UNIVERSITY OF LIVERPOOL

Earth Science MESci

COURSE DETAILS

A level requirements: **AAB**

UCAS code: F601

Study mode: Full-time

Length: 4 years

KEY DATES

Apply by: **29 January 2025(https://www.ucas.com/students)**

Starts: 22 September 2025

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 Earth Science MESci (Hons) shares the first three years with Geology BSc (Hons), with the final year providing more advanced training in all aspects of earth science.

In years one and two, we provide core training in all key areas of earth science. 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.

This programme also has a year abroad option, an incredible opportunity to spend an academic year at one of our partner universities. On the 4-year integrated masters programme, you can go abroad either between Year 2 and 3 (apply in Year 2) OR Year 3 and 4 (apply in Year 3).

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 earth science
- 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.

Teaching Excellence Framework 2023

We're proud to announce we've been awarded a Gold rating for educational excellence.

Find out why we're rated Gold(https://www.liverpool.ac.uk/undergraduate/tef-gold-rating/) >

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 1

This module provides an introduction to the Earth and aims to teach students about the structure and composition of the Earth, the Earth's gravitational and magnetic fields, and dynamics within the deep Earth; the physics of Earth material and the geological time scale; and plate tectonics. The course is delivered through a combination of lectures and practicals. Students are assessed through a combination of coursework and a final exam.

INTRODUCTION TO FIELD GEOLOGY (ENVS109)

Credits: 15 / Semester: semester 1

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 1

This module introduces key subjects 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, 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, tutorials, and directed reading will help you navigate this course. You will be assessed on the development of your practical skills through an open book practical exam and an individual research paper on a topic in structural geology.

STUDY SKILLS AND GIS (EARTH SCIENCE) (ENVS101)

Credits: 15 / Semester: semester 2

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 (including assessment), careers and employability. Academic tutors undertake personal development planning (careers and module selection advice) with each tutee.

EARTH MATERIALS (ENVS185)

Credits: 15 / Semester: semester 1

This module will introduce and develop understanding of rock-forming minerals and critical raw 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 critical to sustainable and renewable energy resources and various societal infrastructure. The key practical skills 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 and for future employment.

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 emphasises acquiring mechanistic insight and drawing upon order of magnitude calculations. By the end of the module students will understand how the oceans and atmosphere combine to shape Earth's climate. Students gain quantitative skills by completing a series of coursework exercises and a final exam. Students address the Net Zero carbon goal via group work involving digital storytelling.

ENVIRONMENTAL CHEMISTRY (ENVS153)

Credits: 15 / Semester: semester 1

This module will give students an understanding of the fundamental properties of elements and matter, either solid, liquid or gas, in the context of the environmental sciences. It will introduce the fundamentals of atomic structure, elements and molecules from simple inorganic to large organic ones and the bonding forces that hold them together. It will look at the basics of chemical reactions such as the processes of oxidation and reduction, the solubility of solids and gases in water and acid-base properties. Students will learn how to make quantitative predictions, for instance on 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. The module is taught through lectures, tutorial sessions and online formative quizzes with automated feedback. Assessment is through online tests and an open book final exam. This module is largely an introduction to chemistry and might therefore not be well suited for students who did A-level chemistry or equivalent.

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. Basic matrix manipulation will be covered as well as vector algebra and an understanding of eigenvectors and eigenvalues.

THEORY AND LABORATORY EXPERIMENTS IN EARTH SURFACES PROCESSES (ENVS165)

Credits: 15 / Semester: semester 1

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 year. This module comprises multiple whole-day practical sessions, each designed to give students first-hand experience of a topic important in understanding our changing environment. Students get formal feedback in each assessed week (one poster per group). However, perhaps most valuable is the feedback obtained informally via discussions during the sessions.

Show all modules

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 application of all the main geophysical methods used for exploration purposes. These methods include seismic refraction, seismic reflection, electrical methods, ground penetrating radar, gravity and magnetics. Case studies will be used to highlight the application of these methods at a range of scales from shallow to deep to small to large, highlighting their uses within archaeology, engineering and geology. The module concludes with a synthesis of methods and how to approach site investigation. The module is delivered through lectures and problem sessions and is based on continuous assessment from set homework assignments or problem sheets and a final exam.

METAMORPHISM AND CRUSTAL EVOLUTION (ENVS212)

Credits: 15 / Semester: semester 2

Building on previous study of mineralogy, igneous and structural geology, this module provides students with a foundation in the 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. Delivery involves a combination of interactive lectures and practical sessions. Practicals involve thin section work, hand specimen examination, calculations and the study of geological maps. Metamorphic geology plays a pivotal role in unravelling the story of the Caledonides of Britain and Ireland, 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.

RESEARCH SKILLS (EARTH SCIENCE) (ENVS200)

Credits: 15 / Semester: semester 2

This module introduces and develops a range of skills that are central to the research process and 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. The lecture/workshop series covers IT-related skills needed for writing and illustrating reports, graphically representing geospatial data, consistently citing and referencing data sources, as well as aspects of project planning and risk assessment. Assessment is coursework-based and comprises an oral presentation, a report/literature review, a poster displaying geological/geophysical geospatial data, and a project plan (Gantt chart).

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 recognise 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. Lectures will be supported by laboratory-based practicals. It will be assessed using a theory examination and a practical examination.

VOLCANOLOGY AND GEOHAZARDS (ENVS284)

Credits: 15 / Semester: semester 1

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 combination of on-campus workshops followed by a residential field class in which students learn various techniques required to characterise the 3D geological and geomorphological evolution of an area. Training entails mapping of geological and geomorphological features at different scales, training in methods for acquiring a variety of field data, and guidance for synthesising and interpreting field datasets. Training is 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 of the geological history of an area from their own measured data. Such fieldskills and data-handling and data synthesis skills are highly regarded and often sought for by geoscience employers. This module also provides the students with skills required for final year independent field-based research projects. Exercises will encourage increasingly independent work as students' skills develop. Group work develops students' ability to work effectively in a team.

EARTH AND ENVIRONMENTAL DATA SCIENCE (ENVS229)

Credits: 15 / Semester: semester 2

This module introduces students to fundamentals of Earth and environmental data science. Students will become familiar with methods used to collate and computationally analyse a variety of Earth Science data. After introducing programming basics, students will then start to write code to analyse and simulate Earth processes that model their datasets. By the end of the module, students are expected to have a broad overview of the ways in which data science is applied in the study of the Earth and environment.

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

Under the supervision of an academic member of staff, students will plan and undertake an independent (field or lab-based) research project in an area of their choosing. Students will use the subject specific and research skills that they have developed over the first 2 years of their degree, as well as developing data collection and analytical skills. Data collection is completed in the summer before Year 3 and write-up includes 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 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 projects that correspond to the 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 landslip. 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.

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, 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, 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 designed to run alongside and support the lecture material, giving the student the opportunity to understand the module content more deeply. 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 1

Our dynamic Earth results in a classic cycle of oceans opening, closing, and the formation of mountain belts. This module will utilise the field skills of students to piece together the large-scale picture of a continental collision, from sediment accumulation on continental margins and in subduction zones, through the collisional phase, to late stage melting and mineralisation of the continental crust. Students will learn how to bridge the gap between small-scale field observations and large-scale tectonics, and understand how this links to the accumulation of economically important resources. Concepts, processes, and controversies relating to this tectonic cycle will be introduced and analysed.

APPLIED GEOLOGY AND GEOHAZARDS OF THE CANARY ISLANDS (ENVS375)

Credits: 15 / Semester: semester 2

More than 800 million people around the world live at risk of being negatively affected by volcanic activity, yet the number of people living near active volcanoes is increasing every year. On the island of Tenerife we explore how the physical and chemical processes of volcanism and geohazards are shaped by geodynamics and geology. You will develop field skills to reconstruct a geological history based on your own observations. We study the deposits from volcanic plumbing systems to lava flow, catastrophic caldera-forming eruptions, volcanic plumes, explosive magma-water interactions and the evidence of volcanic island collapse. This module helps students understand how the economic benefits and beauty of a volcanic landscape are juxtaposed against the threat of evacuation and loss of life, property and infrastructure.

DYNAMICS OF CRUST AND MANTLE (ENVS355)

Credits: 15 / Semester: semester 2

This module is a synthesis of geodynamic processes and their geological consequences across a range of scales from atoms to minerals to mountain belts to the whole mantle. You will learn about how rocks can deform even while solid, and how those deformation mechanisms are controlled by temperature and how they lead to our dynamic Earth. You will study mountain belts that are understood through study of the mineralogy of metamorphic rocks which fingerprint changing pressures and temperatures, and through unravelling the timings of events using radiogenic isotopes. You will be taught through lectures and practicals and assessed on both theoretical and practical aspects.

Show all modules

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: semester 2

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 review and communication 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 sciences, 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 landslip. 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 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 and a final coursework essay from a choice of three topics.

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

More than 800 million people around the world live at risk of being negatively affected by volcanic activity, yet the number of people living near active volcanoes is increasing every year. On the island of Tenerife we explore how the physical and chemical processes of volcanism and geohazards are shaped by geodynamics and geology. You will develop field skills to reconstruct a geological history based on your own observations. We study the deposits from volcanic plumbing systems to lava flow, catastrophic caldera-forming eruptions, volcanic plumes, explosive magma-water interactions and the evidence of volcanic island collapse. This module helps students understand how the economic benefits and beauty of a volcanic landscape are juxtaposed against the threat of evacuation and loss of life, property and infrastructure.

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, this module 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, 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 understand the module content more deeply. 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 1

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 FIELD CLASS (ENVS574)

Credits: 15 / Semester: semester 1

Our dynamic Earth results in a classic cycle of oceans opening, closing, and the formation of mountain belts. This module will utilise the field skills of students to piece together the large-scale picture of a continental collision, from sediment accumulation on continental margins and in subduction zones, through the collisional phase, to late stage melting and mineralisation of the continental crust. Students will learn how to bridge the gap between small-scale field observations and large-scale tectonics, and understand how this links to the accumulation of economically important resources. Concepts, processes, and controversies relating to this tectonic cycle will be introduced and analysed.

DYNAMICS OF CRUST AND MANTLE (ENVS555)

Credits: 15 / Semester: semester 1

This module is a synthesis of geodynamic processes and their geological consequences across a range of scales from atoms to minerals to mountain belts to the whole mantle. You will learn about how rocks can deform even while solid, and how those deformation mechanisms are controlled by temperature and how they lead to our dynamic Earth. You will study mountain belts that are understood through study of the mineralogy of metamorphic rocks which fingerprint changing pressures and temperatures, and through unravelling the timings of events using radiogenic isotopes. You will be taught through lectures and practicals and assessed on both theoretical and practical aspects. In assessment there is an expectation that you can describe the strengths and weaknesses of various models, and synthesise diverse information on all scales from atoms to the Earth's mantle.

Show all modules

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.

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.

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.

Fees and funding

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

TUITION FEES

UK fees (applies to Channel Islands, Isle of Man and Republic of Ireland)	
Full-time place, per year	£9,250
Year in industry fee	£1,850
Year abroad fee	£1,385

International fees	
Full-time place, per year	£27,200

Fees shown are for the academic year 2024/25. Please note that the Year Abroad fee also applies to the Year in China.

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 paying for your studies(http://www.liverpool.ac.uk/paying-for-your-studies)**.

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(http://www.liverpool.ac.uk/paying-for-your-studies/study-costs/?course=earth-science-mesci)** that may apply to this course.

SCHOLARSHIPS AND BURSARIES

We offer a range of scholarships and bursaries that could help pay your tuition and living expenses.

We've set the country or region your qualifications are from as United Kingdom. **Change it here(/international/countries/)**

RIGBY ENTERPRISE AWARD

✓ Home students

Are you a UK student with a household income of £25,000 or less? If you've participated in an eligible outreach programme, you could be eligible to apply for a Rigby Enterprise Award worth £5,000 per year for three years of your undergraduate degree.

(https://www.liverpool.ac.uk/study/fees-and-funding/scholarships-and-bursaries/undergraduate/rigby-enterprise-award/)

THE LIVERPOOL BURSARY

✓ Home students

If you're a UK student joining an undergraduate degree and have a household income below £35,000, you could be eligible for a Liverpool Bursary worth up to £2,000 for each year of undergraduate study.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/liverpool-bursary/)

ASYLUM SEEKERS SCHOLARSHIP

✓ Home students

Apply for an Asylum Seekers Scholarship and you could have your tuition fees paid in full and receive help with study costs. You'll need to have applied for asylum in the UK, or be the dependant of an asylum seeker, and be joining an eligible undergraduate degree.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/asylum-seekers-scholarship/)

CARE LEAVERS' OPPORTUNITY BURSARY

✓ Home students

If you've spent 13 or more weeks in Local Authority care since age 14, you could be eligible for a bursary of £3,000 per year of study. You'll need to be a UK student joining an eligible undergraduate degree and be aged 28 or above on 1 September in the year you start.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/care-leavers-opportunity-bursary/)

COWRIE FOUNDATION SCHOLARSHIP

✓ Home students

Are you a UK student with a Black African or Caribbean heritage and a household income of £25,000 or less? You could be eligible to apply for a Cowrie Foundation Scholarship worth up to £8,000 for each year of undergraduate study.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/cowrie-foundation-scholarship/)

ESTRANGED STUDENTS BURSARY

- Home students

If you're a UK student identified as estranged by Student Finance England (or the equivalent UK funding body), you could be eligible for a bursary of £1,000 for each year of undergraduate study.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/estranged-students-bursary/)

GENESYS LIFE SCIENCES SCHOLARSHIP

- Home students

Joining a School of Biosciences degree and have a household income of less than £25,000? If you're a UK student, you could apply to receive £4,500 per year for three years of your undergraduate course.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/genesys-life-sciences-scholarship/)

GRADUATE ASSOCIATION HONG KONG & TUNG UNDERGRADUATE SCHOLARSHIPS

- International students
- Hong Kong

If you're an undergraduate student from Hong Kong who can demonstrate academic excellence, you may be eligible to apply for a scholarship worth £10,000 in partnership with the Tung Foundation.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/hong-kong-awards/)

NOLAN SCHOLARSHIPS

- Home students

Do you live in the Liverpool City Region with a household income of £25,000 or less? Did neither of your parents attend University? You could be eligible to apply for a Nolan Scholarship worth £5,000 per year for three years of undergraduate study.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/nolan-scholarships/)

ROLABOTIC SCHOLARSHIP

- Home students

Are you a UK student with a household income of £25,000 or less? Did neither of your parents attend University? You could be eligible to apply for a ROLABOTIC Scholarship worth £4,500 for each year of your undergraduate degree.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/rolabotic-scholarship/)

SPORT LIVERPOOL PERFORMANCE PROGRAMME

- Home and international students

Apply to receive tailored training support to enhance your sporting performance. Our athlete support package includes a range of benefits, from bespoke strength and conditioning training to physiotherapy sessions and one-to-one nutritional advice.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/sport-liverpool-performance-programme/)

TECHNETIX BROADHURST ENGINEERING SCHOLARSHIP

- Home students

Joining a degree in the School of Electrical Engineering, Electronics and Computer Science? If you're a UK student with household income below £25,000, you could be eligible to apply for £5,000 a year for three years of study. Two awards will be available per academic year.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/technetix-broadhurst-engineering-scholarship/)

UNDERGRADUATE GLOBAL ADVANCEMENT SCHOLARSHIP

- International students

If you're a high-achieving international student starting an undergraduate degree with us from September 2024, you could be eligible to receive a fee discount of up to £5,000. You'll need to achieve grades equivalent to AAA in A levels and be joining a non-clinical degree.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/global-advancement-scholarship/)

UNIVERSITY OF LIVERPOOL INTERNATIONAL COLLEGE EXCELLENCE SCHOLARSHIP

- International students

Completed a Foundation Certificate at University of Liverpool International College (UoLIC)? We're offering a £5,000 fee discount off the first year of undergraduate study to some of the highest achieving students joining one of our non-clinical degrees from UoLIC.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/uolic-excellence-scholarship/)

UNIVERSITY OF LIVERPOOL INTERNATIONAL COLLEGE FIRST CLASS SCHOLARSHIP

- International students

We're offering a £1,000 fee discount for years 2 and 3 of undergraduate study to eligible students progressing from University of Liverpool International College. You'll need to be studying a non-clinical subject and get an average of 70% or above in year 1 of your degree.
(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/uolic-first-class-scholarship/)

UNIVERSITY OF LIVERPOOL INTERNATIONAL COLLEGE IMPACT PROGRESSION SCHOLARSHIPS

- ✓ International students

If you're a University of Liverpool International College student awarded a Kaplan Impact Scholarship, we'll also consider you for an Impact Progression Scholarship. If selected, you'll receive a £3,000 fee discount off the first year of your undergraduate degree.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/uolic-impact-progression-scholarships/)

YOUNG ADULT CARER'S (YAC) BURSARY

- ✓ Home students

If you're a young adult and a registered carer in the UK, you might be eligible for a £1,000 bursary for each year of study. You'll need to be aged 18-25 on 1 September in the year you start your undergraduate degree.

(https://www.liverpool.ac.uk/study/paying-for-your-studies/scholarships-and-bursaries/undergraduate/yac-bursary/)

Entry requirements

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

Your qualification	Requirements **About our typical entry requirements(https://www.liverpool.ac.uk/study/undergraduate/applying/entry-requirements-and-qualifications/)**
A levels	AAB 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. You may automatically qualify for reduced entry requirements through our **contextual offers scheme(https://www.liverpool.ac.uk/study/undergraduate/applying/contextual-data/)**.
GCSE	4/C in English and 4/C in Mathematics
Subject requirements	For applicants from England: For science A levels that include the separately graded practical endorsement, a "Pass" is required.
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
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	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(https://www.kaplanpathways.com/colleges/university-of-liverpool-international-college/)**, can guarantee you a place on a number of similar courses which may interest you.

ALTERNATIVE ENTRY REQUIREMENTS

If your qualification isn't listed here, or you're taking a combination of qualifications, **contact us(/study/undergraduate/contact-us/)** for advice

Applications from mature students(/study/undergraduate/applying/mature-students/) are welcome.

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