

| Pre-requisite Module codes | Co-Requisite Module code(s) | ECTS Credits | Module Code | Module Title |
|-------------------------------|-----------------------------------|-----------------|----------------|----------------------------------|
| | None | 5 | CMPU4032 | Geographical Information Systems |

8.9.7. Geographical Information Systems

Module Author(s): Mark Foley

Module Description

A Geographical Information System (GIS) is a computer system designed to facilitate the collection, management, and analysis of large volumes of geographical knowledge.

This course will focus on the fundamental principles of GIS, the practical techniques of implementing a GIS and the creation and use of a GIS for spatial analysis.

Module Aim

The aim of this module is to take students from no prior knowledge of GIS to a position where they (i) understand the role and current state of the art in Geographical Information Systems, (ii) can analyse a problem in GIS and build an appropriate solution and (iii) are familiar with the basic techniques of spatial analysis and modelling.

Learning Outcomes

On successful completion of the module the students will be able to

- Understand the role of GIS and its application in solving practical problems.
- Understand how geographic data is represented in a computer.
- Understand the unique character of geographic data and how this is mapped to the real world.
- Be able to confidently use the market-leading commercial GIS package.
- Understand the rudiments of spatial databases and when and where to use database technology.
- Understand how GI data is created and acquired and be aware of possible sources of data.
- Understand the art and science of cartography and map design.
- Solve problems in spatial analysis especially in the areas of visualization, query/measurement and design/modelling.

Learning and Teaching Methods

Lectures, self-study, labs, tutorials, and any combination of discussion, case study, problem-solving exercises, readings, seminars, and computer-based learning.

Module Content

The module content will include the following topics. Material may be added to or deleted from this list over the lifetime of the module to reflect the changing nature of the relevant technologies.

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Principles

- Introduction to GIS and its applications.
- Representing geography and the nature of geographic data.
- Georeferencing.
- The notion of uncertainty in GI data.

Techniques

- GIS software.
- GIS data collection.
- Creating and managing GI data.
- Introduction to distributed and web GIS.

Analysis

- Cartography and map production.
- Visualization of GI data.
- Query and measurement
- Data summary and inference
- Introduction to spatial modelling

There will be also be hands-on work with the leading GIS software packages and students will apply the course material to practical problems and case studies.

Module Assessment

The methods of assessment to be used to measure the learning objectives stated above are written examination and continuous assessment including one or more of assignment, essay, problem-solving exercise, oral presentation, and class or lab tests.

Continuous Assessment 50%

Examination 50%

Essential Reading List

The material listed here represents a sample of possible reading material for the module. The actual reading material will be determined by the lecturer, taking account of availability of new material and changing technologies which could, in turn, determine module content.

Geographic Information Systems and Science, 3rd ed.; Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind; Wiley, 2010; ISBN: 978-0-470-72144-5.

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Supplementary Reading list

Introduction to Geographic Information Systems, 5th ed.; Kang-tsung Chang; McGraw Hill, 2009; ISBN: 978-007-126758-8.

Geospatial Analysis - a comprehensive guide, 2nd ed.; Michael de Smith, Michael F. Goodchild and Paul A. Longley; Winchelsea, 2007; ISBN: 978-1906221-980.

Software

Practical hands-on experience using GIS will be provided through the use of a current market-leading GIS software package.

Further Details

Contact Hours

Three hours per week; 1 hours lecture / tutorial, 1 hour lab.

Delivery

One semester

Date of Academic Council approval