UNIVERSITY OF LIVERPOOL

# Environmental Science BSc (Hons)

### COURSE DETAILS

- A level requirements: ABB
- UCAS code: F750
- Study mode: Full-time
- Length: 3 years

### KEY DATES

- Apply by: 31 January 2024
- Starts: 23 September 2024

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# Course overview

Our Environmental Sciences BSc (Hons) degree focusses on real-world issues such as climate change, pollution, and resource exploitation and will prepare you to play your part in tackling those challenges.

### INTRODUCTION

Understanding the complex interactions between the physical and biological environment and how humans influence them both is essential if we are to find solutions to the increasing global environmental challenges that face us today.

Our degree is accredited by the Institution of Environmental Sciences and will give you an in-depth understanding of both natural and human-induced environmental problems. All of our modules centre on real-world issues and application including climate change, pollution, and natural hazards.

The key strength of our programme is the unique breadth of staff expertise in the School of Environmental Sciences. This allows you to choose from an extensive range of modules delivered by experts in their field using state-of-the-art equipment and techniques. Your choices are guided by one of five module pathways themes: digital environments, ecology, oceans, society, sustainability, and the environment, and earth and surface processes.

These pathways ensure that our students graduate with the specialist skills and knowledge needed for their future careers, while also having the benefit of a wide-ranging education in Environmental Science.

From your first week to your final year, field classes are an integral part of your learning, giving you a chance to experience the environments that you are learning about and practice using industry-standard sampling and surveying approaches. In addition to making

the most of Liverpool’s coastal location, you will also have the opportunity to undertake fieldwork in locations such as Snowdonia, Pembrokeshire, and the Peak District as well as options in Portugal.

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

- Small tutor groups (typically six-eight students) through all years
- High levels of field and lab-based teaching within the School of Environmental Sciences and in Europe’s most advanced teaching laboratories
- An emphasis on active, problem-based learning (learning by doing)
- Hands-on experience with cutting-edge laboratory technologies
- Opportunities to study abroad throughout your course
- Supervised independent and group project work, including a final year independent research-based dissertation supervised by a dedicated expert in the field.

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## ACCREDITATION

Our Environment Sciences BSc (Hons) course is accredited by the Institution of Environmental Sciences.

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# Course content

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

## YEAR ONE

Year one is based on four core modules that provide key skills and knowledge across the School of Environmental Sciences in the classroom, online, field and laboratory. These are supported by three optional modules to allow you to begin to explore what interests you most.

## COMPULSORY MODULES

### EXPERIMENTS IN PHYSICAL GEOGRAPHY (ENVS120)

**Credits: 15 / Semester: semester 1**

The module uses laboratory experiments to allow students to gain first-hand experience of some fundamental physical, biological and chemical processes underlying physical geography, aimed primarily at interactions between people and their physical environment. It is designed to provide a foundation for environmental modules in the second and third years. 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. Dedicated computer practicals are also run to provide training in use of EXCEL, MINITAB, and basic inferential statistics. 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.

### LABORATORY AND FIELD TECHNIQUES FOR ECOLOGISTS (ENVS171)

**Credits: 15 / Semester: semester 2**

This varied practical module will provide training in a range of ecological skills through a series of field and lab exercises, either in person, or through online equivalent exercises, as necessary. Fieldwork will expose you to diverse and beautiful natural environments where you will learn to develop identification and sampling skills for both terrestrial and marine animals and plants. The skills used will have a wide application to many fields of environmental science including biology, ecology, and physical geography. You will learn quantitative skills in field ecology and use these to solve fundamental and applied problems. Assessments include a mix of MCQ tests and practical portfolios.

### STUDY SKILLS AND GIS (ENVS100)

**Credits: 30 / Semester: whole session**

This 30-credit module will provide the bedrock for your degree, and comprises five main elements. Firstly, pastoral and study support, provided via a series of regular one-to-one and small-group tutorials with an allocated academic tutor/adviser; secondly, development of core study skills, including essay writing, lecture-note taking, critical thinking, presentation skills, and bibliographic searching and referencing; thirdly, a hands-on introduction to the fundamentals of Geographical Information Systems, helping you learn how to combine spatial data from different sources to create maps that address real-world problems; fourthly, a fieldwork experience designed to help you develop data collection and analysis skills, to enhance your academic understanding and to provide you with an opportunity to get to know the other members of your degree cohort better; fifthly, employability training designed to help you better understand what graduate employers are looking for, how to apply for summer work and/or volunteering opportunities, and how best to use your time at University to maximise your employability upon graduation.

### 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 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.

## 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.

**EARTH STRUCTURE AND PLATE TECTONICS (ENVS112)**

**Credits: 15 / Semester: semester 2**

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.

**ECOLOGY AND CONSERVATION (ENVS157)**

**Credits: 15 / Semester: semester 2**

The zone of life on earth, or the 'biosphere', is a highly dynamic system responding to external pressures including changing human activities. The biosphere obeys a numbers of simple natural principles, but these often interact to create complex and sometimes unexpected responses. Using a wide range of examples we will explore these interactions between organisms and the environment. We will examine how species organise into communities, and how energy and other resources flow through ecosystems. We will explore how ecosystems respond to change, including gradual environmental shifts, sudden disturbance events and the effects of human activities. We will also learn how the key principles of ecology can be applied to conservation. We will assess the current state of the biosphere, and evaluate the major current threats. We will also look towards the future of ecosystems, including whether we can restore degraded habitats, and recreate "natural" landscapes.

**ENVIRONMENTAL CHEMISTRY (ENVS153)**

**Credits: 15 / Semester: semester 2**

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.

**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.

**LIVING WITH ENVIRONMENTAL CHANGE (ENVS119)**

**Credits: 15 / Semester: semester 1**

This module examines a number of global 'grand challenges' facing humans on the planet earth related to climate and environmental change. It will introduce students to core concepts of sustainability and human impacts upon the environment, as well as exploring the range of proposed solutions and mitigation strategies which are available to understand climate and environmental change. The module thus provides a core knowledge base for social and natural scientists who wish to understand environmental change.

**LIFE IN THE SEAS AND OCEANS (ENVS121)**

**Credits: 15 / Semester: semester 1**

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 blended learning approach that combines e-lectures with a series of interactive workshops, practical activities and field visits. You will have the opportunity to examine marine organisms in our award-winning teaching facilities and during field visits, which will allow you to explore some of the diverse adaptations marine organisms have adopted to meet the challenge of survival in the marine environment. Your knowledge and understanding will be assessed via online tests, a group project in which you will create a guide to a specific group of marine organisms, and a practical workbook.

**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.

**MARINE ECOSYSTEMS: DIVERSITY, PROCESSES AND THREATS (ENVS122)**

**Credits: 15 / Semester: semester 2**

This module is designed to deliver an introduction to the diversity of marine ecosystems across the globe. Each week during in person lectures you will be introduced to a new ecosystem and will learn about this habitat, specifically the main organisms, key processes, and human threats to each ecosystem described and explored. Central to this module are interactive discussion sessions (workshops) that will build an understanding of how marine ecosystems are expected to respond to the human-induced changes of the anthropocene. During these workshops you will learn to critique a piece of scientific research in small group discussions guided by academics. Your knowledge and understanding will be assessed via open-book online tests, and a group project in which you will create an infographic outlining the threats a particular ecosystem faces.

**QUANTITATIVE SKILLS FOR ECOLOGY AND MARINE BIOLOGY (ENVS128)**

**Credits: 15 / Semester: semester 1**

This module will help students to develop the quantitative skills needed for ecology, marine biology and related subjects, including basic mathematics, statistics and computing. It will be delivered via a series of lectures, practical classes and problem-solving sessions. No mathematical knowledge above GCSE level will be assumed.

**INTRODUCTION TO CLIMATE CHANGE AND MITIGATION (ENVS189)**

**Credits: 15 / Semester: semester 2**

This module will introduce you to the concept of Earth System interactions as a framework for understanding the causes and consequences of climate change. The module will cover the key features of the earth, atmosphere and ocean, and their interactions. alongside the drivers and consequences for perturbing part of the Earth System. Past, contemporary and projections of climate change will be discussed, as well as the toolkit tools deployed by environmental scientists to detect climate change and show attribute it to be a consequence of human activities. The module will discuss also measures to mitigate against climate change, drawing on the United Nations Framework Convention on Climate Change (UNFCC) efforts .

#### 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.

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

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## YEAR TWO

Year two is comprised of three core modules (including a week-long field class), two modules from your chosen pathway, and three optional modules that you can choose from any pathway.

## COMPULSORY MODULES

#### ENVIRONMENTAL SCIENCE FIELD CLASS (ENVS285)

**Credits: 15 / Semester: semester 2**

In this module, BSc Environmental Science students work together on a group project based on data collected in the field. Students take part in a residential field class in a UK location that provides a diverse range of opportunities for data collection on topics such as water quality, flood risk and carbon capture. Students develop skills in data collection, analysis and presentation, focussed real-world environmental issues using industry-relevant techniques and equipment. This module provides ideal preparation for final year individual projects. The module is assessed in via group oral presentation in the style of in industry consultant and an individual written project report in the style of a peer-reviewed scientific journal article.

#### RESEARCH SKILLS (GEOGRAPHY AND ENVIRONMENTAL SCIENCE) (ENVS203)

**Credits: 15 / Semester: whole session**

The module will develop students' knowledge of careers and employability with a focus on enhancing employability through tutorial-based exercises. In addition, the module provides a range of research skills required for the planning, implementation, analysis and reporting (written and oral) of independent research projects. Practical training will be provided in a range of qualitative and quantitative techniques across a broad range of geographical and environmental science themes. From this, students should develop a critical awareness as to the advantages and disadvantages of research methodologies in particular contexts.

### STATISTICS FOR ENVIRONMENTAL SCIENTISTS (ENVS222)

**Credits: 15 / Semester: semester 1**

This module provides training in statistics for environmental scientists. We provide training in industry-standard software – R and RStudio – to allow students to explore, present, and analyse data, and we ensure that the practical training is fully supported by explanations of the underlying theory. The practical work is focused on real environmental data, often generated by the students themselves so that they understand where the data have come from and have access to the full context as they learn how to describe and explain the findings of their analyses. Students will leave with the tools to collect, work with, and present data necessary for scientific writing.

## OPTIONAL MODULES

### KEY SKILLS FOR ENVIRONMENTAL DATA ANALYSIS (ENVS202)

**Credits: 15 / Semester: semester 1**

The module provides a generic training in manipulating environmental data sets using the industry-standard Matlab software. Skills are provided in reading in data, manipulating and plotting the data, and interpreting the data signals. The assumption is that students have little or no experience in programming. The module begins with an introduction to Matlab – what it is, what it can do, how to operate it – and then develops a series of programming skills, each week using data collected in the staffs' own research to provide real-world examples of the use of Matlab. The aim is to provide students with sufficient grasp of programming in Matlab to enable its use in subsequent project work, as well as providing the foundations in one of the key tools used in science and industry.

### UNDERSTANDING MARINE AND TERRESTRIAL SPATIAL ECOLOGY USING GIS (ENVS255)

**Credits: 15 / Semester: semester 2**

This module explores the concepts and applications of Geographical Information Systems (GIS) to solve contemporary questions in spatial ecology. The module involves applied case studies and practical work designed to develop both an understanding of GIS principles and concepts, such as data acquisition, integration and spatial analyses. The hands-on workshops allow students to learn the basic skills before applying them to a real world authentic assessment.

**POPULATION AND COMMUNITY ECOLOGY (LIFE214)**

**Credits: 15 / Semester: semester 2**

This module aims to introduce students to the concepts and principles underlying the dynamic interactions within populations and between species within communities. It will draw upon examples taken from across the globe: pressures on fish stocks; use of natural predators for biological control processes; how mutualistic interactions benefit communities, such as coral reefs and leguminous plants. It will also explore how knowledge and understanding of these species and community interactions can help plan for ecological mitigation and restoration. The lectures will be supplemented with on-line resources. Students will begiven guided reading, and regular formative assessment exercises will enable students to evaluate their understanding of the module. The module will be assessed by coursework.

**ENVIRONMENTAL SUSTAINABILITY (ENVS218)**

**Credits: 15 / Semester: semester 1**

Environmental concerns have become increasingly pressing over the last few decades, especially the global challenge of climate change. Environmental sustainability directs our attention to finding new approaches and methods for many of our activities and is an increasingly accepted principle that many professions are seeking to work out in practice.

This module explores the notion of environmental sustainability particularly within the context of urban planning. In this context, it can help us to develop the places where we live in a way that makes them cleaner, more energy efficient and better adapted to climate change, and that provides more biodiversity and a better quality of life. Planners, geographers and environmental scientists can all contribute to achieving a more sustainable world around us.

**GIS FOR HUMAN GEOGRAPHY (ENVS257)**

**Credits: 15 / Semester: semester 2**

The module introduces the principles of geographical information systems and science with a focus on human geography. Examples will be drawn from population geography with components linked to data sources, analysis and visualisation. Students will learn how to use GIS to map population data, to explore social deprivation, geographic inequalities, and commuting patterns, amongst other themes.

**CATCHMENT HYDROLOGY (ENVS217)**

**Credits: 15 / Semester: semester 1**

The study of catchment hydrology is concerned with water above and below the land surface, its various forms, and its circulation and distribution in time and space within drainage catchments; it is based on fundamental knowledge of the hydrological cycle and its governing factors. Understanding the hydrological cycle is fundamental to physical geography. All life is supported by water and all earth systems incorporate fluxes of water to some extent. The module covers the main hydrological processes operating in drainage catchments in terms of their measurement, operation and controlling factors. The module provide 'hands-on' experience of both observing hydrology and modelling hydrological systems, with an emphasis on applied learning, which might be useful in a vocational sense in the future. The module will aim to deliver excellent training in the knowledge required to work in a wide variety of environmentally-facing careers, including those with the EA, Natural England or DEFRA, as well as Environmental Consultancies.

**GEOMORPHOLOGY: ICE, SEA AND AIR (ENVS252)**

**Credits: 15 / Semester: semester 2**

The module develops an understanding of these major geomorphic systems and how they create terrestrial landforms. It explores the basic processes that have helped shaping the geomorphology of Britain and investigates magnitude and frequency of events, as well as time and space scales over which the processes operate.

The module is divided into four components, each composed of 4 sessions: glacial systems, glacial geomorphology and environmental change, aeolian processes, and coastal geomorphology . Weekly face-to-face sessions are supported by access to online videos, power point presentations, lecture notes, reading lists and some selected web sites. Weekly timetabled sessions will be a combination of lectures, discussions around reading and Q&A. Two days of fieldwork form the basis of the summative assessment addressing set problems and questions. A formative GIS exercise is also delivered via timetabled support sessions.

**CHANGING ENVIRONMENTS (ENVS214)**

**Credits: 15 / Semester: semester 1**

The Earth is subject to a myriad of threats and stresses, ranging from a changing global climate to unprecedented scales of human impacts on ecosystems, so that a new geological time period, the Anthropocene was created. Placing future change in freshwater and coastal wetlands and lakes into a long-term context is a critical science, and without it, society cannot constrain the 'natural' baseline against which future changes could be judged. This module will provide a critical insight into the global changes currently impacting the Earth over decades to millennial timescales. We will introduce a series of contemporary environmental concerns, and teach how we can reconstruct climatic and environmental conditions, the landscapes and vegetation of the past. We will explore a wide variety of archives (lakes, freshwater and coastal wetlands, oceans) and develop an understanding of the key techniques used to trace environmental conditions (physical properties, biogeochemistry, biological indicators). We will assess how the drivers behind these changes will affect future landscapes and ecosystems.

**CLIMATOLOGY (ENVS231)**

**Credits: 15 / Semester: semester 2**

The module covers energy balance and transfer processes at the surface, clouds, rain formation, weather forecasting, monsoons, tropical cyclones, weather in the mid latitudes, and the regional climates. The module has a balance between theory, processes, impacts, and hands-on experimentation and data analysis.

**MARINE ECOPHYSIOLOGY, ECOLOGY AND EXPLOITATION (ENVS251)**

**Credits: 15 / Semester: semester 2**

The marine environment presents a particular set of challenges for the organisms which inhabit it and these conditions are constantly changing as a result of human interventions. This module will provide a solid grounding in a number of topics, concepts and issues in the marine environment relating to the physiology and ecology of marine organisms and how they are affected by the activities of humans. Module content will be delivered primarily through interactive lectures supported by computer-based practical exercises and assessed by examination and coursework. Students will be guided to specific sections of textbooks, online resources and scientific papers to shape their learning.

**MARINE POLLUTION (ENVS232)**

**Credits: 15 / Semester: semester 2**

Students are taught how marine systems are changing due to globally increasing water temperatures and increasing carbon dioxide concentrations in the atmosphere, which are affecting the chemistry, physics and ultimately biology of the marine systems at unprecedented rates. These changes are expected to accelerate in the coming decades. Localised anthropogenic stressors such as excess nutrients, plastic debris, trace metals (e.g. mercury, copper), marine heatwaves and/or other emerging contaminants affecting coastal and open ocean waters are covered. Students will gain an understanding of the causes and processes that drive marine pollution issues as well as techniques used to monitor, remediate and/or regulate those issues. Assessment is done through group work, coursework and a final in-person exam.

**AN INTRODUCTION TO ENVIRONMENTAL HISTORY (ENVS223)**

**Credits: 15 / Semester: semester 1**

This module explores the course of human history, examining the interaction of people with the environment, moving through the different stages of human development, from early agrarian based developments in the Neolithic 9000 years ago, through to modern agricultural practices and landscape management. The following topics and concepts are introduced and examined:

Landscape geography, cultural ecology and environmental history.

Philosophical insights into environmental history, how have societies viewed and understood the environment.

Agriculture and the environment, long term perspectives and present day issues i.e. the environmental impact of hunting and gathering societies.

The agricultural revolution of the Neolithic and its impact, the impact of pre-industrial agriculture and some environmental issues raised by contemporary agriculture.

An ecological history of industrialisation and population growth, i.e. population resources and environment in an industrialised world.

Perils of a restless planet: an introduction to hazard research.

The module uses wide ranging literature and case studies to explore a range of human-environment interactions (fuel, food, water, culture and space), exploring how human activities have modified, and been modified, by their environments, and how sudden changes whether natural or human induced have changed this relationship.

This module has proven popular over the years and is of relevance and interest to both social scienceand physical science based students.

**BIODIVERSITY PRACTICAL SKILLS (LIFE233)**

**Credits: 7.5 / Semester: semester 1**

This practical module aims to provide practical experience in many of the techniques and methods currently used to identify and classify plants and animals. This will include microscopic and macroscopic examination of specimens, recognition of the role of museum collections in research, and electronic methods of data analysis and storage. Teaching activities include a combination of field work at Ness Gardens and the World Museum, laboratory sessions, and introductory lectures. The module is continuously assessed with workbooks completed in the practical classes, and a final report which draws on several of the practical classes.

**BIRD ECOLOGY, IDENTIFICATION AND CONSERVATION (LIFE243)**

**Credits: 7.5 / Semester: semester 1**

This module considers the ecology, identification and conservation of birds. It seeks to provide an evidence based understanding of bird conservation through studying bird ecology. Key to this is the ability to identify species and assess how key ecological concepts apply to this group. This course will teach students to integrate avian ecology with population and habitat management practices. It will illustrate the links between management and avian biology, habitat fragmentation, migration, and other ecological concepts. Throughout the module, emphasis is placed on the role of research methods in ornithology and how data gained are used to achieve maximally effective conservation and management. The module is aimed at students studying C100 Biological Science and C300 Zoology. The module will be of interest to students wishing to learn more about birds, including those who wish to pursue a career in ornithology or applied ecology.

**OCEANOGRAPHY, PLANKTON AND CLIMATE (ENVS245)**

**Credits: 15 / Semester: semester 1**

The tiny plankton are the base of marine food chains and also affect the Earth's climate. If you want to understand how and where these organisms live in the ocean, you need to step out of your own experience as a terrestrial animal and learn how the physics, biology and chemistry of the ocean come together to control the lives of plankton. In this module we will get you to think about how turbulence and stratification in the ocean control the growth of different sizes of plants and animals by determining how they can acquire light, nutrients and food. You will learn how plankton play a key role in shaping Earth's climate, but that this depends on the plankton species and plankton size. We will also consider how plankton respond to changes in Earth's climate, with important shifts in species distributions currently being caused by our warming climate. In this module we take you from the micron scales of the tiniest plankton up to the scale of the global ocean to illustrate the fundamental links between the ocean's physical and biogeochemical processes, plankton communities and Earth's climate. Teaching is structured around a series of short videos on key topics and concepts, with class work then looking at relevant case studies, discussing some of the important implications of our changing climate on plankton, and gaining practice in quantifying plankton responses to changes in their ocean environment. Assessment is by one coursework assignment halfway through the semester, and an online open-book exam.

**SOILS, SLOPES AND THE ENVIRONMENT (ENVS238)**

**Credits: 15 / Semester: semester 2**

The module is concerned with the fundamental properties and characteristics of slopes and soils, and their relationship with the environment. Through a combination of theory and practical-led teaching, students will learn about slope and soil forming processes and evolution, and apply this knowledge to a number of pure and applied problems relating to slope and soil stability. The module is assessed through a combination of coursework (group report) and examination.

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

## YEAR THREE

Your final year dissertation is the only compulsory module, where you conduct a piece of original research on a topic of your choice. You have the option to take one of our field courses, which recently have included destinations such as the Cairngorms and the Algarve. You will have two core modules from your chosen pathway and up to four optional modules.

## COMPULSORY MODULES

### DISSERTATION (GEOGRAPHY & ENVIRONMENTAL SCIENCE) (ENVS321)

**Credits: 30 / Semester: semester 1**

This module provides students with the opportunity to undertake an independent research project into a topic of the choosing, under the supervision of an allocated member of staff.

### WORK-BASED DISSERTATION (GEOGRAPHY AND ENVIRONMENTAL SCIENCE) (ENVS323)

**Credits: 30 / Semester: semester 1**

This module provides students with the opportunity to undertake an independent research project into a topic of their choosing, under the supervision of an allocated member of academic staff. Students utilise the research skills developed during Years 1 and 2 of the degree to conduct in-depth research, allowing the development of critical thinking, data collection and analysis skills. Students will also develop transferable skills such as time management, independent working and organisational proficiency. The work-based dissertation additionally involves students in working collaboratively with an external organisation on a mutually agreed research topic, thereby providing students with valuable work-related experience.

## OPTIONAL MODULES

### GEOGRAPHIC DATA SCIENCE (ENVS363)

**Credits: 15 / Semester: semester 1**

This module will introduce students to the nascent field of Geographic Data Science (GDS), a discipline established at the intersection between Geographic Information Science (GIS) and Data Science. The course covers how the modern GIS toolkit can be integrated with Data Science tools to solve practical real-world problems. Core to the set of employable skills to be taught in this course is an introduction to programming tools for GDS in R and Python. The programme of lectures, guided practical classes and independent study illustrate how and why GDS is useful for social science applications.

**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.

**GLACIOLOGY PAST, PRESENT AND FUTURE (ENVS330)**

**Credits: 15 / Semester: semester 1**

During this module students will be provided with fully up to date knowledge of how glaciers and ice sheets (1) have behaved in the past; (2) are currently behaving in the present; and (3) will behave in the future. This will be achieved through paired lectures and seminars on different glacial themes, where students will have the opportunity to examine and critique a range of glaciological research techniques that are applied to glacial environments around the world, ranging from valley glaciers to ice sheets. It is intended that this will provide students with a working knowledge of the controls on (and the social and climatic impacts of) past, present and potential future glacier behaviour.

**NATURAL HAZARDS AND SOCIETY (ENVS319)**

**Credits: 15 / Semester: semester 1**

This module aims to provide an integrated perspective on a range of natural hazards, the different levels of impact on human societies, and the mitigation and adaptation strategies adopted before, during and after extreme events. At the end of this module students will have an understanding of the physical processes and societal impacts associated with a range of geophysical and meteorological hazards. The course is delivered in a series of lectures supported by tutorial sessions and is assessed by an exam and coursework assignment.

**CONSERVATION BIOLOGY (LIFE326)**

**Credits: 15 / Semester: semester 1**

This module uses research-led teaching to explore current thinking in conservation biology;

The module explores patterns of biodiversity and encourages students to critically evaluate the evidence supporting alternative explanations for the extinctions or demise of many animal and plant species;

It also enables students to critically evaluate different approaches to conserving biodiversity;

The module is taught via lectures and student led seminars, in the form of debates. To support independent learning, students will also be guided to sections of specific textbooks and expected to follow up references, primary and secondary sources, listed by staff.

**POLITICS OF THE ENVIRONMENT (ENVS325)**

**Credits: 15 / Semester: semester 1**

Increasingly recognition of the environmental threats that we all face means that responding to this crisis affects the decisions we all make at a variety of different scales. This module explores the extent to which environmental concerns are taken into account in various decision-making processes involving the public (government), private and third sectors at a variety of different scales, global, European, national and local. The module is assessed by an essay and an open-book exam, which provides students with significant choice to explore those parts of the module they find most interesting.

**SURVIVING THE MARINE ENVIRONMENT: ADAPTATION, BEHAVIOUR AND CONSERVATION (ENVS310)**

**Credits: 15 / Semester: semester 1**

This module aims to foster a broad understanding of contemporary theory in behavioural ecology, evolutionary biology and ecophysiology, with special reference to the marine environment. We will consider processes that operate at scales from individuals to populations and consider implications of these processes for the conservation of marine species and ecosystems. This 15 credit module builds on knowledge acquired about techniques, theory and processes acquired in Year 1 ( e.g. Marine Biology: Life in the Seas and Oceans & Marine Ecosystems: Diversity Processes & Threats) and Year 2 (e.g. Marine Ecophysiology, Ecology & Exploitation) and provides the opportunity to experience the integration of current research themes in marine biology.

**OCEAN DYNAMICS (ENVS332)**

**Credits: 15 / Semester: semester 1**

Ocean dynamics addresses how the ocean and atmosphere circulate. Fundamental questions are addressed, such as how heat, salt, and dissolved substances are transported, how jets and weather systems emerge on our planet, why there are western boundary currents in the ocean, and how seafloor topography shapes the ocean circulation. Students will improve their understanding of how the ocean and atmosphere behave, including comparing the importance of different physical processes in the climate system. The module is delivered via lectures and formative workshops to gain skills at problem solving. There is significant mathematical content, requiring familiarity with calculus and algebra. The module is assessed through two online tests and an essay.

**ADVANCED TOPICS IN ECOLOGY (LIFE337)**

**Credits: 15 / Semester: semester 1**

This module will examine a range of key topics in contemporary ecology, by experts in their fields.

At a 3rd year level it will place into a real context material covered at a more general level in associated modules in levels 4 and 5.

Three main topics, of global importance, will be explored: community ecology, disease ecology, and macroecology.

To offer an authentic approach to evaluation, the module will be assessed by continuous assessment – reports on specific issues with no final exam.

**CLIMATE CHANGE - A CRITICAL REVIEW (ENVS389)**

**Credits: 15 / Semester: semester 2**

This module examines climate change impacts on humans and ecosystems. The module is designed to give the student a good overview of the strength and weaknesses of climate modelling approaches. Elements of the global carbon cycle are discussed.

**FLUVIAL ENVIRONMENTS (ENVS372)**

**Credits: 15 / Semester: semester 2**

Fluvial processes are found all over the world and are some of the most important in sculpting the Earth's surface and producing landforms. This module examines fundamental concepts and recent ideas relating to fluvial geomorphology, building on study throughout your educational career. A key point about studying fluvial environments is to understand how the system functions, its links and interactions. It is important to look at all the main components of the system, to understand the dynamics and controls on water and sediment flux and how these produce different types of landforms. The amounts of water and sediment can vary with the environmental conditions and thus study of the drivers of these systems such as climate and human activities and how they have changed over time is essential for being able to interpret the current landscape. Understanding of the present functioning of fluvial systems is essential for any environmental management since rain and runoff are ubiquitous and floods are a major natural hazard.

**CONTEMPORARY ISSUES IN OCEAN AND CLIMATE SCIENCES (ENVS366)**

**Credits: 15 / Semester: semester 2**

This research-led module aims to promote interest, awareness and understanding of current important research topics within Ocean and Climate Sciences. It also aims to develop generic skills such as team working and communication skills. The module considers recent reports such as the IPCC (Intergovernmental Panel on Climate Change) and the associated 2019 SROCC (Special Report on Oceans and Cryosphere in a Changing Climate), with students working with one of the lead IPCC authors based in Liverpool. Students will also attend the bi-weekly Ocean and Climate Sciences research seminars that are given by invited national and international experts on a range of subjects related to the marine and climate system. Assessment is by individual oral presentations by students presenting what they have learnt from recent research papers of particular interest to them, and a group presentation on a research topic of current importance (e.g. as highlighted in the latest SROCC report). A final in-person exam is focused around a recent high-impact scientific paper provided to the students.

**HUMAN-ENVIRONMENTAL INTERACTIONS (ENVS315)**

**Credits: 15 / Semester: semester 2**

The module aims to demonstrate and explore how both human and physical geographers can combine expertise to work at the intersections of human-environment interactions and environmental humanities. Emphasising the importance of interdisciplinarity, students are introduced to a variety of research areas, such as health studies, data sciences, and climatology to examine the variety of cross-disciplinary and collective approaches to studying environmental science. Through group tutorials, students develop a group project based on their shared interests, culminating in a group presentation and individual essay as part of their assessment.

**CARBON, NUTRIENTS AND CLIMATE CHANGE MITIGATION (ENVS381)**

**Credits: 15 / Semester: semester 1**

The module will involve both individual and group work, workshops, group presentations/debates, and engagement with the most current scientific literature and social media and science communication. This module is open to all students, but those taking this module must be willing to engage in quantitative analyses of carbon and nutrient cycling and its importance to climate mitigation strategies.

**GLOBAL CARBON CYCLE (ENVS335)**

**Credits: 15 / Semester: semester 2**

Increasing amounts of carbon dioxide in the atmosphere are having a profound impact on our Earth system. This module will introduce students to the fundamental theory behind the global carbon cycle. Students will see how carbon is partitioned between the atmosphere, land and ocean in the contemporary and past Earth system, understand how the ocean stores 50 times more carbon than the atmosphere, and consider the impact of increasing carbon dioxide on the organisms living on land and in the ocean. Teaching is through lectures, workshops focusing on key components of the carbon cycle, and guided reading. Assessment is by two pieces of coursework.

**FIELD CLASS (ALGARVE, PORTUGAL) (ENVS380)**

**Credits: 30 / Semester: semester 2**

The focus of the module is a field session in the Algarve where students will learn about landscape, land use, vegetation processes, coastal environments in a Mediterranean landscape. The students will carry out research projects in teams that they will have planned in advance. A series of lectures will introduce the physical geography of the region and students will design their own projects under the guidance of staff. The assessment will comprise the project plan, a presentation of the data acquired during the field class and the final project report.

**BSC FIELD CLASS (GEOGRAPHY & ENVIRONMENTAL SCIENCE) (ENVS391)**

**Credits: 15 / Semester: semester 2**

This final-year Physical Geography field class is held in the second semester and is taught through a short lecture series that guides groups of students through general field skills, organisation of field work, and safety including risk assessment. The module has been designed to allow students who may not wish to travel or undertake residential fieldwork in Geography to continue to develop their fieldwork and research skills. Assessment is via a group Field Planning and Safety test, group daily Oral Field Reports, and an individual Written Report. Emphasis is placed on field skills, data analysis and presentation, and report writing.

**MARINE ECOLOGY: THEORY AND APPLICATIONS (ENVS383)**

**Credits: 15 / Semester: semester 2**

This module develops the connections between ecological theory and management of marine communities and ecosystems. The theory will mainly focus on mathematical models of the dynamics of populations and communities, and will include practical work with software. The second half of the module aims to give a rounded overview of the current understanding of vulnerability of marine taxa to human activities and climate change, and enable students to evaluate consequences of loss of species on ecosystem structure and functioning, as well as on human wellbeing.

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

## HOW YOU'LL LEARN

You will be assigned an academic adviser in each of the three years who will provide pastoral care and help you develop your skills for your chosen career path.

To help you meet the intellectual and practical challenges of studying Environmental Science, our programmes are taught using a student-centred approach, involving a range of learning experiences. These include:

- Small tutor groups (typically six-eight students) through all years
- High levels of field and lab-based teaching within the School of Environmental Sciences and in Europe's most advanced teaching laboratories
- An emphasis on active, problem-based learning (learning by doing)
- Hands-on experience with cutting-edge laboratory technologies
- Supervised independent and group project work, including a final year independent research-based dissertation supervised by a dedicated expert in the field.

## HOW YOU'RE ASSESSED

Assessment methods are tailored to the specific needs of each module, and student progression from year to year. A key consideration is that they are designed around the styles of communication, types of problems encountered, and the skills needed, in commercial, research and public sector jobs. Methods include exams, assessed essays, laboratory and computer practicals, online tests, field assignments including field notebooks, poster presentations, research reports and oral presentations. Many assessments involve group work. You will complete a compulsory research project (dissertation) in the final year on a topic of your choice. This is your opportunity to develop skills as an independent researcher, supported on a one-to-one basis by an expert in the field.

## 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

Environmental Science at Liverpool is focused on providing you with the key knowledge and practical skills to be successful within the environmental sector, such as report writing, field and laboratory practical skills, oral presentations, project planning, and coding and modelling skills.
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Recent Environmental Science graduates have been employed in roles within the sector such as:

- Conservation management
- Environmental consultancy
- Geotechnical surveying
- Sustainability consultancy
- Other roles outside of our immediate sector have included Accountancy and Education.

As part of your degree the following work experience opportunities are available:

- Work-based dissertation in your final year, where you work with a local business on a project applied to environmental sciences
- Year two semester one: studying abroad with one of our exchange partners across North America
- 'Year in China' option: where you are taught about Chinese language and culture in addition to studying environmental science-related modules at Liverpool's sister university, XJTLU.

**90%** **OF GEOGRAPHY AND PLANNING STUDENTS ARE IN WORK AND/OR FURTHER STUDY 15 MONTHS AFTER GRADUATION.**

*Discover Uni, 2018-19.*

# 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 |

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

*Fees are correct for the academic year 2024/25*
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.

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## 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 the cost of your dissertation/project, and optional field classes in year three.

Find out more about the additional study costs that may apply to this course.

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## SCHOLARSHIPS AND BURSARIES

We offer a range of scholarships and bursaries to provide tuition fee discounts and help with living expenses while at university.

Check out our Undergraduate Global Advancement Scholarship. This offers a tuition fee discount of up to £5,000 for eligible students starting an undergraduate degree from September 2024. There's also the Liverpool Bursary which is worth £2,000 per year for eligible students.

Discover our full range of undergraduate scholarships and bursaries

# Entry requirements

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

| **Your qualification** | **Requirements**<br>About our typical entry requirements |
|---|---|
| A levels | ABB<br>Applicants with the Extended Project Qualification (EPQ) are eligible for a reduction in grade requirements. For this course, the offer is BBB with an A in the EPQ<br>You may automatically qualify for reduced entry requirements through our contextual offers scheme.<br>If you don't meet the entry requirements, you may be able to complete a foundation year which would allow you to progress to this course.<br>Available foundation years:<br>• Geography BSc (Hons) (4 year route including a foundation year at Carmel College) BSc (Hons) |
| GCSE | 4/C in English and 4/C in Mathematics |
| Subject requirements | We are happy to accept the following A levels: Geography, Geology, Chemistry, Biology, Physics, Mathematics and Further Mathematics, Environmental Science/Studies/Environmental Technology*, Applied Science (Double Award), Economics, Computer Science.<br>*Not in combination with each other.<br>For applicants from England: For science A levels that include the separately graded practical endorsement, a "Pass" is required. |
| International Baccalaureate | 33 points, with no score less than 4 including 1 Science at Higher Level. |

| Your qualification | Requirements<br>About our typical entry requirements |
|---|---|
| Irish Leaving Certificate | H1, H2, H2, H2, H3, H3, including H2 or above in one science |
| Scottish Higher/Advanced Higher | Not accepted without Advanced Highers at grades ABB, including one science subject. |
| Welsh Baccalaureate Advanced | Welsh Baccalaureate accepted at grade B alongside A level grades AB (including one science subject) |
| Access | 45 Level 3 credits in graded units, including 30 at Distinction and a further 15 with at least Merit. 15 Distinctions are required in one science subject. |
| International qualifications | Many countries have a different education system to that of the UK, meaning your qualifications may not meet our entry requirements. Completing your Foundation Certificate, such as that offered by the University of Liverpool International College, means you're guaranteed a place on your chosen course. |

## 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.

THE ORIGINAL REDBRICK