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 g.p.a. 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.

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

Mathematics

<table>
<thead>
<tr>
<th>Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MATH:1550</td>
<td>Engineering Mathematics I: Single Variable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH:1850</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH:1560</td>
<td>Engineering Mathematics II: Multivariable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH:1860</td>
<td>Calculus II</td>
<td>4</td>
</tr>
</tbody>
</table>

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)

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 |
--- | --- | ---
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 | 3
EES:4640 | Contaminant Hydrogeology | 3
EES:4720 | Paleoclimatology | 3
EES:4790 | Applied Environmental Geology | 3
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 | 3
EES:4640 | Contaminant Hydrogeology | 3
EES:4820 | Tectonics and Basin Analysis | 3

### Tectonics/Petrology

| Code | Title | Hours |
--- | --- | ---
EES:3350 | Active Tectonics | 3
EES:4410 | Analytical Methods Seminar | 2
EES:4490 | Elements of Geochemistry | 3
EES:4520 | Isotope Geochemistry | 3
EES:4530 | Volcanology | 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 | 3
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:3030 | Conservation Paleobiology | 4
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

### 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:3300  Sedimentary Geology  4
EES:3770  Global Stratigraphy  3
EES:4420  Vertebrate Osteology and Phylogeny  3
EES:4490  Elements of Geochemistry  3
EES:4520  Isotope Geochemistry  3
EES:4700  Evolution of Ecosystems  3
EES:4710  Evolution of Plants  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 Teacher Education Program Application and Admission 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 g.p.a. 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 g.p.a. 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**

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 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.
# Geoscience, B.S.

## Course Title Hours
### Academic Career
### Any Semester

The course requirements are designed to ensure that students develop a strong foundation in the principles of geoscience while also allowing for flexibility to explore specialized areas of interest. Students are encouraged to participate in additional field experiences, whenever possible.

### Hours
0

#### First Year

**Fall**
- **EES:1050** Introduction to Geology, Principles of Earth Science 4
- **CHEM:1110** Calculus I, Principles of Chemistry I 4
- **ENGL:1200** Calculus II, The Interpretation of Literature 3
- **EES:2831** Principles of Geologic Field Methods and Environmental Sciences 3

**Spring**
- **PHYS:1611** Introductory Physics I 4
- **CHEM:1120** Calculus II 4
- **ENGL:1200** Calculus II 4
- **EES:3001** Third-Year Field Trip for Earth and Environmental Sciences 1

### Hours
15-17

#### 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** 3-4

**Spring**
- **EES:3500** Igneous and Metamorphic Petrology 4
- **GE CLAS Core: World Languages Second Level** 4-5
- **EES:4832** Geologic Field Analysis 3

### Hours
16-17

#### Third Year

**Fall**
- **EES:3300** Sedimentary Geology 4
- **GE CLAS Core: World Languages Second Level** 4-5

**Spring**
- **MATH:1850** Calculus II 4
- **CHEM:1110** Calculus II 4
- **EES:1050** Career Path Planning for Earth and Environmental Sciences 3

### Hours
14-16

#### Fourth Year

**Fall**
- **MATH:1860** Principles of Chemistry II 4
- **CHEM:1120** Calculus II 4
- **ENGL:1200** Calculus II 4
- **EES:4800** Fourth-Year Field Trip for Earth and Environmental Sciences 2

**Spring**
- **MATH:1860** Principles of Chemistry II 4
- **CHEM:1120** Calculus II 4
- **ENGL:1200** Calculus II 4
- **EES:4800** Fourth-Year Field Trip for Earth and Environmental Sciences 2

### Hours
14-17

Total Hours 129-141
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.