Module Specification

Air, Land and Water: Data and Models

Version: 2023-24, v2.0, 16 May 2023

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Part 1: Information

Module title: Air, Land and Water: Data and Models

Module code: UBGMC1-30-2

Level: Level 5

For implementation from: 2023-24

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Environment & Technology

Department: FET Dept of Geography & Envrnmental Mgmt

Partner institutions: None

Field: Geography and Environmental Management

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This is the second module in a series of two linked across Level 4 and Level 5 that are designed to deliver a spine of critical environmental sciences knowledge and skills, and specifically develops quantitative analytical skills. This module also develops more advanced GIS and remote sensing skills and understanding, building on the two Level 4 modules.

Features: Not applicable

Educational aims: This module builds on understanding of air land and water systems previously developed by equipping learners with the analytical skills to acquire, manipulate and use data from diverse sources (instrumentation, remote sensing, model outputs, data portals). Emphasis is placed on understanding data quality and limitations and on the proper curation of datasets. A fundamental aim is to instil a critical understanding of the limitations, assumptions and applicability of air, land and water models. Learners should complete the module having developed sound practical and interpretive skills and the confidence to use data and models appropriately in contributing to solving environmental problems.

Outline syllabus: Understanding data – data structures, data currency and quality evaluation. Metadata, data management, and data curation. Remotely sensed data, time series data from instrumentation and observation, simulated data and climate projections.

Understanding modelling applied to air, land and water resources – model typology and concepts, model development processes, model validation, calibration and verification. Accuracy, precision and bias. Uncertainty, sensitivity analysis and accounting for error.

Working with data and models – air quality models and sources of data, hydrological models and data sources. Representing land surface processes in models. Data portals and wrangling data for analysis and modelling.

Understanding and applying analytical techniques - spatial statistics, inferential statistics, time series analysis, building models in r, advanced GIS and remote sensing techniques.

Part 3: Teaching and learning methods

Teaching and learning methods: Lectures, supported by reading and enquiry-based tasks will be used to build understanding around analytical approaches to quantifying and analysing air, land and water environments and their interactions.

This understanding will be reinforced and further developed through weekly practicals which will focus on the application of knowledge to a defined context and through training in the practical application of skills. Practical materials are specifically designed to develop independent learning skills and enhance learner confidence. This module is the second across a longitudinal curriculum of knowledge acquisition, technical skilling and personal development.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Acquire, analyse and interpret data from global and regional climate models, including climate projections.

MO2 Source, analyse and interpret meteorological, hydrological and landscape data.

MO3 Devise methodological analyses that demonstrate an understanding of the complexities of temporal and spatial data quality.

MO4 Apply statistical and spatial analysis methods to characterise air, land and water.

MO5 Demonstrate an understanding of modelling approaches, assumptions, limitations and uncertainty by critiquing the application of environmental models in different contexts.

MO6 Address environmental problems by applying GIS, RS and data-based models and techniques.

MO7 Integrate science communication principles in the production and delivery of a variety of outputs (written, visual, technical – digital and physical).

MO8 Produce an artefact that integrates a variety of data sources and analytical methods to address an environmental management challenge and communicate the results effectively.

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 220 hours

Face-to-face learning = 80 hours

Total = 300

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/ubgmc1-30-2.html

Part 4: Assessment

Assessment strategy: The assessment strategy for this module, adopts the same principles and approaches as related modules at earlier levels and continuing to building learner's confidence in application of practical skills. At this stage of learning we aim to amplify development of critical reasoning and evaluation skills alongside practical skills. We adopt a similar approach of sequential, skills-based learning through practicals supported by immediate, context-sensitive feedback.

Portfolio - developing practical analytical skills. Comprises 4 Elements which are released sequentially to encourage continuous engagement, designed to test application of specific skills and the interpretation of relevant data and outputs. Feedback is given on each Portfolio Element before the next is released, so that learners can incorporate learning from this into their next attempt. Each Portfolio Element must not exceed 5 pages.

Project - Whilst the portfolio is designed to assess learning around the application of advanced analytical techniques, the Report is much more holistic and students will build on the integrative dimension of learning. The assessment at the end of the module will be an integrative project. Students will be given a specified environmental challenge and will then be required to obtain and analyse appropriate data, which may also include undertaking model simulations. This is defined as a project rather than a report because the output could be something other than technical writing - Storymap, annotated data explorer, model and documentation etc. Learners will be given a problem and will then need to demonstrate that they can acquire and analyse relevant data from diverse sources to quantify or characterise some dimension(s) of this problem. They will need to apply relevant techniques,

justify their choice of technique and demonstrate a mature understanding of the assumptions and limitations of their approach. The problem could be constructed in such a way that different groups of students address different facets of the problem and that collectively we obtain a more integrated understanding. Students will be required to report verbally on their progress during the semester in a scaffolded project enquiry process, supported by feedforward at each stage.

Resit Portfolio - a similar brief to that described above, which may include some topic changes.
Resit Project - a similar brief to that described above, which may include a summary of changes.

Assessment tasks:

Portfolio (First Sit)
Description: Portfolio (20 pages)
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7

Project (First Sit)
Description: Project
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7, MO8

Portfolio (Resit)
Description: Portfolio (20 pages)
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7

Project (Resit)

Description: Project

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6, MO7, MO8

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Environmental Management {Apprenticeship-UWE} [Sep][FT][Frenchay][5yrs] BSc (Hons) 2021-22

Environmental Management [Frenchay] BSc (Hons) 2022-23

Environmental Management [Frenchay] BSc (Hons) 2022-23