**Geology-Chemistry**

Geochemistry involves two different emphases. Low-temperature geochemistry involves study of chemical and biochemical processes on and near Earth’s surface, including land, oceans and freshwater bodies, and how the geochemical record reflects climate conditions. High-temperature geochemistry includes study of formation and evolution of the Earth and other planets, magma formation and properties, volcanic activity, and metamorphism. The AB degree requires a total of 14 courses, including 5 geoscience courses and 4 chemistry courses, and a few supporting math and physics courses. The ScB degree requires a total of 20 courses, including 7 geoscience courses and 4 chemistry courses, plus some supporting math and physics courses and one research course. Geochemistry courses emphasize a process-oriented approach, with hands-on experiences in labs and on field trips. There is a strong emphasis on active and collaborative learning, and on practice in communication. There are many opportunities for students to do research work for pay during the academic year or in the summer, in areas such as experimental studies of magma formation, and analyzing lunar rock samples for water content.

**Standard program for the A.B. degree**

Recommended for students seeking a liberal education and interested in applying physical and chemical principles toward an understanding of Earth history, Earth processes, and environmental and resource issues.

**Basic supporting science courses**

Select two courses in mathematics at the level of:
- MATH 0090 Introductory Calculus, Part I (or more advanced)
- MATH 0100 Introductory Calculus, Part II (or more advanced)
- CHEM 0330 Equilibrium, Rate, and Structure
- PHYS 0050 Foundations of Mechanics (or a more advanced course, or advanced placement.)
- or ENGN 0030 Introduction to Engineering

**Concentration courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>GEOL 0220</td>
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<tr>
<td>GEOL 0230</td>
<td>Geochemistry: Earth and Planetary Materials and Processes</td>
</tr>
<tr>
<td>GEOL 0240</td>
<td>Earth: Evolution of a Habitable Planet</td>
</tr>
</tbody>
</table>

Three additional chemistry courses

Select one of the following Series:

- GEOL 1410 Mineralogy
- & GEOL 1420 Petrology
- GEOL 1130 Ocean Biogeochemical Cycles
- & GEOL 1370 Environmental Geochemistry

Two additional courses from upper level geological sciences, math, or supporting sciences with approval from the department concentration advisor.

**Total Credits** 14

**Standard program for the Sc.B. degree**

This program is recommended for students interested in graduate study and careers in geochemistry and related fields.

**Basic Supporting Science Courses:**

Select two courses in mathematics at the level of:
- MATH 0090 Introductory Calculus, Part I (or more advanced)
- MATH 0100 Introductory Calculus, Part II (or more advanced)
- CHEM 0330 Equilibrium, Rate, and Structure

Select one of the following series:

- PHYS 0050 Foundations of Mechanics
- & PHYS 0060 Foundations of Electromagnetism and Modern Physics
- ENGN 0030 Introduction to Engineering
- & ENGN 0040 Dynamics and Vibrations

**Concentration Courses:**

Either the geochemistry/inorganic option or the geochemistry/organic option:

**Geochemistry/Inorganic Option:**

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</tr>
<tr>
<td>or GEOL 1370</td>
<td>Environmental Geochemistry</td>
</tr>
</tbody>
</table>

Plus one from:

- GEOL 1240 Stratigraphy and Sedimentation
- GEOL 1330 Global Environmental Remote Sensing
- GEOL 1450 Structural Geology

Three from:

- CHEM 0350 Organic Chemistry
- CHEM 0500 Inorganic Chemistry
- CHEM 1060 Advanced Inorganic Chemistry
- CHEM 1140 Physical Chemistry: Quantum Chemistry
- CHEM 1150 Physical Chemistry: Thermodynamics and Statistical Mechanics

**Geochemistry/Organic Option:**

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</tr>
</tbody>
</table>

Plus one from:

- GEOL 1240 Stratigraphy and Sedimentation
- GEOL 1330 Global Environmental Remote Sensing
- GEOL 1380 Environmental Stable Isotopes

Three Chemistry courses:

- CHEM 0350 Organic Chemistry
- CHEM 0360 Organic Chemistry

Plus one additional chemistry course

Four additional courses from upper level geological sciences, mathematics, or supporting sciences with approval of the departmental concentration advisor

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<tr>
<td>GEOL 1970</td>
<td>Individual Study of Geologic Problems</td>
</tr>
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**Total Credits** 20

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1 Advanced placement may be substituted for the first semester of physics.
Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Helvetia was used instead of Arial.
The editor may contact Leepfrog for a draft with the correct fonts in place.