EARTH AND ENVIRONMENTAL SCIENCES MAJOR

ADMISSION TO THE MAJOR

GATEWAY COURSES FOR THE MAJOR
To declare E&ES as a major, students are required to have completed an E&ES gateway course (E&ES101, E&ES115, E&ES197, or E&ES199), and to have completed (or be currently taking) two gateway courses (or higher) in biology, chemistry, mathematics, or physics.

E&ES101 Dynamic Earth 1
E&ES115 Introduction to Planetary Geology 1
E&ES197 Introduction to Environmental Studies 1
E&ES199 Introduction to Environmental Science and Sustainability 1

SOPHOMORE SEMINAR
E&ES195 Sophomore Field Course 0.5

MAJOR REQUIREMENTS

- E&ES gateway course (E&ES101, E&ES115, E&ES197, or E&ES199).
- Earth and environmental scientists need a broad background in the natural sciences. Therefore, E&ES majors are required to take one year (two semesters) of gateway courses from two of the following disciplines for a total of four courses: biology (BIOL181/BIOL182), chemistry (CHEM141/CHEM142 or CHEM143/CHEM144), mathematics (MATH117/MATH118 or MATH121/MATH122), or physics (PHYS111/PHYS112 or PHYS113/PHYS116). Upper-level courses in these disciplines can be substituted, as can statistics courses for mathematics. Students are urged to complete these introductory courses within their first two years. Students considering professional work in the sciences are encouraged to take gateways in more than two disciplines, including any associated lab courses, as well as upper-level coursework in other natural science and mathematics disciplines.
- The Sophomore Field Course (E&ES195). This course is typically taken during the spring semester of the sophomore year.
- The Senior Seminar (E&ES497). This capstone is typically taken in the senior year.
- For the Class of 2020 and earlier: Seven upper-level courses, comprised of three "cores" and four "electives." Lab courses associated with the primary courses are required. Up to two upper-level natural science or math courses taken in other departments can count as electives; up to two preapproved courses from study-abroad programs can also count as cores or electives. At least four of the upper-level courses must be Wesleyan E&ES courses. Tutorial and the senior thesis do not count towards the requirement.
- For the Class of 2021 and later: Seven upper-level courses. Five of these courses must cover the following thematic areas: two from "Earth and Planets" (numbered 201-233 and 301-333), two from "Hydrosphere, Biosphere, and Atmosphere" (numbered 234-266 and 334-366), and one from "Methods" (numbered 267-299 and 367-399). Lab courses associated with the primary courses are required. The remaining two courses may come from any thematic area. Also, the following can be used: Up to two upper-level natural science or math courses taken in other departments, and up to two preapproved courses from study-abroad programs. At least four of the upper-level courses

The Department of E&ES does not require completion of Wesleyan's General Education Requirements to complete the major. Honors students are required to complete Wesleyan's General Education Requirements through stage II.

CORE COURSES
E&ES213 Mineralogy & E&ES214 and Laboratory Study of Minerals 1.5
E&ES215 Earth Materials & E&ES216 and Earth Materials Laboratory 1.5
E&ES220 Geomorphology & E&ES221 and Geomorphology Laboratory 1.5
E&ES223 Structural Geology & E&ES224 and Field Geology 1.5
E&ES230 Sedimentology & E&ES231 and Sedimentology/Stratigraphy Techniques 1.5
E&ES234 Geobiology & E&ES235 and Geobiology Laboratory 1.5
E&ES250 Environmental Geochemistry & E&ES251 and Environmental Geochemistry Laboratory 1.5
E&ES260 Oceans and Climate & E&ES261 and Techniques in Ocean and Climate Investigations 1.5
BIOL216 Ecology 1

ELECTIVE COURSES
E&ES244 Soils & E&ES245 and Soils Laboratory 1.5
E&ES246 Hydrology & E&ES247 and Hydrology Laboratory 1.5
E&ES270 Quantitative Methods for the Biological and Environmental Sciences 1
E&ES280 Introduction to GIS 1
E&ES313 Petrogenesis of Igneous and Metamorphic Rocks & E&ES314 and Laboratory Study of Igneous and Metamorphic Rocks 1.5
E&ES317 Volcanology & E&ES318 and Volcanology Lab Course 1.5
E&ES321 Planetary Evolution 1
E&ES359 Global Climate Change 1
E&ES361 Living in a Polluted World 1
E&ES368 Isotope Geochemistry 1
E&ES375 Modeling the Earth and Environment 1
E&ES385 Remote Sensing & E&ES386 and Remote-Sensing Laboratory 1.5

SENIOR SEMINAR
E&ES497 Senior Seminar 1.5

For the Class of 2021 and later: Seven upper-level courses. Five of these courses must cover the following thematic areas: two from "Earth and Planets" (numbered 201-233 and 301-333), two from "Hydrosphere, Biosphere, and Atmosphere" (numbered 234-266 and 334-366), and one from "Methods" (numbered 267-299 and 367-399). Lab courses associated with the primary courses are required. The remaining two courses may come from any thematic area. Also, the following can be used: Up to two upper-level natural science or math courses taken in other departments, and up to two preapproved courses from study-abroad programs. At least four of the upper-level courses

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**EARTH AND PLANET COURSES**

- E&ES213: Mineralogy and Laboratory Study of Minerals: 1.5
- E&ES2216: Earth Materials and Earth Materials Laboratory: 1.5
- E&ES220: Geomorphology and Geomorphology Laboratory: 1.5
- E&ES223: Structural Geology and Field Geology: 1.5
- E&ES230: Sedimentology and Sedimentology/Stratigraphy Techniques: 1.5
- E&ES313: Petrogenesis of Igneous and Metamorphic Rocks and Laboratory Study of Igneous and Metamorphic Rocks: 1.5
- E&ES317: Volcanology and Volcanology Lab Course: 1.5
- E&ES319: Meteorites and Cosmochemistry and Meteorites Laboratory: 1.5
- E&ES321: Planetary Evolution: 1

**HYDROSPHERE, BIOSPHERE, AND ATMOSPHERE COURSES**

- E&ES234: Geobiology and Geobiology Laboratory: 1.5
- E&ES238: The Forest Ecosystem: 1
- E&ES240: Invasive Species: Biology, Policy, and Management: 1
- E&ES242: Ecological Resilience: The Good, the Bad, and the Mindful: 1.25
- E&ES244: Soils and Soils Laboratory: 1.5
- E&ES246: Hydrology and Hydrology Laboratory: 1.5
- E&ES250: Environmental Geochemistry and Environmental Geochemistry Laboratory: 1.5
- E&ES260: Oceans and Climate and Techniques in Ocean and Climate Investigations: 1.5
- E&ES359: Global Climate Change: 1
- E&ES361: Living in a Polluted World: 1

**METHOD COURSES**

- E&ES270: Quantitative Methods for the Biological and Environmental Sciences: 1
- E&ES280: Introduction to GIS: 1
- E&ES368: Isotope Geochemistry: 1
- E&ES375: Modeling the Earth and Environment: 1
- E&ES380: Advanced GIS and Spatial Analyses: 1

**CAREER OPTIONS AND THE E&ES MAJOR**

Earth and environmental sciences majors go on to pursue a wide range of careers, limited only by their own imaginations. E&ES courses can be selected to help prepare for a student’s long-term interests. The course listings below are not requirements, but suggested guidelines. Students interested in academic or research careers should consider involvement in research or producing a senior thesis.

**Geology.** These courses can help prepare students for academic careers or jobs in industry or government in natural resource or geohazard management (e.g., USGS, water resources, mining and energy industries).

- E&ES101: Dynamic Earth: 1
- E&ES115: Introduction to Planetary Geology: 1
- E&ES213: Mineralogy and Laboratory Study of Minerals: 1.5
- E&ES220: Geomorphology and Geomorphology Laboratory: 1.5
- E&ES223: Structural Geology and Field Geology: 1.5
- E&ES230: Sedimentology and Sedimentology/Stratigraphy Techniques: 1.5
- E&ES240: Invasive Species: Biology, Policy, and Management: 1
- E&ES242: Ecological Resilience: The Good, the Bad, and the Mindful: 1.25
- E&ES247: Hydrology and Hydrology Laboratory: 1.5
- E&ES250: Environmental Geochemistry and Environmental Geochemistry Laboratory: 1.5
- E&ES260: Oceans and Climate and Techniques in Ocean and Climate Investigations: 1.5
- E&ES280: Introduction to GIS: 1
- E&ES313: Petrogenesis of Igneous and Metamorphic Rocks and Laboratory Study of Igneous and Metamorphic Rocks: 1.5
- E&ES317: Volcanology and Volcanology Lab Course: 1.5
- E&ES319: Meteorites and Cosmochemistry and Meteorites Laboratory: 1.5
- E&ES321: Planetary Evolution: 1
- E&ES385: Remote Sensing and Remote-Sensing Laboratory: 1.5

**Environmental Science/Environmental Chemistry.** These courses can help prepare students for jobs in consulting, government, or nonprofit organizations (e.g., EPA, NOAA, USGS, state agencies), or for academic careers in climate science and water resources.

- E&ES197: Introduction to Environmental Studies: 1
- E&ES199: Introduction to Environmental Science and Sustainability: 1
- E&ES213: Mineralogy and Laboratory Study of Minerals: 1.5
- E&ES220: Geomorphology and Geomorphology Laboratory: 1.5
- E&ES223: Structural Geology and Field Geology: 1.5
- E&ES230: Sedimentology and Sedimentology/Stratigraphy Techniques: 1.5
- E&ES240: Invasive Species: Biology, Policy, and Management: 1
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- E&ES317: Volcanology and Volcanology Lab Course: 1.5
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- E&ES321: Planetary Evolution: 1
- E&ES385: Remote Sensing and Remote-Sensing Laboratory: 1.5
- E&ES386: Remote Sensing and Remote-Sensing Laboratory: 1.5
Earth and Environmental Sciences Major

Environmental Science/Ecology. These courses can help prepare students for jobs in government, consulting, and nonprofit organizations (e.g., U.S. Fish and Wildlife Service, state conservation agencies, Nature Conservancy, National Audubon Society) or academic careers in conservation and natural resource management.

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<tr>
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<td>E&amp;ES197</td>
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<td>Quantitative Methods for the Biological and Environmental Sciences</td>
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<td>Introduction to GIS</td>
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<td>Global Climate Change</td>
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<td>E&amp;ES368</td>
<td>Isotope Geochemistry</td>
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<td>E&amp;ES497</td>
<td>Senior Seminar</td>
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<td>BIOL216</td>
<td>Ecology</td>
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Planetary Geology. These courses can help prepare students for jobs in government and industry (e.g., NASA, remote sensing, and GIS contractors) or for academic careers in space science and remote sensing.

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<td>Dynamic Earth</td>
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STUDENT LEARNING GOALS

Students graduating with a BA degree in earth and environmental sciences should be able to:

- **Decipher the structure, composition, and dynamics of the earth system.** The student should understand the structure and composition of earth’s spheres (geosphere, hydrosphere, atmosphere, biosphere), and how these spheres interact with one another and change over time.
- **Apply the scientific method.** The student should be able to develop and test scientific hypotheses.
- **Understand data.** The student should understand how earth and environmental sciences data are produced, interpreted, and applied.
- **Apply quantitative tools.** The student should be able to select and apply appropriate quantitative techniques to earth and environmental sciences questions (e.g., calculus, statistics, spatial analysis).
- **Use the primary literature.** The student should be able to search for and understand publications from the primary scientific literature.
- **Critically evaluate scientific claims.** The student should be able to critique arguments made in the earth and environmental sciences literature.
- **Communicate.** The student should be able to present earth and environmental sciences data and their interpretation in a variety of written, visual, and oral formats.
- **Conduct research.** The student should be able to carry out an original research project, including: the identification of a research problem; the formulation of a hypothesis; the design of the methodology; the collection, processing, and interpretation of data; and the presentation of findings in written, visual, and oral formats.

GENERAL EDUCATION

Candidates for honors in E&ES are required to complete the University’s General Education Expectations through stage II.

RELATED PROGRAMS OR CERTIFICATES

- **The College of the Environment**, which includes the environmental studies-linked major and Environmental Studies Certificate, provides a linkage between the sciences, public policy, economics, and the arts and provides a wide variety of career options.
- **The Planetary Science Group and the Planetary Science Course Cluster** seek to understand the origin and evolution of the solar system in which we live and the other solar systems that we have identified in our galaxy.
• The Service-Learning Center and Service-Learning Course Cluster seek to broaden students’ understanding of course content through activities that are, at the same time, of service to the community.

**BA/MA PROGRAM**

[https://wesleyan.edu/grad/degree-programs/ba-ma.html](https://wesleyan.edu/grad/degree-programs/ba-ma.html)

This program provides an attractive option for science majors to enrich their course and research background. The course requirements for the BA/MA are the same as the MA. It is important for students interested in the BA/MA program to plan a course of study early enough (nominally in the junior year) to meet the MA requirements over both the senior and MA years. Admission is competitive and based on GPA, faculty recommendations, and research experience.

**HONORS**

Candidates for honors in E&ES are required to complete the University’s General Education Expectations through stage II.

**CAPSTONE EXPERIENCE**

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<tbody>
<tr>
<td>E&amp;ES409</td>
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<tr>
<td>E&amp;ES410</td>
<td>Senior Thesis Tutorial</td>
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