BSc (Hons) Ecology and Environmental Science

Introduction to Environmental Science

- Mandatory Module.
- Mapping soil nutrients at the field scale.
- Detecting arsenic in cooked rice.
- Investigating heavy-metal pollution in river sediments.
- Measuring atmospheric pollution using particle counters.

Environmental Change - Past and Present

- Mandatory Module.
- Investigate plastic pollution with the Marine Conservation Society.
- Visit an Anaerobic Digestion plant and a Landfill site.
- The Big Debate: ‘Fracking - opportunities and impacts’.

The combination of Ecology and Environmental Science enables students to learn more about the environment and how it operates. Not only do students gain a solid understanding of species and their interactions in communities, habitats, and ecosystems, but they also investigate how such relationships are being affected by humans, with a strong focus on environmental pollution and climate change.

There is flexibility within the programme to tailor the course to your interests. Mandatory modules provide students with essential skills and the course is further enhanced through the availability of a range of optional modules. Listed below are highlights from some of the modules we offer on this joint degree programme:
Year One

**Introduction to Ecology**
- Mandatory Module.
- Visits to several different local Nature Reserves.
- Explore the relationships between species and their habitats.
- Develop skills in plant and animal identification.

**Environmental Skills & Applications**
- Mandatory Module.
- The art of scientific communication, including social media.
- Critical reading - a precursor to academic writing.
- Writing up your work - how to get it right.
- The use of science to address environmental issues.

**Basis of Biological Surveying**
- Mandatory Module.
- Practical: Bird surveying techniques - mist netting and ringing.
- Practical: Reptile surveying on the Malvern Hills.
- Practical: Vortis suction sampling for insects - how effective is it?
- Practical: Small mammal monitoring using Longworth traps.

**Classification & Species Identification**
- Mandatory Module.
- Gain identification skills for a range of different taxonomic groups.
- Practical sessions every week to explore different groups.
- Create your own field notebook detailing notes on key species.
- Field observations coupled with further analysis in the lab.
Year Two

Environmental Analysis and Interpretation
- Mandatory Module.
- Measuring the response of *Daphnia* to climate change.
- Detecting micro-plastics in marine fish.
- Analysing samples for environmental DNA.

Research Practice & Professional Development
- Mandatory Module.
- Designing experiments for robust studies.
- Group scientific project - topic of your choice.
- Data analysis and presentation.
- Enhancing your employability - How to write a cover letter and CV.

Ecology - Individuals to Ecosystems
- Mandatory Module.
- Understand the interactions between animals and plants, and their environment.
- Explore how ecosystems support human activities.
- Debate the role of 'natural capital' in conservation and ecosystem management.

Geographical Information Systems
- Optional Module - can be taken in year two or three.
- Real-life application of ArcGIS and QGIS software.
- Site suitability analysis (e.g. for windfarms).
- Create maps to illustrate key aspects of a landscape.
- Reconstruct Antarctic surface topography from ice-thickness data.
Year Two

River Monitoring and Assessment

- Optional Module.
- Identify natural and human variables affecting water quality, including water quality and sediment analysis in the laboratory.
- Macro-invertebrate identification in the field, and bio-assessment monitoring.
- Access hydrological data using telemetry.

Natural Hazards

- Optional Module.
- Explore the nature and distribution of natural hazards.
- Mapping hazards and flood risk.
- Practical: Volcano monitoring.
- Practical: Tracking tropical storms.

Field Techniques & Identification Skills

- Optional Module.
- Numerous field and lab sessions bringing together theory & practice.
- Opportunities to develop field techniques and identification skills in your preferred area.
- Group environmental/ecological project on a topic of your choice.

Animal Behaviour

- Optional Module.
- Data collection of animal behaviour in the field.
- Work as a group to develop, carry out and evaluate your own study on animal behaviour.
- Gain practical experience in clicker training of horses.
- Evaluate theories related to animal behaviour and their interaction with their environment.
Year Three

**Mediterranean Environments Field Course**
- Mandatory Module.
- Residential field course to Provence, South of France.
- Visits to the Camargue, Crau Plain and the lower Alps.
- Compare and contrast Mediterranean environments with the UK.
- Conduct group projects around La Roque d’Anthéron.

**Restoration Ecology**
- Mandatory Module.
- Explore rewilding and species reintroduction in the UK & globally.
- Discover and evaluate how contaminated land can be restored.
- Debate the role of restoration ecology and habitat creation.

**Landscape Ecology**
- Mandatory Module.
- Evaluate landscapes in relation to the species and ecological processes they support.
- Field trip to assess connectivity between woodlands.
- Use GIS to map species movement between habitat patches according to land use type.

**Environmental Pollution and its Detection**
- Mandatory Module.
- Biomeasurement of toxicity e.g. in earthworms.
- Investigate the accumulation of heavy-metals in aquatic plants.
- Measure pesticide residuals on food.
- Investigate pollution exposure to humans.
Year Three

River Conservation & Management
- Optional Module.
- Conduct Environment Agency ‘River Habitat Surveys’.
- Develop skills in producing an environmental consultancy report.
- Guest lectures from external organisations involved with river conservation and management (e.g. Wildlife Trust, Rivers Trust).

Environmental Impact Assessment
- Optional Module.
- Investigate and evaluate current and historic EIAs.
- Presentations from industry practitioners.
- Debate 'development' versus 'conservation'.

Atmospheric Processes and Pollution
- Optional Module.
- Working with real problems and cutting-edge detection tools.
- Learn how to fly drones for atmospheric sampling.
- Combination of field work with data analysis.
- Introduction to state-of-the-art mechanistic modelling used in research and the regulation of air quality.

Environmental Geology
- Optional Module.
- Study interactions between humans and the geological environment.
- Develop skills in site investigation, land-use planning, and EIA.
- Practical: Assessing the engineering properties of rocks and soils.
Year Three

Zoo-based Conservation
- Optional Module.
- Majority of module delivered at Bristol Zoo with lectures by zoo keepers, veterinary and research staff.
- Learn about the management of animals in captivity and the link between zoos and *in-situ* conservation and research.
- Debate the ethical and welfare issues of zoos.

Project Management
- Optional Module.
- Learn how to apply project management skills.
- Combine project management skills with scientific knowledge.
- Work on a 'real' project for a 'real' client.

Applied GIS and Remote Sensing
- Optional Module.
- Habitat mapping of Sentinel-2 satellite data with ENVI software.
- Estimating coastal erosion from LiDAR data.
- Multi-spectral imaging of campus vegetation.

Geographical Information Systems
- Optional Module - can be taken in year two or three.
- Real-life application of ArcGIS and QGIS software.
- Site suitability analysis (e.g. for windfarms).
- Create maps to illustrate key aspects of a landscape.
- Reconstruct Antarctic surface topography from ice-thickness data.
Across each academic year students take 120 credits from Mandatory and Optional modules. Below, large boxes are 30 credit modules, whilst smaller boxes are 15 credit modules. Boxes in light blue denote Mandatory modules.

### Year One

- Introduction to Environmental Science
- Environmental Change - Past & Present
- Environmental Skills & Applications
- Classification and Species Identification
- Basis of Biological Surveying
- Introduction to Ecology

### Year Two

- Research Practice & Professional Development
- Environmental Analysis & Interpretation
- Ecology - Individuals to Ecosystems

Optional Modules:
- Field Techniques & Identification Skills
- Natural Hazards
- Geographical Information Systems (GIS)
- River Monitoring and Assessment
- Animal Behaviour
- Work Experience

Mandatory modules contribute 90 credits. Students are required to select two, 15 credit modules from those shown above.
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**Year Three - Optional Modules**

- Atmospheric Processes & Pollution
- Project Management
- River Conservation and Management
- Zoo-based Conservation
- Environmental Impact Assessment
- Applied GIS & Remote Sensing
- Environmental Geology
- Geographical Information Systems (GIS)
**Josh Toogood**

I have thoroughly enjoyed my first semester on the course. As somebody who enjoys learning about the environment and its wildlife, I found the 'Classification and Species Identification' module very interesting. Field trips to local nature reserves on this module and the 'Introduction to Ecology' module have undoubtedly been my personal highlights.

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**Emma Clarke**

Worcester is a fantastic University to be studying an environmental based course. The lecturers are highly experienced within their subject areas, and are very supportive. They provide the right balance of academic and field skills necessary for this area of study. My course also focuses on the development of key skills necessary for employment.

The department is very well equipped and technical staff are always on hand to provide extra support.

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**James Gould**

The lecturers take you out of the classroom and into the field, providing a great opportunity to gain hands-on practical experience, helping me to prepare for the workplace.

The modules are engaging and I’ve been able to mould my experience to include aspects such as Animal Behaviour and GIS mapping. The small class size means that feedback and support can be tailored specifically to each student.

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**Emily Griffiths**

The course covers a broad range of topics and has allowed me to choose modules relevant to what I want to do; Worcester has a good variety and choice.

I feel all my lecturers are really approachable and offer good support. The range of trips we do is useful as we get to see lots of things we are studying for ourselves, which helps me to engage with learning.
Graduate Profiles

Pete Case

After graduating, Pete joined Worcestershire Wildlife Trust where he was appointed as their Wetlands Officer. He led the Trust’s river restoration and wetland creation activities in partnership with the Environment Agency. He also advised on the hydrology at numerous wetland nature reserves across Worcestershire, and supported the Reserve Officers in the management of these sites. Pete is now a Project Officer at the Freshwater Habitats Trust, a role which involves coordinating the People Ponds and Water (PPW) project in Central England.

Charlotte Hale

After completing her degree, Charlotte joined Waterco, where she was responsible for producing the flood risk and drainage elements of ‘Code for Sustainable Homes’. She then worked for Solihull Metropolitan Borough Council, where her main role was to review and comment on planning applications from a flood risk and drainage perspective. Following this, Charlotte was a Senior Engineer at Wardell Armstrong, where she developed Flood Risk Assessments and Drainage Strategies for major development sites. Charlotte is now on a full-time secondment to Telford and Wrekin Council, assisting the Lead Local Flood Authority.

Chris Greensmith

Whilst studying for his degree, Chris became an active member of Worcestershire Wildlife Trust (WWT), initially as a volunteer and then as a volunteer reserve warden. Following completion of his degree, Chris continued his studies to undertake an MRes (Master of Research) in River Science at the University of Worcester. He is currently investigating the use of environmental DNA to detect the use of rivers and streams by European otters.

Will Stiles

After completing his degree at the University of Worcester, Will joined Cranfield University where he was involved in a project that developed a calibration model for measuring phosphorus in UK soil using visible and near infrared spectroscopy. He then joined Aberystwyth University, where he completed a PhD in ecology and biogeochemistry. Will is now a university lecturer and continues to manage the knowledge exchange hub at Aberystwyth, which provides scientific knowledge to the agricultural industry in Wales.
Further Information

Course Leaders

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