Rice University

Proposal for a Minor in Earth

Environmental and Planetary Sciences

(EEPS)

Approved by the Faculty Senate

March 25, 2020
Proposal to Create a New Departmental EEPS (a.k.a. ESCI) Minor

Date: March 1, 2020

Prepared by:
Julia Morgan, Earth, Environmental, and Planetary Science

Synopsis:
The Department of Earth, Environmental, and Planetary Science (EEPS) requests the creation of an undergraduate minor in EEPS. This new minor will be hosted, administered, and monitored by the department, along with the already existing undergraduate major, as part of B.A. and B.S. degree offerings.

Faculty Endorsement:
The proposal to create a departmental minor was discussed during faculty meetings that took place Spring 2020. A vote was held by faculty in the department on Wednesday, January 29 faculty meeting. All 15 faculty present voted in favor, and two others voiced their approval in person after the vote. Endorsements by the Dean of Natural Sciences and the Chair of Earth, Environmental, and Planetary Sciences are attached.

Objectives
Historically, introductory Earth Science (ESCI) courses attract many students from across the University. Many of our majors (including double majors) discover the field through these courses, as Earth Science and related disciplines are not typically required in high school. Despite their interests in the discipline, however, students may prioritize different fields of study in which to complete a major. Therefore, we propose to introduce a more accessible means for students to learn more about the Earth, Environmental, and Planetary Sciences, and to gain an academic credential that recognizes that training. For this reason, we propose to create a Minor in Earth, Environmental, and Planetary Sciences. This departmental minor in EEPS is ideal for students who want to enrich their major studies at the University with a specific focus on one or more aspects of Earth, Environmental, and Planetary Sciences, and to explore how this body of knowledge might apply to their own specific academic or professional goals, and expand their career opportunities.

Requirements for the Minor
We are proposing the creation of this minor concurrent with revising our major requirements. The requirements detailed below correspond to the revised requirements, and the differences between the existing and proposed requirements are detailed in a separate proposal (Change Major Name). Furthermore, the minor requirements will be consistent with the EEPS major requirements, drawing upon a large pool of stable courses that are offered regularly.

The following are the proposed requirements to complete the Minor,

Proposed DRAFT GA Text (Minor in Earth, Environmental and Planetary Sciences) as of 03/01/2020
- A minimum of 6 departmental (EEPS) courses (minimum of 19-24 credit hours)
- A minimum of 1 100-level departmental (EEPS) course from list 1 below (3-4 credit hours)
- A minimum of 2 300-level departmental (EEPS) courses from list 2 below (7-8 credit hours)
- A minimum of 3 electives at the 300-level or above, inclusive of list 2 (9-12 credit hours)

**Required and Elective Courses**

**Required:** 1 course (minimum 3 credit hours) from the following:

- ESCI 101 The Earth (3 credit hours)
- ESCI 109 Oceanography (3 credit hours)
- ESCI 110 The Earth System, Environment, & Society (3 credit hours)
- ESCI 111 Inhabiting Planet Earth (3 credit hours)
- ESCI 115 Introduction to the Earth (4 credit hours)
- ESCI 201/ENST 201 The Science of Climate Change (3 credit hours)

**Required:** 2 courses (minimum 6 credit hours) from the following:

- ESCI 321 Earth & Planetary Surfaces (4 credit hours) *
- ESCI 322 Earth & Planetary Materials & Properties (4 credit hours) *
- ESCI 323 Earth’s Interior & Dynamics (4 credit hours) *
- ESCI 325 Oceans, Atmospheres & Climate (4 credit hours) [a proposed NEW Course]
- ESCI 334 The Earth Laboratory (3 credit hours) *

*Course Title Changes pending:*

ESCI 321 is currently “Earth System Evolution & Cycles”, ESCI 322 is currently “Earth Chemistry and Materials”, ESCI 323 is currently “Earth Structure and Deformation” and ESCI 334 is currently “Geological Techniques”.

**Electives:** 3 courses (minimum 9 credit hours) from EEPS departmental undergraduate course offerings at the 300-level and above, excluding courses already selected to meet the above requirements. (See Rice University Course Catalog ESCI subject code.)

**Program Learning Objectives**

Upon completing the minor in Earth, Environmental, and Planetary Sciences, students will be able to:

1. Demonstrate a comprehensive knowledge of the structure of the Earth from core to atmosphere, and how it has changed over time.
2. Acquire and demonstrate knowledge in a number of advanced Earth, environmental, and planetary topics of their choosing.

**Curriculum Map and Assessment Plan**

The Office of Institutional Effectiveness (John Cornwell) does not require these for a minor when a major is already established with assessment in place.
Faculty Involved

All faculty in the Department will be teaching classes for the minor, just as they do for the major. The faculty list includes:

- Jonathan Ajo-Franklin
- Rajdeep Dasgupta
- Sylvia Dee
- Gerald R. Dickens
- André W. Droxler
- Melodie French
- Helge Gonnermann
- Richard G. Gordon
- Cin-Ty Lee
- Adrian Lenardic
- Alan R. Levander
- Caroline A. Masiello
- Julia K. Morgan
- Jeffrey Nittrouer
- Fenglin Niu
- Kirsten Siebach
- Mark Torres
- Laurence Yeung
- Colin A. Zelt

Proposed General Announcement Text [for inclusion in 2020-2021 GA]

Earth, Environmental, and Planetary Sciences

Overview | Undergraduate | Graduate | Faculty | Courses | Codes

Add to the revised Overview Tab text (full Overview text is included at end of document):

The department also offers an undergraduate minor providing a solid introduction to the broad field of Earth, Environmental, and Planetary Sciences, and allowing students to gain exposure to additional advanced topics, while pursuing their major in another field.

Earth, Environmental, and Planetary Sciences

Overview | Undergraduate | Graduate | Faculty | Courses | Codes

Bachelor’s Programs

- Bachelor of Arts (BA) Degree with a Major in Earth, Environmental, and Planetary Sciences
- Bachelor of Science (BS) Degree with a Major in Earth, Environmental, and Planetary Sciences

Minor

- Minor in Earth, Environmental, and Planetary Sciences

Proposed DRAFT GA Text (Minor in Earth, Environmental and Planetary Sciences) as of 03/01/2020
Minor in Earth, Environmental, and Planetary Sciences

Outcomes | Requirements | Policies | Opportunities

Program Learning Outcomes for the Minor in Earth, Environmental, and Planetary Sciences

Upon completing the minor in Earth, Environmental, and Planetary Sciences, students will be able to:

1. Demonstrate a comprehensive knowledge of the structure of the Earth from core to atmosphere, and how it has changed over time.
2. Acquire and demonstrate knowledge in a number of advanced Earth, environmental, and planetary topics of their choosing.

Requirements for the Minor in Earth, Environmental, and Planetary Sciences

Students pursuing the minor in Earth, Environmental, and Planetary Sciences must complete:

- A minimum of 6 courses (minimum of 19-24 credit hours, depending on course selection) to satisfy minor requirements.
- A minimum of 5 courses (minimum of 15 credit hours) taken at the 300-level or above.
- A minimum of 3 courses (minimum of 9) to satisfy the Core Requirements
  - A minimum of 1 course at the 100-level (minimum of 3 credit hours), and
  - A minimum of 2 courses at the 300-level or above (minimum of 7 credit hours).
- A minimum of 3 Elective Requirements courses at the 300-level or above (minimum of 9 credit hours).
- A maximum of 1 course (3 credit hours) from study abroad or transfer credit. (No courses from study abroad or other transfer credit accepted for 300-level courses and above. For additional program guidelines regarding transfer credit, see Policies tab.

Summary

| Total Credit Hours Required for the Minor in Earth, Environmental, and Planetary Sciences | 19-24 |

*Proposed DRAFT GA Text (Minor in Earth, Environmental and Planetary Sciences) as of 03/01/2020*
Minor Requirements

Core Requirements

*Select 1 from the following:*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESCI 101</td>
<td>THE EARTH</td>
<td>3</td>
</tr>
<tr>
<td>ESCI 109</td>
<td>OCEANOGRAPHY</td>
<td>3</td>
</tr>
<tr>
<td>ESCI 110</td>
<td>THE EARTH SYSTEM, ENVIRONMENT, &amp; SOCIETY</td>
<td>3</td>
</tr>
<tr>
<td>ESCI 111</td>
<td>INHABITING PLANET EARTH</td>
<td>3</td>
</tr>
<tr>
<td>ESCI 115</td>
<td>INTRODUCTION TO THE EARTH</td>
<td>4</td>
</tr>
<tr>
<td>ESCI 201/ENST 201</td>
<td>THE SCIENCE OF CLIMATE CHANGE</td>
<td>3</td>
</tr>
</tbody>
</table>

*Select 2 from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESCI 321</td>
<td>EARTH &amp; PLANETARY SURFACE (formerly known as EARTH SYSTEM EVOLUTION AND CYCLES)</td>
<td>4</td>
</tr>
<tr>
<td>ESCI 322</td>
<td>EARTH &amp; PLANETARY MATERIALS &amp; PROPERTIES (formerly known as EARTH CHEMISTRY AND MATERIALS)</td>
<td>4</td>
</tr>
<tr>
<td>ESCI 323</td>
<td>EARTH'S INTERIOR &amp; DYNAMICS (formerly known as EARTH STRUCTURE AND DEFORMATION)</td>
<td>4</td>
</tr>
<tr>
<td>ESCI 325</td>
<td>OCEANS, ATMOSPHERE &amp; CLIMATE <em>(a proposed NEW course)</em></td>
<td>4</td>
</tr>
<tr>
<td>ESCI 334</td>
<td>THE EARTH LABORATORY (formerly known as GEOLOGICAL TECHNIQUES)</td>
<td>3</td>
</tr>
</tbody>
</table>

Elective Requirements

*Select 3 courses from EEPS departmental course offerings (coursework with the ESCI subject code) at the 300-level or above, excluding courses already selected to meet the above requirements.*

**Total Credit Hours**

<table>
<thead>
<tr>
<th>Credit Hours</th>
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<tr>
<td>19-24</td>
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**Minor in Earth, Environmental, and Planetary Sciences**

Outcomes | Requirements | Policies | Opportunities

**Policies for the Minor in Earth, Environmental, and Planetary Sciences**

**Program Restrictions and Exclusions**

Students pursuing the minor in Earth, Environmental, and Planetary Sciences should be aware of the following program restrictions:

*Proposed DRAFT GA Text (Minor in Earth, Environmental and Planetary Sciences) as of 03/01/2020*
• As noted in Majors, Minors, and Certificates, i.) students may declare their intent to pursue a minor only after they have first declared a major, and ii.) students may not major and minor in the same subject.

Transfer Credit

For Rice University’s policy regarding transfer credit, see 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.

Departmental Transfer Credit Guidelines

Students pursuing the minor in Earth, Environmental, and Planetary Sciences should be aware of the following program-specific 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 EEPS website: https://earthscience.rice.edu/.

Minor in Earth, Environmental, and Planetary Sciences

Outcomes | Requirements | Policies | Opportunities

Opportunities for the Minor in Earth, Environmental, and Planetary Sciences

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 (summa cum laude, magna cum laude, and cum laude) and Distinction in Research and Creative Work. Some departments have department-specific Honors awards or designations.

Additional Information

For additional information, please see the EEPS website: https://earthscience.rice.edu/.
Proposed General Announcement Text [for inclusion in 2020-2021 GA]

Earth, Environmental, and Planetary Sciences

Overview | Undergraduate | Graduate | Faculty | Courses | Codes

Earth, Environmental, and Planetary Sciences encompass a range of interrelated disciplines focused on understanding the origin of Earth and planetary systems, the processes that operate within them, and their evolution through time. Topics represented in our field include the physics and chemistry of the solid Earth and its planetary neighbors, the causes and consequences of plate tectonics, and the origin and importance of the oceans and atmosphere. The study of past and present-day environmental processes is integral to understanding the impacts of Earth’s climate, land surface evolution, natural resources, and natural hazards on the biosphere, including humans.

The Department of Earth, Environmental, and Planetary Sciences offers undergraduate and graduate programs for a wide range of interests. All undergraduate majors take a five-course core sequence, typically in the freshman through junior years, gaining a fundamental understanding of earth and planetary systems, processes, materials, history, and interactions. Majors also take a course in applied laboratory, field, and computational techniques, and introductory courses in mathematics, chemistry, and possibly physics and biology. The BS degree provides three areas of specialization:

- **Geoscience** – focused on Earth systems and processes, including upper level courses in solid Earth geophysics, geochemistry, tectonics, and a range of elective options.
- **Environmental Earth Science*** – emphasizing interactions between Earth processes and Earth’s biosphere, enhanced by upper level electives selected from Biosciences, Chemistry, Civil and Environmental Engineering, and more.
- **Planetary Science** – designed to apply our knowledge of the Earth to other planetary systems in our solar system, enhanced by upper level electives in Physics and Astronomy and beyond.

The BS degree in Earth, Environmental, and Planetary Sciences should be chosen by students planning a career or further study in Earth, environmental, or planetary science or related field. The BA degree is a more flexible program that still provides a comprehensive overview of Earth, environmental, and planetary sciences, but can be combined easily with other majors or professional career paths. Many undergraduate students engage in research projects during their careers, gaining the opportunity to work with complex and highly interconnected problems, gaining skills to become leaders and entrepreneurs in the real world - field and laboratory opportunities abound! Future career opportunities include academia, working in industry, business or government, or working with and for societal issues. Many students present their own research projects at national and international professional conferences.
The department also offers an undergraduate minor providing a solid introduction to the broad field of Earth, Environmental, and Planetary Sciences*, and allowing students to gain exposure to additional advanced topics, while pursuing their major in another field.

The department offers two graduate degrees, a Master of Science and Doctor of Philosophy. Students select research projects in concert with their research advisors, and have the opportunity to work on a wide-range of open-ended, complex, and highly interconnected problems.

Faculty members have joint research projects with scientists at over 100 institutions worldwide, giving an international scope to the department with research programs on all the continents, in all of the oceans, and on four planets. Faculty research interests span a wide range of topics; see https://earthscience.rice.edu for more information. Many departmental research programs involve substantial field activities, both on land and at sea. Several courses also include field trips to a variety of destinations and geologic settings.

* Students interested in an undergraduate major with an environmental emphasis have multiple options at Rice University, spanning the Natural Sciences, Engineering, Humanities, and Social Sciences Schools, including:

- **Environmental Earth Science Area of Specialization** under the Earth, Environmental, and Planetary B.S. described above. This major is built upon a strong foundation in Earth Science, and focuses on the interface between the Earth and life.
- **Environmental Science B.S. and B.A.** is a broad and interdisciplinary program that incorporates humanities and social sciences perspectives of environmental issues, in addition to natural sciences. This major is jointly administered by the Biosciences and Earth, Environmental, and Planetary Sciences departments, and offers two corresponding Concentrations: **Ecology and Evolutionary Biology and Earth Science**.
- **Environmental Engineering Area of Specialization** within the Bachelor of Science in Chemical Engineering degree.
- **Environmental Engineering Concentration** within the Bachelor of Arts degree in Civil and Environmental Engineering.

Similarly, students interested in an undergraduate minor with an environmental emphasis have three options at Rice University:

- **Minor in Earth, Environmental and Planetary Sciences** offered by the Earth, Environmental, and Planetary Sciences department, with a strong Earth Science basis.
- **Minor in Energy and Water Sustainability** offered through the Civil and Environmental Engineering department, highlighting engineering and economic considerations.
- **Minor in Environmental Studies**, an interdisciplinary minor drawing broadly from the Schools of Natural Sciences, Engineering, Humanities, and Social Sciences.

Proposed DRAFT GA Text (Minor in Earth, Environmental and Planetary Sciences) as of 03/01/2020
To the University Committee on the Undergraduate Curriculum and Faculty Senate:

From the position of the Chair of the Department of Earth, Environmental, and Planetary Sciences (EEPS), I am writing to fully endorse the creation of a departmental undergraduate minor in EEPS. This new minor will be hosted, administered, and monitored by the EEPS department, along with the already existing undergraduate B.A. and B.S. majors. The department requires no additional resources to provide this 6-course minor, as the required courses will be drawn from those that are currently serve the existing departmental majors, taught by the current faculty.

I believe that the creation of an EEPS minor will help expose more students at Rice to some of the exciting courses we offer in EEPS. Altogether, I believe this new academic minor not only will enhance our department, but also will broaden the experience of Rice students in general.

Sincerely,

Cin-Ty Lee
Chair of the Department of Earth, Environmental, and Planetary Sciences
DATE: February 20, 2020

TO: Committee on Undergraduate Curriculum and Faculty Senate

FROM: Peter Rossky / Dean, Wiess School of Natural Sciences

RE: Endorsement of Earth, Environmental and Planetary Sciences proposal for new departmental minor

I am pleased to endorse the proposal from the Department of Earth, Environmental and Planetary Sciences for a new departmental minor. This minor will enhance opportunities for Rice undergraduates to gain exposure to several of the Natural Sciences’ thereby supporting the mission of the Wiess School of Natural Sciences.

The department can provide this 6-course minor with no additional resources, utilizing the current faculty and course offerings that serve the existing departmental majors. I can commit to sustaining the department while I am at Rice at a level that will make this minor possible.

Sincerely,

Peter Rossky