Program Description

Global climate change and environmental change on a more local scale present major challenges for our future. The solution to these problems requires people with a solid scientific understanding of natural earth/environmental systems, and also an understanding of the social, economic, and political dimensions of these problems. This major is intended to bridge the gap between the physical, natural sciences (the Earth sciences) and the social sciences, with the understanding that intelligent, effective solutions to environmental problems will require people who grasp the scientific and social dimensions of environmental problems. This major is intended to produce graduates who not only grasp these problems, but who can also apply a wide array of quantitative tools and fundamental principles to generate practical solutions.

Students develop a sense of community through a set of common upper level courses and they gain practical experience through a mandatory internship course. A variety of options are offered to enable greater depth of study in aspects of science and policy related to water and land use, climate change, and energy; a general option is also available.

This major will provide an excellent preparation for careers in environmental law, environmental consulting, and nonprofit organizations engaged in the science and policy of environmental issues. This major will also serve as a strong basis for postgraduate studies in environmental science and policy.

Water and Land Use Option

This option is intended to develop a focus on the role of water and land in environmental issues, encompassing scientific, economic, and policy dimensions of groundwater and surface water resources and of land use. The Water and Land Use option is appropriate both for students who intend to pursue postgraduate degrees and for students who want to enter the workforce.

Climate Change Option

This option is intended for students who want to focus on the science and policy related to climate change, including the scientific basis for identifying, understanding, and potentially mitigating climate change. The option also develops a basis for understanding the economic costs and risks related to climate change, as well as the political dimensions. This option is appropriate both for students who intend to pursue postgraduate degrees and for students who want to enter the workforce.

Energy Option

This option is designed to provide a focus on aspects of Earth science and policy related to energy, including the origins of energy and mineral resources, the future of these resources, and the alternatives for meeting future needs. This option also provides a focus on the economics of energy systems and the political dimensions of the challenges related to our energy future. The Energy option is appropriate both for students who intend to pursue postgraduate degrees and for students who want to enter the workforce.

General Option

This option is intended for students who desire a broad sampling of Earth science as it relates to policy or those who desire to design their own focus within Earth science in consultation with an academic adviser. The General option is appropriate both for students who intend to pursue postgraduate degrees and for students who want to enter the workforce.

What is Earth Science and Policy?

The Earth Science and Policy program is designed to help train students to address big picture questions like how to prepare for climate change and how to solve issues affecting communities, such as maintaining sources of clean water and reliable energy. The program is designed to help students develop a more detailed understanding of how scientists from a range of Earth science disciplines—including meteorology, geosciences, and geography—collaborate with government and industry representatives on legislation that can have an impact on local communities, the nation, and the world. The program is ideal for students who want to apply their knowledge of the sciences to help create solutions for pressing problems facing society.

You Might Like This Program If...

- You like to work as part of a team to create solutions.
- You want to address important Earth science-related challenges such as climate change, clean energy, and water resources.
- You are interested in how humans interact with the natural world.
- You like to study about the Earth and its physical and chemical processes.
- You would like to build a solid scientific background to engage in informed discussions about some of the world’s most pressing concerns.

Entrance to Major

In order to be eligible for entrance to this major, a student must:

1. attain at least a C (2.00) cumulative grade-point average for all courses taken at the University; and
2. have third-semester classification (http://www.registrar.psu.edu/registration/semester_classification.cfm).

READ SENATE POLICY 37-30: ENTRANCE TO AND CHANGES IN MAJOR PROGRAMS OF STUDY (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/37-00-entrance-to-a-college-or-major)

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>

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 degrees.
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

33 of these 45 credits are included in the Requirements for the Major.

**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**
This includes 33 credits of General Education courses: 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.

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>Prescribed Courses</td>
<td></td>
<td></td>
</tr>
<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>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>PHIL 118</td>
<td>Introduction to Environmental Philosophy</td>
<td>3</td>
</tr>
<tr>
<td>PLSC 1</td>
<td>American Politics: Principles, Processes and Powers</td>
<td>3</td>
</tr>
<tr>
<td>STAT 200</td>
<td>Elementary Statistics</td>
<td>4</td>
</tr>
<tr>
<td>GEOS 364</td>
<td>Spatial Analysis</td>
<td>3</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>Prescribed Courses: Require a grade of C or better</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EARTH 402</td>
<td>Modeling the Earth System</td>
<td>3</td>
</tr>
<tr>
<td>EBF 472</td>
<td>Quantitative Analysis in Earth Sciences</td>
<td>3</td>
</tr>
<tr>
<td>GEOC 450</td>
<td>Risk Analysis in the Earth Sciences</td>
<td>3</td>
</tr>
<tr>
<td>Additional Courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 15</td>
<td>Rhetoric and Composition</td>
<td>3</td>
</tr>
<tr>
<td>or ENGL 30</td>
<td>Honors Freshman Composition</td>
<td></td>
</tr>
<tr>
<td>GEOS 111</td>
<td>Physical Geology</td>
<td>3</td>
</tr>
<tr>
<td>or GEOS 20</td>
<td>Planet Earth</td>
<td></td>
</tr>
<tr>
<td>MATH 111</td>
<td>Techniques of Calculus II</td>
<td>2-4</td>
</tr>
<tr>
<td>or MATH 141</td>
<td>Calculus with Analytic Geometry II</td>
<td></td>
</tr>
<tr>
<td>PHYS 211</td>
<td>General Physics: Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>or PHYS 250</td>
<td>Introductory Physics I</td>
<td></td>
</tr>
<tr>
<td>CAS 100</td>
<td>Effective Speech</td>
<td>3</td>
</tr>
<tr>
<td>or ENGL 202C</td>
<td>Effective Writing: Technical Writing</td>
<td></td>
</tr>
<tr>
<td>CED 201</td>
<td>Introductory Environmental and Resource Economics</td>
<td>3</td>
</tr>
</tbody>
</table>
Earth Science and Policy, B.S.

**Additional Courses:** Require a grade of C or better

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 83</td>
<td>Technical Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH 110</td>
<td>Techniques of Calculus I</td>
<td></td>
</tr>
<tr>
<td>MATH 140</td>
<td>Calculus With Analytic Geometry I</td>
<td></td>
</tr>
</tbody>
</table>

Select 8 credits of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOSC 201</td>
<td>Earth Materials</td>
<td></td>
</tr>
<tr>
<td>GEOSC 202</td>
<td>Chemical Processes in Geology</td>
<td></td>
</tr>
<tr>
<td>GEOSC 203</td>
<td>Physical Processes in Geology</td>
<td></td>
</tr>
</tbody>
</table>

**Requirements for the Option**

Select an option

- **Water and Land Use Option (27 credits)**
  
  **Additional Courses**
  
  Select 3 credits of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARTH 111</td>
<td>Water: Science and Society</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 160</td>
<td>Mapping Our Changing World</td>
<td></td>
</tr>
<tr>
<td>SOILS 101</td>
<td>Introductory Soil Science</td>
<td></td>
</tr>
</tbody>
</table>

  Select 12 credits of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERM 300</td>
<td>Basic Principles and Calculations in Environmental Analysis</td>
<td>12</td>
</tr>
<tr>
<td>FOR 455</td>
<td>Remote Sensing and Spatial Data Handling</td>
<td></td>
</tr>
<tr>
<td>FOR 470</td>
<td>Watershed Management</td>
<td></td>
</tr>
<tr>
<td>GEOG 363</td>
<td>Geographic Information Systems</td>
<td></td>
</tr>
<tr>
<td>GEOSC 340</td>
<td>Geomorphology</td>
<td></td>
</tr>
<tr>
<td>GEOSC 402</td>
<td>Natural Disasters</td>
<td></td>
</tr>
<tr>
<td>GEOSC 409</td>
<td>Geomicrobiology</td>
<td></td>
</tr>
<tr>
<td>GEOSC 413</td>
<td>Techniques in Environmental Geochemistry</td>
<td></td>
</tr>
<tr>
<td>GEOSC 452</td>
<td>Hydrogeology</td>
<td></td>
</tr>
<tr>
<td>GEOSC 483</td>
<td>Environmental Geophysics</td>
<td></td>
</tr>
<tr>
<td>SOILS 422</td>
<td>Natural Resources Conservation and Community Sustainability</td>
<td></td>
</tr>
<tr>
<td>SOILS 450</td>
<td>Environmental Geographic Information Systems</td>
<td></td>
</tr>
</tbody>
</table>

Select a total of 12 credits of the following:

- 3-6 credits of the following:
  - CED 429 | Natural Resource Economics          |   |
  - CED 431 | Economic Analysis of Environmental and Resource Policies | |
  - ECON 302 | Intermediate Microeconomic Analysis | |

- 6-9 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 438W | Human Dimensions of Global Warming  | |
  - PLSC/STS 460 | Science, Technology, and Public Policy | |
  - STS 201 | Climate Change, Energy, and Biodiversity | |

**Climate Change Option (27 credits)**

**Additional Courses**

Select 3 credits of the following:

- 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:

- GEOG 310 | Introduction to Global Climatic Systems |
- GEOG 412 |
- GEOSC 320 | Geology of Climate Change |
- METEO 201 | Introduction to Weather Analysis |
- METEO 466 | Planetary Atmospheres |

Select a total of 12 credits of the following:

- 3-6 credits of the following:
  - CED 429 | Natural Resource Economics          |
  - CED 431 | Economic Analysis of Environmental and Resource Policies |
  - ECON 302 | Intermediate Microeconomic Analysis |

- 6-9 credits of the following:
  - CED 230 | Development Issues in the Global Context |
  - CED 410 | The Global Seminar |
  - 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 438W | Human Dimensions of Global Warming |
  - PLSC/STS 460 | Science, Technology, and Public Policy |
  - STS 201 | Climate Change, Energy, and Biodiversity |

**Energy Option (27 credits)**

**Additional Courses**

Select 3 credits of the following:

- EARTH 100 | Environment Earth |
- 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 |
- EBF 484 | Energy Economics |
- or GEOG 424 | Geography of the Global Economy |

Select 12 credits of the following:

- CED 230 | Development Issues in the Global Context |

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.
General Option (27 credits)

Select a total of 12 credits of the following:

- EBF 484
- CED 431
- GEOSC 483
- GEOSC 454
- GEOSC 452
- GEOSC 413
- GEOSC 402
- GEOSC 409
- GEOSC 340
- GEOSC 320
- GEOG 412
- ERM 300
- METEO 466
- SOILS 450
- SOILS 422
- SOILS 101

Select 12 credits of the following:

- ECON 302
- GEOG 424
- CED 230
- CED 309
- CED 409
- CED 410
- ERM 411
- GEOG 130
- GEOG 430
- GEOG 431
- GEOG 434
- GEOG 438W
- GEOG 439
- ECON 302
- SOILS 101
- METEO 4
- GEOG 160
- GEOG 412
- GEOG 30N
- METEO 3
- METEO 4
- SOILS 101

Additional Courses

Select 3 credits of the following:

1. EARTH 2: The Earth System and Global Change
2. EARTH 100: Environment Earth
3. EARTH 111: Water: Science and Society
4. EGEE 101: Energy and the Environment
5. GEOG 10: Physical Geography: An Introduction
6. GEOG 30N: Environment and Society in a Changing World
7. GEOG 160: Mapping Our Changing World
8. METEO 3: Introductory Meteorology
9. METEO 4: Weather and Risk
10. SOILS 101: Introductory Soil Science

Select 6-9 credits of the following:

11. ERM 300: Basic Principles and Calculations in Environmental Analysis
12. EGEE 302: Principles of Energy Engineering
13. EGEE 412: Green Engineering & Environmental Compliance
14. FOR 455: Remote Sensing and Spatial Data Handling
15. FOR 470: Watershed Management
16. GEOG 310: Introduction to Global Climatic Systems
17. GEOG 363: Geographic Information Systems
18. GEOG 412: Geology of Climate Change
19. GEOG 340: Geomorphology
20. GEOG 409: Geomicrobiology
21. GEOG 413: Techniques in Environmental Geochemistry
23. GEOG 452: Hydrogeology
24. GEOG 454: Geology of Oil and Gas
25. GEOG 483: Environmental Geophysics
26. METEO 466: Planetary Atmospheres
27. SOILS 422: Natural Resources Conservation and Community Sustainability
28. SOILS 450: Environmental Geographic Information Systems

Select a total of 12 credits of the following:

19. ECON 302: Basic Principles and Calculations in Environmental Analysis
20. EGEE 302: Principles of Energy Engineering
21. EGEE 412: Green Engineering & Environmental Compliance
22. FOR 455: Remote Sensing and Spatial Data Handling
23. FOR 470: Watershed Management
24. GEOG 310: Introduction to Global Climatic Systems
25. GEOG 363: Geographic Information Systems
26. GEOG 412: Geology of Climate Change
27. GEOG 340: Geomorphology
28. GEOG 409: Geomicrobiology
29. GEOG 413: Techniques in Environmental Geochemistry
31. GEOG 452: Hydrogeology
32. GEOG 454: Geology of Oil and Gas
33. GEOG 483: Environmental Geophysics
34. METEO 466: Planetary Atmospheres
35. SOILS 422: Natural Resources Conservation and Community Sustainability
36. SOILS 450: Environmental Geographic Information Systems

Program Learning Objectives

1. To produce graduates who can analyze, understand, and utilize data and model results relevant to the Earth and environmental sciences.
2. To produce graduates who can make decisions regarding environmental problems based on fundamental knowledge of the mathematics, science, geography, economics, and political science.
3. To produce graduates who possess a broad understanding of the impact of Earth system processes and resources on humans and the impact of human activities on Earth systems.
4. To produce graduates who can communicate the results of scientific inquiry through writing and speaking to an audience with diverse backgrounds and perspectives.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information need to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy)

Jacob Hoover
Suggested Academic Plan

General Option at University Park Campus

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Plan or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Fall</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOSC 1 or 20</td>
<td>3</td>
<td>MATH 111, 141, or 141G</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHEM 110 (GN)†</td>
<td></td>
<td>Elective (2 cr needed if schedule MATH 111)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>MATH 83, 110, 140, or 140G (GQ)†</td>
<td></td>
<td>CHEM 112</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CHEM 111 (GN)‡</td>
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<td>1 CHEM 113</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>EMSC 100S (GWS)‡‡</td>
<td></td>
<td>3 PLSC 1 (GS)†</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENGL 15, 30, or ESL 15 (GWS)‡</td>
<td></td>
<td>3</td>
<td></td>
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<tr>
<td><strong>Total Credits</strong></td>
<td>14</td>
<td></td>
<td></td>
<td>14</td>
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</table>

### Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Fall</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 211 or 250 (GN)†</td>
<td>4</td>
<td>STAT 200 (GQ)‡‡</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ECON 102 (GS)†</td>
<td>3</td>
<td>GEOSC 201, 202, or 203*</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BIOL 110 (GN)‡</td>
<td>4</td>
<td>PHIL 118 (GH)†</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GEOG 126 or 326 (GS)‡</td>
<td>3</td>
<td>CED 201 or EBF 200</td>
<td>3</td>
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<tr>
<td>General Education-Health and Wellness (GHW)</td>
<td>1.5</td>
<td>General Education-Health and Wellness (GHW)</td>
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<td><strong>Total Credits</strong></td>
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</table>

### Third Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Fall</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOSC 201, 202, or 203*</td>
<td>3</td>
<td>EARTH 400 (take SUST 200 in place of EARTH 400)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GEOG 364</td>
<td>3</td>
<td>GEOSC 450*</td>
<td>3</td>
<td></td>
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### Fourth Year

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Total Credits 120

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### Advising notes:

General Option electives (27 credits): Must include one writing across the curriculum course


Select a total of 12 credits from the following: 3 to 6 credits from: CED 429(3), CED 431(3), EBF 484(3), ECON 302 GS(3), GEOG 424 US,IL(3)

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| General education-Knowledge domain | 3 | General Education-Knowledge domain | 3 |
| 15 | 15 |

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**Advising notes:**

Water and Land Use Option electives (27 credits): Must include one writing across the curriculum course

Select 3 credits from: EARTH 111 GN, US(3), GEOG 160 GS(3), SOILS 101 GN(3)


Select a total of 12 credits from the following:

- 3 to 6 credits from: CED 429(3), CED 431(3), ECON 302 GS(3)
- 6 to 9 credits from: CED 309(3), CED 409(3), CED 410(3), GEOG 430(3), GEOG 431(3), GEOG 434(3), GEOG 439(3), PLSC 490(3), PLSC 490(3), STS 201(3)

**Climate Change Option at University Park Campus**

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### Advising notes:

Climate Change Option electives (27 credits): Must include one writing across the curriculum course

Select 3 credits from: EARTH 2 GN(3), GEOG 110 GN(3), METEO 3 GN(3), METEO 4 GN(3)

Select 12 credits from: GEOG 310(3), GEOG 412(3), GEOSC 320(3), GEOSC/METEO 475(3), METEO 201(3), METEO 466(3)

Select a total of 12 credits from the following: 3 to 6 credits from: CED 429(3), CED 431(3), ECON 302(3)

6 to 9 credits from: CED 230(3), CED 410(3), EMSC/STS/SOC 420(3), GEOS 430(3), GEOG 434(3), GEOG 438W(3), PLSC/STS 460(3), STS 201(3)

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General Education Requirements

Academic Requirements:

1. **General Education Requirements**

   - **Knowledge Domain Requirements**
     - **General Education**
       - **GWS**
       - **GQ**
       - **GHW**
       - **GN**
       - **GA**
       - **GH**
       - **GS**

   - **Integrative Studies**

   - **US**
   - **IL**

   - **W**
   - **M**
   - **X**
   - **Y**

   - **Z**

   - **N**

2. **Linked Course**

   - **PCC**

3. **University Requirements and General Education Notes**

   - **US**
   - **IL**

   - **GWS**
   - **GQ**
   - **GHW**
   - **GN**
   - **GA**
   - **GH**
   - **GS**

   - **W**
   - **M**
   - **X**
   - **Y**

   - **Z**

4. **Advising Notes**

   - **Energy Option electives (27 credits): Must include one writing across the curriculum course**

   - **Select 3 credits from:**
     - **EGEE 101 GN(3)**
     - **EGEE 102 GN(3)**
     - **EGEE 302(3)**
     - **EGEE 401(3)**
     - **EGEE 412(3)**
     - **GEOSC 451(3)**
     - **GEOSC 454(3)**
     - **GEOSC 483(3)**

   - **Select 3 credits from:**
     - **MATH 111 or 141**
     - **MATH 110, 83, or 140**

5. **General Education**

   - **Math**
   - **English**
   - **Science**
   - **History**
   - **Social Science**
   - **Comp. Sc.**
   - **Knowledge Domain**

   - **Option Electives**

6. **General Education**

   - **Writing Across the Curriculum**

   - **Required Courses**

7. **General Education**

   - **College of Earth and Mineral Sciences First Year Seminar (3) is a required course only for students who begin their studies at UP in the College of Earth and Mineral Sciences.**

8. **General Option for Commonwealth Campus**

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Earth Science and Policy, B.S.

CAS 100, 100A, 100B, or 100C<sup>1</sup>  
3 ENGL 202C<sup>††</sup>  
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General Education-Health and Wellness (GHW)  
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Water and Land Use Option for Commonwealth Campus

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<td>CHEM 110 (GN)&lt;sup&gt;†&lt;/sup&gt;</td>
<td>3 CHEM 113</td>
<td>1</td>
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<tr>
<td>CHEM 111&lt;sup&gt;‡&lt;/sup&gt;</td>
<td>1 PLSC 1 (GS)&lt;sup&gt;‡&lt;/sup&gt;</td>
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<tr>
<td>General Education-Knowledge Domain</td>
<td></td>
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Second Year

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<th>Credits</th>
<th>Spring</th>
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<tr>
<td>PHYS 211 or 250 (GN)&lt;sup&gt;‡&lt;/sup&gt;</td>
<td>4 GEOSC 1 or 20</td>
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<tr>
<td>BIOL 110 (GN)&lt;sup&gt;‡&lt;/sup&gt;</td>
<td>4 STAT 200 (GQ)&lt;sup&gt;††&lt;/sup&gt;</td>
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<tr>
<td>GEOG 126 (GS)&lt;sup&gt;†&lt;/sup&gt;</td>
<td>3 PHIL 118 (GH)&lt;sup&gt;†&lt;/sup&gt;</td>
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<tr>
<td>CAS 100, 100A, 100B, or 100C&lt;sup&gt;‡&lt;/sup&gt;</td>
<td>3 ENGL 202C&lt;sup&gt;††&lt;/sup&gt;</td>
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<td>General Education-Health and Wellness (GHW)</td>
<td>1.5 General Education-Health and Wellness (GHW)</td>
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Third Year

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<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
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<tr>
<td>EARTH 402 (instead of EARTH 202)&lt;sup&gt;‡&lt;/sup&gt;</td>
<td>3 EARTH 400 (take SUST 200 in place of EARTH 400)</td>
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GEOSC 201, 202, or 203
GEOG 364
Option elective
CED 201 or EBF 200

4
3
3
3
16

Fourth Year
Fall
Credits
EARTH 495
EBF 472
Option elective
Option elective
General education- knowledge domain

3
3
3
3
3

Credits
3
3
3
3
3

Total Credits 120

* Course requires a grade of C or better for the major
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University Requirements and General Education Notes:

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Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

Students who begin their studies at non-UP locations and/or join the college after their first year should substitute CAS 100 (GWS), CAS 100A (GWS), CAS 100B (GWS), or CAS 100C (GWS) or ENGL 202C (GWS) for EMSC 100S (GWS). EMSC 100S Earth and Mineral Sciences First year Seminar (3) is a required course only for students who begin their studies at UP in the College of Earth and Mineral Sciences.

Advising notes:

Water and Land Use Option electives (27 credits): Must include one writing across the curriculum course.

Select 3 credits from: EARTH 111 GN, US(3), GEOG 160 GS(3), SOILS 101 GN(3)


Select a total of 12 credits from the following:

3 to 6 credits from: CED 429(3), CED 431(3), ECON 302 GS(3)
6 to 9 credits from: CED 309(3), CED 409(3), CED 410(3), GEOG 430(3), GEOG 431(3), GEOG 434(3), GEOG 439(3), PLSC/STS 460(3), PUBPL 481(3)

Climate Change Option for Commonwealth Campus

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit report. Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year
Fall
Credits
ENGL 15, 30, or ESL 15 (GWS)†‡
ECON 102†
MATH 110, 83, or 140 (GQ)†‡
CHEM 110 (GN)†
CHEM 111†

3 MATH 111 or 141
3 Elective (2 cr needed if schedule MATH 111)
4 CHEM 112
3 CHEM 113
1 PLSC 1 (GS)†

4
0
3
1
3

Credits
16
14
14

Second Year
Fall
Credits
PHYS 211 or 250 (GN)†
BIOL 110 (GN)†
GEOG 126 (GS)†
CAS 100, 100A, 100B, or 100C†
General Education- Health and Wellness (GHW)

4 GEOSC 1 or 20
4 STAT 200 (GO)†‡
3 PHIL 118 (GH)†
3 ENGL 202C†‡
1.5 General Education- Health and Wellness (GHW)

3
4
3
3
1.5

Credits
15.5
14.5

Third Year
Fall
Credits
EARTH 402 (instead of EARTH 202)†
GEOSC 201, 202, or 203†
GEOG 364
Option elective
CED 201 or EBF 200

3 EARTH 400 (take SUST 200 in place of EARTH 400)
4 GEOSC 201, 202, or 203†
3 GEOG 450†
3 Option elective
3 Option elective

3
4
3
3
3

Credits
16
16

Fourth Year
Fall
Credits
EARTH 495
EBF 472†

3 Option elective
3 Option elective

3
3
Option elective 3 Option elective 3
Option elective 3 Option elective 3
General education- 3 General Education- 3
Knowledge domain Knowledge domain

Total Credits 120

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Advising notes:

Climate Change Option electives (27 credits): Must include one writing across the curriculum course

Select 3 credits from: EARTH 2 GN(3), GEOG 110 GN(3), METEO 3 GN(3), METEO 4 GN(3)

Select 12 credits from: GEOG 310(3), GEOG 412(3), GEOSC 320(3), GEOSC/METEO 475(3), METEO 201(3), METEO 466(3)

Select a total of 12 credits from the following:
3 to 6 credits from: CED 429(3), CED 431(3), ECON 302(3)
6 to 9 credits from: CED 230(3), CED 410(3), EMSC/STS/SOC 420(3), GEOG 430(3), GEOG 434(3), GEOG 438W(3), PLSC/STS 460(3), STS 201(3)

Energy Option for Commonwealth Campus

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Requirements or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

<table>
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<tr>
<th>Fall</th>
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<th>Spring</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGL 15, 30, or ESL 15 (GWS)†</td>
<td>3</td>
<td>MATH 111 or 141</td>
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<tr>
<td>ECON 101 ‡</td>
<td>3</td>
<td>Elective (2 cr needed if schedule MATH 111)</td>
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<tr>
<td>MATH 110, 83, or 140 (GQ) †</td>
<td>4</td>
<td>CHEM 112</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 110 (GN) †</td>
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<td>CHEM 111 †</td>
<td>3</td>
<td>PLSC 1 (GS)</td>
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14 14

Second Year

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<td>3</td>
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<tr>
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<td>4</td>
<td>STAT 200 (GQ) †</td>
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<td>3</td>
<td>PHIL 118 (GH) †</td>
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15 14.5

Third Year

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<tr>
<td>GEOG 364</td>
<td>3</td>
<td>GEOSC 450 †</td>
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<td>Option elective</td>
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<td>Option elective</td>
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<td>CED 201 or EBF 200</td>
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<td>Option elective</td>
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16 16

Fourth Year

<table>
<thead>
<tr>
<th>Fall</th>
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<th>Spring</th>
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<tr>
<td>EARTH 495</td>
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<td>Option elective</td>
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<td>EBF 472 †</td>
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<td>Option elective</td>
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<td>Option elective</td>
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<td>Option elective</td>
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<td>Option elective</td>
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<tr>
<td>General education-Knowledge domain</td>
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<td>General Education-Knowledge domain</td>
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15 15

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Advising notes:

Energy Option electives (27 credits): Must include one writing across the curriculum course

Select 3 credits from: EARTH 100 GN(3), EGEE 101 GN(3), EGEE 102 GN(3)
Select 9 credits from: EGEE 302(3), EGEE 401(3), EGEE 412(3), GEOSC 451(3), GEOSC 454(3), GEOSC 483(3)
Select 3 credits from: EBF 484(3), GEOG 424 US:IL(3)

Career Paths

An Earth Science and Policy degree can prepare you to work within a diverse set of industries or for further graduate study in many Earth science or policy-related fields.

Careers

Earth Science and Policy graduates may find careers in local, state, or federal government; investigating the impact of new scientific findings on industry practices; conducting science advocacy for a variety of institutions; consulting on land and water use policies; investigating the application of environmental law; or educating the public on the science behind issues involving the Earth, the environment, and sustainability.

MORE INFORMATION (http://www.geosc.psu.edu/careers)

Opportunities for Graduate Studies

The Earth Science and Policy program can prepare graduates for many fields of graduate school, such as environmental science, the Earth sciences, or policy. Some may be inclined to pursue Master of Business Administration, Master of Education, or Environmental Law degrees.

MORE INFORMATION (http://www.geosc.psu.edu/graduates)