

Module Descriptor

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|----------------------------|------------------------------------|---|-----------|
| Title | Introduction to GIS and Monitoring | | |
| Session | 2024/25 | Status | Published |
| Code | BIOL09039 | SCQF Level | 8 |
| Credit Points | 20 | ECTS (European Credit Transfer Scheme) | 10 |
| School | Health and Life Sciences | | |
| Module Co-ordinator | Ngozi Amaeze | | |

Summary of Module

In this module students will continue to develop their scientific and environmental measurement skills, through exploring sampling data, uncertainty, and spatial temporal variability. Students will be introduced to geographical information systems (GIS) to support the analysis of the natural and built environment. This will include developing an understanding on how to monitor geological and ecological data to inform researchers, regulatory bodies, and policy makers to develop and implement controls to minimise the impacts of pollutants, which is crucial to ensure environmental and global sustainability.

Students will explore the use of GIS in multiple fields of science such as geochemistry and microbiology, as well as mitigation strategies such as bioremediation and carbon sequestration, for the mapping of microbial and chemical diversity in different environments. The impact of climate change on microbial communities, investigating the biogeography, tracking sources of contamination and understanding their role in ecosystems will be studied. Environmental and microbial data will be integrated to provide holistic insights into the spatial distribution, evolution and function of microorganisms which can inform conservation and management practices.

A series of practical sessions will be used to provide hands-on experience in relevant methodologies and to provide experience of collating and interpreting relevant datasets. We will cover the role of GIS in environmental sciences, measurement and representation of geographical information, Vector and raster data analysis, cartography and the visual presentation of spatial data.

By undertaking this module students will develop a range of 'I am UWS' Graduate Attributes.

Universal – development of critical thinking, ethically and research minded.

Work Ready – an effective problem solver, communicator and ambitious. This includes an ability to work with a range of people, receptive to others' views and working well with others to reach shared goals. Being a good communicator, open-minded, flexible, empathetic, a good listener, and pro-active.

Successful – by being autonomous, resilient, and driven, which includes having the ability to weather challenges and setbacks, utilising adversity to build new skills and support others in

the future. Being determined, motivated, self-confident and demonstrating will-power. Not fearing failure.

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| Module Delivery Method | On-Campus¹ <input type="checkbox"/> | Hybrid² <input checked="" type="checkbox"/> | Online³ <input type="checkbox"/> | Work -Based Learning⁴ <input type="checkbox"/> |
| Campuses for Module Delivery | <input type="checkbox"/> Ayr <input type="checkbox"/> Dumfries | <input checked="" type="checkbox"/> Lanarkshire <input type="checkbox"/> London <input type="checkbox"/> Paisley | <input type="checkbox"/> Online / Distance Learning <input type="checkbox"/> Other (specify) | |
| Terms for Module Delivery | Term 1 <input type="checkbox"/> | Term 2 <input type="checkbox"/> | Term 3 <input type="checkbox"/> | |
| Long-thin Delivery over more than one Term | Term 1 – Term 2 <input checked="" type="checkbox"/> | Term 2 – Term 3 <input type="checkbox"/> | Term 3 – Term 1 <input type="checkbox"/> | |

| Learning Outcomes | |
|--------------------------|--|
| L1 | Understand and be able to apply the fundamental principles of environmental monitoring techniques. |
| L2 | Demonstrate an understanding of fundamental GIS principles and be able to produce high quality maps and visualisations for effective presentations of data |
| L3 | Recognise the roles GIS can play in microbiology and understand the process of combining environmental data with microbial data. |
| L4 | Be able to evaluate how GIS could be used in protecting microbial diversity, eDNA monitoring and understand the role it plays in the functioning of ecosystem. |
| L5 | |

| Employability Skills and Personal Development Planning (PDP) Skills | |
|--|--|
| SCQF Headings | During completion of this module, there will be an opportunity to achieve core skills in: |
| Knowledge and Understanding (K and U) | SCQF 9 Demonstrate knowledge of environmental monitoring, GIS principles and their applications in fields of science such as geochemistry and microbiology |

¹ Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

² The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

³ Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

⁴ Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

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| Practice: Applied Knowledge and Understanding | SCQF 9 Apply knowledge and skills to produce GIS maps, including relevant methodologies and interpretation of datasets |
| Generic Cognitive skills | SCQF 9 Critically analyse and evaluate data concepts using GIS to provide information on geological and ecological data. |
| Communication, ICT and Numeracy Skills | SCQF 9 Present and convey geo- and biological spatial digital data |
| Autonomy, Accountability and Working with Others | SCQF 9 Exercise autonomy and teamwork by designing a work profile for case studies and presentations. |

| Prerequisites | Module Code | Module Title |
|----------------------|--------------------|---------------------|
| | Other | |
| Co-requisites | Module Code | Module Title |

| Learning and Teaching | |
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| In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours. | |
| Learning Activities | Student Learning Hours |
| During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below: | (Note: Learning hours include both contact hours and hours spent on other learning activities) |
| Lecture / Core Content Delivery | 12 |
| Tutorial / Synchronous Support Activity | 12 |
| Laboratory / Practical Demonstration / Workshop | 24 |
| Independent Study | 152 |
| Please select | |
| Please select | |
| TOTAL | 200 |

| Indicative Resources |
|---|
| The following materials form essential underpinning for the module content and ultimately for the learning outcomes: Longley, P. Goodchild, M. F., Maguire, D.J. and Rhind, D. (2016). Geographic information science and systems. Hoboken, N.J.: Wiley Custom Learning Solutions |

Heywood, I., Cornelius, S., and Carver, S. (2011) An introduction to geographical information systems.4th Ed. Harlow: Prentice Hall

(N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements

In line with the [Student Attendance and Engagement Procedure](#), Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

For the purposes of this module, academic engagement equates to the following:

Attendance to all online, on-campus classes and laboratory sessions

Equality and Diversity

The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: [UWS Equality, Diversity and Human Rights Code](#).

(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

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|---|--|
| Divisional Programme Board | Biological Sciences Health |
| Overall Assessment Results | <input type="checkbox"/> Pass / Fail <input checked="" type="checkbox"/> Graded |
| Module Eligible for Compensation | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details. |
| School Assessment Board | Biological Sciences and Health |
| Moderator | Anne Crilly |
| External Examiner | TBC |
| Accreditation Details | |
| Module Appears in CPD catalogue | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Changes / Version Number | 1 |

Assessment (also refer to Assessment Outcomes Grids below)

Assessment 1

Presentation (30%)

Assessment 2

Portfolio of practical work (70%)

Assessment 3

Formative assessment and feedback: Students receive verbal feedback from the instructor during the computer laboratory sessions as they complete GIS exercises, some of which form part of their GIS and remote sensing portfolio. Where students work in pairs during the computer laboratory sessions students will receive feedback from their peers as they work through exercises together. Students will be given the opportunity to submit a GIS analysis report for formative assessment prior to completing the two GIS / remote sensing analysis reports for summative assessment.

(N.B. (i) Assessment Outcomes Grids for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed.

(ii) An indicative schedule listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

| Component 1 | | | | | | | |
|------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--|---------------------------------|
| Assessment Type | LO1 | LO2 | LO3 | LO4 | LO5 | Weighting of Assessment Element (%) | Timetabled Contact Hours |
| Presentation | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 30 | 1 |

| Component 2 | | | | | | | |
|-----------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--|---------------------------------|
| Assessment Type | LO1 | LO2 | LO3 | LO4 | LO5 | Weighting of Assessment Element (%) | Timetabled Contact Hours |
| Portfolio of practical work | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 70 | 0 |

| Component 3 | | | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--|---------------------------------|
| Assessment Type | LO1 | LO2 | LO3 | LO4 | LO5 | Weighting of Assessment Element (%) | Timetabled Contact Hours |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Combined total for all components | | | | | | 100% | hours |

Change Control

| What | When | Who |
|-------------|-------------|------------|
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