Bachelor of Science in Geology

Why study geology?

In Geology you get to apply techniques and knowledge from chemistry, physics, biology and math to answer important questions about Earth processes, history and future. Geologists are in demand to evaluate geologic hazards, evaluate natural resources, and understand the environment.

The B.S. program (http://geo.ku.edu/overview) provides intensive training in geology and other sciences. B.S. majors may emphasize traditional geology, environmental geology (with a specialized track in hydrogeology), engineering geology, geophysics, or earth and space science licensure. The hydrogeology track, the engineering geology option, and the geophysics option combine basic training in geology with training in mathematics, engineering, physics, and geophysics. The environmental geology option combines training in geology with many different sciences.

Undergraduate Admission

Admission to KU

All students applying for admission must send high school and college transcripts to the Office of Admissions. Unless they are college transfer students with at least 24 hours of credit, prospective students must send ACT or SAT scores to the Office of Admissions. Prospective first-year students should be aware that KU has qualified admission requirements that all new first-year students must meet to be admitted. Consult the Office of Admissions (http://admissions.ku.edu) for application deadlines and specific admission requirements.

Visit the International Support Services (http://www.iss.ku.edu) for information about international admissions.

Students considering transferring to KU may see how their college-level course work will transfer on the Office of Admissions (http://credittransfer.ku.edu) website.

Admission to the College of Liberal Arts and Sciences

Admission to the College is a different process from admission to a major field. Some CLAS departments have admission requirements. See individual department/program sections for departmental admission requirements.

Geology Programs

The B.S. program provides intensive training in geology and other sciences. B.S. majors may emphasize traditional geology, environmental geology (with a specialized track in hydrogeology), engineering geology, geophysics, or earth and space science licensure. The hydrogeology track, the engineering geology option, and the geophysics option combine basic training in geology with training in mathematics, engineering, physics, and geophysics. The environmental geology option combines training in geology with many different sciences.

Degree requirements may be altered to suit particular needs of a student upon petition to the undergraduate studies committee and in consultation with a geology faculty advisor. Special consideration is given to students with strong backgrounds in supporting sciences and students with superior records who decide to major in geology late in their programs.

First- and Second-Year Preparation

Students interested in geology, especially in the B.S. degree, should see a department advisor as soon as possible. They should enroll in mathematics, chemistry, and English in addition to Introduction to Geology and electives. Students should take GEOL 360 as soon as possible.

Advising

Developing a strong relationship with a faculty advisor helps students get the most out of their educational programs in the shortest time. Most courses for majors are offered in only one semester each year. Advisors can guide the student through complexities of the curriculum or into a specialized program.

Requirements for the B.S. Degree

The B.S. program provides intensive training in geology and other sciences. B.S. majors may emphasize traditional geology, environmental geology (with a specialized track in hydrogeology), engineering geology, geophysics, or earth and space science licensure. The hydrogeology track, the engineering geology option, and the geophysics option combine basic training in geology with training in mathematics, engineering, physics, and geophysics. The environmental geology option combines training in geology with many different sciences.

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General Geology Option

Written Communication - Core Skill and Critical Inquiry.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 101</td>
<td>Composition</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Satisfied by one of the following. Requirement must be completed during initial term of admission at KU.</td>
<td></td>
</tr>
<tr>
<td>ACT English score of 27 or above or SAT English score of 600 or above</td>
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<td></td>
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<tr>
<td>AP English Literature &amp; Composition score of 3 or above</td>
<td>3</td>
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<tr>
<td>Equivalent transfer course</td>
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</table>

Critical Reading and Writing

Satisfied by one of the following. Requirement must be completed during initial term of admission at KU.

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<thead>
<tr>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>ENGL 102</td>
<td>Critical Reading and Writing</td>
<td>3</td>
</tr>
<tr>
<td>or ENGL 105</td>
<td>Honors Introduction to English</td>
<td>3</td>
</tr>
<tr>
<td>AP English Literature &amp; Composition score of 4 or above</td>
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<td></td>
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<td>Equivalent transfer course</td>
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</table>

Sophomore Reading and Writing II

Satisfied by one of the following:

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<tr>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>ENGL 203</td>
<td>Topics in Reading and Writing: ______</td>
<td>3</td>
</tr>
<tr>
<td>or ENGL 205</td>
<td>Freshman-Sophomore Honors Proseminar: ______</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 209</td>
<td>Introduction to Fiction</td>
<td>3</td>
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</table>
ENGL 210 Introduction to Poetry 3
ENGL 211 Introduction to the Drama 3
ENGL 362 Foundations of Technical Writing 3
AP English Literature & Composition score of 5 or above Equivalent

Communications.

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<tbody>
<tr>
<td>COMS 130</td>
<td>Speaker-Audience Communication</td>
<td>3</td>
</tr>
<tr>
<td>or COMS 150</td>
<td>Personal Communication</td>
<td></td>
</tr>
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Humanities - Understanding the Human Condition. Satisfied by completing 2 courses (requirement code H). Approved courses may be searched for availability through the Kyuo portal.

Social and Behavioral Sciences - Understanding Society and Behavior. Satisfied by completing 2 courses (requirement code S). Approved courses may be searched for availability through the Kyuo portal. An introductory course in economics is recommended.

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<thead>
<tr>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>Geology Prerequisite or Co-requisite Knowledge</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Majors must complete courses as specified in each of the following areas. Majors are advised to take honors courses when eligible. These hours do not contribute to the minimum number of hours required for the major.

Calculus I. Satisfied by:
MATH 125 Calculus I (Prerequisite: MATH 104; or MATH 103; or three years of college preparatory mathematics including trigonometry and a score of 28 or higher on ACT mathematics or 640 or higher on the SAT; or a qualifying score on the mathematics placement test.)

Calculus II. Satisfied by:
MATH 126 Calculus II

Chemistry. Satisfied by:
CHEM 130 General Chemistry I
& CHEM 135 and General Chemistry II

Physics. Satisfied by:
PHSX 211 General Physics I
& PHSX 216 and General Physics I Laboratory
PHSX 212 General Physics II
& PHSX 236 and General Physics II Laboratory

Biology. Satisfied by BIOL:
BIOL 150 Principles of Molecular and Cellular Biology

Information Technology. Satisfied by one of the following:
EECS 138 Introduction to Computing: _____

C&PE 325 Numerical Methods and Statistics for Engineers

Geology Core Knowledge and Skills
Majors must complete the following core courses:
Introduction to Geology. Satisfied by:
GEOL 101 The Way The Earth Works
Geology Fundamentals Laboratory. Satisfied by:
GEOL 103 Geology Fundamentals Laboratory

Historical Geology. Satisfied by:
GEOL 304 Historical Geology
Mineralogy and Structure of the Earth. Satisfied by:
GEOL 311 Mineralogy and Structure of the Earth
Mineral Structures and Equilibria Laboratory. Satisfied by:
GEOL 312 Mineral Structures and Equilibria Laboratory
Sedimentology and Stratigraphy. Satisfied by:
GEOL 331 Sedimentology and Stratigraphy
Field Investigation. Satisfied by:
GEOL 360 Field Investigation
Igneous and Metamorphic Petrology. Satisfied by:
GEOL 512 Igneous and Metamorphic Petrology
Petrology Laboratory. Satisfied by:
GEOL 513 Petrology Laboratory
Introductory Field Geology. Satisfied by:
GEOL 560 Introductory Field Geology
Field Geology. Satisfied by:
GEOL 561 Field Geology
Structural Geology. Satisfied by:
GEOL 562 Structural Geology

Geology Required Electives 18

At least one course from each of the three categories listed below: Life; Water & Climate; Rocks. Additional elective credit requirements fulfilled by 500 level and above geology courses, although only one geology course fulfilling KU Core Goal 4 or 5 may count towards these 9 hours. Additionally, 3 hours of GEOL 121, if taken before the student has completed 60 hrs, GEOL 391 or GEOL 399 can also count towards these 9 credit hours.

Life
GEOL 316 Geochemistry
GEOL 521 Paleontology
GEOL 525 Geobiology: The Coevolution of Life and Rocks
GEOL 553 Biogeochemistry
GEOL 591 Topics in Geology: _____ (Geobiology)

Rocks
GEOL 501 Error Analysis
GEOL 502 Linear Algebra for Earth Scientists
GEOL 503 Numerical Methods in the Earth Sciences
GEOL 511 Raman Spectroscopy of Crystalline Solids
GEOL 533 Shales and Other Mudstones
GEOL 534 Volcanology
GEOL 536 Geological Log Analysis
GEOL 537 Petroleum Reservoir Characterization
GEOL 538 Basin Analysis
GEOL 535 Petroleum and Subsurface Geology
GEOL 572 Geophysics

Water and Climate
GEOL 552 Introduction to Hydrogeology
GEOL 554 Contaminants in Groundwater
GEOL 555 Climate Science
GEOL 558 Applied Groundwater Modeling
GEOL 577 Environmental Geophysics
GEOL 579 Hydrogeophysics
GEOL 591 Topics in Geology: _____ (Climate: Past, Present and Future)

Major Hours & Major GPA
While completing all required courses, majors must also meet each of the following hour and grade-point average minimum standards:

**Major Hours**
Satisfied by 50 hours of major courses.

**Major Hours in Residence**
Satisfied by a minimum of 15 hours of KU resident credit in the major.

**Major Junior/Senior Hours**
Satisfied by a minimum of 18 hours from junior/senior courses (300+) in the major.

**Major Junior/Senior Graduation GPA**
Satisfied by a minimum of a 2.0 KU GPA in junior/senior courses (300+) in the major. GPA calculations include all junior/senior courses in the field of study including F's and repeated courses. See the Semester/Cumulative GPA Calculator [here](http://clas.ku.edu/undergrad/tools/gpa).

**Engineering Geology Option**
Written Communication - Core Skill and Critical Inquiry.

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<tr>
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<tr>
<td>ENGL 101</td>
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<tr>
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<td>AP English Literature &amp; Composition score of 3 or above</td>
<td></td>
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<tr>
<td></td>
<td>Equivalent transfer course</td>
<td></td>
</tr>
</tbody>
</table>

Critical Reading and Writing
Satisfied by one of the following: Requirement must be completed within the first academic year at KU.

| ENGL 102 | Critical Reading and Writing | 3     |
|          | or ENGL 105 Honors Introduction to English |       |
|          | AP English Literature & Composition score of 4 or above |       |
|          | Equivalent transfer course |       |

Sophomore Reading and Writing II
Satisfied by one of the following:

| ENGL 362 | Foundations of Technical Writing | 3     |
|          | AP English Literature & Composition score of 5 or above |       |
|          | Equivalent |       |

Communications.

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<td>Speaker-Audience Communication</td>
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<td>or COMS 150 Personal Communication</td>
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Humanities - Understanding the Human Condition. Satisfied by completing 2 courses (requirement code H). Approved courses may be searched for availability through the Kyoo portal.

Social and Behavioral Sciences - Understanding Society and Behavior. Satisfied by completing 2 courses (requirement code S). Approved courses may be searched for availability through the Kyoo portal. An introductory course in economics is recommended.

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<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOL 101</td>
<td>The Way The Earth Works</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 103</td>
<td>Geology Fundamentals Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>GEOL 304</td>
<td>Historical Geology</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 311</td>
<td>Mineralogy and Structure of the Earth</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 312</td>
<td>Mineral Structures and Equilibria Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>GEOL 331</td>
<td>Sedimentology and Stratigraphy</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 351</td>
<td>Environmental Geology</td>
<td>3</td>
</tr>
</tbody>
</table>

Field Investigation. Satisfied by:
Bachelor of Science in Geology

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOL 360</td>
<td>Field Investigation</td>
<td>2</td>
</tr>
<tr>
<td>GEOL 512</td>
<td>Igneous and Metamorphic Petrology. Satisfied by:</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 513</td>
<td>Petrology Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>GEOL 541</td>
<td>Geomorphology</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 560</td>
<td>Introductory Field Geology</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 561</td>
<td>Field Geology</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 562</td>
<td>Structural Geology</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 572</td>
<td>Geophysics or Geodynamics and Plate Tectonics. Satisfied by one of the following:</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 521</td>
<td>Paleontology</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 535</td>
<td>Petroleum and Subsurface Geology</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 715</td>
<td>Geochemistry</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 751</td>
<td>Physical Hydrogeology</td>
<td>3</td>
</tr>
<tr>
<td>CE 770</td>
<td>Concepts of Environmental Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CE 771</td>
<td>Environmental Engineering Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>MATH 365</td>
<td>Elementary Statistics</td>
<td>3</td>
</tr>
<tr>
<td>or BIOL 570</td>
<td>Introduction to Biostatistics</td>
<td></td>
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</tbody>
</table>

**Geology or Civil Engineering Required Electives**
Majors must complete three additional geology or civil engineering courses, at least two of which must be from the following:

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>GEOL 512</td>
<td>Igneous and Metamorphic Petrology. Satisfied by:</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 560</td>
<td>Introductory Field Geology</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 561</td>
<td>Field Geology</td>
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</tr>
<tr>
<td>GEOL 562</td>
<td>Structural Geology</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 572</td>
<td>Geophysics or Geodynamics and Plate Tectonics. Satisfied by one of the following:</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 101</td>
<td>Composition</td>
<td>3</td>
</tr>
</tbody>
</table>

**Major Hours & Major GPA**
While completing all required courses, majors must also meet each of the following hour and grade-point average minimum standards:

**Major Hours**
Satisfied by 45 hours of major courses.

**Major Hours in Residence**
Satisfied by a minimum of 15 hours of KU resident credit in the major.

**Major Junior/Senior Hours**
Satisfied by a minimum of 18 hours from junior/senior courses (300+) in the major.

**Major Junior/Senior Graduation GPA**
Satisfied by a minimum of 2.0 KU GPA in junior/senior courses (300+) in the major. GPA calculations include all junior/senior courses in the field of study including F's and repeated courses. See the Semester/Cumulative GPA Calculator (http://clas.ku.edu/undergrad/tools/gpa).

**Environmental Geology Option**
Written Communication - Core Skill and Critical Inquiry.

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<tr>
<td>ENGL 101</td>
<td>Composition</td>
<td>3</td>
</tr>
</tbody>
</table>

**ACT English score of 27 or above or SAT English score of 600 or above**

**AP English Literature & Composition score of 3 or above**
Equivalently transfer course

**Critical Reading and Writing**
Satisfied by one of the following. Requirement must be completed within the first academic year at KU.

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<tr>
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<th>Hours</th>
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<tbody>
<tr>
<td>ENGL 102</td>
<td>Critical Reading and Writing</td>
<td>3</td>
</tr>
<tr>
<td>or ENGL 105</td>
<td>Honors Introduction to English</td>
<td></td>
</tr>
<tr>
<td>AP English Literature &amp; Composition score of 4 or above</td>
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</table>
Equivalently transfer course

**Sophomore Reading and Writing II**
Satisfied by one of the following:

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ENGL 203</td>
<td>Topics in Reading and Writing: ______</td>
<td>3</td>
</tr>
<tr>
<td>or ENGL 205</td>
<td>Freshman-Sophomore Honors Proseminar: ______</td>
<td></td>
</tr>
<tr>
<td>ENGL 209</td>
<td>Introduction to Fiction</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Introduction to Poetry</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 211</td>
<td>Introduction to the Drama</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 362</td>
<td>Foundations of Technical Writing</td>
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**Communications.**

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**Humanities - Understanding the Human Condition.** Satisfied by completing 2 courses (requirement code H). Approved courses may be searched for availability through the Kyou portal.

**Social and Behavioral Sciences - Understanding Society and Behavior.** Satisfied by completing 2 courses (requirement code S). Approved courses may be searched for availability through the Kyou portal. An introductory course in economics is recommended.

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<tbody>
<tr>
<td>MATH 125</td>
<td>Calculus I</td>
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<tr>
<td>MATH 126</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 130</td>
<td>General Chemistry I</td>
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<tr>
<td>CHEM 135</td>
<td>General Chemistry II</td>
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</tr>
<tr>
<td>PHSX 211</td>
<td>General Physics I</td>
<td>5</td>
</tr>
<tr>
<td>PHSX 212</td>
<td>General Physics II</td>
<td>4</td>
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<tr>
<td>PHSX 216</td>
<td>General Physics I Laboratory</td>
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</tr>
<tr>
<td>PHSX 236</td>
<td>General Physics II Laboratory</td>
<td></td>
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</tbody>
</table>
Bachelor of Science in Geology

PHSX 114 & PHSX 115
College Physics I and College Physics II

Biological Science. Satisfied by:
Biol 150 Principles of Molecular and Cellular Biology 8
& Biol 152 Principles of Organismal Biology

Information Technology. Satisfied by one of the following:
EECS 138 Introduction to Computing: _____ 3
C&PE 325 Numerical Methods and Statistics for Engineers 3

Geology Core Knowledge and Skills

Majors must complete the following core courses:

Introduction to Geology. Satisfied by:
GEOL 101 The Way The Earth Works 3

Geology Fundamentals Laboratory. Satisfied by:
GEOL 103 Geology Fundamentals Laboratory 2

Historical Geology. Satisfied by:
GEOL 304 Historical Geology 3

Mineralogy and Structure of the Earth. Satisfied by:
GEOL 311 Mineralogy and Structure of the Earth 3

Sedimentology and Stratigraphy. Satisfied by:
GEOL 331 Sedimentology and Stratigraphy 4

Environmental Geology. Satisfied by:
GEOL 351 Environmental Geology 3

Field Investigation. Satisfied by:
GEOL 360 Field Investigation 2

Paleontology. Satisfied by:
GEOL 521 Paleontology 3

Geomorphology. Satisfied by:
GEOL 541 Geomorphology 4

Introduction to Hydrogeology. Satisfied by:
GEOL 552 Introduction to Hydrogeology 3

Introductory Field Geology. Satisfied by:
GEOL 560 Introductory Field Geology 3

Structural Geology. Satisfied by:
GEOL 562 Structural Geology 4

Geophysics. Satisfied by:
GEOL 572 Geophysics 3

Geology Required Electives

Majors must complete additional courses to total at least nine hours numbered 500 or above. The following are recommended:

GEOL 391 Special Studies in Geology 1-6
GEOL 535 Petroleum and Subsurface Geology 4
GEOL 715 Geochemistry 3
GEOL 751 Physical Hydrogeology 3

CE 770 Concepts of Environmental Chemistry 6
& CE 771 and Environmental Engineering Laboratory

GEOG 535 Soil Geography 4
GEOG 558 Intermediate Geographical Information Systems 4
GEOL 753 Chemical and Microbial Hydrogeology 4
BIOL 400 Fundamentals of Microbiology 3

Environmental Hydrogeology Track

Besides the general program above, a specialized track in hydrogeology satisfies degree requirements. In addition to College, supporting science, and geology courses, the environmental hydrogeology track requires the following mathematics and civil engineering/physics courses:

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<th>Code</th>
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<tbody>
<tr>
<td>MATH 220</td>
<td>Applied Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MATH 290</td>
<td>Elementary Linear Algebra</td>
<td>2</td>
</tr>
<tr>
<td>CE 330</td>
<td>Fluid Mechanics</td>
<td>3</td>
</tr>
</tbody>
</table>

In addition, Technical Electives (9 hours). These normally are chosen from courses numbered 500 or above in geology, physics, mathematics, chemistry, engineering or computer science. Courses numbered below 500 must be approved by a geology advisor.

Major Hours & Major GPA

While completing all required courses, majors must also meet each of the following hour and grade-point average minimum standards:

Major Hours
Satisfied by 49 hours of major courses.

Major Hours in Residence
Satisfied by a minimum of 15 hours of KU resident credit in the major.

Major Junior/Senior Hours
Satisfied by a minimum of 45 hours from junior/senior courses (300+) in the major.

Major Junior/Senior Graduation GPA
Satisfied by a minimum of a 2.0 KU GPA in junior/senior courses (300+) in the major. GPA calculations include all junior/senior courses in the field of study including F’s and repeated courses. See the Semester/Cumulative GPA Calculator (http://clas.ku.edu/undergrad/tools/gpa).

Geophysics Option

Written Communication - Core Skill and Critical Inquiry.

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<th>Code</th>
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<th>Hours</th>
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</table>
| Composition

Satisfied by one of the following. Requirement must be completed during initial term of admission at KU.

| ENGL 101 | Composition                        | 3     |
|          | ACT English score of 27 or above or SAT English score of 600 or above |       |
|          | AP English Literature & Composition score of 3 or above                 |       |
|          | Equivalent transfer course       |       |

Critical Reading and Writing

Satisfied by one of the following. Requirement must be completed during initial term of admission at KU.

| ENGL 102 | Critical Reading and Writing      | 3     |
| or ENGL 105 | Honors Introduction to English   |       |
|          | AP English Literature & Composition score of 4 or above                 |       |
|          | Equivalent transfer course       |       |

Sophomore Reading and Writing II

Satisfied by one of the following:

| ENGL 203 | Topics in Reading and Writing: _____ | 3     |
| or ENGL 205 | Freshman-Sophomore Honors Proseminar: _____ |       |
| ENGL 209 | Introduction to Fiction           | 3     |
| ENGL 210 | Introduction to Poetry            | 3     |

Notes:

- Environmental Hydrogeology Track
- Geophysics Option
- Written Communication - Core Skill and Critical Inquiry
- Major Hours & Major GPA
- Geophysics Option
- Sophomore Reading and Writing II
ENGL 211  Introduction to the Drama  3
ENGL 362  Foundations of Technical Writing  3
  AP English Literature & Composition score of 5 or above

Humanities - Understanding the Human Condition. Satisfied by completing 2 courses (requirement code H). Approved courses may be searched for availability through the Kyou portal.

Social and Behavioral Sciences - Understanding Society and Behavior. Satisfied by completing 2 courses (requirement code S). Approved courses may be searched for availability through the Kyou portal. An introductory course in economics is recommended.

Code  Title  Hours
Geology Prerequisite or Co-requisite Knowledge
Majors must complete courses as specified in each of the following areas. Majors are advised to take honors courses when eligible.
These hours do not contribute to the minimum number of hours required for the major.
Calculus I. Satisfied by:
Calculus II. Satisfied by:
Vector Calculus and Elementary Linear Algebra. Satisfied by:
  MATH 125  Calculus I  4
  MATH 126  Calculus II  4
  MATH 127  Calculus III  4
  MATH 290  Elementary Linear Algebra  2
Elementary Differential Equations. Satisfied by:
  MATH 320  Elementary Differential Equations  3
Chemistry. Satisfied by:
  CHEM 130  General Chemistry I  10
  & CHEM 135  and General Chemistry II
Physics. Satisfied by:
  PHSX 211  General Physics I  5
  & PHSX 216  and General Physics I Laboratory
  PHSX 212  General Physics II  4
  & PHSX 236  and General Physics II Laboratory
  PHSX 313  General Physics III  3
  PHSX 521  Mechanics I  3
  PHSX 531  Electricity and Magnetism  3
  or EECS 220  Electromagnetics I
Intro to Computing. Satisfied by one of the following:
  EECS 138  Introduction to Computing: _____  3
  Demonstrate equivalent programming skills

Geology Core Knowledge and Skills
Majors must complete the following core courses:
Introduction to Geology. Satisfied by:
  GEOL 101  The Way The Earth Works  3
Geology Fundamentals Laboratory. Satisfied by:
  GEOL 103  Geology Fundamentals Laboratory  2
Historical Geology. Satisfied by:
  GEOL 304  Historical Geology  3
Mineralogy and Structure of the Earth. Satisfied by:
  GEOL 311  Mineralogy and Structure of the Earth  3
Sedimentology and Stratigraphy. Satisfied by:
  GEOL 331  Sedimentology and Stratigraphy  4
Field Investigation. Satisfied by:
  GEOL 360  Field Investigation  2
Igneous and Metamorphic Petrology. Satisfied by:
  GEOL 512  Igneous and Metamorphic Petrology  3
Introductory Field Geology. Satisfied by:
  GEOL 560  Introductory Field Geology  3
Structural Geology. Satisfied by:
  GEOL 562  Structural Geology  4
Geophysics. Satisfied by one of the following:
  GEOL 572  Geophysics  3

Additional Geology Courses
Geophysics elective 500 and above (at least 9 hours)  9
  GEOL 535  Petroleum and Subsurface Geology
  GEOL 536  Geological Log Analysis
  GEOL 552  Introduction to Hydrogeology

Technical Required Electives
At least 6 hours from the list below or other 500 and above Geology, Physics, Mathematics, Engineering, or Computer Science.
  GEOL 535  Petroleum and Subsurface Geology
  GEOL 536  Geological Log Analysis
  GEOL 552  Introduction to Hydrogeology

Major Hours & Major GPA
While completing all required courses, majors must also meet each of the following hour and grade-point average minimum standards:

Major Hours
Satisfied by 45 hours of major courses.

Major Hours in Residence
Satisfied by a minimum of 15 hours of KU resident credit in the major.

Major Junior/Senior Hours
Satisfied by a minimum of 12 hours from junior/senior courses (300+) in the major.

Major Junior/Senior Graduation GPA
Satisfied by a minimum of a 2.0 KU GPA in junior/senior courses (300+) in the major. GPA calculations include all junior/senior courses in the field of study including F’s and repeated courses. See the Semester/Cumulative GPA Calculator (http://clas.ku.edu/undergrad/tools/gpa).

Earth and Space Science Licensure Option
This program fulfills the requirements for a Bachelor of Science degree in geology. The program also meets course requirements necessary to gain state licensure eligibility in earth and space science to become a secondary teacher in Kansas, but completion of the program does not guarantee the student’s licensure. This list is a guideline. Contact the geology department for further information about meeting degree and additional licensure requirements. You may also contact the UKanTeach Office for information about similar tracks resulting in eligibility for licensure in this and other science and mathematics fields.
### Written Communication - Core Skill and Critical Inquiry

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### Communications

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<tr>
<td>COMS 130</td>
<td>Speaker-Audience Communication</td>
<td>3</td>
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<tr>
<td>or COMS 150</td>
<td>Personal Communication</td>
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</tbody>
</table>

### Humanities - Understanding the Human Condition

Satisfied by completing 2 courses (requirement code H). Approved courses may be searched for availability through the Kyu portal.

### Social and Behavioral Sciences - Understanding Society and Behavior

Satisfied by completing 2 courses (requirement code S). Approved courses may be searched for availability through the Kyu portal. An introductory course in economics is recommended.

### Geology Prerequisite or Co-requisite Knowledge

Majors must complete courses as specified in each of the following areas. Majors are advised to take honors courses when eligible. These hours do not contribute to the minimum number of hours required for the major.

#### Calculus I
Satisfied by:
- MATH 125 Calculus I 4

#### Chemistry
Satisfied by:
- CHEM 130 General Chemistry I 10
- CHEM 135 and General Chemistry II
- Physics. Satisfied by:
  - PHSX 211 General Physics I 5
  - PHSX 216 and General Physics I Laboratory
  - PHSX 212 General Physics II 4
  - PHSX 236 and General Physics II Laboratory
- Biology. Satisfied by:
  - BIOL 150 Principles of Molecular and Cellular Biology 4
  - BIOL 151 Principles of Molecular and Cellular Biology, Honors
  - BIOL 152 Principles of Organismal Biology 4
  - BIOL 153 Principles of Organismal Biology, Honors
- Geology Core Knowledge and Skills
  - Majors must complete the following core courses:
    - Introduction to Geology. Satisfied by:
    - GEOL 101 The Way The Earth Works 3
  - Geology Fundamentals Laboratory. Satisfied by:
    - GEOL 103 Geology Fundamentals Laboratory 2
    - Historical Geology. Satisfied by:
    - GEOL 304 Historical Geology 3
  - Mineralogy and Structure of the Earth. Satisfied by:
    - GEOL 311 Mineralogy and Structure of the Earth 3
  - Sedimentology and Stratigraphy. Satisfied by:
    - GEOL 331 Sedimentology and Stratigraphy 4
  - Field Investigation. Satisfied by:
    - GEOL 360 Field Investigation 2
  - Paleontology. Satisfied by:
    - GEOL 521 Paleontology 4
    & GEOL 523 and Paleontology Laboratory
  - Introduction to Hydrogeology. Satisfied by:
    - GEOL 552 Introduction to Hydrogeology 3
  - Introductory Field Geology. Satisfied by:
    - GEOL 560 Introductory Field Geology 3
  - Structural Geology. Satisfied by:
    - GEOL 562 Structural Geology 4
- Space Science Core Knowledge and Skills
  - Majors must complete the following core courses:
    - Introductory Meteorology. Satisfied by:
    - ATMO 105 Introductory Meteorology 5
    - Contemporary Astronomy. Satisfied by:
    - ASTR 191 Contemporary Astronomy 3
- Earth and Space Required Electives
  - Majors must complete one of the areas below:
    - Geology Focus. Satisfied by 4 hours in a geology course numbered 300 or above.
    - Astronomy Focus. Satisfied by 4 hours in astronomy courses numbered 300 or above. This can include three hours of GEOL 121 if taken before the completion of 60 hours, or ASTR 390 or GEOL 399.
- Research Methods
  - Satisfied by:
    - CHEM 598 Research Methods 3

### Professional Development Course Work
A minimum grade of C is required in all courses. 

Liberal Arts and Sciences. Satisfied by:

<table>
<thead>
<tr>
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<th>Hours</th>
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<tbody>
<tr>
<td>LA&amp;S 290</td>
<td>Approaches to Teaching Science and Mathematics</td>
<td>1</td>
</tr>
<tr>
<td>LA&amp;S 291</td>
<td>Global Challenge: Building Communities and Expanding Opportunities</td>
<td>1</td>
</tr>
</tbody>
</table>

Curriculum and Teaching (19 hours). Satisfied by:

C&T 448 Reading and Writing across the Curriculum and 16 hours of courses approved by UKanTeach in curriculum and teaching. These should include courses such as Classroom Interactions (3), Knowing and Learning (3), Project Based Instruction (3), Student Teaching (6), and Special Topics Seminar (1).

**Major Hours & Major GPA**

While completing all required courses, majors must also meet each of the following hour and grade-point average minimum standards:

**Major Hours**
Satisfied by 46 hours of major courses.

**Major Hours in Residence**
Satisfied by a minimum of 15 hours of KU resident credit in the major.

**Major Junior/Senior Hours**
Satisfied by a minimum of 34 hours from junior/senior courses (300+) in the major.

**Major Junior/Senior Graduation GPA**
Satisfied by a minimum of a 2.0 KU GPA in junior/senior courses (300+) in the major. GPA calculations include all junior/senior courses in the field of study including F's and repeated courses. See the Semester/Cumulative GPA Calculator [here](http://clas.ku.edu/undergrad/tools/gpa).

**Departmental Honors**

Pursuit of departmental honors in Geology is by invitation from the Department of Geology honors coordinator. Requirements include:

- 3.25 or higher KU GPA at graduation.
- 3.50 or higher KU geology-courses GPA at graduation.
- Completion of at least 2 credit hours of GEOL 399.

Completion and successful defense of an honor's thesis. Additional requirements and more information may be obtained from the Department of Geology honors coordinator and web site.