## ES1001 Understanding Planet Earth

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| **SCOTCAT Credits:** | 20 | SCQF level 7 | **Semester** | 1 |
| **Academic year:** | 2021-2022 | | | |
| **Planned timetable:** | Lectures: 12.00 noon - 1.00 pm Mon - Fri. Practicals: Thursday 2-4 or Thursday 4-6 or Friday 2-4 | | | |
| The Earth is unique in our solar-system by being both geologically active and hosting a myriad of life. This module introduces the study of Planet Earth, from planetary formation to the present-day processes that control our climate. The course covers topics including the dawn of the solar system, the dynamic nature of the solid Earth, and the surface processes that shape the planet. We introduce oceanography, atmospheric science and the cryosphere to understand how climate has and will continue to change with time. Fieldwork will be introduced as two half-day excursions and you will gain experience critically assessing scientific data, working in groups, and giving oral and written presentations. | | | | |
| **Learning and teaching methods of delivery:** | **Weekly contact**: 5 lectures, tutorials and skills sessions, and 1 x 2-hour practical (x 11 weeks), 7-hours fieldwork in total. | | | |
| | **Scheduled learning:** 77 hours | | **Guided independent study:** 123 hours | |
| **Assessment pattern:** | **As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50% | | | |
| | **As used by St Andrews:** 2-hour Written Examination = 50%, 2-hour Practical Examination = 30%, Coursework = 20% | | | |
| **Re-assessment pattern:** | 50% continuous assessment, 50% exam | | | |
| **Module coordinator:** | Dr C V Rose | | | |
| **Module teaching staff:** | Earth and Environmental Sciences staff | | | |

## ES1002 Earth's Resource Challenges

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| **SCOTCAT Credits:** | 20 | SCQF level 7 | **Semester** | 2 |
| **Academic year:** | 2021-2022 | | | |
| **Planned timetable:** | 12.00 noon - 1.00 pm Mon - Fri; 2.00 pm - 4.00 pm Thu and Fri | | | |
| Access to clean water, fertile soil, critical metals, and cheap energy is crucial for modern society. However, the unsustainable use of these natural resources is changing the face of our planet at an unprecedented rate. This module builds on the understanding of planet Earth gained in ES1001, and will highlight the work done by Earth Scientists to solve 21st century resource and environmental challenges. The module investigates the geological processes that generate Earth's 'traditional' resources, such as metals and hydrocarbons, and their environmental impact. Equally, we study 'new' alternative energies such as geothermal and hydro power, and discuss resource requirements of a 'Green New Deal' and potential environmental solutions, such as carbon capture and pollution remediation strategies. Key skills developed include team work, making detailed observations, and evaluating spatial data. There is a fully-funded six-day residential field excursion to the Highlands of Scotland. | | | | |
| **Pre-requisite(s):** | Before taking this module you must pass ES1001 | | | |
| **Anti-requisite(s)** | ES1002 Anti-Requisite | | | |
| **Learning and teaching methods of delivery:** | **Weekly contact**: 5 lectures, tutorials and 1 x 2-hour practical (x 11 weeks), plus 40 hours of fieldwork over the semester. | | | |
| | **Scheduled learning:** 117 hours | | **Guided independent study:** 83 hours | |
| **Assessment pattern:** | **As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50% | | | |
| | **As used by St Andrews:** 2-hour Written Examination = 50%, 2-hour Practical Examination = 30%, Coursework = 20% | | | |
| **Re-assessment pattern:** | 50% continuous assessment, 50% exam | | | |
| **Module coordinator:** | Dr C V Rose | | | |
| **Module teaching staff:** | Earth and Environmental Sciences staff | | | |

## ES1802 The Geological History of Scotland

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| **SCOTCAT Credits:** | 12 | SCQF level 7 | **Semester** | Summer after graduation |
| **Academic year:** | 2021-2022 | | | |
| **Availability restrictions:** | Available only to non-graduating students | | | |
| **Planned timetable:** | Mon - Fri, variable hours | | | |
| This module introduces students to Earth Science using the geological history of Scotland as a case study. This is a four-week course that focuses on applying scientific method through collection and interpretation of field data collect by students. An emphasis is placed on identifying the distinction between data and interpretation, thinking in four dimensions and hypothesis testing. No prior knowledge of geology is required. Scotland is the ideal natural laboratory; it offers classic exposures of a variety of rock types relevant to key periods of time throughout three billion-years of Earth's history. The taught content of the module includes lectures, practical classes and field excursions. Assessments are comprised of written exams (multiple choice/short answer questions, an illustrated essay), a lab exam, field notebook presentation, participation in group discussions and written reports. | | | | |
| **Pre-requisite(s):** | Currently enrolled in a third level institution. Completion of at least one year in a third level institution. Letter of recommendation from this institution / obtained at a 3.0 GPA in one science subject. | | | |
| **Learning and teaching methods of delivery:** | **Weekly contact**: Each week of this module will typically consist of 7 hrs of lectures - lab classes. In addition students will take part in an average of 9 of fieldwork each week. Students are expected to completed the directed reading assignments and read outside of this literature in their own spare time. | | | |
| | **Scheduled learning:** 65 hours | | **Guided independent study:** 55 hours | |
| **Assessment pattern:** | **As defined by QAA:**<br>Written Examinations = 35%, Practical Examinations = 15%, Coursework = 50% | | | |
| | **As used by St Andrews:**<br>2-hour Written Examination = 35%, Practical Examination = 15%, Coursework = 50% | | | |
| **Re-assessment pattern:** | 3-hour Written Examination = 100% | | | |
| **Module coordinator:** | Dr J C Brooke | | | |
| **Module teaching staff:** | Earth and Environmental Sciences Staff. | | | |

## ES2001 Dynamic Earth: The Earth System

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| **SCOTCAT Credits:** | 30 | SCQF level 8 | **Semester** | 1 |
| **Academic year:** | 2021-2022 | | | |
| **Planned timetable:** | 10.00 am - 11.00 am Mon - Fri; 2.00 pm - 5.00 pm Tue | | | |
| This module reflects an up-to-date approach to understanding of the behaviour of the solid Earth and its interaction with the atmosphere and biosphere and beyond. It will provide detailed training in some of the processes acting at or near the Earth's surface (for example the dynamics of erosional processes). The evolution of the planet as a whole (including the evolution of life) from magma oceans in the early Earth to the present day will be covered in detail. Practical and theoretical training in geophysical methods for probing the near surface of the Earth will be provided. | | | | |
| **Pre-requisite(s):** | Before taking this module you must pass ES1001 and pass ES1002 | | | |
| **Learning and teaching methods of delivery:** | **Weekly contact**: 5 lectures and 1 x 3-hour laboratory per week, and occasional tutorials; 16 hours fieldwork | | | |
| | **Scheduled learning:** 96 hours | | **Guided independent study:** 204 hours | |
| **Assessment pattern:** | **As defined by QAA:** Written Examinations = 50%, Practical Examinations = 30%, Coursework = 20% | | | |
| | **As used by St Andrews:** 2-hour Written Examination = 50%, 3-hour Practical Examination = 30%, Coursework = 20% | | | |
| **Re-assessment pattern:** | 50% written exam, 20% field reports, 30% practical tests & quizzes | | | |
| **Module coordinator:** | Professor R W White | | | |
| **Module teaching staff:** | Earth and Environmental Sciences staff | | | |

## ES2002 Dynamic Earth: Magma, Minerals and Metamorphism

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| **SCOTCAT Credits:** | 30 | SCQF level 8 | **Semester** | 2 |
| **Academic year:** | 2021-2022 | | | |
| **Planned timetable:** | 10.00 am - 11.00 am Mon, Wed, Fri; 2.00 pm - 5.00 pm Tue | | | |
| This module focuses on the geology of the solid Earth, the formation of different rock types and how the processes the Earth's interior shape the surface we live on. The mineral building blocks of the Earth will be covered in detail, as well as volcanic and metamorphic processes from the perspective of plate tectonics. A key component of this course is the residential field course to central Spain around the time of the Easter vacation, where independent field mapping will be introduced. | | | | |
| **Pre-requisite(s):** | Students should normally have taken ES2001 or have special permission. | | | |
| **Learning and teaching methods of delivery:** | **Weekly contact**: 4 hour x 11 weeks online lectures, 1 hour x 11weeks online tutorial. 3 hour x 10 weeks in-person or take-home practical | | | |
| | **Scheduled learning:** 120 hours | | **Guided independent study:** 188 hours | |
| **Assessment pattern:** | **As defined by QAA:** Written Examinations = 30%, Practical Examinations = 50%, Coursework = 20% | | | |
| | **As used by St Andrews:** 2-hour Written Examination = 50%, 2-hour Practical Examination = 20%, Coursework = 30% | | | |
| **Re-assessment pattern:** | 2-hour Written Examination = 80%, Coursework = 20%, No Re-assessment if Coursework mark is less than 4 | | | |
| **Module coordinator:** | Professor R W White | | | |
| **Module coordinator Email:** | rww3@st-andrews.ac.uk | | | |
| **Module teaching staff:** | Earth and Environmental Sciences staff | | | |

## ES2003 Dynamic Earth: Earth Surface Processes

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| **SCOTCAT Credits:** | 30 | SCQF level 8 | **Semester** | 2 |
| **Academic year:** | 2021-2022 | | | |
| **Planned timetable:** | Lecture: 10.00 am - 11.00 am Tue, Thu and 2.00 pm - 3.00 pm Mon. Practical 3.00 pm - 6.00 pm Mon | | | |
| This module focuses on the low temperature processes that occur in the outer envelopes of the Earth, including land-atmosphere interactions, geomicrobiology and oceanography. You will explore the relationships between these processes and their impact on environment and climate. You will study how stable isotopes can be used to reconstruct past environments and to interrogate surface processes. A key component of this course will be fieldwork to develop a range of skills in environmental monitoring. | | | | |
| **Pre-requisite(s):** | Before taking this module you must pass ES2001 | | | |
| **Learning and teaching methods of delivery:** | **Weekly contact**: 3 x 1-hour lectures and 1 x 2-hour laboratory per week; 9 hours of tutorials and 40 hours fieldwork over the semester. | | | |
| | **Scheduled learning:** 99 hours | | **Guided independent study:** 201 hours | |
| **Assessment pattern:** | **As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50% | | | |
| | **As used by St Andrews:** 2-hour Written Examination = 50%, Coursework = 50% | | | |
| **Re-assessment pattern:** | 2-hour Written Examination = 80%, Coursework = 20%, No Re-assessment if Coursework mark is less than 4 | | | |
| **Module coordinator:** | Dr N Allison | | | |
| **Module coordinator Email:** | na9@st-andrews.ac.uk | | | |
| **Module teaching staff:** | Earth and Environmental Sciences staff | | | |

## ES2004 Practical and Field Skills for Earth Sciences (Direct Entrants)

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| **SCOTCAT Credits:** | 30 | SCQF level 8 | **Semester** | Full Year |
| **Academic year:** | 2021-2022 | | | |
| **Availability restrictions:** | Available only to students who have been accepted for direct 2nd year entry to an Earth Science degree programme. | | | |
| **Planned timetable:** | 12.00 noon - 1.00 pm Mon - Fri; practical 2.00 pm - 4.00 pm Thu or Fri | | | |
| This module is only available to students who have been accepted for direct 2nd year entry to an Earth Science degree programme. It provides basic practical and fieldwork skills that are not taught at secondary school and which characterise University-taught, accredited Earth Science programmes. Students will take part in 1000 level practical and field-based exercises, and then apply these skills to the 2000 level teaching programme. The students also will attend those aspects of the lecture programme that are not covered in A-level or Higher Geology curricula. The learning in this module will supplement and complement the ES2001, ES2002 and ES2003 teaching. | | | | |
| **Pre-requisite(s):** | Direct Second Year acceptance to BSc Geology, BSc Environmental Earth Science or MGeol Earth Science Degrees | | | |
| **Anti-requisite(s)** | You cannot take this module if you take ES1001 or take ES1002 | | | |
| **Co-requisite(s):** | null | | | |
| **Learning and teaching methods of delivery:** | **Weekly contact**: Weekly lectures, practical classes, and fieldwork. Generally 5 hours per week lecture/lab time plus associated field classes. | | | |
| | **Scheduled learning:** 190 hours | | **Guided independent study:** 110 hours | |
| **Assessment pattern:** | **As defined by QAA:** Written Examinations = 0%, Practical Examinations = 50%, Coursework = 50% | | | |
| | **As used by St Andrews:** Coursework = 100% (made up of Group Work and 2 Field Excursions = 50%, Practical Examinations = 50%) | | | |
| **Re-assessment pattern:** | 2-hour Written Examination = 100% | | | |
| **Module coordinator:** | Dr C V Rose | | | |
| **Module teaching staff:** | Earth and Environmental Sciences staff | | | |