

<b>GIS and Remote Sensing</b>	
<b>Module Ref No:</b>	<b>F890-3</b>
<b>Date of Validation:</b>	<b>2020</b>
<b>SCQF Level:</b>	<b>9</b>
<b>SCQF Credits:</b>	<b>15</b>

<b>1. Rationale</b>	
<p>Geographic Information System (GIS) and Remote Sensing (RS) technologies continue to develop rapidly and are increasingly regarded as standard 'professional tools' in many diverse sectors. Fundamental to their application is the ability of both GIS and RS data-sets to be placed in a unique geographic spatial context, thereby offering practitioners a very powerful and effective decision-making tool within project and/or business management.</p> <p>This module will serve to develop the understanding and practical skills required to allow students to become competent in the basic use and application of GIS and RS resource material. In addition to class practical and lecture sessions, the module will use case studies, demonstrations and/or visits to illustrate the widespread and versatile applications of GIS and RS systems currently in use.</p> <p>There is no expectation of prior knowledge of GIS, however the module is based on practice using industry-standard GIS software, so students should be confident in using complex software under written and practical guidance.</p>	
<b>2. Learning Outcomes</b>	
At the conclusion of this module the student should be able to:	
<b>LO1:</b>	For specified GIS applications, identify and evaluate possible sources of relevant information (including as appropriate field survey data, and RS data), and then integrate that information into a GIS project
<b>LO2:</b>	Discern what is required to problem solve a given issue using GIS by developing a suitable workflow and selecting appropriate tools to create a reasoned and fully supported decision
<b>LO3:</b>	Appraise the contribution of utilising a GIS-based approach for selected application(s)
<b>3. Content</b>	
<b>3.1</b>	<b>Resource requirements for specified GIS applications</b> Lecture and practical exercises. Digital and paper mapping, GIS softwares, Ordnance Survey and Internet mapping sources, vector and raster map types, map information, features and coordinate systems.
<b>3.2</b>	<b>Practical GIS functions and tasks</b> Demonstration of software, and practical exercises to be completed by students. Software tools and operation: skills may include (but not be limited to) importing and translating data, presentation, overlaying data, scale, manipulating layer properties, symbology, create own map data, field calculator, buffering, measurements, georeferencing, raster mosaics, viewshed analysis, contours, 3D imaging, display, present, print.
<b>3.3</b>	<b>Integrate field survey</b> Lecture/demonstration and local field trip. Operate handheld GPS units to locate and survey ground features. Extract GPS data to create thematic mapping. Other GPS equipment (e.g. DGPS, RTK) may be demonstrated if appropriate.
<b>3.4</b>	<b>Be aware of how to prepare, utilise and interpret RS data</b> Demonstration/lecture/practical exercise. Screen viewing and interpretation of aerial photography and Sentinel (or other) satellite imagery. Fundamental principles of Earth Observation techniques. Use of RS to monitor global change.

<b>3.5</b>	<b>Planning a GIS-based investigation</b>	
	An introduction to multi-criteria decision analysis (MCDA) and use of process charts. These approaches are used to design/plan a GIS-based project in a clear and logical way that considers important aspects such as: choice of dataset; choice data within a data set; choice of GIS tool and parameters (e.g. how many metres for a buffer).	
<b>3.6</b>	<b>Appraise the contribution of utilising a GIS-based approach for selected application(s)</b>	
	Be able to critically examine the data used, mapping and analysis approach adopted for a specific task, and suggest additional approaches.	
<b>4. Approaches to Learning and Teaching</b>		
<b>Notional Study Hours:</b>		
Typically, students will have to undertake about <b>150 hrs</b> 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.		
<b>Scheduled Study:</b>	<b>35 hrs</b>	
Typically consisting of:		
Lectures	3 hrs	
Fieldwork/site visit	2 hrs	
Practical classes or workshops	30 hrs	
<b>Independent Study:</b>	<b>114 hrs</b>	
<b>5. Graduate Attributes</b>		
Opportunity to develop the following aspects of graduate attributes will be included within this module:		
<b>Graduate Attribute</b>	<b>Learning Activity and Aspect Developed</b>	
1. Academically competent	Through practice with different data types, development of a theoretical understanding of spatial data, along with a knowledge of how that data may be applied.	
2. Critical thinker	Through critical consideration of problems, determine the data required for a specific task, critically evaluate the usefulness of data within an analysis.	
3. Desire for learning and personal development	Through development of a basic understanding of GIS and RS possibilities, gain an appreciation of how such technology can be utilised in the students' own discipline or area of interest.	
4. Responsible member of society	Students undertaking this module will develop skills in applying sustainability criteria to making balanced and planning decisions.	
5. Employability	Through completion of this module, be able to offer employers a basic ability/awareness of GIS and RS technologies and application.	
<b>6. Assessment</b>		
The subject material does not lend itself to an end-of-year exam, and the unit should thus be assessed by 100% course work. This could be made up of a selection of the following (weightings and mix subject to discussion, and may be resource-dependant):		
<b>Assessment Method</b>	<b>Contribution to Grade (%)</b>	<b>Nature of Assessment</b>
Report	70%	<b>LO1, LO2</b> Report to demonstrate familiarity with GIS, downloading datasets, MDCA and using tools. Word limit 2,500 words.

Presentation or poster	30%	<b>LO1, LO2, LO3</b> Presentation of findings from an applied investigation assessing change (e.g. of land cover and land use, ecological status, etc.) using GIS and Remote Sensing, and evaluation of various Remote Sensing equipment for monitoring and planning in land management. Online poster (750words) or PowerPoint (maximum 15 slides/15mins)
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## 7. Reading

**Some of these data courses will be required, depending on the examples students address:**

Due to the nature of this course, many websites (for accessing data, and/or finding information on specified techniques) will be of prime importance, such as:

### **ArcGIS**

<http://www.esri.com/>

<https://www.youtube.com/channel/UCgGDPs8cte-VLJbgpaK4GPw>

### **QGIS**

<https://www.qgis.org/en/site/>

### **Edina DIGIMAP**

<http://www.edina.ac.uk/>

<http://digimap.blogs.edina.ac.uk/question/what-is-the-appropriate-wording-for-the-copyright-statement/>

### **Data Downloads**

<https://www.nature.scot/information-library-data-and-research/snhi-data-services>

<http://www.ordnancesurvey.co.uk/oswebsite/>

<https://statistics.gov.scot/home>

[http://ec.europa.eu/dqs/energy\\_transport/galileo/index\\_en.htm](http://ec.europa.eu/dqs/energy_transport/galileo/index_en.htm)

<https://scihub.copernicus.eu/>

<https://countrysidesurvey.org.uk/>

<https://www.ceh.ac.uk/data>

<http://www.bgs.ac.uk/opengeoscience/>

<https://www2.gov.scot/Topics/marine/science/MSInteractive>

<https://scotland.nbnatlas.org/>

<https://ckan.publishing.service.gov.uk/publisher/scottish-government-spatial-data-infrastructure>

<https://www.hutton.ac.uk/learning/exploringscotland/landcover-scotland-1988>

<https://www.eea.europa.eu/data-and-maps>

### **Additional:**

Corridor Design: [http://corridordesign.org/designing\\_corridors/resources/gis\\_tools](http://corridordesign.org/designing_corridors/resources/gis_tools)

BURROUGH. P.A AND MCDONNELL.R.A (2004-)Principles of Geographic Information Systems - Oxford University Press

DURR, P &. GATRELL, A C. ( 2002)- GIS and spatial analysis in veterinary science Wallingford : CABI, 2002

MARSH, W M &. GROSSA, J( 2001) Environmental geography : science, land use and earth systems /2nd ed Chichester : Wiley, 2001

NEWTON, A (2007-) Forest ecology and Conservation- a handbook of techniques-Oxford University Press (chapters on Remote Sensing and GIS)

Scottish Forestry Vol 53 No 3 1999 pages149-162- articles relating use of GIS to Forestry- Royal Scottish Forestry Society

Enact Vol 8 No4 2000 p9-11 Using GPS to map trees.

Conservation Land Management Vol 1 No4 2003 p4-8- Use of GIS & GPS in conservation management.

**8. Staff****Module Leader:**

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**Other contributing staff:**

Simon Gibson-Poole (Edinburgh)