EARTH SCIENCES, B.S.

Begin Campus: Any Penn State Campus
End Campus: University Park

Degree Requirements
For the Bachelor of Science degree in Earth Sciences, a minimum of 123 credits is required:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>45</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>99-101</td>
</tr>
</tbody>
</table>

21 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses; 6 credits of GWS courses.

General Education
Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required.)
- Quantification (GQ): 6 credits
- Writing and Speaking (GWS): 9 credits

Knowledge Domains
- Arts (GA): 6 credits
- Health and Wellness (GHW): 3 credits
- Humanities (GH): 6 credits
- Social and Behavioral Sciences (GS): 6 credits
- Natural Sciences (GN): 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)
- Inter-Domain or Approved Linked Courses: 6 credits

University Degree Requirements
First Year Engagement
All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement
6 credits are required and may satisfy other requirements
- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum
3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits
A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work
Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition
The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80)). For more information, check the Suggested Academic Plan for your intended program.

Requirements for the Major
To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44).

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 110</td>
<td>Biology: Basic Concepts and Biodiversity</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 110</td>
<td>Chemical Principles I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 111</td>
<td>Experimental Chemistry I</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 112</td>
<td>Chemical Principles II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 113</td>
<td>Experimental Chemistry II</td>
<td>1</td>
</tr>
<tr>
<td>EMSC 100S</td>
<td>Earth and Mineral Sciences First-Year Seminar 1</td>
<td>3</td>
</tr>
<tr>
<td>MATH 140</td>
<td>Calculus With Analytic Geometry I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Calculus With Analytic Geometry II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 211</td>
<td>General Physics: Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 212</td>
<td>General Physics: Electricity and Magnetism</td>
<td>4</td>
</tr>
</tbody>
</table>

Additional Courses

Select 15 credits of introductory earth science of the following:
- ENGL 15 Rhetoric and Composition
- or ENGL 30H Honors Rhetoric and Composition
- EARTH 2 The Earth System and Global Change
- EARTH 101 Natural Disasters: Hollywood vs. Reality
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARTH 103N</td>
<td>Earth in the Future: Predicting Climate Change and Its Impacts Over the Next Century</td>
</tr>
<tr>
<td>EARTH 105N</td>
<td>Environments of Africa: Geology and Climate Change</td>
</tr>
<tr>
<td>GEOG 30N</td>
<td>Environment and Society in a Changing World</td>
</tr>
<tr>
<td>GEOG 110</td>
<td>Climates of the World</td>
</tr>
<tr>
<td>GEOG 111</td>
<td>Landforms of the World</td>
</tr>
<tr>
<td>GEOG 115</td>
<td>Mapping Our Changing World</td>
</tr>
<tr>
<td>GEOSC 1</td>
<td>Physical Geology</td>
</tr>
<tr>
<td>GEOSC 21</td>
<td>Earth and Life: Origin and Evolution</td>
</tr>
<tr>
<td>METEO 3</td>
<td>Weather Revealed: Introductory Meteorology</td>
</tr>
<tr>
<td>SOILS 101</td>
<td>Introductory Soil Science</td>
</tr>
</tbody>
</table>

Select 3 credits of writing-intensive courses from within Earth and Mineral Sciences to include, but not limited to the following:  
- GEOG 310 Introduction to Global Climatic Systems  
- GEOG 412  
- GEOSC 402Y Natural Disasters  
- GEOSC 470W Introduction to Field Geology  
- METEO 471  

**Additional Courses: Require a grade of C or better**  
Select 15 credits of advanced earth science of the following:  
- GEOG 412  
- GEOG 430 Human Use of Environment  
- GEOG 438W Human Dimensions of Global Warming  
- GEOSC 204 Geobiology  
- GEOSC 320 Geology of Climate Change  
- GEOSC 340 Geomorphology  
- GEOSC 402Y Natural Disasters  
- GEOSC 416 Stable and Radioactive Isotopes in Geosciences: Introduction  
- METEO 300 Fundamentals of Atmospheric Science  
- METEO 431 Atmospheric Thermodynamics  

**Supporting Courses and Related Areas**  
Select 3-4 credits of advanced math, statistics, computer science in consultation with an adviser  
Select 3 credits of field, laboratory experience in consultation with an adviser  
Select 8-9 credits in other approved courses (students may apply 6 credits of ROTC)  

**Supporting Courses and Related Areas: Require a grade of C or better**  
Select 18 credits, in consultation from an adviser, from one of the following Earth and Mineral Sciences interdisciplinary minors:  
- Climatology  
- Marine Science  
- Watersheds & Water Resources  
- Earth Systems  
- Global Business Strategies for Earth and Environmental Industries  

1 The following substitutions are allowed for students attending campuses where the indicated course is not offered: CAS 100 or ENGL 202C can be substituted for EMSC 100S.  
2 Courses may not double count with minor requirements.