<table>
<thead>
<tr>
<th>Module Code</th>
<th>GSU11004</th>
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</thead>
<tbody>
<tr>
<td>Module Name</td>
<td>Spaceship Earth: An Introduction to Earth System Science</td>
</tr>
<tr>
<td>ECTS Weighting</td>
<td>10 ECTS</td>
</tr>
<tr>
<td>Semester taught</td>
<td>Semester 1</td>
</tr>
<tr>
<td>Module Coordinator/s</td>
<td>Dr Robin Edwards (<a href="mailto:robin.edwards@tcd.ie">robin.edwards@tcd.ie</a>)</td>
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### Module Learning Outcomes

On successful completion of this module, students should be able to:

- **LO1:** Outline the fundamental concepts of Earth Systems Science with reference to its major subsystems: Geosphere, Biosphere, Atmosphere, Hydrosphere and Anthroposphere
- **LO2:** Illustrate how material and energy are cycled through the Earth system
- **LO3:** Describe the links between biotic and abiotic systems and their role in maintaining a habitable planet
- **LO4:** Apply an Earth Systems approach to describe the phenomena of environmental and climate change
- **LO5:** Discriminate between ‘weather’ and ‘climate’ and situate concerns about current climate change in a longer-term (geological) context
- **LO6:** Identify how human activities modify Earth System function
- **LO7:** Make links between Earth Systems Science and topics covered in their chosen field of study

### Graduate Attributes: levels of attainment

- To act responsibly - Introduced
- To think independently - Introduced
- To develop continuously - Introduced
- To communicate effectively - Introduced
More than 7 billion people now inhabit the Earth and no corner of the planet is unaffected by human activity. The rise of our species has been fuelled by our ability to access planetary storehouses of energy and employ this to manipulate the environments around us. The global-scale of human impacts has led some to suggest we are entering a new era of Earth history - the Anthropocene. Dealing with the effects of environmental and climate change is one of the most significant challenge that our species faces in the 21st century.

This module provides a foundation for understanding global environmental issues by considering the Earth as an interconnected system in which matter and energy are exchanged between the Geosphere, Biosphere, Atmosphere, Hydrosphere and the Anthroposphere. It considers the life-support systems of ‘spaceship Earth’ and aims to provide a theoretical basis for evaluating the role of humans as agents of climate and environmental change.

Module learning aims
To provide foundation-level knowledge of:
- Fundamental concepts of Earth systems science and the theoretical basis of the ‘systems approach’ in Geography and Geoscience
- Character and scope of Earth’s principal sub-systems: Geosphere, Hydrosphere, Atmosphere, Biosphere and Anthroposphere
- Composition / structure of the solid Earth (Geosphere) and the principal processes / drivers responsible for its formation and evolution
- Composition / structure of atmosphere and ocean, the physical processes / drivers of their circulation, and the nature of coupling between them
- Weather and climate at a global scale including climate change past, present and future
- Biogeochemical cycling and the role of interconnected biotic and abiotic systems in the maintenance of life on Earth
- Ecological and historical biogeography including fundamentals of ecology, evolution and extinction
- Nature and scope of human impacts on the Earth system including the ‘Anthropocene’ concept

To develop the following skills & graduate attributes:
- Digital skills to manipulate and analyse geographical data, including use of Google Earth and Excel
- Self-motivated and reflective approach to independent learning, including completion of assigned reading, activities and formative assessment
- Make connections between a student’s core subject areas and the field of geography & geoscience
Teaching and Learning Methods

The module is taught by a combination of lectures and student-centred activities comprising

- 28 lectures
- 28 set readings with accompanying online MCQ tests
- 5 problem-based online activities with associated assessment

Assessment Details

Please include the following:

- Assessment Component
- Assessment description
- Learning Outcome(s) addressed
- % of total
- Assessment due date

<table>
<thead>
<tr>
<th>Assessment Component</th>
<th>Assessment Description</th>
<th>LO Addressed</th>
<th>% of total</th>
<th>Week due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment 1</td>
<td>Set reading &amp; accompanying short online MCQ tests</td>
<td>1-6</td>
<td>20%</td>
<td>3-16</td>
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<tr>
<td>Continuous Assessment 2</td>
<td>Problem-based online activities &amp; associated short online tests</td>
<td>2, 4-6</td>
<td>30%</td>
<td>4-14</td>
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<tr>
<td>Continuous Assessment 3</td>
<td>End of module online test (1.5hrs)</td>
<td>1-7</td>
<td>50%</td>
<td>15-16</td>
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Reassessment Requirements

Retake failed components.

Contact Hours and Indicative Student Workload

Contact hours: 28 hrs

Independent Study (preparation for course and review of materials): 52 hrs

Independent Study (preparation for assessment, incl. completion of assessment): 120 hrs

Recommended Reading List


Earth. 15-16