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 Environmental and Earth sciences, including the ability to apply scientific method and apply Earth systems thinking (e.g. feedback processes). *(Critical Thinking)*
2. Integrate knowledge of natural and applied sciences to understand and be able to communicate about complex natural environmental systems and cycles. *(Communication)*
3. Synthesize knowledge and skills from natural sciences and understand how it applies to the study of the environment, including via research and/or field studies in environmental science. *(Research, Design, or Scholarly Pursuits)*
4. Understand environmental issues from scientific and interdisciplinary perspectives (e.g., social sciences, economics, humanities, and/or architecture). *(Critical Thinking, Communication)*
5. Demonstrate advanced knowledge and skills in 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 (https://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 26-29 courses (75-82 credit hours), depending on course selection, to satisfy major requirements.
- A minimum of 120 credit hours to satisfy degree requirements.
- A minimum of 5-7 courses (15-24 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 (https://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***
  - Ecology and Evolutionary Biology (https://ga.rice.edu/programs-study/departments-programs/natural-sciences/environmental-science/environmental-science-bs-ecology-evolutionary-biology-concentration/#Ecology_Evolutionary).

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

Code	Title	Credit Hours
Total Credit Hours Required for the Major in Environmental Science		75-82
Total Credit Hours Required for the BS Degree with a Major in Environmental Science		120

Degree Requirements

Code	Title	Credit Hours
Core Requirements		
Foundation Coursework		
BIOS 201	INTRODUCTORY BIOLOGY I	3
BIOS 202	INTRODUCTORY BIOLOGY II	3
BIOS 332	ECOLOGY	3
CHEM 121	GENERAL CHEMISTRY I	3
or CHEM 111	AP/OTH CREDIT IN GENERAL CHEMISTRY I	
CHEM 123	GENERAL CHEMISTRY LABORATORY I	1
or CHEM 113	AP/OTH CREDIT IN GENERAL CHEMISTRY LAB I	
CHEM 122	GENERAL CHEMISTRY II	3
or CHEM 112	AP/OTH CREDIT IN GENERAL CHEMISTRY II	
CHEM 124	GENERAL CHEMISTRY LABORATORY II	1
or CHEM 114	AP/OTH CREDIT IN GENERAL CHEMISTRY LAB II	
MATH 101	SINGLE VARIABLE CALCULUS I	3
or MATH 105	AP/OTH CREDIT IN CALCULUS I	
MATH 102	SINGLE VARIABLE CALCULUS II	3
or MATH 106	AP/OTH CREDIT IN CALCULUS II	
STAT 280	ELEMENTARY APPLIED STATISTICS [1]	4
or STAT 305	INTRODUCTION TO STATISTICS FOR BIOSCIENCES	
Select 1 course from the following:		*3-4*

PHYS 101 & PHYS 103	MECHANICS (WITH LAB) and MECHANICS DISCUSSION	
PHYS 111	HONORS MECHANICS (WITH LAB)	
PHYS 125	GENERAL PHYSICS (WITH LAB)	
PHYS 141	CONCEPTS IN PHYSICS I	
Data and Quantitation		
Select 1 from the following:		*3-4*
BIOS 338	ANALYSIS AND VISUALIZATION OF BIOLOGICAL DATA	
BIOS 470	COMPUTATION WITH BIOLOGICAL DATA	
CEVE 421	CLIMATE RISK MANAGEMENT	
COMP 140	COMPUTATIONAL THINKING	
DSCI 101	INTRODUCTION TO DATA SCIENCE	
EEPS 220	INTRODUCTION TO COMPUTATION IN THE EARTH, ENVIRONMENTAL AND PLANETARY SCIENCES	
EEPS 435	REMOTE SENSING	
EEPS 436	GIS FOR SCIENTISTS AND ENGINEERS	
EEPS 440	GEOSPATIAL DATA SCIENCE	
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)	
PHYS 142	CONCEPTS IN PHYSICS II	
Core Courses [2]		
BIOS 213	INTRODUCTORY LAB IN ECOLOGY & EVOLUTION	2
ENST 100 / ARCH 105	ENVIRONMENT, CULTURE AND SOCIETY	3
Any course (minimum 3 credit hours) from Earth, Environmental, and Planetary Sciences (EEPS) courses offerings at the 100-level (any course offerings between course numbers EEPS 100 and EEPS 199)		3
EEPS 321	EARTH AND PLANETARY SURFACE ENVIRONMENTS	4
EEPS 325	OCEANS, ATMOSPHERES AND CLIMATE	4
Field Experience		
Select 1-2 courses from the following:		*2-3*
BIOS 204	ENVIRONMENTAL SUSTAINABILITY: THE DESIGN & PRACTICE OF COMMUNITY AGRICULTURE [3]	
BIOS 316	LAB MODULE IN ECOLOGY	
BIOS 317	LAB MODULE IN BEHAVIOR	
BIOS 319	TROPICAL FIELD BIOLOGY	
BIOS 320	ECOLOGY AND CONSERVATION OF BRAZILIAN WETLANDS LABORATORY	
BIOS 322	CONSERVATION BIOLOGY LAB	
BIOS 323 / ANTH 323	CLIMATE CHANGE AND HUMAN EVOLUTION: AFRICAN SAVANNA ECOLOGY AND PALEOECOLOGY	
BIOS 327	BIOLOGICAL DIVERSITY	
BIOS 330	INSECT BIOLOGY LAB	
BIOS 337	FIELD BIRD BIOLOGY LAB	
EEPS 103	FIELD TRIPS FOR THE EARTH	
EEPS 309 / FOTO 390	VISUALIZING NATURE	
EEPS 334	THE EARTH LABORATORY	
Major Concentration		
Select 1 from the following Major Concentrations (see below for Major Concentration requirements):		*9-12*
Earth Science		
Ecology and Evolutionary Biology		
Advanced Electives [4]		
Select 1 course from each of the following categories (see course lists below):		*9-10*
Humanities and Architecture		
Natural Sciences and Engineering [5]		
Social Sciences		
Advanced Field or Research Experience Requirement		
Independent Research (see the Opportunities tab for additional information). [6]		
Select 1 course from the following:		*3*
BIOS 310	INDEPENDENT RESEARCH FOR BIOSCIENCES UNDERGRADUATES	
BIOS 322	CONSERVATION BIOLOGY LAB	
BIOS 323 / ANTH 323	CLIMATE CHANGE AND HUMAN EVOLUTION: AFRICAN SAVANNA ECOLOGY AND PALEOECOLOGY	
BIOS 401	UNDERGRADUATE HONORS RESEARCH	
EEPS 390	GEOLOGY FIELD CAMP	
EEPS 391	PRACTICAL EXPERIENCE IN EARTH, ENVIRONMENTAL AND PLANETARY SCIENCE	
EEPS 481	UNDERGRADUATE RESEARCH IN EARTH, ENVIRONMENTAL AND PLANETARY SCIENCES	
Capstone Senior Seminar Requirement		
BIOS 495 / EEPS 495	SEMINAR: TOPICS IN ENVIRONMENTAL SCIENCE	3
Total Credit Hours Required for the Major in Environmental Science		**75-82**
Additional Credit Hours to Complete Degree Requirements *		7-13
University Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/) *		31
Total Credit Hours		**120**

Footnotes and Additional Information

* **Note:** University Graduation Requirements include 31 credit hours, comprised of Distribution Requirements (Groups I, II, and III), FWIS, and LPAP coursework. In some instances, courses satisfying FWIS or distribution requirements may additionally meet other requirements, such as the Analyzing Diversity (AD) requirement, or some of the student's declared major, minor, or certificate requirements. Additional Credit Hours to Complete Degree Requirements include general electives, coursework completed as upper-level, residency (hours taken at Rice), and/or any other additional academic program requirements.

1 STAT 180 may be substituted for STAT 280.

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 BIOS 204 *Environmental Sustainability: The Design & Practice of Community Agriculture* (1 credit hour) may only be applied once toward the Field Experience Requirement.

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

5 In addition to the courses in the Natural Sciences and Engineering Advanced Electives list, students may complete 1 course listed in the major concentration requirements outside of the student's declared major concentration.

6 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 10-12 credit hours, depending on course selection) as listed below to satisfy requirements for the major concentration in Earth Science.

Code	Title	Credit Hours
Core Requirements		
Select 2 courses from the following:		*7-8*
EEPS 220	INTRODUCTION TO COMPUTATION IN THE EARTH, ENVIRONMENTAL AND PLANETARY SCIENCES	
EEPS 322	EARTH AND PLANETARY CHEMISTRY AND MATERIALS	
EEPS 323	EARTH AND PLANETARY STRUCTURE AND DYNAMICS	
Elective Requirement		
Select at least 1 course from the following: [1]		*3-4*
Any course from Earth, Environmental, and Planetary Sciences (EEPS) courses offerings at the 300-level (or above) designated as Lecture in the course catalog		
EEPS 322	EARTH AND PLANETARY CHEMISTRY AND MATERIALS	
EEPS 323	EARTH AND PLANETARY STRUCTURE AND DYNAMICS	
EEPS 415	GEOCHEMISTRY OF EARTH'S SURFACE	
EEPS 417	COSMOCHEMISTRY AND METEORITICS	
EEPS 420	ORGANIC GEOCHEMISTRY	
EEPS 426	GEOMORPHOLOGY	
EEPS 427	MECHANICS OF SEDIMENT TRANSPORT	
EEPS 429	PALEOCEANOGRAPHY	
EEPS 432	FLUID FLOW IN FRACTURED ROCKS	
EEPS 433	CLIMATE DYNAMICS	
EEPS 434	PALEOCLIMATE	
EEPS 435	REMOTE SENSING	
EEPS 436	GIS FOR SCIENTISTS AND ENGINEERS	
EEPS 437	EARTH'S NATURAL RESOURCES FOR THE ENERGY TRANSITION	
EEPS 439	GEOMICROBIOLOGY	
EEPS 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. Courses previously used to meet Core Requirements cannot be counted a second time as an Elective Requirement.

Course Lists to Satisfy Requirements

Advanced Electives

Students must complete a total of 3 courses (9-10 credit hours, depending on course selection) from each of the following categories: Humanities and Architecture, Natural Sciences and Engineering, and Social Sciences.

Code	Title	Credit Hours
Humanities and Architecture		
Select 1 course from the folowing:		*3*
ECON 480 / ENST 480	THE ECONOMICS OF ENERGY & THE ENVIRONMENT	
ENGL 269 / ENST 265	SCIENCE FICTION AND THE ENVIRONMENT	
ENGL 310	NONFICTION NATURE WRITING	
ENGL 358	CONSUMPTION AND CONSUMERISM	
ENGL 459	STUDIES IN LITERATURE AND ECOLOGY	
ENST 205	RECKONING WITH THE ANTHROPOCENE	
ENST 313 / ARCH 313	CASE STUDIES IN SUSTAINABLE DESIGN	
ENST 316	ENVIRONMENTAL MEDIA: GAMING THE ENVIRONMENT	
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	
ENST 445	SEMINAR IN URBAN SUSTAINABILITY AND LIVABILITY RESEARCH METHODS AND APPLICATIONS	

ENST 446	LAB IN ENGAGED URBAN SUSTAINABILITY AND LIVABILITY RESEARCH
HART 302	FROM THE SUBLIME TO THE SUSTAINABLE: ART, ARCHITECTURE AND NATURE
HIST 321	US ENVIRONMENTAL HISTORY
HIST 470	ENCOUNTERING THE ENVIRONMENT: CASE STUDIES FROM THE GARDEN OF EDEN TO THE SPACE AGE
POLI 441 / ENST 441	GOVERNING THE ENVIRONMENTAL COMMONS

Code	Title	Credit Hours
Natural Sciences and Engineering [5]		
Select 1 course from the following:		*3-4*
BIOS 280	SUSTAINABLE DEVELOPMENT AND REPORTING	
BIOS 374	GLOBAL CHANGE BIOLOGY	
BIOS 559	SUSTAINABILITY IMPACT ASSESSMENTS	
CEVE 302 / ENGI 302	SUSTAINABLE DESIGN	
CEVE 308	INTRODUCTION TO AIR POLLUTION CONTROL	
CEVE 310	PRINCIPLES OF ENVIRONMENTAL ENGINEERING	
CEVE 314 / BIOE 365 / GLHT 314	SUSTAINABLE WATER PURIFICATION FOR THE DEVELOPING WORLD	
CEVE 323	APPLIED SUSTAINABLE PLANNING AND DESIGN	
CEVE 401	CHEMISTRY FOR ENVIRONMENTAL ENGINEERING AND SCIENCE	
CEVE 404	ATMOSPHERIC PARTICULATE MATTER	
CEVE 411	ATMOSPHERIC CHEMISTRY AND CLIMATE	
CEVE 412	HYDROLOGY AND WATER RESOURCES ENGINEERING	
CEVE 414	COASTAL HAZARDS IN A CHANGING CLIMATE	
CEVE 415	URBAN INFRASTRUCTURE, ENVIRONMENT AND SUSTAINABILITY	
CEVE 420	ENVIRONMENTAL REMEDIATION RESTORATION	
CEVE 421	CLIMATE RISK MANAGEMENT	
CEVE 434	FATE AND TRANSPORT OF CONTAMINANTS IN THE ENVIRONMENT	
CEVE 484 / STAT 484	ENVIRONMENTAL RISK ASSESSMENT & HUMAN HEALTH	
CHBE 382	INNOVATION AND SUSTAINABILITY	
CHEM 211 & CHEM 213	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY DISCUSSION I	
EEPS 440	GEOSPATIAL DATA SCIENCE	
ENST 250	UNDERSTANDING ENERGY: ENERGY LITERACY AND CIVICS	
ENST 307 / CEVE 307 / EEPS 307	ENERGY AND THE ENVIRONMENT	
ENST 406 / CEVE 406	INTRODUCTION TO ENVIRONMENTAL LAW	
HEAL 376	FUNDAMENTALS AND APPLICATIONS OF GIS IN PUBLIC HEALTH	

Code	Title	Credit Hours
Social Sciences		
Select 1 course from the following:		*3*
ANTH 210	EAT ME: FOOD AND CULTURE IN GLOBAL PERSPECTIVE	
ANTH 303	INTRODUCTION TO ARCHAEOLOGICAL SCIENCE	
ANTH 315	ZOOARCHAEOLOGY	
ANTH 348	ANTHROPOLOGIES OF NATURE	
ANTH 352	PEOPLE AND ANIMALS IN THE PAST	
ANTH 355	SPACE, PLACE, AND LANDSCAPE	
ANTH 377	SOUTH ASIAN ECOLOGIES	
ANTH 381	MEDICAL ANTHROPOLOGY	
ECON 480 / ENST 480	THE ECONOMICS OF ENERGY & THE ENVIRONMENT	
ECON 485	THE ECONOMICS OF SUSTAINABILITY, CONSERVATION, AND PANDEMICS	
ENST 301	ENVIRONMENTAL JUSTICE	
ENST 302 / SOCI 304	ENVIRONMENTAL ISSUES: RICE INTO THE FUTURE	
ENST 312	JUSTICE IN THE FOOD SYSTEM	
ENST 316	ENVIRONMENTAL MEDIA: GAMING THE ENVIRONMENT	
ENST 332 / ANTH 332	THE SOCIAL LIFE OF CLEAN ENERGY	
ENST 367 / SOCI 367	ENVIRONMENTAL SOCIOLOGY	
ENST 437 / ECON 437	ENERGY ECONOMICS	
POLI 332	URBAN POLITICS	
POLI 441 / ENST 441	GOVERNING THE ENVIRONMENTAL COMMONS	
POLI 362	COMPARATIVE URBAN POLITICS AND POLICY	
SOCI 313	DEMOGRAPHY	
SOCI 368	SOCIOLOGY OF DISASTER	
SOCI 423	SOCIOLOGY OF FOOD	

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

Program Restrictions and Exclusions

Students pursuing the BS Degree with a Major in Environmental Science and a Major Concentration in Earth Science should be aware of the following program restrictions:

- As noted in Majors, Minors, and Certificates (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/) under *Declaring Majors, Minors and Certificates*, students may not obtain both a BA and a BS in the same major. Students pursuing the BS Degree with a Major in Environmental Science and a Major Concentration in Earth Science may not additionally pursue the BA Degree with a Major in Environmental Science.
- Students pursuing the major in Environmental Science may pursue only one major concentration within the major.
- Students pursuing the major in Environmental Sciences and a major concentration in Earth Science may not additionally declare the minor in Earth, Environmental and Planetary Sciences.

Transfer Credit

For Rice University's policy regarding transfer credit, see Transfer Credit (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/). Some departments and programs have additional restrictions on transfer credit. Requests for transfer credit must be approved for Rice equivalency by the designated transfer credit advisor for the appropriate academic department offering the Rice equivalent course (corresponding to the subject code of the course content). The Office of Academic Advising maintains the university's official list of transfer credit advisors (https://oaa.rice.edu/advising-network/transfer-credit-advisors/) on their website: https://oaa.rice.edu. Students are encouraged to meet with the applicable transfer credit advisor as well as their academic program director when considering transfer credit possibilities.

Additional Information

For additional information, please see the following websites:

- https://biosciences.rice.edu/,
- https://eeps.rice.edu/undergraduate/environmental-science-major (https://eeps.rice.edu/undergraduate/environmental-science-major/)/.

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

Academic Honors

The university recognizes academic excellence achieved over an undergraduate's academic history at Rice. For information on university honors, please see Latin Honors (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/) (*summa cum laude*, *magna cum laude*, and *cum laude*) and Distinction in Research and Creative Work (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/). Some departments have department-specific Honors awards or designations.

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: BIOS 401, BIOS 402, and EEPS 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 (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/), a university honor. Details for each program can be found here:

- **BIOS Honors Research**

(https://biosciences.rice.edu/research-overview (https://biosciences.rice.edu/research-overview/))

- **EEPS Explore Research**

(https://eeps.rice.edu/eeps.explore.research (https://eeps.rice.edu/eeps.explore.research/))

- **EEPS Senior Honors Thesis**

(https://eeps.rice.edu/eeps-honor-thesis (https://eeps.rice.edu/eeps-honor-thesis/))

- **Rice Undergraduate Scholars Program**

(https://ouri.rice.edu/rusp (https://ouri.rice.edu/rusp/))

Additional Information

For additional information, please see the following websites:

- https://biosciences.rice.edu/,
- https://eeps.rice.edu/undergraduate/environmental-science-major/.