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| Pathway Title: Earth Science | | A levels: Maths & Chemistry | | AS/A2: Chemistry required, GCSE: Physics preferred. | |
| FIRST YEAR MODULES | | | | A levels: Chem no Maths - LEC.181* replaces LEC.171 | |
| Module Code: LEC.171 | Title: Earth's Internal Processes | | No of Wks: 5 | Terms Taught: M1 | exam/cwa: 50/50% |
| The surface features of the Earth are shaped by a combination of processes largely driven by solar energy and processes powered by the planets internal heat. This course aims to cover the internal structure and dynamics of the Earth, using plate tectonics as a basis for interpreting the relevant mechanisms. It will outline the significance of plate tectonics for many environmental topics, such as sea-level change, global climatic patterns and natural hazard analysis. | | | | | |
| or* | | | | | |
| Module Code: LEC.181 | Title: Numerical Skills I | | No of Wks: 5 | Terms Taught: M1 | exam/cwa: 50/50% |
| The module is designed to give new undergraduate students a foundation course in the numerical skills required for studying environmental science. The course concentrates on explicit links between mathematical analysis and physical processes involved with environmental systems. In this regard, environmental case studies are employed throughout the course and a number of environmental data sets are analysed. The learning outcome of this module is, therefore, the acquisition of practical skills in environmental data processing and visualisation of environmental systems. | | | | | |
| Module Code: LEC.172 | Title: Geological Processes | | No of Wks: 5 | Terms Taught: M2 | exam/cwa: 50/50% |
| This course will introduce the principles involved in the following geological processes: formation of minerals, volcanism, metamorphism sedimentation and deformation. There will be close links with the Biogeochemical Processes LEC.173 and Hydrological Processes LEC.174. Practicals will cover the mineral kingdom, volcanoes and magma chambers, metamorphic processes and sediments and also a brief introduction to geological maps. | | | | | |
| Module Code: LEC.173 | Title: Biogeochemical Processes | | No of Wks: 5 | Terms Taught: L1 | exam/cwa: 50/50% |
| The main aim of the module is to introduce students to key biogeochemical processes that have a major impact on the lithosphere, hydrosphere and atmosphere. The importance of biogeochemical processes will be demonstrated through a consideration of their relevance to the new environmental discipline of Earth System Science. The processes will be illustrated using examples of biogeochemical cycles of various elements, on various spatial scales. | | | | | |
| Module Code: LEC.174 | Title: Hydrological Processes | | No of Wks: 5 | Terms Taught: L2 | exam/cwa: 50/50% |
| The module aims to introduce the science of hydrology through an appreciation of the transfer of precipitation to evaporation, groundwater and riverflow. Emphasis is given to hands-on experience of various gauging techniques. Case studies of (a) the physical impacts of rainforest logging (Borneo) and (b) assessment of potential water contamination by a buried radionuclide repository (West Cumbria) are used. | | | | | |
| Module Code: LEC.175 | Title: Atmosphere, Weather & Climate 1 | | No of Wks: 5 | Terms Taught: S1 | exam/cwa: 50/50% |
| This module is an introduction to weather and the climate-related nature of the Earth's lower atmosphere. The course will cover constituents of the atmosphere, World Weather Watch, temperature, wind and precipitation patterns, the atmosphere at rest and in motion, the general circulation, greenhouse effects, weather systems and forecasting. Practicals will include weather observation, weather mapping and measurements techniques. | | | | | |

SECOND YEAR MODULES

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| Module Code: LEC.270 | Title: Environmental Field Course | No of Wks: 1 | Terms Taught: SV | cwa: 100% |
| Pre-requisite: LEC172, 174 & 175 | | | | |
| This is a residential field course held in the Lake District in the week prior to start of the Michaelmas Term of the second year. Groups of approximately 10 students work together on hydrological, geological, geochemical, surveying and erosion projects. Training is provided through 6 days which offer complementary field skills and insight into local environmental processes. The aims are (1) to assess the present and future impacts on water quality of a disused tungsten mine and (2) to provide training in environmental field techniques. 15 credits | | | | |
| Module Code: LEC.243 | Title: Data Collection and Analysis | No of Wks: 10 | Terms Taught: M | Exam/cwa: 50/50% |
| All scientists need to be able to understand the scientific method, to design experiments, to be able to collect data in an unbiased scientific manner, to analyse it using robust statistical techniques and to present it in a clear and concise form, in an appropriate medium and in a way that is appropriate to a relevant audience. The aim of this module is to introduce students in these complementary methods, with a view to providing individuals with the skills they will need to successfully complete their final year projects. | | | | |
| Module Code: LEC.273 | Title: Earth Science Field Skills CORE MODULE | No of Wks: 5 | Terms Taught: L2 | exam/cwa: 50/50% |
| Pre-requisite: LEC.277 | | | | |
| This module is designed for students to learn about geologic and geomorphologic processes, and to acquire the skills to enable them to work competently in the field. The course deals with the following geologic processes: sedimentation; glaciation; volcanism and deformation. It covers the field skills: use of topographic and geologic maps; use of field notebooks; geologic mapping; field sketches; use of compass clinometers; stratigraphic logging and descriptions of rocks, sediments and fossils. It is relevant for students who anticipate careers involving field work. The teaching is carried out in the field for four days over a five week period. There are four half days of practical classes to consolidate each day's activities. 15 credits | | | | |
| Module Code: LEC.274 | Title: Geological Mapping | No of Wks: 1 | Terms Taught: S4 | cwa: 100% |
| Pre-requisite: LEC.273, plus consultation with Dr Steve Lane | | | | |
| This is a six day residential course, held in SW Mull, Scotland, which provides training in geological mapping. Students will collect field data in order to make a single solid geological map. Students will describe, sketch, photograph and map key localities. They will be taught geological mapping skills, i.e. indication of outcrops on field slips of 1:10,000 scale, map reading, recording of information in notebooks, inking in of maps and safety in the field. Coursework is split into two parts, submitting a fair copy geological map for 60% of the module, and their field notebook which carries 40% of the module grade. 15 credits | | | | |
| ATTENDANCE AT THE FIRST AID COURSE AT THE START OF SUMMER TERM IS COMPULSORY FOR ALL STUDENTS REGISTERING FOR THIS MODULE. | | | | |
| Module Code: LEC.275 | Title: Catchment Hydrology | No of Wks: 5 | Terms Taught: M1 | exam/cwa: 50/50% |
| Pre-requisites: LEC.174 & 183 | | | | |
| To introduce concepts, plus measurement and analytical techniques used by professional hydrologists to solve water-related problems in catchments (notably flood forecasting and water quality remediation). 15 credits | | | | |
| Module Code: LEC.277 | Title: Geological Methods: Understanding Earth Science Processes and Products CORE MODULE | No of Wks: 5 | Terms Taught: L1 | cwa: 100% |
| Pre-requisites: LEC171,172 & 270 | | | | |
| The landscapes we see today are the consequence of interaction between tectonic uplift (endogenetic) processes and denudational (exogenetic) processes. These processes are continually in flux resulting in a dynamic landscape which evolves and adjusts through time. This module examines tectonic processes and products, the interaction between uplift and denudation, and looks at how we can recognise and quantify the amounts and rate of change. This module complements Dynamic Landscapes I which focuses on exogenetic processes. This is a strongly practical-based course, designed to provide students with key skills needed by earth scientists. Lectures are designed to provide an introductory background to the practical skills required for the assessed assignment. 15 credits | | | | |

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| Module Code: LEC.278 | Title: Soil Science | No of Wks: 5 | Terms Taught: L2 | exam/cwa: 50/50% |
| Pre-requisite: LEC.103 This module aims to demonstrate the nature and properties of soils in an environmental context. An introduction to soil formation, description, chemical and physical properties, and biology leads to the application of soil science to a variety of practical problems. 15 credits | | | | |
| THIRD YEAR MODULES | | | | |
| Module Code: LEC.370 | Title: Hydrological Processes Field Course | No of Wks: | Summer Vac 1 | cwa: 100% |
| Pre-requisite: LEC.275 The field course is an introduction to the study of flow and transport processes based on projects leading to an understanding of the spatial distribution of hydrological processes and a physical basis for the delineation of nitrate protection or buffer zones in the Slapton Wood Catchment. Places limited and pre-registration required. 15 credits | | | | |
| Module Code: LEC.374 | Title: Volcanic Process Field Course | No of Wks: 1 | Terms Taught: Easter Vac | cwa: 100% |
| Pre-requisites: LEC.185, 273 & must take LEC.377 This course will build upon skills acquired during previous geological field courses. During an intensive week-long field course to an active volcanic region students will improve their understanding of many of the complex processes that take place both on the surface and beneath volcanoes. This will be achieved by undertaking detailed fieldwork at key localities of a basaltic volcano. Students will also gain experience in hazard analysis and mitigation. Places are limited and any student wishing to enrol must express an interest via the ES Teaching office and attend an initial briefing session [Cost in 2011 was £450]. 15 credits | | | | |
| Module Code: LEC.375 | Title: The Dynamic Earth CORE MODULE | No of Wks: 5 | Terms Taught: L | exam/cwa: 67/33% |
| Pre-requisite: LEC.171 This course builds on material covered in Part 1 (Earth's Internal Processes) to develop a deeper understanding of the Earth's internal structure and dynamics, and interactions between surface (crust/lithosphere) and deep (core/mantle) processes. Several geophysical techniques are described and compared. You will be encouraged to read a variety of journal articles as a basis for discussion of current theories and controversies about how the Earth works. 15 credits | | | | |
| Module Code: LEC.376 | Title: Introduction to Geophysical Techniques CORE MODULE | No of Wks: 5 | Terms Taught: M2 | exam/cwa: 67/33% |
| This module introduces the underpinning aspects of geophysical and remote sensing techniques used to investigate the Earth's surface and near surface. The techniques covered are illustrated by case studies demonstrating their advantages and limitations, for example, for the investigation of contaminated sites and sites suitable for exploitation (e.g. for minerals or for hydrothermal energy) and for monitoring hazardous regions such as volcanoes. The course provides a synoptic view of active and passive techniques, seismic, gravity, magnetic, radar and electrical methods for sub-surface characterisation and GPS, radar and laser techniques for surface measurements. The techniques are linked through developing an understanding of measurements in terms of both spatial and temporal coverage and resolution. 15 credits | | | | |
| Module Code: LEC.377 | Title: Geological Hazards | No of Wks: 5 | Terms Taught: L1 | exam/cwa: 67/33% |
| This module is designed for students who wish to understand more about fundamental geological hazards and the processes responsible. The module puts geological hazards in their context and primarily includes issues of prediction, but with linkage to response and preparedness issues. The core of the module addresses the fundamental processes and mechanics of hazard prediction. Specific hazards addressed are seismic-based hazards, slope stability and landslides and volcanic hazards (eruption styles, plumes and pyroclastic flows). It includes case histories of both national and international disasters. 15 credits | | | | |
| Module Code: LEC.381 | Title: Environmental Applications of Isotope Geochemistry CORE MODULE | No of Wks: 10 | Terms Taught: M | exam/cwa: 67/33% |
| This module will focus on how different chemical and isotopic systems can be used to describe and account for the compositions of the oceans. It will also facilitate an understanding of physical processes in the environment, particularly with reference to aqueous systems. The course will also consider the use of isotopes for understanding palaeoclimatic conditions and for acquiring surface and groundwater ages. 15 credits | | | | |
| Module Code: LEC.300 | Title: Dissertation | No of Wks: 40 | Terms Taught: S yr 2+3rd | cwa: 100% |

This module aims to integrate career planning and an awareness of graduate key skills, e.g. intellectual, practical, communication, numeracy, teamwork, self-management and professional development skills, with production of a thesis based on original work, on a topic of the students' choice. The subject knowledge will be particular for each students' dissertation. **30 credits**

Module Code: **LEC.301**

Title: **Dissertation with Work Placement**

No of Wks:

Terms Taught: Summer Vac

dissertation: 100%

Pre-requisite: LEC.243

Although many students undertake paid work or work experience, they rarely have the opportunity to work on a defined project in an organisation that is directly related to their degree. The main general aim of this module is to provide students with a better understanding of the skills and competencies required in the workplace and to enhance their chances of gaining relevant employment after graduation. In addition, the experience of linking academic study to a placement project will enhance the generic skills of critical thinking, good time management, analysis and writing that are inherent in all dissertations and projects. **30 credits**

Please note:

- 1. If the LEC 300/ LEC 301 dissertation is selected (for students studying more than 120 credits), the relevant skills course must also be taken as a pre-requisite.**
- 2. If 120 credits + are taken this enables you to study the LEC.270 Environmental Field Course and LEC.243 Project Skills linked with the field course, these equal 30 credits.**

The above options are only available after consultation with the department.

Skills tutorials start in Michaelmas Term of your SECOND year only.

Content Major Pathway

Students take 90 credits, if possible, divided equally between second and third year

Content Minor Pathway

Students take 60 credits, if possible, divided equally between second and third year