

Environmental and Ecological Field Skills	
Module Ref No:	H220-3Z/002
Date of Validation:	2020
SCQF Level:	9
SCQF Credits:	15

1. Rationale	
<p>This module will provide an opportunity for development of robust and pragmatic practical skills in environmental and ecological surveying and monitoring, obtained through a series of case studies covering key environmental and ecological disciplines.</p> <p>The module will allow students to critically study and evaluate a suite of environmental and ecological areas, from water and air monitoring to soil systems and biotic communities, using industry approved and novel approaches to environmental and ecological assessment. Students will develop skills in the planning, collection and interpretation of environmental and ecological data with the aim to inform environmental issues or problems, policy, land management decisions or other developments. The course is structured around a series of context-specific situations where students will consider sampling design and surveying approaches, the collection of field data and, if necessary, preservation of environmental samples, and their interpretation via instrumentation, modelling or similar data analysis. In particular, the course aims to provide skills to allow conclusive investigations to be independently achieved by the students.</p> <p>This module will underpin studies in Research Skills and Data Analysis and should contribute to preparing students for both Honours dissertation study and professional consultancy or research based employment.</p>	
2. Learning Outcomes	
At the conclusion of this module the student should be able to:	
L01:	Understand the strengths and weaknesses of a range of survey techniques and approaches.
L02:	Apply these techniques effectively, including creation of site risk assessments, survey and sampling regimes, appropriate use of equipment and data handling and analysis.
L03:	Apply suitable data visualisation, analysis and modelling methods to the collected data
L04:	Interpret and communicate the outputs effectively via a range of communication streams and in conjunction with academic/grey literature.
3. Content	
3.1	<p>Survey techniques and approaches</p> <p>The formulation of a good research questions and the logical formulation of hypotheses. Design and execution of surveys and sampling. Issues of sample size. Limitations and benefits of conventional and novel approaches. Implications for data management and quality. Statistical theory of sampling/monitoring techniques. Consideration of ethical and moral issues in relation to environmental systems, animal welfare and other relevant legislation.</p>
3.2	<p>Generation of risk assessments alongside the production of survey/monitoring designs. Practical experience in using field and laboratory equipment such as UV-Vis, air-monitoring systems, UAVs, camera traps, quadrats etc. The robust collection, management and storage of collected information in digital and alternative formats.</p>
3.3	<p>Graphical analysis of data. Descriptive statistics. Regression modelling. Environmental metrics and indices. Spatial interpretation and mapping. Formal hypothesis testing. Use of specialised graphical and statistical software. Simplistic and industry standard environmental models. Use of secondary data to complement and enhance collected information.</p>

3.4	Scientific report writing and the production of illustrative material (e.g. posters, presentations, and infographics). Consideration and evaluation of academic and grey literature sources in reference to the collected information. The presentation of data to a wide range of audiences.
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4. Approaches to Learning and Teaching

Notional Study Hours:

This module will be delivered via a 7 – 10 day residential field trip based either in the UK or abroad, as appropriate.

Typically, students will have to undertake about **150hrs** of study to successfully achieve the learning outcomes for this module; this will be made up of a combination of both scheduled and independent study as indicated below.

Scheduled Study: Typically consisting of:	60 hrs
Lectures	10
Tutorials	10
Practical sessions/fieldwork	40
Independent Study:	90hrs

5. Graduate Attributes

Opportunity to develop the following aspects of graduate attributes will be included within this module:

Graduate Attribute	Learning Activity and Aspect Developed
1. Academically competent	<ul style="list-style-type: none"> • Students are supported in the production of professional scientific outputs from the generation of reports and illustrative outputs • Enhancement of numerical, statistical and quantitative skills from the analysis of data • Interpretation and evaluation of complex information in relation to the wider scientific knowledge from literature surveys. • Problem solving and contextualisation of knowledge and ideas from survey design.
2. Critical thinker	<ul style="list-style-type: none"> • Improved capacity for independent and creative thinking, stemming from the design and application of environmental surveys. • Ability to identify and solve problems arising from recognised and unexpected issues whilst conducting investigations. • Capacity to collect, synthesise and analyse information in a reasoned manner via the design, execution and evaluation of collected information.
3. Desire for learning and personal development	<ul style="list-style-type: none"> • Awareness of personal strengths and weaknesses highlighted during the different components of the investigative work. • Promotion of lifelong learning via directed and independent study by facilitating a range of topics of potential interest.
4. Responsible member of society	<ul style="list-style-type: none"> • An understanding of the environmental responsibilities and issues within the environmental sphere, alongside the collection of information that can aid positive policies and decisions. • A responsible and professional attitude to the collection and interpretation of environmental data.
5. Employability	<ul style="list-style-type: none"> • An ability to gather information to support policy and develop solutions to environmental issues. • Pragmatic, industry relevant skills for those interested in consultancy or research work.

6. Assessment

This module will be assessed using the following methods:

Assessment Method	Contribution to Grade (%)	Nature of Assessment
Scientific Report	75	A 3,000 word scientific report on a selected survey completed during the course. This should be linked to the second assessment below. This is an individual effort (All LO's).
Presentation/Poster	25	A 15 minute, group presentation on selected surveys completed during the course OR a group poster presentation delivered in a conference-style setting. To be completed/submitted during the field trip (LO3 and 4).

Note: The presentation/poster and scientific reports should be linked, with the presentation/poster providing the initial basis for the more comprehensive report.

7. Reading

Required:

British Plant Communities (Vol 1-5) J.S.Rodwell (2000)

National Vegetation Classification: Users handbook. J.S.Rodwell (2006)

Artiola, J.F., Pepper, I.L. & Brusseau, M.L., Monitoring and Characterization of the Environment-1. In Environmental Monitoring and Characterization. (Kindle Edition available)

Gitzen, R.A. et al., (2012). Design and Analysis of Long-term Ecological Monitoring Studies, Cambridge: Cambridge University Press.

Additional:

Quinn, G.P. & Keough, M.J., 2002. Experimental design and data analysis for biologists, Cambridge: Cambridge University Press.

Kirk, A., 2016. Data visualisation : a handbook for data driven design, Los Angeles: SAGE. (available at (<http://book.visualisingdata.com/>))

8. Staff

Module Leader:	Deirdre Wilson
Other contributing staff:	Andrew Innes Alistair Hamilton Madeleine Bell