Geology-Physics/Mathematics

Geophysics involves the application of physics and mathematics to the study of processes that operate on and within the Earth and other planets, over short and long timescales. The AB degree requires a total of 14 courses, including 6 geoscience courses, 3 physics or engineering courses, and 3 math and applied math courses. The ScB degree requires a total of 20 courses, including 8 geoscience courses, 4 physics or engineering courses, and 3 math and applied courses; students can choose courses from both solid Earth geophysics and climate science themes. Geoscience courses emphasize an analytical and process-oriented approach, with hands-on experiences in labs and on field trips. Active and collaborative learning is encouraged, as is practice in written and oral communication. There are many opportunities for students to engage in research (typically in paid positions) during the academic year or in the summer, in areas such as analysis of seismic waves in subduction zones, theoretical modeling of convection in the Earth’s mantle, modeling the effects of the warming climate in the oceans and atmosphere, and remote sensing of how climate change affects vegetation.

Standard program for the A.B. degree

Recommended for students seeking a liberal education and interested in applying physical and mathematical principles toward an understanding of the processes affecting planets, Earth, and the environment and how they are modeled. Some course requirements may be flexible based on consultation with concentration advisor.

Five supporting science courses:
- CHEM 0330 Equilibrium, Rate, and Structure 1
- A course involving mechanics such as:
  - PHYS 0050 Foundations of Mechanics 1
  - ENGN 0040 Dynamics and Vibrations or equivalent 1
Three courses in APMA or MATH, one of which must be APMA 0330, APMA 0350, or equivalent 3

Nine concentration courses:
- EEPS 0220 Earth Processes 1
- EEPS 0230 Geochemistry: Earth and Planetary Materials and Processes 1
- EEPS 0250 Computational Approaches to Modelling and Quantitative Analysis in Natural Sciences: An Introduction or EEPS 0350 Mathematical Methods of Fluid Mechanics 1
- EEPS 1430 Principles of Planetary Climate or EEPS 1610 Solid Earth Geophysics 1
Two upper level courses from:
- EEPS 0850 Weather and Climate 1
- EEPS 1310 Global Water Cycle 1
- EEPS 1410 Mineralogy 1
- EEPS 1420 Petrology 1
- EEPS 1430 Principles of Planetary Climate 1
- EEPS 1450 Structural Geology 1
- EEPS 1510 Introduction to Atmospheric Dynamics 1
- EEPS 1520 Ocean Circulation and Climate 1
- EEPS 1610 Solid Earth Geophysics 1
- EEPS 1620 Continuum Physics of the Solid Earth 1
One additional EEPS course such as:
- EEPS 1130 Ocean Biogeochemical Cycles 1

Standard program for the Sc.B. degree

This program is recommended for students interested in graduate study and careers in geophysics, climate science and related fields. Students will be prepared to understand and use models, make measurements, and use theories of the processes studied in these fields. Some course requirements may be flexible based on consultation with concentration advisor.

Five supporting science courses:
- CHEM 0330 Equilibrium, Rate, and Structure 1
- A course involving mechanics such as:
  - PHYS 0050 Foundations of Mechanics 1
  - ENGN 0040 Dynamics and Vibrations or equivalent 1
Three courses in APMA or MATH, one of which must be APMA 0330, APMA 0350, or equivalent 3

Fourteen Concentration Courses:
- EEPS 0220 Earth Processes 1
- EEPS 0230 Geochemistry: Earth and Planetary Materials and Processes or EEPS 0240 Earth: Evolution of a Habitable Planet 1
- EEPS 0250 Computational Approaches to Modelling and Quantitative Analysis in Natural Sciences: An Introduction or EEPS 0350 Mathematical Methods of Fluid Mechanics 1
- EEPS 1430 Principles of Planetary Climate or EEPS 1610 Solid Earth Geophysics 1
Three upper level EEPS courses from:
- EEPS 1310 Global Water Cycle 1
- EEPS 1410 Mineralogy 1
- EEPS 1420 Petrology 1
- EEPS 1450 Structural Geology 1
- EEPS 1510 Introduction to Atmospheric Dynamics 1
- EEPS 1520 Ocean Circulation and Climate 1
- EEPS 1620 Continuum Physics of the Solid Earth 1
One additional EEPS course such as:
- EEPS 0850 Weather and Climate 1
- EEPS 1130 Ocean Biogeochemical Cycles 1

Total Credits 14
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>EEPS 1330</td>
<td>Global Environmental Remote Sensing</td>
</tr>
<tr>
<td>EEPS 1560</td>
<td>Global Tectonics</td>
</tr>
<tr>
<td>EEPS 1650</td>
<td>Earthquake Seismology</td>
</tr>
<tr>
<td>EEPS 1810</td>
<td>Physics of Planetary Evolution</td>
</tr>
<tr>
<td>EEPS 1820</td>
<td>Geophysical Fluid Dynamics: Rotating, Stratified Turbulence Edition</td>
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a field or sea course

or any EEPS course listed above

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<th>Course</th>
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<tbody>
<tr>
<td>PHYS 0060</td>
<td>Foundations of Electromagnetism and Modern Physics</td>
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<td>PHYS 0470</td>
<td>Electricity and Magnetism</td>
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<td>PHYS 0500</td>
<td>Advanced Classical Mechanics</td>
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<td>PHYS 1600</td>
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<td>ENGN 0310</td>
<td>Mechanics of Solids and Structures</td>
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<td>ENGN 0490</td>
<td>Fundamentals of Environmental Engineering</td>
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<td>ENGN 0510</td>
<td>Electricity and Magnetism</td>
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<tr>
<td>ENGN 0810</td>
<td>Fluid Mechanics</td>
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<tr>
<td>ENGN 1370</td>
<td>Advanced Engineering Mechanics</td>
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One additional upper-level science or math course with approval from the concentration advisor

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<th>Course</th>
<th>Title</th>
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<tr>
<td>EEPS 1970</td>
<td>Individual Study of Geologic Problems</td>
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**Total Credits**: 19