EARTH SCIENCE AND POLICY, B.S.

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

Degree Requirements
For the Bachelor of Science degree in Earth Science and Policy, a minimum of 120 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>Electives</td>
<td>0-2</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>106-108</td>
</tr>
</tbody>
</table>

33 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; 9 credits of GWS courses; 3 credits of GH courses; 6 credits of GS 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 (http://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 82-44 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44)). 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).

Common Requirements for the Major (All Options)

<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>EARTH 400</td>
<td>Earth Sciences Seminar</td>
<td>3</td>
</tr>
<tr>
<td>EARTH 495</td>
<td>Internship</td>
<td>3</td>
</tr>
<tr>
<td>ECON 102</td>
<td>Introductory Microeconomic Analysis and Policy</td>
<td>3</td>
</tr>
<tr>
<td>EMSC 100S</td>
<td>Earth and Mineral Sciences First-Year Seminar</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 126</td>
<td>Economic Geography</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 364</td>
<td>Spatial Analysis</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 118</td>
<td>Environmental Philosophy</td>
<td>3</td>
</tr>
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</table>
PLSC 1  American Politics: Principles, Processes and Powers  3
STAT 200  Elementary Statistics  4

Prescribed Courses: Require a grade of C or better
EARTH 402  Modeling the Earth System  3
EBF 472  Quantitative Analysis in Earth Sciences  3
GEOSC 450  Risk Analysis in the Earth Sciences  3

Additional Courses
CAS 100  Effective Speech  3
or ENGL 202C  Effective Writing: Technical Writing
CED 201  Introductory Environmental and Resource Economics  3
or EBF 200  Introduction to Energy and Earth Sciences Economics
ENGL 15  Rhetoric and Composition  3
or ENGL 30H  Honors Rhetoric and Composition
GEOSC 1  Physical Geology  3
or GEOSC 20  Planet Earth
MATH 111  Techniques of Calculus II  2-4
or MATH 141  Calculus with Analytic Geometry II
PHYS 211  General Physics: Mechanics  4
or PHYS 250  Introductory Physics I

Additional Courses: Require a grade of C or better
Select one of the following:  4
  MATH 83  Technical Calculus
  MATH 110  Techniques of Calculus I
  MATH 140  Calculus With Analytic Geometry I
Select 8 credits of the following:  8
  GEOC 201  Earth Materials
  GEOC 202  Chemical Processes in Geology
  GEOC 203  Physical Processes in Geology

Requirements for the Option
Select an option  27

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.

Requirements for the Option
All options must include one W course.

Water and Land Use Option (27 credits)

Additional Courses
Select 3 credits of the following:  3
  EARTH 2  The Earth System and Global Change
  GEOG 110  Climates of the World
  METEO 3  Introductory Meteorology
  METEO 4  Weather and Risk
Select 12 credits of the following:  12
  GEOG 310  Introduction to Global Climatic Systems
  GEOG 412  Geology of Climate Change
  METEO 201  Introduction to Weather Analysis
  METEO 466  Planetary Atmospheres
Select a total of 12 credits of the following:  12
  Select 3-6 credits of the following:
  CED 429  Natural Resource Economics
  CED 431  Intermediate Microeconomic Analysis
  CED 409  Land Use Planning and Procedure
  CED 410  The Global Seminar
  EMSC/STS/ SOC 420  Energy and Modern Society
  GEOG 310  Introduction to Global Climatic Systems
  GEOG 412  Geology of Climate Change
  METEO 201  Introduction to Weather Analysis
  METEO 466  Planetary Atmospheres
  PLSC/STS 460  Science, Technology, and Public Policy
  PUBPL 481  Seminar in Environmental Policy

Climate Change Option (27 credits)

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Water and Land Use Option (27 credits)

Additional Courses
Select 3 credits of the following:  3
  EARTH 110  Water: Science and Society
  GEOG 160  Mapping Our Changing World
  SOILS 101  Introductory Soil Science
Select 12 credits of the following:  12
  ERM 300  Basic Principles and Calculations in Environmental Analysis
  FOR 455  Remote Sensing and Spatial Data Handling
  FOR 470  Watershed Management
  GEOG 363  Geographic Information Systems
  GEOSC 340  Geomorphology
  GEOSC 402Y  Natural Disasters

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<tr>
<td>EBF 484</td>
<td>Energy Economics</td>
<td>3</td>
</tr>
<tr>
<td>or GEOG 424</td>
<td>Geography of the Global Economy</td>
<td></td>
</tr>
</tbody>
</table>

Select 3 credits of the following:
- EARTH 100 | Environment Earth                        | 3       |
- EGEE 101  | Energy and the Environment               |         |
- EGEE 102  | Energy Conservation for Environmental Protection |         |

Select 9 credits of the following:
- EGEE 302  | Principles of Energy Engineering         |         |
- EGEE 401  | Energy in a Changing World               |         |
- EGEE 412  | Green Engineering & Environmental Compliance |     |
- GEOSC 451 | Natural Resources: Origins, Economics and Environmental Impact |         |
- GEOSC 454 | Geology of Oil and Gas                   |         |
- GEOSC 483 | Environmental Geophysics                 |         |

Select 12 credits of the following:
- CED 230  | Development Issues in the Global Context |         |
- CED 410  | The Global Seminar                       |         |
- EMSC/STS/SOC 420 | Energy and Modern Society |         |
- GEOG 430 | Human Use of Environment                 |         |
- GEOG 434 | Politics of the Environment              |         |
- GEOG 439 | Property and the Global Environment      |         |
- GEOG 438W | Human Dimensions of Global Warming      |         |
- PLSC/STS 460 | Science, Technology, and Public Policy |         |
- STS 201 | Climate Change, Energy, and Biodiversity |         |

### General Option (27 credits)

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<tr>
<td>or GEOG 424</td>
<td>Geography of the Global Economy</td>
<td></td>
</tr>
</tbody>
</table>

Select 3 credits of the following:
- EARTH 2  | The Earth System and Global Change        |         |
- EARTH 100 | Environment Earth                        |         |
- EARTH 111 | Water. Science and Society               |         |
- EGEE 101 | Energy and the Environment               |         |
- GEOG 10  | Physical Geography. An Introduction      |         |
- GEOG 30N | Environment and Society in a Changing World |     |
- GEOG 160 | Mapping Our Changing World               |         |
- METEO 3  | Introductory Meteorology                 |         |
- METEO 4  | Weather and Risk                         |         |
- SOILS 101 | Introductory Soil Science              |         |

Select 12 credits of the following:
- EGEE 302 | Principles of Energy Engineering         |         |
- EGEE 412 | Green Engineering & Environmental Compliance |     |
- ERM 300  | Basic Principles and Calculations in Environmental Analysis | |
- FOR 455  | Remote Sensing and Spatial Data Handling |         |
- FOR 470  | Watershed Management                     |         |
- GEOG 310 | Introduction to Global Climatic Systems  |         |
- GEOG 363 | Geographic Information Systems           |         |
- GEOG 412 |                                       |         |
- GEOSC 320 | Geology of Climate Change                |         |
- GEOSC 340 | Geomorphology                             |         |
- GEOSC 402Y | Natural Disasters                       |         |
- GEOSC 409W | Geomicrobiology                           |         |
- GEOSC 413W | Techniques in Environmental Geochemistry |     |
- GEOSC 451 | Natural Resources: Origins, Economics and Environmental Impact | |
- GEOSC 452 | Hydrogeology                              |         |
- GEOSC 454 | Geology of Oil and Gas                   |         |
- GEOSC 483 | Environmental Geophysics                 |         |
- METEO 466 | Planetary Atmospheres                    |         |
- SOILS 422 | Natural Resources Conservation and Community Sustainability | |
- SOILS 450 | Environmental Geographic Information Systems |     |

Select a total of 12 credits of the following:
- CED 230  | Development Issues in the Global Context |         |
- CED 309  | Land Economics and Policy                |         |
- CED 409  | Land Use Planning and Procedure         |         |
- CED 410  | The Global Seminar                      |         |
- EMSC/STS/SOC 420 | Energy and Modern Society |         |
- ERM 411  | Legal Aspects of Resource Management     |         |
- GEOG 430 | Human Use of Environment                 |         |
- GEOG 431 | Geography of Water Resources             |         |
- GEOG 434 | Politics of the Environment              |         |
- GEOG 438W | Human Dimensions of Global Warming      |         |
- GEOG 439 | Property and the Global Environment      |         |
- PLSC 403  | The Legislative Process                  |         |
- PLSC 412  | International Political Economy         |         |
- PLSC 426  | Political Parties and Interest Groups   |         |
- PLSC/STS 460 | Science, Technology, and Public Policy |         |
- PLSC 471  | American Constitutional Law              |         |
- STS 201  | Climate Change, Energy, and Biodiversity |         |