Module Descriptor

Title	Introduction to GIS and Monitoring		
Session	2026/27	**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.

Module Delivery Method	On-Campus[1] ☐	Hybrid[2] ☒	Online[3] ☐	Work -Based Learning[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☒ Lanarkshire ☐ London ☐ Paisley	☐ Online / Distance Learning ☐ Other (specify)	

Terms for Module Delivery	Term 1	☐	Term 2	☒	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

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 mapsand visualisations for effective presentations of data.
L3	Recognise the roles GIS can play in microbiology and understand the process of combiningenvironmental data with microbial data.
L4	Be able to evaluate how GIS could be used in protecting microbial diversity, eDNA monitoring andunderstand 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.
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**

[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

	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	
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. This long and thin module covers a wide variety of theoretical, conceptual and practical areas, which require arange of knowledge and skills to be displayed and exercised. Delivery of its syllabus content therefore involvesa diversity of teaching and assessment methods suitable to the learning outcomes of the module; these includelectures, structured tutorials (work closely integrated with the lecture material), laboratory exercises to developpractical skills and familiarisation with equipment and experimental techniques, completion and submission ofwritten coursework making use of appropriate forms of IT and VLE, and independent study.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (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
n/a	
n/a	
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 attending and participating in all timetabled programme activities including on-campus and online teaching sessions, asynchronous online learning activities, placement, work-based elements, 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. In line with current legislation (Equality Act, 2010) and the UWS Equality, Diversity, and Human Rights Code, our modules are accessible and inclusive, with reasonable adjustment for different needs where appropriate. Module materials comply with University guidance on inclusive learning and teaching, and specialist assistive equipment, support provision and adjustment to assessment practice will be made in accordance with UWS policy and regulations. Where modules require practical and/or laboratory based learning or assessment required to meet accrediting body requirements the University will make reasonable adjustment such as adjustable height benches or assistance of a 'buddy' or helper.
(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

Divisional Programme Board	**Biological Sciences Health**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☒ **Yes** ☐ **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	Biology
Moderator	Robin Freeburn
External Examiner	T Temple
Accreditation Details	
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	2

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Presentation (30%)
Assessment 2
Portfolio of practical work (70%) Formativite 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.
Assessment 3
(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	☒	☒	☐	☐	☐	30	1

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Portfolio of practical work	☐	☒	☒	☒	☐	70	0

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		
Combined total for all components						100%	1 hours

Change Control

What	**When**	**Who**
Delivery changed to Term 2 Moderator change	Jan 2026	R Freeburn
