

Geology

 MEdSci

COURSE DETAILS

- A level requirements: [AAB](#)
- UCAS code: F601
- Study mode: Full-time
- Length: 4 years

KEY DATES

- Apply by: [25 January 2023](#)
- Starts: 25 September 2023

Course overview

Discover planet Earth: from natural hazards to natural resources, from the history of life to the history of the planet itself. You don't need to have studied geology before and this programme can open the door to a career as a professional geologist in industries such as petroleum, mineral resources, engineering geology and environmental assessment. You will gain thorough and highly practical training in modern geology, with a strong emphasis on fieldwork.

INTRODUCTION

The Geology MEdSci (Hons) shares the first three years with Geology BSc (Hons), with the final year providing more advanced training in all aspects of geology.

In years one and two, we provide core training in all key areas of geology. You will undertake an independent field-based project and complete a dissertation in year three. Modules specific to the four-year programme include volcanic processes, mineral deposits, and research methods. Year three and four field classes visit Northern Spain and Tenerife.

In year four, you will work within one of our research groups and complete a major geological research project. This will involve development of research and communication skills through a project proposal, literature review, journal-style manuscript and conference-style talk. Results often get published in international journals.

There is scope for an industrial placement with organisations such as Shell, BP, Exxon-Mobil, RioTinto, Anglo-American, the Environment Agency and the British Geological Survey.

Many of our students successfully complete internships in industry between years three and four.

You will choose from a wide range of applied and more academic modules to create your own pathway. Again, there is high level of field-based training designed specifically to give you skills in data analysis, synthesis, problem solving, research and reporting your results.

Semester two of year three can be spent abroad at a partner university in Australia

or New Zealand.

A number of the School's degree programmes involve laboratory and field work. Fieldwork is carried out in various locations, ranging from inner city to coastal and mountainous environments. We consider applications from prospective disabled students on the same basis as all other students, and reasonable adjustments will be considered to address barriers to access.

WHAT YOU'LL LEARN

- Core training in all key areas of geology
- Volcanic processes, mineral deposits, and research methods
- Work with one of our research groups and complete a major geological research

project

- Develop data analysis, synthesis, problem solving, research and communication skills

ACCREDITATION

This degree is accredited by the Geological Society of London, satisfying the

requirements of Fellowship and Chartered Geologist status.

Course content

Discover what you'll learn, what you'll study, and how you'll be taught and assessed.

YEAR ONE

Year one aims to provide a comprehensive introduction to core disciplines in geoscience assuming no prior knowledge of the subject. A strong feature of year one is the development of transferable skills (eg Geographical Information Systems (GIS), IT, essay writing, oral communication), integrated within a tutorial system. Tutorials are run by academic staff.

Fieldwork involves:

- 1 day in North England (October)
- 8 days in Pembrokeshire (Easter)

ENVS117 is a compulsory module for those without A level Maths or Physics at grade C or above. ENVS153 is a compulsory module for those without A level Chemistry at grade C or above. You should discuss this with your programme director at the start of the academic session.

COMPULSORY MODULES

EARTH STRUCTURE AND PLATE TECTONICS (ENVS112)

Credits: 15 / Semester: semester 2

The "Earth structure and plate tectonics" module provides an introduction to the Earth and aim to teach students about:

- 1) the structure and composition of the Earth, the Earth's gravitational and magnetic fields, and dynamics within the deep Earth;
- 2) the physics of Earth material and the geological time scale; and
- 3) plate tectonics.

INTRODUCTION TO FIELD GEOLOGY (ENVS109)

Credits: 15 / Semester: semester 2

This field module provides a basic training in field techniques and gives students practical experience working with a wide range of rock types and tectonic structures to solve geological problems. Students gain experience in recording field data and use their own data to interpret geological processes and environments.

The module is assessed by means of an individual fieldwork portfolio, and a group synthesis poster completed after the field class.

SEDIMENTARY ROCKS AND FOSSILS (ENVS118)

Credits: 15 / Semester: semester 1

This module provides a basic introduction to sedimentology and palaeontology. Students learn about the origin of sediment, sedimentary processes and structures and the ways in which sediments are converted into solid rock. The course outlines the importance of sedimentary rocks for hydrocarbons, water and as construction materials. Students learn how to describe and interpret sedimentary deposits.

The palaeontology component introduces students to the major fossil groups and to the ways in which organisms can be preserved as fossils. It covers the importance of fossils for the study of evolution, environmental change and earth history. Students learn how to describe fossils and how observations contribute to a broader understanding.

Students will be assessed by means of two practical tests and a theory examination.

INTRODUCTION TO STRUCTURAL GEOLOGY AND GEOLOGICAL MAPS (ENVS156)

Credits: 15 / Semester: semester 2

This module introduces a key subject within Earth Sciences, Structural Geology and Geological Mapping. In this module you will be introduced to geological structures from the micro to the mountain scale, and receive training in the geometrical techniques used to document and analyse them. You will also learn the basic principles of stress and strain which underpin a number of advanced Earth Science subjects and skills used in industry and research. Finally, the module will provide training in how to read and understand geological maps, and train your 3D visualisation skills by learning how to create geological cross-sections from maps, and how to stereographically plot 3D geological data. A combination of virtual lectures, practical skill development sessions, discussion sessions, and directed reading will help you navigate this important Earth Sciences topic. You will be assessed on the development of your practical skills through an end-of-semester open book practical exam, and you will write an individual research paper on a specific topic in structural geology.

STUDY SKILLS AND GIS (EARTH SCIENCE) (ENVS101)

Credits: 15 / Semester: whole session

This module introduces students to the key skills necessary to succeed on a University Earth Science course. It does this via a series of lectures, workshops, and tutorials, together with a geology fieldwork day and attendance at departmental seminars and talks. The lectures, towards the start of the first semester, cover academic integrity, exam skills, employability and 2D/3D visualisation. Tailored workshops cover Geographical Information Systems (GIS), Word, Excel and programming skills. Small-group (typically 4 to 8 students) tutorials are run by academic staff and cover essay writing, careers and employability. Students receive formative feedback on a practice essay in the first semester before completing one that is summatively assessed, set in the second semester. Academic tutors undertake personal development planning (PDP, i.e. careers and module selection advice) with each tutee. It is recommended that all students attend departmental seminars and the annual Herdman (student-led) conference as these help students integrate into the department and understand the sorts of research and applied activity that takes place.

EARTH MATERIALS (ENVS185)

Credits: 15 / Semester: semester 2

This module will introduce and develop understanding of rock-forming minerals, and other key Earth materials in terms of their environments of formation, occurrence, and abundance. The module will focus on exploring the uses and societal significance of a range of Earth materials, especially those most important for providing sustainable and renewable energy resources and various societal infrastructure. The key practical skill of mineral description, identification and interpretation will be developed and applied throughout the module, to equip students with appropriate skills for many later geoscience modules.

OPTIONAL MODULES**CLIMATE, ATMOSPHERE AND OCEANS (ENVS111)****Credits: 15 / Semester: semester 1**

Climate, Atmosphere and Oceans provides an understanding of how the climate system operates. The module draws on basic scientific principles to understand how climate has evolved over the history of the planet and how the climate system is operating now. Attention is particularly paid to the structure and circulation of the atmosphere and ocean, and how they both interact. The course emphasizes acquiring mechanistic insight and drawing upon order of magnitude calculations. Students gain quantitative skills by completing a series of coursework exercises. Students address the Net Zero carbon goal via group work involving digital storytelling.

ENVIRONMENTAL CHEMISTRY (ENVS153)**Credits: 15 / Semester: semester 2**

This module will give students an understanding of the basics that control fundamental properties of elements and matter, either solid, liquid or gas. It will introduce the fundamentals of atomic structure, elements and molecules from simple inorganic to large organic ones and the bonding forces that held them together. It will look at the basics of chemical reactions with processes of oxidation and reduction, solubility of solids and gases, acid-base properties and thermo-chemistry. Students will learn how to make quantitative predictions on e.g. the amount of products that will be produced based on balanced chemical reactions and will see how basic chemistry can be used to explain many environmental properties. Teaching will be delivered through lectures, tutorial sessions and on-line formative quiz with automated feedback. The tutorial session consists in a set of formative exercises with the presence of demonstrator for facilitate individual learning. The module also include revision sessions (run by demonstrators and staff) as well as revision sessions run by Year 2 and/or Year 3 students who have done this module previously. Assessment is done through 3 on-line tests and a final in-person open book exam.

ESSENTIAL MATHEMATICAL SKILLS (ENVS117)**Credits: 15 / Semester: semester 1**

This module is designed to provide students without a A-Level GCE level (or equivalent) background in mathematics a foundation to their degree programme. The module covers pure maths, maths mechanics and statistics developing the required knowledge and skills to be able complete degree programmes in Ocean Sciences, Earth Sciences, Geography, Environmental Science and Marine Biology. The module is taught as weekly lectures following a ten-chapter book developed for the module by world leading experts in the fields. Lectures are supplemented with workshops where concepts can be discussed and skills improved. The module is assessed though online pop-quizzes and a formal written exam.

MATHEMATICS FOR PHYSICISTS I (PHYS107)

Credits: 15 / Semester: semester 1

This module aims to provide all students with a common foundation in mathematics, necessary for studying the physical sciences and maths courses in later semesters. All topics will begin "from the ground up" by revising ideas which may be familiar from A-level before building on these concepts. In particular, the basic principles of differentiation and integration will be practised, before extending to functions of more than one variable.

THEORY AND LABORATORY EXPERIMENTS IN EARTH SURFACES PROCESSES (ENVS165)

Credits: 15 / Semester: semester 2

The module uses a lecture and laboratory-based problem-solving approach to explore some of the fundamental physical and chemical processes underlying physical geography. It is designed to provide a foundation for environmental and physical geography modules in the second and third years.

LIFE IN THE SEAS AND OCEANS (ENVS121)

Credits: 15 / Semester: semester 1

The seas and oceans cover 71% of the Earth's surface, with an average depth of 3.6 km and a volume of >1 billion cubic kilometres, the seas and oceans represent around 99% of planet Earth's living space. Around 50-80% of all life on Earth is found in the oceans, with an estimated 240,000 species. As we have only explored around 10% of the oceans, more species and ways of life are still being discovered.

This module is designed to deliver an introduction to the diversity of life in the marine environment. You will be introduced to the range of living organisms in the oceans from microscopic plants and bacteria to whales through a series of E-lectures. During a series of workshops and practicals you will have the opportunity to examine marine organisms in our award winning teaching facilities and explore some of the diverse adaptations marine organisms have adopted in order to meet the challenge of survival in the marine environment. Your knowledge and understanding will be assessed via open-book online tests, a group project and an individual project.

Programme details and modules listed are illustrative only and subject to change.

YEAR TWO

Year two takes subjects to greater depth and builds student skills in synthesising and evaluating geological data. A key part of the year is training you in preparation for year three independent field projects, particularly in tutorial sessions run by academic staff.

Fieldwork involves:

- 9 days geological mapping training Yorkshire (Easter)

To fulfil the aims of the year and ensure accreditation, all modules are compulsory.

COMPULSORY MODULES

APPLIED GEOPHYSICS (ENVS216)

Credits: 15 / Semester: semester 1

This module provides an introduction to the principles and practise of all the main geophysical methods used for exploration purposes. This includes seismic refraction, seismic reflection, electrical methods, ground penetrating radar, gravity, and magnetics. Students will also gain understanding of when and where each method can be useful. Case studies will be used to highlight application of methods on all scales from shallow to deep, small to large and include uses within archaeology, engineering and geology. The module concludes with a synthesis of methods and how to approach site investigation. The module is lecture and problem session based with 50% continuous assessment from set homework assignments or problem sheets. The final exam constitutes the rest of the assessment.

METAMORPHISM AND CRUSTAL EVOLUTION (ENVS212)

Credits: 15 / Semester: semester 2

This module provides second or third year students with a foundation in the whole subject of metamorphism, from how and why atoms move around to form new minerals, through the textures of metamorphic rocks in hand specimen and how to interpret them, to the large scale plate tectonic phenomena that drive everything. Previous study of mineralogy, igneous and structural geology is assumed. Lectures are interactive – the lecturer presents the outline to the audience, takes questions from the audience and students will work up the lecture notes in their own time incorporating material from textbooks. Practicals involve thin section work (the only way to become familiar with metamorphic minerals and textures), hand specimen examination, calculations and the study of metamorphic and other maps of the Caledonian mountain belt in Britain and Ireland. Students will begin by studying the fundamental principles of metamorphic geology and gradually the scale of consideration enlarges until by halfway through the module, we see how metamorphism links to, and informs us about, past and present plate tectonics. We then return to some more detailed techniques for studying metamorphism, and finish by tying all the ideas together in a “case study” of the Caledonides of Britain and Ireland, the eroded remnants of Palaeozoic subduction and collision. Metamorphic geology plays a pivotal role in unravelling this story, as it does in unravelling the history of the entire Earth. Students are assessed during term in using practical skills (thin section drawing, calculations, use of various graphical and pictorial techniques) and through a final theory exam in knowledge and understanding of the subject

MINERALS, MAGMAS AND IGNEOUS GEOCHEMISTRY (ENVS247)

Credits: 15 / Semester: semester 1

This module comprises a series of lectures and practical classes to facilitate students constructing their own learning in the fields of mineralogy, igneous petrology and geochemistry. The module's learning outcomes are assessed by a mid-term class test, creating an individual A3 poster based on a topical case study, and a summative exam.

RESEARCH SKILLS (GEOSCIENCES) (ENVS200)

Credits: 15 / Semester: whole session

The module introduces and develops a range of skills that are central to the research process and the development of key skills important for employment after graduation. The module provides students with the research skills they will need to complete Year 3 dissertation projects. The syllabus is delivered via tutorial sessions and a lecture/workshop series. The tutorials provide a learning environment to support students in discussing key issues and in developing important professional skills. They also provide students with the opportunity of developing a champion – their academic tutor, a member of staff who will get to know them well and be well positioned to write references for employment. The lecture/workshop series covers IT-related skills needed for writing and illustrating reports, consistently citing and referencing data sources, constructing final versions of geological maps, and plotting orientation data, as well as aspects of Careers and Employability. Assessment is coursework-based and comprises an oral presentation, a geological report / literature review, a computer-generated final map poster and a project plan (Gantt chart). As part of this module, students are required to complete dissertation project hazard/risk assessment paperwork. Help and feedback is provided by the academic tutor and technical staff, as well as the module leader.

SEDIMENTARY PROCESSES AND DEPOSITIONAL ENVIRONMENTS (ENVS219)

Credits: 15 / Semester: semester 1

Sedimentary successions are the only archive from which we can accurately decode the Earth's past. Using physical, chemical and biological information we can reconstruct past climates, tectonics and depositional environments. This module teaches the fundamental principles of interpreting sedimentary stratigraphy, and develops students' abilities to recognize sedimentary textures and use them to interpret ancient depositional environments.

STRUCTURAL GEOLOGY AND INTERPRETATION OF GEOLOGICAL MAPS (ENVS263)

Credits: 15 / Semester: semester 2

This module builds on the prerequisite module Introduction to Structural Geology and Geological Maps. While the module introduces additional structures, emphasis is placed on the spatial, kinematic and temporal relationships between geological structures. Strain and stress analysis are developed to a level such that they may be used, as appropriate, to explain the origins of selected geological structures. The module considers the geometries of a series of geological structures and stratigraphies displayed on geological maps and how they should be described and analysed with an emphasis on the interpretation of a geological map as an integrated whole. A combination of lectures, laboratory work and directed reading are used to deliver the module. Twenty lectures will be supported by ten laboratory based practicals. It will be assessed using a theory examination and a practical examination.

VOLCANOLOGY AND GEOHAZARDS (ENVS284)

Credits: 15 / Semester: semester 2

This module comprises a series of lectures, seminars and practical classes to facilitate students constructing their own learning in the fields of volcanology and geohazards. Lectures and guided reading present the scientific, societal, economic and political aspects of volcanic hazards within the wider geohazard context. These themes are then explored further through illustrative case studies, guest seminars and practical exercises.

FIELD MAPPING TECHNIQUES (ENVS293)

Credits: 15 / Semester: semester 2

This module is a 10 day field class or online equivalent in which students learn various techniques required to assess the 3D geological evolution of an area. Training entails mapping exercises at different scales, designed to develop abilities to visualise geology and geomorphology in 3D, and to analyse and synthesise discrete observations to build a full four-dimensional model that includes the deep-time geological history of the area . Mapping techniques also include notebook construction, to complement any geological or geomorphological map, generalised vertical sections and lithostratigraphy, and the construction of cross-sections for 3D visualisation. These are all skills that are highly regarded and often required by geoscience employers, and this field class also provides the students with several skills required for final year independent research projects. Staff supervise all mapping and technical exercises and provide feedback throughout, but with progressively less direct staff supervision as the module progresses, to encourage independent work as student's skills develop. Group work, when possible, develops the individual's ability to work effectively in a team. Assessment takes place during the field class exercise.

Programme details and modules listed are illustrative only and subject to change.

YEAR THREE

Years three and four lead you to research-

level understanding of a range of earth

science problems and issues via formal teaching and independent research work. A major feature of the third year is the independent field project and dissertation in which you have the opportunity to conduct a major piece of independent fieldwork and present it in a substantial report.

Fieldwork involves:

- 13 days advanced field techniques in Donegal, Ireland (summer between Years Two and Three)
- 35 days independent project fieldwork (summer between Years Two and Three)
- 8 day field course in Tenerife or 7 days in Northern Spain.

Students take three compulsory modules which includes either ENVS374 or ENVS375 and choose four optional modules.

COMPULSORY MODULES

FIELD PROJECT AND DISSERTATION (ENVS354)

Credits: 30 / Semester: semester 1

Students will demonstrate their scientific skills by planning and undertaking a project with a major component of field study (completed in the summer before Year 3). Once field (and lab) work is complete, they will analyse and write-up their findings under staff supervision, presenting their results as a talk, a dissertation and a poster.

ADVANCED GEOLOGY FIELD TECHNIQUES (ENVS351)

Credits: 15 / Semester: semester 1

Geological fieldwork can be conveniently divided into three parts: reconnaissance, geological mapping, and more detailed geological analysis all of which are necessary in building up a picture of the geological history of a given area. This two-week field class, which takes place in June immediately after the end of the second year, deals with the third, detailed phase of geological fieldwork, and forms the final part of training for your independent field project and subsequent dissertation write-up. Using comfortable self-catering accommodation in Bundoran, County Donegal as a base, we examine sedimentary, igneous and metamorphic rocks in Donegal and Sligo. Bringing together knowledge and techniques from all the theory modules taken in Years One and Two, you will undertake three projects that correspond to the three main phases of the geological history of the north of Ireland: regional and contact metamorphism and deformation of Dalradian rocks; Carboniferous basin formation and fill; Palaeogene igneous intrusions. Students are assessed on the basis of their individual field notebooks, as well as for their contribution to two group projects. In addition to gaining a thorough understanding of the geology of this part of northwest Ireland, you will also develop invaluable skills in problem solving and independent working.

OPTIONAL MODULES

GEOENERGY (ENVS337)

Credits: 15 / Semester: semester 1

Our pathway to a carbon neutral world relies upon our ability to develop new technologies and improve established technologies. Earth Scientists will play a major role in this energy revolution from sourcing raw materials for solar cells and batteries to sequestering carbon dioxide in rock units deep beneath the Earth's surface. This module provides a background to the GeoEnergy sector, with particular focus on fluid flow through geological structures and rock units. The broad aim of the module is to provide students with the appropriate level of knowledge and skillset to be able to evaluate and manage hydrocarbon reservoirs, including carbon dioxide sequestration, and geothermal systems.

ENGINEERING GEOLOGY AND HYDROGEOLOGY (ENVS338)

Credits: 15 / Semester: semester 1

This module provides the basic principles of engineering geology and hydrogeology. The applications of these principles are illustrated using selected examples and emphasis is placed on the interaction between them and their control on the mechanical stability of natural systems. By necessity predictions must be quantitative but, in order to develop understanding, a strongly graphical approach has been adopted in this module. The applications of engineering geology and hydrogeology will be highlighted using a field-based case study: the Mam Tor landslide. Engineering geology and hydrogeology are two important sources of employment and this module provides an opportunity to experience the scope and nature of these subjects. A combination of lectures, directed reading, laboratory work and fieldwork are used to deliver the module. Twelve lectures will be supported by six laboratory based practicals. It will be assessed using a report of the field investigation and an examination.

ENVIRONMENTAL GEOPHYSICS (ENVS258)

Credits: 15 / Semester: semester 2

This module builds on the theory taught in Exploration Geophysics (ENVS216), by introducing a large amount of practical experience, data analysis and interpretation. Fieldwork will be run using input from industry professionals from RSK. The module will introduce principles of remote sensing, and give practical experience in GIS, electrical methods, seismics, ground penetrating radar, gravity and magnetics. Attention will be paid to how these different methods can be integrated to give a thorough understanding of a study site. The module will be assessed through a combination of continuous assessment such as short reports.

INTRODUCTION TO QUATERNARY MICROPALAEONTOLOGY (ENVS342)

Credits: 15 / Semester: semester 2

This module intends to give a holistic insight of a number of marine and terrestrial microfossils that are conventionally used for reconstructing past environmental conditions for the Quaternary period, including recent past. Microfossils are biological indicators that can help to either qualitatively and/or quantitatively estimate environmental conditions such as atmospheric temperature and precipitation (pollen), sea-surface conditions (foraminifera, diatoms, radiolarians, dinoflagellate cysts), salinity (ostracods, diatom), pH (diatoms), sea-ice cover (diatoms, dinoflagellate cysts), etc. These conditions are of paramount importance for modelling past climate conditions and the data derived from microfossil assemblages enable to better calibrate models, which in turn, are essential to forecast future climate. In addition, microfossil assemblages help to understand the natural evolution of our environment as well as measuring the amplitude of human activities over time.

MINERAL RESOURCES (ENVS326)

Credits: 15 / Semester: semester 2

This module aims to provide understanding of the major types of mineral deposit through a critical assessment of conceptual models of deposit forming processes. There is an emphasis on geochemistry and quantitative methods. Content is delivered through on-line lectures with the aim of understanding: how mineral resources are formed; synthesising their distribution in space and time and evaluating this distribution in relation to overall Earth evolution; considering sustainability and the role of economics and politics. Practical understanding of mineral exploration is achieved through team-based role-playing activities in which students are divided into exploration companies. Each company has a two-stage budget and has to decide how to spend it on sampling, mapping, geochemical analysis, trenching and drilling. Each team presents an interim verbal report on the first stage followed by a second-stage final executive report summarising findings and providing an evaluation of gold resource. Assessment is split between the team exploration project (50%) and a final coursework essay (50%) from a choice of three topics. The team project uses peer assessment to produce individual marks for team members. This module has encouraged many students to follow mineral exploration careers.

SIMULATING ENVIRONMENTAL SYSTEMS (ENVS397)

Credits: 15 / Semester: semester 2

This module will teach students to write and use simple numerical forward models of environmental systems, including geomorphic, geophysical, oceanographic and ecological models. Successful students will develop important transferrable coding and numeracy skills through a series of lectures, seminars and practical work. The module will be assessed through practical work only, with formative feedback throughout to help develop the necessary skills.

THE LIVING, EVOLVING EARTH (ENVS320)

Credits: 15 / Semester: semester 1

This module looks at long term evolutionary patterns and the links between the evolution of life, climate and environmental change. Building on the basics of palaeontology covered in ENVS118, this module could be subtitled "palaeontology for palaeontologists" since it covers topics and ideas that are used day-to-day by professional palaeontologists. The course deals with evolutionary theory and its place in palaeontology, as the student learns how to read and construct evolutionary hypotheses, and describe and understand patterns in the fossil record. In addition the module will explore key events in the history of life on Earth – changing fossils on a changing planet – using exceptionally preserved faunas to illustrate the evolution of the flora and fauna. The module is delivered through lectures and practical sessions. The practicals are a key component of the module and are designed to run alongside and support the lecture material, giving the student the opportunity to more deeply understand the module content. Once the bulk of the practicals are completed, students are required to undertake a group project that brings together much of the course material into a coherent whole.

BASINS TO MOUNTAINS FIELD CLASS (ENVS374)

Credits: 15 / Semester: semester 2

This module will introduce the fundamental concepts of mountain building and highlight the impact these have on the earth system and opportunities they provide in terms of earth resources.

APPLIED GEOLOGY AND GEOHAZARDS OF THE CANARY ISLANDS (ENVS375)

Credits: 15 / Semester: semester 2

This module comprises a series of lectures, seminars, and a field class to facilitate students constructing their own learning.

Lectures and guided reading present the theoretical framework of key topics and controversies. A field class promotes a deep understanding of the scale of geological and geohazard analysis particular to Tenerife. Ideas, concepts and knowledge built in the field act as stimuli to carry out independent and group investigations of select topics. Primary field evidence is applied to explore controversial topics in geology and geohazards.

Programme details and modules listed are illustrative only and subject to change.

YEAR FOUR

Year four concentrates on the development of high-level research skills through training in research methods and completion of a major research project working within one of the departmental research groups. In this project you will choose the topic to be studied and will use state-of-the-art research equipment.

Fieldwork:

- Eight day field course in Tenerife or seven days in Northern Spain

Advanced research project:

- Advanced geological project and dissertation focused on one of the areas of current research in the Department eg

sedimentology, rock microstructures, rock deformation, geochemistry, volcanology, palaeontology, mineral deposits. You take three compulsory modules and can choose four optional modules from the indicative list outlined below.

Choose one from ENVS574 or ENVS575.

COMPULSORY MODULES

ADVANCED GEOLOGY AND GEOLOGY-PHYSICAL GEOGRAPHY PROJECT (ENVS405)

Credits: 45 / Semester: whole session

In this module students will carry out their final year independent research project based on laboratory analyses and/or modelling and fieldwork. It is specifically designed to enable students to develop and demonstrate independent research skills and transferable skills valuable to employers. The module will develop critical thinking, research level understanding of current debates in the geosciences and knowledge of the use and applications of specialised cutting-edge research equipment and facilities.

Each student is supervised by one or more academic members of staff who offer guidance during the period of independent research carried out by the student. The Module Manager offers support on paper writing and communication skills as well as additional academic support, if needed.

The module entails the production of a literature review paper that is relevant to each individual project; a talk to communicate the research undertaken to a mixed audience of UGs, PGTs, Postdocs and Academic staff; the final dissertation in manuscript format.

CURRENT ISSUES IN EARTH SCIENCE (ENVS440)

Credits: 15 / Semester: semester 1

This module covers geoscience topics that have current societal importance. It will promote independent thinking, critical insight and a sound understanding of a variety of current geoscience topics that affect local, national and international governance. The module will allow development of independent research skills and encourage effective communication with a variety of different stakeholders (governing bodies, public, companies).

The module is delivered as a series of lectures, seminars and workshops. Lectures will introduce some high-level current issues in earth science, followed by progressively more student-led seminars and workshops, where they present their work and debate issues with other students in the class. Feedback from these seminars/debates informs them on how to write their consultancy reports, and deliver the group presentation.

RESEARCH METHODS (ENVS444)

Credits: 15 / Semester: semester 1

This module is designed to train our students, largely by personal practice, in: scientific, journal-style writing; the initial development of a research problem and the definition, presentation and defence of a research proposal; the use of a small number of lab-analytical and data-analytical techniques of broad relevance to Advanced Geology and Geology-Physical-Geography projects.

OPTIONAL MODULES

ENGINEERING GEOLOGY AND HYDROGEOLOGY (ENVS538)

Credits: 15 / Semester: semester 1

This module provides the principles of engineering geology and hydrogeology. The applications of these principles are illustrated using selected examples and emphasis is placed on the interaction between them and their control on the mechanical stability of natural systems. By necessity predictions must be quantitative but, in order to develop understanding, a strongly graphical approach has been adopted in this module. The evaluation of errors in natural datasets and their impacts on quantitative predictions will be considered. The applications of engineering geology and hydrogeology will be highlighted using a field-based case study: the Mam Tor landslide. Engineering geology and hydrogeology are two important sources of employment and this module provides an opportunity to experience the scope and nature of these subjects. A combination of lectures, directed reading, laboratory work and fieldwork are used to deliver the module. Twelve lectures will be supported by six laboratory based practicals. It will be assessed using an individual report of the field investigation and an examination.

MINERAL RESOURCES (M) (ENVS526)

Credits: 15 / Semester: semester 2

This module aims to provide understanding of the major types of mineral deposit through a critical assessment of conceptual models of deposit forming processes. There is an emphasis on geochemistry and quantitative methods. Content is delivered through on-line lectures with the aim of understanding: how mineral resources are formed; synthesising their distribution in space and time and evaluating this distribution in relation to overall Earth evolution; considering sustainability and the role of economics and politics. Practical understanding of mineral exploration is achieved through team-based role-playing activities in which students are divided into exploration companies. Each company has a two-stage budget and has to decide how to spend it on sampling, mapping, geochemical analysis, trenching and drilling. Each team presents an interim verbal report (seminar style) on the first stage followed by a second-stage final executive report summarising findings and providing an evaluation of gold resource and potential environmental impact. Assessment is split between the team exploration project (45%), sustainability seminars (10%), and a final coursework essay (45%) from a choice of two synoptic topics. The team project uses peer assessment to produce individual marks for team members. This module has encouraged many students to follow mineral exploration careers.

GEOENERGY (ENVS537)

Credits: 15 / Semester: semester 1

Our pathway to a carbon neutral world relies upon our ability to develop new technologies and improve established technologies. Earth Scientists will play a major role in this Energy revolution from sourcing raw materials for solar cells and batteries to sequestering carbon dioxide in rock units deep beneath the Earth's surface. This module provides a background to the GeoEnergy sector, with particular focus on fluid flow through geological structures and rock units. The broad aim of the module is to provide students with the appropriate level of knowledge and skillset to be able to evaluate and manage hydrocarbon reservoirs, including carbon dioxide sequestration, and geothermal systems.

APPLIED GEOLOGY AND GEOHAZARDS OF THE CANARY ISLANDS (ENVS575)**Credits: 15 / Semester: semester 2**

This module comprises a series of lectures, seminars, and a field class to facilitate students constructing their own learning.

Lectures and guided reading present the theoretical framework of key topics and controversies. A field class promotes a deep understanding of the scale of geological and geohazard analysis particular to Tenerife. Ideas, concepts and knowledge built in the field act as stimuli to carry out independent and group investigations of select topics. An independent hazard assessment is prepared, communicating the findings in a report to local decision-makers (including executive summary). Primary field evidence is applied to critically discuss controversial topics in geology and geohazards.

THE LIVING, EVOLVING EARTH (ENVS520)**Credits: 15 / Semester: semester 1**

This module looks at long term evolutionary patterns and the links between the evolution of life, climate and environmental change. Building on the basics of palaeontology covered in ENVS118, this module could be subtitled "palaeontology for palaeontologists" since it covers topics and ideas that are used day-to-day by professional palaeontologists. The course deals with evolutionary theory and its place in palaeontology, as the student learns how to read and construct evolutionary hypotheses, and describe and understand patterns in the fossil record. In addition the module will explore key events in the history of life on Earth – changing fossils on a changing planet – using exceptionally preserved faunas to illustrate the evolution of the flora and fauna. The module is delivered through lectures, practical sessions and seminars. The practicals are a key component of the module and are designed to run alongside and support the lecture material, giving the student the opportunity to more deeply understand the module content. Once the bulk of the practicals are completed, students are required to undertake a group project that brings together much of the course material into a coherent whole.

INTRODUCTION TO QUATERNARY MICROPALAEONTOLOGY (ENVS542)**Credits: 15 / Semester: semester 2**

This module intends to give a holistic insight of a number of marine and terrestrial microfossils that are conventionally used for reconstructing past environmental conditions for the Quaternary period, including recent past. Microfossils are biological indicators that can help to either qualitatively and/or quantitatively estimate environmental conditions such as atmospheric temperature and precipitation (pollen), sea-surface conditions (foraminifera, diatoms, radiolaria, dinoflagellate cysts), salinity (ostracods, diatom), pH (diatoms), sea-ice cover (diatoms, dinoflagellate cysts), etc. These conditions are of paramount importance for modelling past climate conditions and the data derived from microfossil assemblages enable to better calibrate models, which in turn, are essential to forecast future climate. In addition, microfossil assemblages help to understand the natural evolution of our environment as well as measuring the amplitude of human activities over time.

SIMULATING ENVIRONMENTAL SYSTEMS (ENVS597)

Credits: 15 / Semester: semester 2

This module will teach students to write and use simple numerical forward models of environmental systems, including geomorphic, geophysical, oceanographic and ecological models. Successful students will develop important transferrable coding and numeracy skills through a series of lectures, seminars and practical work. The module will be assessed through practical work only, with formative feedback throughout to help develop the necessary skills.

BASINS TO MOUNTAINS FIELDCLASS (ENVS574)

Credits: 15 / Semester:

This module will introduce the fundamental concepts of mountain building and highlight the impact these have on the earth system and opportunities they provide in terms of earth resources.

Programme details and modules listed are illustrative only and subject to change.

HOW YOU'LL LEARN

Teaching takes place through lectures, practicals, workshops, seminars, tutorials and fieldwork, with an emphasis on learning through doing. The award-winning Central Teaching Laboratories, provide a state-of-the-art facility for undergraduate practical work. Students value the learning opportunities provided by field classes, including the rapid and detailed feedback on performance.

You will typically receive 15–20 hours of formal teaching each week, and complete between 50 and 100 days of residential fieldwork over the course of their programme. In years three and four you will carry out independent research projects on a topic and location of your choice. All projects are supervised by a member of staff who will meet with you on a weekly, or more frequent, basis.

A number of the School's degree programmes involve laboratory and field work. The field work is carried out in various locations, ranging from inner city to coastal and mountainous environments. We consider applications from prospective students with disabilities on the same basis as all other students, and reasonable adjustments will be considered to address barriers to access.

HOW YOU'RE ASSESSED

Assessment matches the learning objectives for each module and may take the form of written exams, practical laboratory and computer examinations, coursework submissions in the form of essays, scientific papers, briefing notes or lab/field notebooks, reports and portfolios, oral and poster presentations and contributions to group projects, and problem-solving exercises. Assessment is via tasks that mirror those graduate students are likely to undertake working as professional geoscientists. For example, generating and interpreting quantitative spatial data, with appropriate consideration of inherent uncertainty, is a key task and necessary skill for professional environmental geoscientists, and this skill is developed and assessed on several programme modules, especially field and lab-based modules. As well as being authentic in terms of the underlying purpose of the assessed task, assessment tasks are also authentic in terms of format, intended audience, resources used, and collaborative team elements. For example, team-based environmental assessment work with professional format delivery appropriate for presentation to management-level colleagues using state-of-the-art field, lab or IT resources is central to assessments in field classes.

LIVERPOOL HALLMARKS

We have a distinctive approach to education, the Liverpool Curriculum Framework, which focuses on research-connected teaching, active learning, and authentic assessment to ensure our students graduate as digitally fluent and confident global citizens.

Careers and employability

There has never been a better time to study Earth sciences. Many of the fundamental questions of our times will be answered by geoscientists, as we seek to provide sustainable resources for the world's population, as well as predict and mitigate climate change and natural hazards by building a better understanding of the planet on which we live.

The majority of our recent graduates have gained employment within a degree-related field or continued within further education after graduation. We have close links with geoscience and environmental industries ensuring that our degrees properly equip you for future employment. The truly interdisciplinary nature of our degrees additionally makes graduates in Earth sciences highly sought after by other employment sectors.

89.5% OF ENVIRONMENTAL SCIENCES STUDENTS ARE IN WORK AND/OR FURTHER STUDY 15 MONTHS AFTER GRADUATION.

Discover Uni, 2018-19.

RECENT EMPLOYERS

- Geological Surveys in the UK and abroad
- Hydrocarbon and support industries: ExxonMobil, BP, Shell, Geotrace, Geokinetics, Neftex, Robertson, Deloitte, CGG, Osiris, PGS
- Engineering and environmental consultancies: The Environment Agency, Environmental Resources Management,

URS Corporation, Caulmert Ltd, VerdErg Renewables, RSK Geophysics, RSK Environment, Geomaterials, Fugro

- Mining and related industries: Gold Fields, Rio Tinto, Cliffs Natural Resources, Geological Solutions, Hanson Aggregate Marine Ltd., Aggregate Industries.

PREPARING YOU FOR FUTURE SUCCESS

At Liverpool, our goal is to support you to build your intellectual, social, and cultural capital so that you graduate as a socially-

conscious global citizen who is prepared for future success. We achieve this by:

- Embedding employability within your curriculum, through the modules you take and the opportunities to gain real-world experience offered by many of our courses.
 - Providing you with opportunities to gain experience and develop connections with people and organisations, including student and graduate employers as well as our global alumni.
 - Providing you with the latest tools and skills to thrive in a competitive world, including access to Handshake, a platform which allows you to create your personalised job shortlist and apply with ease.
 - Supporting you through our peer-to-peer led [Careers Studio](#), where our career coaches provide you with tailored advice and support.
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Fees and funding

Your tuition fees, funding your studies, and other costs to consider.

TUITION FEES

Tuition fees cover the cost of your teaching and assessment, operating facilities such as libraries, IT equipment, and access to academic and personal support. [Learn more about tuition fees, funding and student finance.](#)

UK fees Also applies to Channel Islands, Isle of Man and Republic of Ireland	
Full-time place, per year	£9,249
Year in industry fee	£1,850
Year abroad fee	£1,385

International fees	
Full-time place, per year	£25,350

Fees stated are for the 2023-24 academic year.

ADDITIONAL COSTS

We understand that budgeting for your time at university is important, and we want to make sure you understand any course-related costs that are not covered by your tuition fee. This includes costs for a lab coat, geological field kit, and sustenance during compulsory field trips.

Find out more about the [additional study costs](#) that may apply to this course.

SCHOLARSHIPS AND BURSARIES

We offer a range of scholarships and bursaries to help cover tuition fees and help with living expenses while at university.

[Scholarships and bursaries you can apply for from the United Kingdom](#)

Select your country or region for more scholarships and bursaries.

Entry requirements

The qualifications and exam results you'll need to apply for this course.

Your qualification	Requirements About our typical entry requirements
A levels	<p>AAB</p> <p>Applicants with the Extended Project Qualification (EPQ) are eligible for a reduction in grade requirements. For this course, the offer is ABB with A in the EPQ.</p> <p>You may automatically qualify for reduced entry requirements through our contextual offers scheme.</p>
GCSE	4/C in English and 4/C in Mathematics
Subject requirements	<p>Including two sciences (Acceptable sciences: Mathematics, Further Mathematics, Physics, Chemistry, Biology, Geology, Geography, Environmental Science, Applied Science, Use of Mathematics.)</p> <p>For applicants from England: For science A levels that include the separately graded practical endorsement, a "Pass" is required.</p>
BTEC Level 3 National Extended Diploma	Not accepted. Applicants should apply to F600
International Baccalaureate	35 points with no score less than 4, including one science subject at Higher Level
Irish Leaving Certificate	H1, H1, H2, H2, H2, H3 including H2 or above in one science

Your qualification	Requirements About our typical entry requirements
Scottish Higher/Advanced Higher	Not accepted without Advanced Highers at AAB including one science subject
Welsh Baccalaureate Advanced	Accepted at Grade B alongside AA in A levels (including one science subject).
Access	Not accepted. Applicants should apply to F600
International qualifications	<div data-bbox="1002 842 1439 981" style="border: 1px solid gray; padding: 5px; text-align: center;"> Select your country or region to view specific entry requirements. </div> <p>Many countries have a different education system to that of the UK, meaning your qualifications may not meet our direct entry requirements. Although there is no direct Foundation Certificate route to this course, completing a Foundation Certificate, such as that offered by the University of Liverpool International College, can guarantee you a place on a number of similar courses which may interest you.</p>

ALTERNATIVE ENTRY REQUIREMENTS

- If your qualification isn't listed here, or you're taking a combination of qualifications, [contact us](#) for advice
 - [Applications from mature students](#) are welcome.
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THE ORIGINAL

REDBRICK

