP:3135	Environmental and Natural Resource Economics	3
ENVS:1115/ EES:1115/ GEOG:1115/ HIST:1115	The History of Oil	3
GEOG:1070	Contemporary Environmental Issues	3
GEOG:2930	Water Resources	3
GEOG:3340	Ecosystem Services	3
GEOG:3780/ GHS:3780/ HIST:3240	U.S. Energy Policy in Global Context	3
GEOG:4770/ AFAM:4770/ GHS:4770	Environmental Justice	3
PBAF:2020/ URP:2020	Environment and Society: Sustainability, Policy, and Politics	3

Hydrosciences Track: Electives

Hydrosciences track students must complete at least 6 s.h. of elective coursework chosen from the following list; additional field study and foundation courses may be approved for elective credit.

Course #	Title	Hours
CEE:3371	Principles of Hydraulics and Hydrology	3
CEE:4150/CBE:4420	Environmental Chemistry	3
CEE:5440	Foundations of Environmental Chemistry and Microbiology	3
EES:2020/ ENVS:2020	Earth's Climate System	3
EES:2200/ ENVS:2200	Historical Geology	4
EES:3070	Marine Ecosystems and Conservation	3
EES:3080	Introduction to Oceanography	2
EES:3190	Directed Study (no more than 6 s.h. may count toward the major)	arr.
EES:3300	Sedimentary Geology	4
EES:3360/ GEOG:3360	Soil Genesis and Geomorphology	3
ENVS:3230	Special Topics	1-4
GEOG:2310/ EES:2310	Introduction to Climatology	3
GEOG:2950	Environmental Conservation	4
GEOG:3570	Light Detection and Ranging (LiDAR): Principles and Applications	3
GEOG:4310	Climate Change	3
GEOG:4470	Ecological Climatology	3

Teacher Licensure

Students interested in teaching in elementary and/or secondary schools should seek admission to the Teacher Education Program (TEP) in the College of Education.

To qualify for licensure in secondary teaching, students in the TEP complete a degree in education as well as a related College of Liberal Arts and Sciences degree. See Apply on the College of Education website for details on requirements and deadlines for applying to the College of Education and about TEP choices of majors leading to licensure.