Geology-Chemistry

Geology-Chemistry 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, either with an organic or an inorganic focus, plus some supporting math and physics courses and one research course. Geoscience 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: 2
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

GEOL 0220 Physical Processes in Geology  
GEOL 0230 Geochemistry: Earth and Planetary Materials and Processes  
GEOL 0240 Earth: Evolution of a Habitable Planet  
Three additional chemistry courses  
Select one of the following Series: 2
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: 2
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: 2
PHYS 0050 Foundations of Mechanics  
& PHYS 0060 Foundations of Electromagnetism and Modern Physics  
or ENGN 0030 Introduction to Engineering  
& ENGN 0040 Dynamics and Vibrations

or a more advanced course

Concentration Courses:

Either the geochemistry/inorganic option or the geochemistry/organic option: 10

Geochemistry/Inorganic Option:

GEOL 0220 Physical Processes in Geology  
GEOL 0230 Geochemistry: Earth and Planetary Materials and Processes  
GEOL 0240 Earth: Evolution of a Habitable Planet  
GEOL 1130 Ocean Biogeochemical Cycles  
or GEOL 1370 Environmental Geochemistry  
GEOL 1410 Mineralogy  
GEOL 1420 Petrology  
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:

GEOL 0220 Physical Processes in Geology  
GEOL 0230 Geochemistry: Earth and Planetary Materials and Processes  
GEOL 0240 Earth: Evolution of a Habitable Planet  
GEOL 1130 Ocean Biogeochemical Cycles  
GEOL 1370 Environmental Geochemistry  
GEOL 1410 Mineralogy  
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: 4
GEOL 1970 Individual Study of Geologic Problems  

Total Credits 20

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