BACHELOR OF SCIENCE (BS) DEGREE WITH A MAJOR IN ENVIRONMENTAL SCIENCE AND A MAJOR CONCENTRATION IN EARTH SCIENCE

Program Learning Outcomes for the BS Degree with a Major in Environmental Science

Upon completing the BS degree with a major in Environmental Science, students will be able to:

1. Demonstrate foundational knowledge in the natural sciences that is fundamental to the environmental sciences or application of the environmental sciences to other fields.
2. Integrate knowledge of natural and applied sciences to understand complex natural systems and cycles.
3. Synthesize knowledge from natural sciences and engineering and apply it to the study of the environment.
4. Understand environmental issues from a scientific perspective and be able to solve issues using a variety of interdisciplinary perspectives (e.g., social sciences, economics, humanities, and/or architecture).
5. Demonstrate knowledge and skills suitable for doing research and/or field studies in environmental science.

Requirements for the BS Degree with a Major in Environmental Science

For graduation requirements, see Graduation Requirements (ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements). Students pursuing the BS degree with a major in Environmental Science must complete:

- A minimum of 25-28 courses (a minimum of 73-75 credit hours) depending on course selection to satisfy major requirements.
- A minimum of 133-135 credit hours to satisfy degree requirements.
- A minimum of 60 credit hours outside of major requirements.
- A minimum of 5-7 courses (15-21 credit hours, depending on declared major concentration) taken at the 300-level or above.
- An advanced field or research experience requirement.
- A capstone senior seminar requirement.
- The requirements of a major concentration. When students declare the major (ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/), in Environmental Science, students must additionally identify and declare one of two major concentrations, either in:
  - Earth Science (p. 3), or

Because of the common core requirements, it is possible for students to change their major concentration at any time, even after initially declaring the major. To do so, please contact the Office of the Registrar (registrar@rice.edu).

Environmental Science is an interdisciplinary major that addresses environmental issues in the context of what we know about earth, ecology, and society. In addition to its science core, the major also seeks to provide students with some appreciation of social, cultural, and policy dimensions of environmental issues.

The courses listed below satisfy the requirements for this major. In certain instances, courses not on this official list may be substituted upon approval of the major’s academic advisor, or where applicable, the department’s Director of Undergraduate Studies. (Course substitutions must be formally applied and entered into Degree Works by the major’s Official Certifier (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier).) Students and their academic advisors should identify and clearly document the courses to be taken.

### Summary

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td>Total Credit Hours Required for the Major in Environmental Science</td>
<td>73-75</td>
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<tr>
<td></td>
<td>Total Credit Hours Required for the BS Degree with a Major in</td>
<td>133-135</td>
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<tr>
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<td>Environmental Science</td>
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### Degree Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td></td>
<td>Core Requirements</td>
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<tr>
<td></td>
<td><strong>Foundation Coursework</strong></td>
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<tr>
<td>BIOC 201</td>
<td>INTRODUCTORY BIOLOGY</td>
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<tr>
<td>EBIO 202</td>
<td>INTRODUCTORY BIOLOGY II</td>
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<tr>
<td>CHEM 121 &amp; CHEM 123</td>
<td>GENERAL CHEMISTRY I and GENERAL CHEMISTRY LABORATORY</td>
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<tr>
<td>CHEM 122 &amp; CHEM 124</td>
<td>GENERAL CHEMISTRY II and GENERAL CHEMISTRY LABORATORY</td>
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<tr>
<td>MATH 101</td>
<td>SINGLE VARIABLE CALCULUS I</td>
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<td>or MATH 105</td>
<td>AP/OTH CREDIT IN CALCULUS I</td>
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<tr>
<td>or MATH 111</td>
<td>CALCULUS: differentiation and its applications</td>
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<tr>
<td>MATH 102</td>
<td>SINGLE VARIABLE CALCULUS II</td>
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<tr>
<td>or MATH 106</td>
<td>AP/OTH CALCULUS II</td>
<td></td>
</tr>
<tr>
<td>or MATH 112</td>
<td>CALCULUS: integration and its applications</td>
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</tr>
<tr>
<td>STAT 280</td>
<td>ELEMENTARY APPLIED STATISTICS</td>
<td>4</td>
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<tr>
<td>or STAT 305</td>
<td>INTRODUCTION TO STATISTICS FOR BIOSCIENCES</td>
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<td><strong>Select 1 from the following:</strong></td>
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<tr>
<td>PHYS 101</td>
<td>MECHANICS (WITH LAB)</td>
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<tr>
<td>&amp; PHYS 103</td>
<td>and MECHANICS DISCUSSION</td>
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<tr>
<td>PHYS 111</td>
<td>HONORS MECHANICS (WITH LAB)</td>
<td></td>
</tr>
<tr>
<td>PHYS 125</td>
<td>GENERAL PHYSICS (WITH LAB)</td>
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</tbody>
</table>
Bachelor of Science (BS) Degree with a Major in Environmental Science and a Major Concentration in Earth Science

Select 1 from the following: 4

- PHYS 102 & PHYS 104 ELECTRICITY & MAGNETISM (WITH LAB) and ELECTRICITY AND MAGNETISM DISCUSSION
- PHYS 112 HONORS ELECTRICITY & MAGNETISM (WITH LAB)
- PHYS 126 GENERAL PHYSICS II (WITH LAB)

Core Courses 2

- ENST 100 / ARCH 105 ENVIRONMENT, CULTURE AND SOCIETY 3
- ESCI 115 INTRODUCTION TO THE EARTH 4

Select 1 from the following: 3

- ESCI 107 OCEANS AND GLOBAL CHANGE
- ESCI 109 OCEANOGRAPHY
- ESCI 201 / ENST 201 THE SCIENCE BEHIND EARTH GLOBAL WARMING AND CLIMATE CHANGE
- EBIO 213 INTRO EXPERIMENTAL ECOLOGY AND EVOLUTIONARY BIOLOGY 2

Field Experience

Select 1-2 from the following: 2-3

- EBIO 306 INDEPENDENT RESEARCH FOR ECOLOGY & EVOLUTIONARY BIOLOGY UNDERGRADUATES
- EBIO 316 LAB MODULE IN ECOLOGY
- EBIO 317 LAB MODULE IN BEHAVIOR
- EBIO 319 TROPICAL FIELD BIOLOGY
- EBIO 320 ECOLOGY AND CONSERVATION OF BRAZILIAN WETLANDS LABORATORY
- EBIO 324 CONSERVATION BIOLOGY LAB
- EBIO 327 BIOLOGICAL DIVERSITY
- EBIO 330 INSECT BIOLOGY LAB
- EBIO 337 FIELD BIRD BIOLOGY LAB
- ENST 379 / EBIO 379 LAB MODULE IN AQUATIC ECOLOGY WITH SCUBA
- ESCI 103 FIELD TRIPS FOR THE EARTH
- ESCI 334 GEOLOGICAL TECHNIQUES
- ESCI 380 / FOTO 390 VISUALIZING NATURE
- FWIS 187 EXPLORING THE SCIENCE AND HISTORY OF HOUSTON'S BAYOUS

Major Concentration

Select 1 from the following Major Concentrations (see below for Major Concentration requirements): 9

- Earth Science
- Ecology and Evolutionary Biology

Advanced Electives

Social Sciences

Select 1 from the following: 3

- ANTH 348 ANTHROPOLOGIES OF NATURE
- ANTH 381 MEDICAL ANTHROPOLOGY
- ENST 302 / SOCI 304 ENVIRONMENTAL ISSUES: RICE INTO THE FUTURE

ENST 331 / POLI 331 ENVIRONMENTAL POLITICS AND POLICY
- ENST 332 / ANTH 332 THE SOCIAL LIFE OF CLEAN ENERGY
- ENST 367 / SOCI 367 ENVIRONMENTAL SOCIOLOGY
- ENST 437 / ECON 437 ENERGY ECONOMICS
- ENST 480 / ECON 480 ENVIRONMENTAL AND ENERGY ECONOMICS
- POLI 332 URBAN POLITICS
- POLI 362 COMPARATIVE URBAN POLITICS AND POLICY
- SOCI 313 DEMOGRAPHY
- SOCI 423 SOCIOLOGY OF FOOD

Humanities and Architecture

Select 1 from the following: 3

- ENGL 358 CONSUMPTION AND CONSUMERISM
- ENGL 459 STUDIES IN LITERATURE AND ECOLOGY
- ENST 202 / HUMA 202 CULTURE, ENERGY, AND THE ENVIRONMENT: AN INTRODUCTION TO ENERGY HUMANITIES
- ENST 313 / ARCH 313 SUSTAINABLE DESIGN
- ENST 322 / ARCH 322 CASE STUDIES IN SUSTAINABILITY: THE REGENERATIVE REPOSITIONING OF NEW OR EXISTING RICE CAMPUS BLDGS
- ENST 368 / ENGL 368 LITERATURE AND THE ENVIRONMENT
- HIST 425 20TH CENTURY AMERICAN CONSERVATION MOVEMENT

Natural Sciences and Engineering

Select 1 from the following: 4

- CEVE 302 / ENGI 302 SUSTAINABLE DESIGN
- CEVE 308 INTRODUCTION TO AIR POLLUTION CONTROL
- CEVE 401 CHEMISTRY FOR ENVIRONMENTAL ENGINEERING AND SCIENCE LAB
- CEVE 404 ATMOSPHERIC PARTICULATE MATTER
- CEVE 411 ATMOSPHERIC PROCESSES
- CEVE 412 HYDROLOGY AND WATER RESOURCES ENGINEERING
- CEVE 420 ENVIRONMENTAL REMEDIATION RESTORATION
- CEVE 434 FATE AND TRANSPORT OF CONTAMINANTS IN THE ENVIRONMENT
- CEVE 484 / STAT 484 ENVIRONMENTAL RISK ASSESSMENT & HUMAN HEALTH
- CHEM 211 & CHEM 213 ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY DISCUSSION
- ENST 281 / CHBE 281 ENGINEERING SOLUTIONS FOR SUSTAINABLE COMMUNITIES
- ENST 307 / CEVE 307 / ESCI 307 ENERGY AND THE ENVIRONMENT
Bachelor of Science (BS) Degree with a Major in Environmental Science and a Major Concentration in Earth Science

ENST 406 / CEVE 406
INTRODUCTION TO ENVIRONMENTAL LAW

Independent Research (see the Opportunities tab for additional information).  

Advanced Field or Research Experience Requirement

Select 1 from the following: 3

- EBIO 403 UNDERGRADUATE HONORS RESEARCH IN ECOLOGY AND EVOLUTIONARY BIOLOGY
- or EBIO 404 UNDERGRADUATE HONORS RESEARCH IN ECOLOGY AND EVOLUTIONARY BIOLOGY
- ESCI 390 GEOLOGY FIELD CAMP
- ESCI 391 EARTH SCIENCE FIELD EXPERIENCE
- ESCI 481 UNDERGRADUATE RESEARCH IN EARTH SCIENCE

Capstone Senior Seminar Requirement

Select at least 1 from the following: 3-4

- ESCI 495 / EBIO 495 SENIOR SEMINAR: TOPICS IN ENVIRONMENTAL SCIENCE
- ESCI 418 / CEVE 418 QUANTITATIVE HYDROGEOLOGY
- ESCI 421 PALEOCEANOGRAPHY
- ESCI 425 / CHEM 425 / ENST 425 ORGANIC GEOCHEMISTRY
- ESCI 430 TRACE-ELEMENT AND ISOTOPE GEOCHEMISTRY FOR EARTH AND ENVIRONMENTAL SCIENCE
- ESCI 431 GEOMORPHOLOGY
- ESCI 435 MECHANICS OF SEDIMENT TRANSPORT
- ESCI 452 GIS FOR SCIENTISTS AND ENGINEERS
- ESCI 467 GEOMECHANICS

Total Credit Hours Required for the Major in Environmental Science

University Graduation Requirements (ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements) 60

Total Credit Hours 133-135

Footnotes and Additional Information

1. Includes coursework completed as distribution credit, FWIS, LPAP upper-level, residency (hours taken at Rice), 60 hours outside of the major (if applicable), and any additional academic program requirements. The “hours outside of the major” requirement may include all of the above university requirements.

2. The core courses acquaint students with a range of environmental topics encountered by scientists, engineers, managers, and policy makers. Core courses stress the components of the global environment and their interactions, culminating with a tropical seminar that integrates across the field.

3. Students may also petition to complete alternative courses to be applied toward the Advanced Electives requirement.

4. In addition, students may complete 1 course listed in the major concentration requirements outside of the student’s declared concentration.

5. Students are encouraged, but not required, to undertake independent research on environmentally related topics.

Major Concentration: Earth Science

Students must complete a total of 3 courses (minimum of 9 credit hours) as listed below to satisfy requirements for the major concentration in Earth Science.

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>ESCI 321</td>
<td>EARTH SYSTEM EVOLUTION AND CYCLES</td>
<td>3</td>
</tr>
<tr>
<td>ESCI 323</td>
<td>EARTH STRUCTURE AND DEFORMATION</td>
<td>3</td>
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</tbody>
</table>

Elective Requirement

Select at least 1 from the following: 1-3

- ESCI 321 EARTH SYSTEM EVOLUTION AND CYCLES
- ESCI 322 EARTH CHEMISTRY AND MATERIALS
- ESCI 323 EARTH STRUCTURE AND DEFORMATION
- ESCI 340 / EBIO 340 / ENST 340 GLOBAL BIOGEOCHEMICAL CYCLES
- ESCI 418 / CEVE 418 QUANTITATIVE HYDROGEOLOGY
- ESCI 421 PALEOCEANOGRAPHY
- ESCI 425 / CHEM 425 / ENST 425 ORGANIC GEOCHEMISTRY
- ESCI 430 TRACE-ELEMENT AND ISOTOPE GEOCHEMISTRY FOR EARTH AND ENVIRONMENTAL SCIENCE
- ESCI 431 GEOMORPHOLOGY
- ESCI 435 MECHANICS OF SEDIMENT TRANSPORT
- ESCI 452 GIS FOR SCIENTISTS AND ENGINEERS
- ESCI 467 GEOMECHANICS

Total Credit Hours 10-12

Footnotes and Additional Information

1. Please note that the course not completed in the Core Requirements list for the major concentration in Earth Science may be completed and applied towards the major concentration’s Elective Requirement.

Policies for the BS Degree with a Major in Environmental Science and a Major Concentration in Earth Science

Transfer Credit

For Rice University’s policy regarding transfer credit, see Transfer Credit (ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit). Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university’s official list of transfer credit advisors on their website: https://oaa.rice.edu. Students are encouraged to meet with their academic program’s transfer credit advisor when considering transfer credit possibilities.

Program Transfer Credit Guidelines

Students pursuing the major in Environmental Science should be aware of the following program transfer credit guidelines:

- Requests for transfer credit will be considered by the program director (and/or the program’s official transfer credit advisor) on an individual case-by-case basis.

Additional Information

For additional information, please see the Department of Earth, Environmental, and Planetary Sciences website, and specifically the Environmental Science major page: https://earthscience.rice.edu/academics/undergraduate-program/
Opportunities for the BS Degree with a Major in Environmental Science and a Major Concentration in Earth Science

Independent Research

Students are encouraged to undertake independent research on environmentally related topics as part of their degree programs, in cooperation with one or more faculty. Course options for independent research, repeatable for credit, include: EBIO 403, EBIO 404, and ESCI 481.

Students also can enroll in senior honors thesis programs within their major concentrations, or by arrangement with other departments, and/or through the Rice Undergraduate Scholars Program. Students completing a thesis will also be eligible for the Distinction in Research and Creative Work, a university honor. Details for each program can be found here:

- EBIO Honors Research
  (https://biosciences.rice.edu/Content.aspx?id=2147484071)
- ESCI Senior Honors Thesis
  (http://earthscience.rice.edu/academics/undergraduate-program/honors-thesis)
- Rice Undergraduate Scholars Program
  (https://ccl.rice.edu/students/learn/undergraduate-research/rice-undergraduate-scholars-program-rusp/)

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