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.
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. Apply methods and theories to develop and test hypotheses or to propose and analyze solutions to environmental issues, using sound experimental, statistical, and/or design practices.

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.

The requirements of a major concentration. When students declare the major (ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/#text) 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 official certifier). 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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</thead>
<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 Environmental Science</td>
<td>133-135</td>
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Degree Requirements

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td>Core Requirements</td>
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<tr>
<td></td>
<td>Foundation Coursework</td>
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</tr>
<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 I</td>
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<tr>
<td>CHEM 122 &amp; CHEM 124</td>
<td>GENERAL CHEMISTRY II and GENERAL CHEMISTRY LABORATORY II</td>
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<tr>
<td>MATH 101 or MATH 111</td>
<td>SINGLE VARIABLE CALCULUS I or CALCULUS: DIFFERENTIATION AND ITS APPLICATIONS</td>
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<tr>
<td>MATH 102 or MATH 112</td>
<td>SINGLE VARIABLE CALCULUS II or CALCULUS: INTEGRATION AND ITS APPLICATIONS</td>
<td>3</td>
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<tr>
<td>STAT 280 or STAT 305</td>
<td>ELEMENTARY APPLIED STATISTICS or INTRODUCTION TO STATISTICS FOR BIOSCIENCES</td>
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<tr>
<td>Select 1 from the following:</td>
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<td>4</td>
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<tr>
<td>PHYS 101 &amp; PHYS 103</td>
<td>MECHANICS (WITH LAB) and MECHANICS DISCUSSION</td>
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</tr>
<tr>
<td>PHYS 111</td>
<td>HONORS MECHANICS (WITH LAB)</td>
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</tr>
<tr>
<td>PHYS 125</td>
<td>GENERAL PHYSICS (WITH LAB)</td>
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<td>Select 1 from the following:</td>
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<tr>
<td>PHYS 102 &amp; PHYS 104</td>
<td>ELECTRICITY &amp; MAGNETISM (WITH LAB) and ELECTRICITY AND MAGNETISM DISCUSSION</td>
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<tr>
<td>PHYS 112</td>
<td>HONORS ELECTRICITY &amp; MAGNETISM (WITH LAB)</td>
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<tr>
<td>PHYS 126</td>
<td>GENERAL PHYSICS II (WITH LAB)</td>
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Core Courses
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
EBIO 325  ECOLOGY 3
ENST 4XX  SEMINAR: Topics in Environmental Science 3

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 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

Select 1 from the following:
POLI 331  ENVIRONMENTAL POLITICS AND POLICY
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 367 / SWGS 367  LITERATURE AND CULTURE OF THE US-MEXICO BORDERLANDS
ENGL 459  TOPICS 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 EXISING RICE CAMPUS BU
ENST 368 / ENGL 368  LITERATURE AND THE ENVIRONMENT
HIST 376  NATURAL DISASTERS IN THE CARIBBEAN
HIST 425  20TH CENTURY AMERICAN CONSERVATION MOVEMENT

Natural Sciences and Engineering
Select 1 from the following: 3
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  ENGINEERING SOLUTIONS FOR SUSTAINABLE COMMUNITIES
ENST 307 / CEVE 307 / ESCI 307  ENERGY AND THE ENVIRONMENT
ENST 406 / CEVE 406  INTRODUCTION TO ENVIRONMENTAL LAW

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

Capstone Requirement
Select 1 from the following: 3
ENST 307 / CEVE 307 / ESCI 307  ENERGY AND THE ENVIRONMENT
**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. #Earth_Science

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ESCI 321</td>
<td>EARTH SYSTEM EVOLUTION AND CYCLES</td>
<td>3-4</td>
</tr>
<tr>
<td>ESCI 322</td>
<td>EARTH CHEMISTRY AND MATERIALS</td>
<td></td>
</tr>
<tr>
<td>ESCI 323</td>
<td>EARTH STRUCTURE AND DEFORMATION</td>
<td></td>
</tr>
<tr>
<td>ESCI 340 / EBIO 340 / ENST 340</td>
<td>GLOBAL BIogEoCHEMICAL CYCLES</td>
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</tr>
<tr>
<td>ESCI 418 / CEVE 418</td>
<td>QUANTITATIVE HYDROGEOLOGY</td>
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</tr>
<tr>
<td>ESCI 421</td>
<td>PALEOCEANOGRAPHY</td>
<td></td>
</tr>
<tr>
<td>ESCI 425 / CHEM 425 / ENST 425</td>
<td>ORGANIC GEOCHEMISTRY</td>
<td></td>
</tr>
<tr>
<td>ESCI 430</td>
<td>TRACE-ELEMENT AND ISOTOPE GEOCHEMISTRY FOR EARTH AND ENVIRONMENTAL SCIENCE</td>
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<tr>
<td>ESCI 431</td>
<td>GEOMORPHOLOGY</td>
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<tr>
<td>ESCI 435</td>
<td>MECHANICS OF SEDIMENT TRANSPORT</td>
<td></td>
</tr>
<tr>
<td>ESCI 452</td>
<td>GIS FOR SCIENTISTS AND ENGINEERS</td>
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</tr>
<tr>
<td>ESCI 467</td>
<td>GEOMECHANICS</td>
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</tbody>
</table>

**Footnotes and Additional Information**

1. Includes coursework completed as distribution credit, FWIS, LPAR, 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.

**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](http://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: [http://oaa.rice.edu](http://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.

For additional information, please see the Department of Earth, Environmental, and Planetary Sciences website, and specifically the Environmental Science major page, at: [http://earthscience.rice.edu/academics/undergraduate-program/](http://earthscience.rice.edu/academics/undergraduate-program/).
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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