Geoscience, B.S.

The B.S. in geoscience offers students an extensive and comprehensive background in the Earth sciences and related scientific disciplines, and is geared toward a career in the geosciences. Strengths of the department include environmental geology, geochemistry, geophysics, paleontology, stratigraphy, tectonics, basin analysis, surficial processes, petrology, and volcanology. Students gain extensive field experience and training and are able to integrate field studies and analytical research, with knowledge gained in the classroom. Opportunities are provided for local, regional, and international field experiences as well as for individual research projects.

Learning Outcomes

Geoscience B.S. graduates will:

- understand the structure, composition, and physical processes of the Earth;
- understand the coevolution of the Earth-life system;
- have the ability to interpret the geologic record in the field;
- understand how to assess and utilize our natural resources in a sustainable manner; and
- develop a quantitative analytical skill set to integrate the diverse array of Earth sciences and related disciplines.

Requirements

The Bachelor of Science with a major in geoscience requires a minimum of 120 s.h., including at least 76 s.h. of work for the major (at least 45 s.h. in earth and environmental sciences courses and at least 31 s.h. in supporting disciplines). 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. Transfer students must complete a minimum of 15 s.h. of coursework in the Department of Earth and Environmental Sciences.

The department recommends that students fulfill the GE CLAS Core World Languages requirement with French, German, Russian, or Spanish and the Social Sciences requirement with approved coursework in economics, geography, or anthropology.

The B.S. with a major in geoscience requires the following coursework.

Code	Title	Hours
Earth and Environmental Sciences Courses		45-50
Mathematics Courses		11-12
Chemistry Courses		8
Physics Courses		8
Biology Course		4
Independent Research Option		
Total Hours		**76-82**

Earth and Environmental Sciences

Code	Title	Hours
One of these:		
EES:1030	Introduction to Earth Science	4
EES:1050	Introduction to Geology (preferred)	4
All of these:		
EES:1040	Evolution and the History of Life	4
EES:2200	Historical Geology	4
EES:2410	Mineralogy	4
EES:2831	Geologic Field Methods	3
EES:3300	Sedimentary Geology	4
EES:3500	Igneous and Metamorphic Petrology	4
EES:3840	Structural Geology	4
EES:4832	Geologic Field Analysis	3
One of these:		
EES:3210	Principles of Paleontology	3
EES:4490	Elements of Geochemistry	3
EES:4630	Hydrogeology	4
EES:4790	Applied Environmental Geology	3
EES:4800	Global Geophysics	3
And:		
Three earth and environmental sciences electives numbered EES:3000 or above, except for the field trip courses EES:3001, EES:3160, or EES:4001; see "Recommended Electives" below		8-12

Mathematics

Code	Title	Hours
One of these:		
MATH:1550	Engineering Mathematics I: Single Variable Calculus	4
MATH:1850	Calculus I	4
One of these:		
MATH:1560	Engineering Mathematics II: Multivariable Calculus	4
MATH:1860	Calculus II	4
And:		
An additional mathematics course numbered MATH:2000 or above, or a computer science course numbered CS:1110 or above, or a statistics course numbered STAT:2010 or above, or EES:3100, or EES:4300 (if the EES courses are not used to satisfy the earth and environmental sciences electives requirement)		3-4

Chemistry

Students must complete at least 8 s.h. of college-level chemistry, including the following sequence or equivalent courses or more advanced courses. Chemistry courses numbered below CHEM:1110 Principles of Chemistry I do not count toward this requirement.

Code	Title	Hours
CHEM:1110 & CHEM:1120	Principles of Chemistry I-II	8

Physics

Students must complete at least 8 s.h. of college-level physics, as follows. Physics courses numbered below PHYS:1511 College Physics I do not count toward this requirement.

Code	Title	Hours
One of these sequences:		
PHYS:1511-PHYS:1512	College Physics I-II	8
PHYS:1611-PHYS:1612	Introductory Physics I-II	8

Biology

Students must complete at least one biology course that includes a laboratory (4 s.h.). Students with an interest in paleontology are encouraged to take BIOL:1411 Foundations of Biology and BIOL:1412 Diversity of Form and Function.

Code	Title	Hours
One biology course (includes a lab)		4

Recommended Electives

All students should take elective courses from the following groups in order to broaden their undergraduate experience and prepare themselves for graduate study or professional employment. Students who have clear career goals are advised to take three or more elective courses from the group that fits their needs most closely. Students also may seek a broad education in geoscience by choosing elective courses from a number of groups.

Quaternary Geology

Code	Title	Hours
EES:3020	Earth Surface Processes	3
EES:3060	Ecology and Natural History of Iowa	3
EES:3100	Earth and Planetary Remote Sensing	4
EES:3360	Soil Genesis and Geomorphology	3
EES:3380	Fluvial Geomorphology	3
EES:4490	Elements of Geochemistry	3
EES:4520	Isotope Geochemistry	3
EES:4630	Hydrogeology	4
EES:4640	Contaminant Hydrogeology	3
EES:4720	Paleoclimatology	3
EES:4790	Applied Environmental Geology	3

Environmental Geology

Code	Title	Hours
EES:3060	Ecology and Natural History of Iowa	3
EES:3070	Marine Ecosystems and Conservation	3
EES:3080	Introduction to Oceanography	2
EES:3100	Earth and Planetary Remote Sensing	4
EES:3380	Fluvial Geomorphology	3
EES:3390	Integrated Watershed Analysis	3
EES:4490	Elements of Geochemistry	3
EES:4520	Isotope Geochemistry	3
EES:4630	Hydrogeology	4
EES:4640	Contaminant Hydrogeology	3
EES:4680	Field Methods in Hydrologic Science	3
EES:4790	Applied Environmental Geology	3
EES:4800	Global Geophysics	3

Geochemistry

Code	Title	Hours
EES:4410	Analytical Methods Seminar	2
EES:4490	Elements of Geochemistry	3
EES:4520	Isotope Geochemistry	3
EES:4630	Hydrogeology	4
EES:4640	Contaminant Hydrogeology	3
EES:4820	Tectonics and Basin Analysis	3

Tectonics/Petrology

Code	Title	Hours
EES:4410	Analytical Methods Seminar	2
EES:4490	Elements of Geochemistry	3
EES:4520	Isotope Geochemistry	3
EES:4750	Mineral and Petroleum Exploration Geology	3
EES:4800	Global Geophysics	3
EES:4820	Tectonics and Basin Analysis	3

Sedimentary Geology

Code	Title	Hours
EES:3080	Introduction to Oceanography	2
EES:3300	Sedimentary Geology	4
EES:3380	Fluvial Geomorphology	3
EES:3770	Global Stratigraphy	3
EES:4490	Elements of Geochemistry	3
EES:4520	Isotope Geochemistry	3
EES:4750	Mineral and Petroleum Exploration Geology	3
EES:4820	Tectonics and Basin Analysis	3

Paleobiology

Code	Title	Hours
EES:3070	Marine Ecosystems and Conservation	3
EES:3080	Introduction to Oceanography	2
EES:3210	Principles of Paleontology	3
EES:3220	Evolution of the Vertebrates	4
EES:3300	Sedimentary Geology	4
EES:3770	Global Stratigraphy	3
EES:4490	Elements of Geochemistry	3

EES:4520	Isotope Geochemistry	3
EES:4820	Tectonics and Basin Analysis	3

Independent Research Option

A junior or senior who is ready to pursue independent research for credit in geoscience may assist a faculty member or graduate student with a current research project EES:2190 Directed Study or may initiate a small-scale project involving a combination of field, laboratory, and library investigation in EES:3190 Directed Study. Independent study is encouraged and may lead to an honors thesis in EES:4999 Honors Thesis in Geoscience or a senior thesis in EES:4990 Senior Thesis in Geoscience that may be published subsequently.

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.

Honors

Honors in the Major

Students have the opportunity to graduate with honors in the major. Departmental honors students must maintain a cumulative grade-point average (GPA) of at least 3.33 in all University of Iowa coursework and in all geoscience courses. Students must complete a senior thesis, registering in EES:4999 Honors Thesis in Geoscience. They must obtain approval of their honors thesis contract from their advisor and the department's undergraduate committee, and they must earn a grade of B or higher in EES:4999.

National Honor Society

The department sponsors a chapter of Sigma Gamma Epsilon National Honor Society for the Earth Sciences. Students with an overall GPA of at least 2.80 and at least 3.20 in geoscience courses are considered for membership after they have completed a minimum of 16 s.h. of coursework in geoscience. Consult the departmental honors advisor for more information.

University of Iowa Honors Program

In addition to honors in the major, students have opportunities for honors study and activities through membership in the University of Iowa Honors Program; visit Honors at Iowa to learn about the university's honors program.

Membership in the UI Honors Program is not required to earn honors in the geoscience major.

Career Advancement

The B.S. in geoscience is designed to prepare students for immediate employment after graduation or for admission to graduate study in earth and environmental sciences. Degree recipients also have been employed in the ancillary fields of public policy, environmental engineering, law, business, archaeology, science education, museum curation, and other allied fields. Nearly all University of Iowa geoscience graduates gain employment or move on to graduate programs following the completion of their degree.

Employment opportunities for graduates are typically in environmental corporations and consulting agencies; natural resource corporations; local, state, and federal agencies, such as geological surveys, educational institutions, conservation agencies, museums, and departments of urban planning, natural resources, and water resource management; nonprofit organizations; research institutions; and ecotourism. Companies such as ExxonMobil recruit Iowa graduates on campus.

The Pomerantz Career Center offers multiple resources to help students find internships and jobs.

Academic Plans

Four-Year Graduation Plan

The following checkpoints list the minimum requirements students must complete by certain semesters in order to stay on the university's Four-Year Graduation Plan. Courses in the major are those required to complete the major; they may be offered by departments other than the major department.

These checkpoints show the range of required coursework. The major requires field trip experiences, many of which take place during breaks in or between semesters or during the summer session. These checkpoints do not include the field trip requirements.

Before the third semester begins: competence in math through trigonometry and the first required chemistry course.

Before the fifth semester begins: three to five courses in the major, including the remainder of the chemistry requirement and continuation of the mathematics requirement.

Before the seventh semester begins: 7–11 courses in the major and at least 90 s.h. earned toward the degree.

Before the eighth semester begins: 10–14 courses in the major.

During the eighth semester: enrollment in all remaining coursework in the major, all remaining GE CLAS Core courses, and a sufficient number of semester hours to graduate.

Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

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Course	Title	Hours
Academic Career		
Any Semester		
Research: students are strongly encouraged to be active participants in research within the department.		
While only two field courses are required (EES:2831 Geologic Field Methods and EES:4832 Geologic Field Analysis), students are encouraged to participate in additional field experiences, whenever possible.		

GE CLAS Core: Sustainability [a]		
	Hours	**0**
First Year		
Fall		
EES:1030 or EES:1050	Introduction to Earth Science [b, c] or Introduction to Geology	4
CHEM:1110	Principles of Chemistry I [c, d]	4
MATH:1850	Calculus I [c, e]	4
ENGL:1200 or RHET:1030	The Interpretation of Literature or Rhetoric	3 - 4
CSI:1600	Success at Iowa	2
	Hours	**17-18**
Spring		
EES:2200	Historical Geology	4
CHEM:1120	Principles of Chemistry II	4
MATH:1860	Calculus II	4
RHET:1030 or ENGL:1200	Rhetoric or The Interpretation of Literature	3 - 4
	Hours	**15-16**
Second Year		
Fall		
EES:2410	Mineralogy	4
EES:1040	Evolution and the History of Life	4
PHYS:1611	Introductory Physics I	4
GE CLAS Core: World Languages First Level Proficiency or elective course [f]		4 - 5
	Hours	**16-17**
Spring		
EES:2001	Second-Year Field Trip for Earth and Environmental Sciences [g]	1
EES:3500	Igneous and Metamorphic Petrology	4
PHYS:1612	Introductory Physics II	4
GE CLAS Core: Diversity and Inclusion [h]		3
GE CLAS Core: World Languages Second Level Proficiency or elective course [f]		4 - 5
	Hours	**16-17**
Summer		
EES:2831	Geologic Field Methods	3
	Hours	**3**
Third Year		
Fall		
EES:3001	Third-Year Field Trip for Earth and Environmental Sciences [g]	1
EES:3300	Sedimentary Geology	4
Major: geoscience elective course prefix EES numbered 3000 or above		3 - 4
GE CLAS Core: Historical Perspectives [h]		3
GE CLAS Core: World Languages Third Level Proficiency or elective course [f]		4 - 5
	Hours	**15-17**
Spring		
EES:3840	Structural Geology	4
Major: biology lab science course (prefix BIOL)		4
GE CLAS Core: Social Sciences [h]		3
GE CLAS Core: World Languages Fourth Level Proficiency or elective course [f]		4 - 5
	Hours	**15-16**
Summer		
EES:4832	Geologic Field Analysis	3
	Hours	**3**
Fourth Year		
Fall		
EES:4001	Fourth-Year Field Trip for Earth and Environmental Sciences [g]	2
Major: math/statistics/computer science course [i]		3 - 4
Major: geoscience elective course prefix EES numbered 3000 or above		3 - 4
GE CLAS Core: Literary, Visual, and Performing Arts [h]		3
GE CLAS Core: International and Global Issues [h]		3
	Hours	**14-16**
Spring		
Major: geoscience "select one" course [j]		3 - 4
Major: geoscience elective course prefix EES numbered 3000 or above		2 - 4
GE CLAS Core: Values and Culture [h]		3
Elective course [k]		3
Elective course [k]		3
Degree Application: apply on MyUI before deadline (typically in February for spring, September for fall) [l]		
	Hours	**14-17**
	Total Hours	**128-140**

a Sustainability must be completed by choosing a course that has been approved for Sustainability AND for one of these General Education areas: Natural Sciences; Quantitative and Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Culture.

b EES:1050 is preferred.

c Fulfills a major requirement and may fulfill a GE requirement.

d Enrollment in chemistry courses requires completion of a placement exam.

e Enrollment in math courses requires completion of a placement exam.

f Students who have completed four years of a single language in high school have satisfied the GE CLAS Core World Languages requirement. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course.

g Recommended but not required to complete Geoscience BS degree requirements.

h GE CLAS Core courses may be completed in any order unless used as a prerequisite for another course. Students should consult with an advisor about the best sequencing of courses.

i Choose from a MATH course numbered 2000 or above, a CS course numbered 1110 or above, a STAT course numbered 2010 or above, or EES:3100 (if the EES courses are not used to satisfy the earth and environmental sciences electives requirement).

j Choose from EES:3210, EES:4490, EES:4630, EES:4790, or EES:4800.

k Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.

- Please see Academic Calendar, Office of the Registrar website for current degree application deadlines. Students should apply for a degree for the session in which all requirements will be met. For any questions on appropriate timing, contact your academic advisor or Graduation Services.