

# MSc Environmental Management

The programme is made up of both core (120 credits) and optional modules (60 credits), divided into three vocational and thematic streams. If you have no prior statistical experience, it is recommended you take one of the statistical options. Students may choose to follow one stream or choose from a variety of options avoiding timetable clashes. Students are required to take a total of 180 credits overall. Our current modules are:

## Programme Overview

### Core Modules (120 credits)

Environmental Management : Principles and Practice	10 credits
Resource and Environmental Economics	10 credits
Waste and Environmental Management	10 credits
Ecosystem Services	10 credits
Contemporary Issues in Environmental Law	10 credits
Skills for Independent Learning	10 credits
Research Project	60 credits

### Optional Modules (60 credits)

#### Recommended:

Field Class (10 credits)  
Research and Enterprise Micro-Placement (10 credits)  
Quantitative Analysis of Environmental Data (10 credits), or  
Qualitative Research Methods (10 credits)

#### Stream 1: Contaminated and Urban Environments

Pollutant Behaviour in the Environment (20 credits)  
Environmental Pollution (10 credits)  
Laboratory analysis of soils and pollutants (10 credits)  
Environmental Consultancy (20 credits)  
Air Pollution: Effects and Control (20 credits)  
Environmental and Pollution Microbiology (10 credits)  
Urban Ecology (10 credits)  
Plants, greenspace and urban sustainability (10 credits)

#### Stream 2: The Changing Environment

Climate Change (20 credits)  
Carbon and Global Change (10 credits)  
Climate Policy, Justice and Society (20 credits)  
The Science of Climate Change (10 credits)  
Preparing for Floods (10 Credits)  
Energy, Climate Change and Development (20 Credits)  
Global Environmental Change, Justice and Development (20 credits)  
Climate Change and Food Systems (10 credits)

### Stream 3: Agriculture and Rural Environments

Issues in Agricultural Systems (20 credits)

Wildlife and Farming (10 credits)

Water agriculture and irrigation (10 Credits)

Agriculture in the Tropics (10 credits)

Principles of Integrated Pest Management (20 credits)

Rethinking agricultural development (20 credits)

Conservation Biology (10 credits)

Climate Change and Food Systems (10 credits)

### Detailed Module Outlines

#### Core Modules:

#### **Environmental Management: Principles and Practice**

*Module Convenor:* Dr Simon Mortimer

*Description:* The module is available to students on the MSc Environmental Management and MSc Environment & Development programmes and aims to introduce students to the ways in which the principles of environmental management are applied in professional settings. Using a series of lectures, case studies and field visits, it examines the motivations for businesses and organisations to carry out environmental management, the ways in which environmental impacts are assessed and the systems employed to minimise environmental problems. Students apply their learning by writing a report to improve the environmental management of a real client's activities.

*Aims:* To encourage and enable students to: understand how business and organisations address environmental issues, measure their impacts and respond to drivers such as policy and regulation and pressure from consumers and the wider public; examine and critically appraise the relationships between the principles of environmental management and its practice in a number of case studies; place their own understanding and experience (professional and/or educational) in a broader multidisciplinary perspective of issues relating to environmental management; develop further their skills in researching cross-cutting issues relating to environmental land management, including skills of critical reasoning, analysing, evaluating and synthesising; further develop their communication skills and team working abilities.

*Assessment:* Written coursework, Team Exercises and Class tests.

#### **Resource and Environmental Economics**

*Module Convenor:* Dr Francisco Areal

*Description:* This module covers the main issues in the fields of environmental economics and resource economics combining theory with applied material taught using computers. The module will explain: the relationship between ecological and economic system, in particular, the role of the natural environment in sustaining the socio-economic system will be discussed (i.e. the sustainability problem); Important market failures (environmental public goods, environmental externalities) and policies aimed at solving them and techniques used by environmental economists, such as environmental input-output modelling, environmental valuation and agent based modelling. The module also pays attention to international environmental policy problems and instruments.

Regarding natural resource economics, students learn about dynamic optimisation of renewable and non-renewable resources.

Aims: To provide the students with the basic tools necessary to understand the importance of the environment in human welfare.

Assessment: In-class tests and practical skills assessments.

## **Waste and Environmental Management**

Module Convenor: Dr Steve Robinson

Description: Through a combination of lectures and site visits, this module aims to develop the student's understanding of the principles and practice of waste production and management. The lectures include contributions from external speakers on a range of technical and political challenges facing the waste industry.

Aims: To provide students with an understanding of the origin and composition of a variety of industrial and domestic organic and inorganic wastes, their treatment and disposal. Students will gain an understanding of the needs of the user-community in relation to soils and the wider environment. The course will provide students with an understanding of the various ways in which underlying principles are applied to the management of environmental issues in the commercial world.

Assessment: Essay and Written report.

## **Ecosystem Services**

Module Convenor: Dr Martin Lukac

Description: The module is available to students on the MSc Environmental Management and MSc Environment & Development programmes and aims to introduce students to the notion and rationale behind ecosystem services, their consumption, management and conservation. The module provides a concise overview of the topic and uses examples of natural and managed ecosystems to illustrate the role of ecosystem services. Case studies will be introduced by researchers to bring cutting edge information and knowledge to the module.

Aims: To encourage and enable students to understand the role of Earth's ecosystems in underpinning human society; To develop an understanding of the hidden subsidies and feedbacks which currently are often not considered and consequently not valued; To evaluate the contribution of ecosystem services to human economy and its stability; To think beyond the immediately obvious and uncover relationships and feedback between the natural environment and human society; To further develop reasoning and communication skills in moderated discussions and question sessions during lectures and external visits.

Assessment: Written Assignment including essay and Exam.

## **Contemporary Issues in Environmental Law**

Module Convenor: Dr Mark Wilde

Description: This module is of interest to students pursuing subjects' related to environmental management and regulation and is designed to provide in depth coverage of certain topical issues in environmental law. It is intended to be a freestanding module and does not depend upon existing knowledge of the subject. To this end it looks at the relationship between domestic, European and international environmental law. The module also considers the general approaches to

environmental law and policy and identifies overarching principles and general themes. Having ‘set the scene’ the module then examines how environmental law deals with a number of the most pressing issues facing society today and looks at a number of substantive areas as ‘case studies’. This means that there is some flexibility in the syllabus and the substantive areas covered may change from time to time. However, there are likely to be some constants, not least of which is climate change.

*Aims:* The aim of the module is demonstrate the role played by law in tackling some of the most pressing environmental issues of our age. It uses a case study approach to introduce a number of recurrent themes in environmental law. These include issues such as the need to achieve sustainable economic development and the difficulties of translating scientific concepts into legally enforceable standards. The module requires students to develop an independent approach to learning and intellectual curiosity. To this end the module affords students the opportunity to undertake an essay on a subject of their choosing. This enables students from other departments, such as the sciences, to link their main studies with a legal topic. It also enables law students to stretch themselves and develop independent research skills.

*Assessment:* Essay.

### **Skills for Independent Learning**

*Module Convenor:* Dr Elizabeth Shaw

*Description:* Through seminars, tutorials and coursework, this module is designed to provide training in the skills required to study and research at postgraduate level.

*Aims:* The module aims to make students aware of the academic standards and integrity expected at postgraduate level and to provide training in study skills required for independent in learning in taught and research project modules.

*Assessment:* Written assignments and set exercise.

### **Research Project**

*Module Convenor:* Dr Elizabeth Shaw

*Description:* This module provides training in the skills required to devise, carry out and report a scientific project

*Aims:* The project, which may be in any appropriate area of Environmental Management, is intended to provide training in the skills required to devise, carry out and report a research project.

*Assessment:* Literature review and dissertation

## **Optional Modules (10 or 20 credits)**

Recommended:

### **Field Class**

*Module Convenor:* Dr Tom Sizmur

*Description:* This module provides field examples of problems discussed during the teaching terms of Environmental Management and Environmental Pollution. You will obtain further hands on experience of monitoring and assessing environmental issues e.g. waste, contaminated land, water

quality, and sustainable land management. The class runs from Sunday to Friday during the Easter vacation.

Aims: This module aims to provide you with the practical skills to identify, document, and evaluate the impact of human activities on the environment in the field.

Assessment: Written Assignments, Field notebook.

## **Research and Enterprise Micro-Placement**

Module Convenor: Dr Rob Batchelor

Description: This module aims to help students apply their academic training within a research and/or enterprise environment. Research placements will provide the opportunity of working with a member of staff on a current project based in the UK or internationally. Enterprise positions within Geography and Environmental Science would allow students to gain experience of working within an external commercial environment.

Aims: This module aims to increase employability through being able to demonstrate dedicated, project-based experience in industry and the university sector and to enhance ‘soft-skills’ such as team-work, communication, time-management and planning. To extend knowledge and learning of degree discipline modules and to help identify future career path(s).

Assessment: Project output other than dissertation and oral presentation.

## **Quantitative Analysis of Environmental Data**

Module Convenor: Dr Shovonlal Roy

Description: Quantitative data analysis is essential for Environmental Science. These practical skills increase our understanding of natural environmental processes and the impact of human activity on the environment (e.g. pollution and land management) through the analysis of data collected during practical investigations. This module will provide an overview of commonly used statistical and graphical techniques for environmental data analysis. Students will have the opportunity to design simple experiments, collect and analyse their own data, as well as analyse real data sets provided from different environmental research studies.

Aims: To help you learn how to analyse environmental data by applying and interpreting the outputs from a range of classic and modern statistical methods using Minitab and ArcGIS.

Assessment: Written report.

## **Qualitative Research Methods**

Module Convenor: Dr Giacomo Zanello

Description: This module will introduce you to qualitative research methods.

Aims: This module aims to introduce students to qualitative research methods and to provide students with an appreciation of the contribution of such methods to social science research, particularly in relation to economics and as applied in the fields of agriculture and food.

Assessment: Oral assessment and presentation and class test.

## Stream 1: Contaminated and Urban Environments

### **Pollutant Behaviour in the Environment**

*Module Convenor:* Dr Elizabeth Shaw

*Description:* The module focuses on both the processes and applied aspects of pollutant behaviour in the environment with an emphasis on terrestrial and freshwater systems and their interface.

*Aims:* This module aims to provide a fundamental grounding in the physical and (bio)chemical processes underpinning the behaviour of pollutant chemicals in the environment; an introduction to the assessment of risk posed by environmental contamination, and objectives of, and strategies for, the remediation of contaminated sites.

*Assessment:* Essay and written reports.

### **Environmental Pollution**

*Module Convenor:* Dr Tom Sizmur

*Description:* Human activities have elevated the concentration of potentially toxic elements in environmental media. This module will provide you with an understanding of the sources, transport pathways, and toxicity of key environmental contaminants. The practical content will allow you to apply contemporary methods to assess the effects of contaminants in the environment and interpret environmental data to develop international policy.

*Aims:* This module aims to develop an understanding of the mechanisms by which potentially toxic elements contaminate environmental media and cause toxicity to biological organisms.

*Assessment:* Written assignment, Annotated bibliography and Exam.

### **Laboratory Analysis of Soils and Pollutants**

*Module Convenor:* Dr Elizabeth Shaw

*Description:* This module develops your laboratory and reporting skills. Over the course of 10 practical classes you will develop knowledge of the main analyses which are applied to soils to determine properties pertinent to the fate and behaviour of pollutants. You will also undertake a number of tests that are used to assess the concentration and bioavailability of a suite of contaminants in polluted soils. This module provides practical experience of techniques introduced and applied in GVMPBE.

*Aims:* To provide students with the skills required to analyse key soil properties related to pollutant fate. To gain experience analysing organic contaminants and potentially toxic elements in environmental samples. To introduce good laboratory practice and the importance of care for health protection and precise results. To develop good reporting and record keeping in the laboratory. To improve understanding of the relationships between soil properties and pollutant fate.

*Assessment:* Practical skills assessment and written report.

## **Environmental Consultancy**

*Module Convenor:* Dr Elizabeth Shaw

*Description:* In this module you will undertake a practical site investigation on a former landfill. The results of the field sampling are used to develop a risk assessment of the site. The findings are presented to an expert panel under realistic conditions. Students benefit from a real life environment that provides genuine field experience that can be presented to future employers.

*Aims:* To teach the theory and application of techniques for contaminated site investigation and assessment with the subsequent presentation of the findings to clients.

*Assessment:* Written assignment including essay, set exercise and oral presentation.

## **Air Pollution: Effects and Control**

*Module Convenor:* Dr Hong Yang

*Description:* This course examines the effects and control of air pollution, enabling students to understand the issues and give them a basis for evaluating the controversies. The module will cover the history of air pollution, the “classical” air pollutants – sulphur dioxide and smoke; nitrogen oxides and particulates; ozone and other secondary pollutants; carbon dioxide and other greenhouse gases; acid rain; indoor air pollution and air pollution in Asia. Current controversies about urban air pollution and the role of traffic, such as "Dieselgate" will be discussed in detail. The module will also examine the management of air pollution: how decisions are made and what legislation is in force. A visit to a monitoring site or industrial installation will be included if possible.

*Aims:* To promote an understanding of the nature and effects of human-induced air pollution; to assess some current controversies on the effects of air pollutants and the appropriate control measures to be applied, and to understand the interface between science and politics in coming to decisions about air pollution.

*Assessment:* Essay, Written report and oral presentation.

## **Environmental and Pollution Microbiology**

*Module Convenor:* Dr Elizabeth Shaw

*Description:* This module provides an understanding of the major groups of microorganisms in soils, their adaptation to soil environments, and their impact on the wider environment. The course will also provide students with examples of the benefits of managing soil microorganisms for bioremediation, plant growth promotion, and environmental sustainability. The associated practical work will provide students with practical experience of measuring, isolating and testing examples of soil microorganisms and quantifying some microbially-mediated processes.

*Aims:* To provide you with an understanding of the major groups of microorganisms in soils, their adaptation to soil environments, and their impact on the wider environment. Emphasis will be placed on the role of soil microorganisms in global cycling of C, N, P and S and in the degradation of natural and anthropogenic chemicals in the environment (biogeochemical processes).

*Assessment:* Essay, written reports.

## **Urban Ecology**

*Module Convenor:* Dr Phil Baker

*Description:* This course will provide a detailed knowledge of the ecology of urban areas, both in the context of urban areas in the wider landscape as well as ecology within urban areas.

*Aims:* Through lectures this course will provide a detailed knowledge of the ecology of urban areas, both in the context of urban areas in the wider landscape as well as ecology within urban areas. Particular emphasis will be given to variation in the global concept of urban areas (i.e. what is an urban area?), how urban areas affect a range of taxonomic groups, how species have adapted to living within urban areas and how human-wildlife conflicts within urban areas arise and how these are managed. The course will also examine issues relating to the impact of the urban environment on human behaviour, health and well-being and how this could be managed to create significant benefits for individuals and society. Examples discussed within the module will include mammalian carnivores (including companion animals e.g. cats and dogs), commensal rodents, birds, invertebrates and plants.

*Assessment:* Exam.

## **Plants, greenspace and Urban Sustainability**

*Module Convenor:* Dr Tijana Blanusa

*Description:* Green plants in urban setting provide numerous ecosystem services, which will be discussed during the module, and would apply to the ecosystem issues in developed as well as the developing world. Case studies will be used to illustrate our relationship with the urban landscape and wider environmental issues. The module has a strong focus on urban environments and the use of appropriate greening interventions to improve human health and quality of life.

*Aims:* To provide you with an overview of the role of green infrastructure in supporting sustainable living in urban environments.

*Assessment:* Exam and oral presentation.

## **Stream 2: The Changing Environment**

### **Climate Change**

*Module Convenor:* Dr Maria Shahgedanova

*Description:* This course examines natural and human-induced climate change with reference to examples from different parts of the world. It addresses interactions between climatic changes and conditions of economies and communities focusing on vulnerabilities to climate change, development of adaptation strategies and techniques, and assessments of barriers to adaptation.

*Aims:* To examine the nature of climate change, its impacts, and methods of adaptation with respect to various parts of the world and different environments and communities.

*Assessment:* Essay, seminar presentation and exam.

## **Carbon and Global Change**

*Module Convenor:* Dr Joanna Clark

*Description:* The impact of human activity on the global carbon cycle and subsequent effect on the climate is one of the main environmental issues of our time. This module will provide students with an overall understanding of the global carbon cycle as a basis for evaluating recent advances in scientific knowledge on the impact of climate change, land use and atmospheric pollution on carbon cycling in natural environments. Particular focus will be given to understanding carbon on the land surface.

*Aims:* To develop understanding about the global carbon cycle, and how it is linked to the water and other biogeochemical cycles, to enable assessment of the human impact on the carbon cycle and the implications for global change.

*Assessment:* Written assignment including Essay and policy briefing note.

## **Climate Policy, Justice and Society**

*Module Convenor:* Prof Chuks Okereke

*Description:* This module provides students the opportunity to explore on the one hand, the socio-political, economic and ethical challenges posed by climate change, and on the other hand, the effort being made by society at various scales – i.e. local, national, and international levels – to address the problem. Case studies include China, the UK, EU and a number of African countries. The role of businesses, NGOs as well as key disagreements between developed and developing countries are also highlighted.

*Aims:* The module aims to explore the various dimensions of climate change from geographical and political lenses, to establish why it is one of the most complex challenges facing humanity. It will expose students to various ways in which climate change challenges society at individual, organizational, national and international levels.

*Assessment:* Exam and practical skills assessment.

## **The Science of Climate Change**

*Module Convenor:* Prof Nigel Arnell

*Description:* This module provides an introduction to the science of climate change, aimed at students who do not necessarily have a scientific background.

*Aims:* The module provides the background for a deep and informed understanding of one of today's key global challenges. Why is climate changing, and how will it change in the future? How can we predict future climate? What is a "dangerous" climate change? And how can we construct and use knowledge of climate change to inform adaptation and mitigation?

*Assessment:* Practical skills assessment, oral presentation and exam.

## **Preparing for Floods**

*Module Convenor:* Prof Hannah Cloke

*Description:* The module will provide a basis for understanding key issues in flood preparedness, from the local to the global scale, including flood forecasting and warning, response and incident management and building community resilience.

*Aims:* To develop a deep understanding of the components of flood preparedness strategies in different contexts and their relationship to science and policy. Students will be able to critically discuss flood preparedness policy and practice in a national and international context, and the scientific and policy concepts used in flood risk management.

*Assessment:* Written assignment including essay, participation in discussions and presentation.

## **Energy, Climate Change and Development**

*Module Convenor:* Prof Nick Bardsley

*Description:* An overview of the social and economic processes contributing to climate change and proposed solutions, drawing on ecological economics and energy economics.

*Aims:* To provide a grounding in ecological and energy economics, and show how these can be applied to analyse the causes of climate change. To enable students to critically consider policies for climate change mitigation and adaptation. To foster an appreciation of the complex and holistic nature of the issues involved.

*Assessment:* Essay, learning log, contribution to class discussions.

## **Global Environmental Change, Justice and Development**

*Module Convenor:* Dr Andrew Ainslie

*Description:* The module provides a comprehensive overview of the major environmental and interrelated social problems plaguing the planet in the twenty-first century and specifically in the 'developing' world, and examines the principal institutions and actors implicated in various ways in these problems and their resolution.

*Aims:* To equip students with the requisite conceptual and analytical skills and evidence-based material to be able to understand the links and trade-offs between development, poverty, justice and the changing global environment.

*Assessment:* Oral presentation, written assignment including essay and class test.

## **Climate change and Food Systems**

*Module Convenor:* Jake Bishop

*Description:* This module will consider the impacts of human-induced climate change on global food systems and how these interact with other issues such as trade and sustainable development. Students will learn about the global climate system, how organisms respond to climate, and about the responses of agricultural productivity to changes in climate and climate variability.

*Aims:* To combine knowledge of the global climate system with the response of ecosystems and agricultural productivity to climate variability and change in order to provide a basis for assessing the impacts of climate change on food production within the Earth system.

*Assessment:* Written assignment including essay and class test.

## Stream 3: Agriculture and Rural Environments

### **Issues in Agricultural Systems**

Module Convenor: Dr Lindsay Todman

Description: This module provides the contextual background in Agriculture, Ecology & Environment, integrating the ecology and environmental science with social and economic considerations. Content covers genetic and natural resources, energy use and greenhouse gas emission, biodiversity and landscape conservation, biosecurity and animal welfare and links through to the food chain, diet and consumer choice.

Aims: This module aims to develop students' knowledge of the underlying environmental, social and economic issues surrounding contemporary agricultural systems. It will expose students to the key debates surrounding sustainable agriculture, through lectures, guest speakers and field trips. Students will develop skills in accessing and synthesising research material from a range of disciplines (environmental, social, economic). The structure of the course is designed to provide opportunity to discuss and debate some of the major contemporary issues in sustainable agriculture and to put their subsequent independent research in its wider societal context.

Assessment: Essay, annotated bibliography, and contributions to seminar debates

### **Wildlife and Farming**

Module Convenor: Dr Simon Mortimer

Description: This module will focus on the history of the relationship between wildlife and farming, the population and community ecology of plants, invertebrates and vertebrates in agricultural ecosystems, management to promote biodiversity in farmland, and the role of biodiversity in delivering ecosystem services.

Aims: To provide an understanding of the interrelationship of farming practice and the abundance and distribution of wildlife in the countryside.

Assessment: Essay, exam, and oral presentation.

### **Water, Agriculture and Irrigation**

Module Convenor: Dr Gillian Rose

Description: This module will enable students to scrutinise the role of water in agriculture and development, evaluate different irrigation systems, and critically analyse the relationship between crop growth and yield and water use, and how to use water efficiently.

Aims: To provide an understanding of the soil and plant processes which contribute to the management of water for crop production, and how these are used to schedule irrigation.

Assessment: In-class test, multiple choice tests and set exercise.

## **Agriculture in the Tropics**

*Module Convenor:* Dr Alistair Murdoch

*Description:* This module will consider tropical agriculture and horticulture and farming systems, focussing on the physical, climatic, edaphic and biological factors affecting crop and animal production, and using case studies to show how these factors are interrelated and integrated in farming systems and livelihoods.

*Aims:* To describe the major crop and livestock species and farming systems in the tropics and sub-tropics and explain how the distribution of farming systems and their component parts are influenced by biological, environmental, physical, edaphic, and socio-economic factors.

*Assessment:* Written assignment including essay and presentation.

## **Principles of Integrated Pest Management**

*Module Convenor:* Prof Michael Shaw

*Description:* This module will introduce the major classes of organisms competing with people to consume crops and outline plant defences against them.

*Aims:* To provide a mental framework for thinking about factors determining the impact of pests, disease and weeds: population growth and factors limiting it; natural enemies; movement from crop to crop in space and time and to show, by selected examples, how this impact depends on the whole cropping system. In restricted settings, to allow students to suggest integrated modifications to a system, including pesticides, biopesticides, classical and inundative biocontrol, and varietal and agronomic factors which will give stable and resilient output from the system.

*Assessment:* Exam and practical skills assessment

## **Rethinking Agricultural Development (including Horticulture): Implementing solutions**

*Module Convenor:* Dr Alistair Murdoch

*Description:* There is a diversity of views about the issues, role and impact of agriculture for development and livelihoods. The key purpose of this module is to give you the opportunity to evaluate evidence critically so that you will be able to defend your own evidence-based opinion.

*Aims:* This course aims to teach and stimulate critical thinking and evaluation about the issues, role and impact of agriculture (including horticulture) for development and livelihoods.

*Assessment:* Written assignments, Essay and oral presentation.

## **Conservation Biology**

*Module Convenor:* Dr Graham Holloway

*Description:* The course will introduce conservation philosophy and how it sits within socio-economic reality. Threats to biodiversity from habitat loss, invasive species, pollution and global climate change are extensively explored. Strategies deployed to counteract biodiversity loss are considered and the strengths and weaknesses of these strategies are examined.

*Aims:* To provide students with an understanding of the science of conservation biology and its use in the sustainable management of genes, species, communities and habitats.

*Assessment:* Written exam.

## **Climate change and Food Systems**

*Module Convenor:* Jake Bishop

*Description:* This module will consider the impacts of human-induced climate change on global food systems and how these interact with other issues such as trade and sustainable development. Students will learn about the global climate system, how organisms respond to climate, and about the responses of agricultural productivity to changes in climate and climate variability.

*Aims:* To combine knowledge of the global climate system with the response of ecosystems and agricultural productivity to climate variability and change in order to provide a basis for assessing the impacts of climate change on food production within the Earth system.

*Assessment:* Written assignment including essay and class test.