

Short Title:	Geospatial Data Analysis and Knowledge Discovery APPROVED
Full Title:	Geospatial Data Analysis and Knowledge Discovery
Module Code:	ADSA H6017
ECTS credits:	10
NFQ Level:	9
Module Delivered in	1 programme(s)
Module Contributor:	Laura Keyes
Module Description:	Module Aims: To introduce the concepts and utility of geographically referenced data and geographic data mining for knowledge discovery in data. To explore and critique data mining techniques and algorithms for mining data with a geographical component.
Learning Outcomes:	
<i>On successful completion of this module the learner will be able to</i>	
<ol style="list-style-type: none"> 1. Understand fundamental geographic concepts and principles underlying geographic data for GIS and geospatial analysis knowledge discovery 2. Demonstrate awareness and critical understanding of challenges in mining geographically-referenced data in spatial database system 3. Apply appropriate (geographic) visualisation tools to the data for mining 4. Select and apply appropriate exploratory spatial data analysis, data preparation techniques and modelling algorithms to a practical case study 5. Independently research applications, trends and developments in Geographical Data Mining 	

Module Content & Assessment

Indicative Content
Geographic Data Mining and Geographic Data Fundamentals Overview of geographic/spatial data mining for knowledge discovery, GIS, spatial data types and data models, data formats and standards, coordinate reference system, geographic data mining applications
Spatial Analysis GIS, data input and output, geographic visualisation and map types, proximity analysis, clustering analysis, buffer analysis, spatial databases, spatial relations, spatial operations, spatial query language
Exploratory Spatial Data Analysis ESDA techniques, spatial outlier detection, spatial dependency, spatial autocorrelation, spatial heterogeneity
Preparing geographical data for mining Data collection and feature extraction, open data, VGI, spatial query, data quality, geocoding, data size and complexity, spatial big data and tools
Techniques for Geographical Data Mining Identify suitable models and algorithms for mining geo-referenced data e.g. spatial classification, spatial clustering and spatial regression and geographically weighted regression, self-organising maps, spatial association rule analysis
Spatial Information Management and Analysis Tools Desktop GIS, spatial database systems, ESDA and geo-visualisation tools, scripting for geo-processing and analysis

Indicative Assessment Breakdown	%
Course Work Assessment %	100.00%

Course Work Assessment %				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Reflective Journal	Students must prepare a portfolio of literary reviews and analysis covering a range of topics or applications across all areas of the syllabus.	2,5	40.00	n/a
Practical/Skills Evaluation	Practical projects and exercises that focus on GIS data, visualisation, data exploration and pre-processing techniques and classification tasks on a pre-defined set of data.	2,3,4,5	60.00	n/a

No Final Exam Assessment %

Indicative Reassessment Requirement
Coursework Only <i>This module is reassessed solely on the basis of re-submitted coursework. There is no repeat written examination.</i>
Reassessment Description As per course work

ITB reserves the right to alter the nature and timings of assessment

Indicative Module Workload & Resources

Resources
<i>Recommended Book Resources</i>
<p>Harvey J. Miller (Editor), Jiawei Han (Editor), <i>Geographic Data Mining and Knowledge Discovery, Second Edition</i> [ISBN: 9781420073973]</p> <p>John Wilson (Editor), A. Stewart Fotheringham (Editor), <i>The Handbook of Geographic Information Science</i> [ISBN: 978-1-4051-0795-2]</p> <p>edited by Paul A. Longley... [et al.], <i>Geographical information systems</i> [ISBN: 0471-32182-6]</p> <p>Gary Sherman, Tyler Mitchell (Editor), <i>The Geospatial Desktop</i>, Locate Press [ISBN: 9780986805219]</p> <p>Guido Cervone, Jessica Lin, Nigel Waters, <i>Data Mining for Geoinformatics Methods and Applications</i>, Springer [ISBN: 9781461476696]</p> <p>Joel Lawhead 2013, <i>Learning Geospatial Analysis with Python</i> [ISBN: 9781783281138]</p> <p>Jiawei Han and Micheline Kamber 2001, <i>Data mining</i>, Morgan Kaufmann Publishers San Francisco [ISBN: 1558604898]</p> <p>Pang-Ning Tan, Michael Steinbach, Vipin Kumar 2006, <i>Introduction to data mining</i>, Pearson Addison Wesley Boston [ISBN: 0321321367]</p>
<i>Recommended Article/Paper Resources</i>
<p>Taylor and Francis 1, International Journal of Geographical Information Science</p> <p>Wiley Online Library 2, Transactions in GIS</p> <p>3, Spatial/Geographic Data Mining www.springerlink.com</p>
<i>Other Resources</i>
<p>Internet based resource: <i>Spatial Data Mining</i> http://www.spatialdatamining.org</p> <p>Internet based resource: <i>Open Geospatial Consortium</i> http://www.opengeospatial.org/</p>

Module Delivered in

Programme Code	Programme	Semester	Delivery
BN_KADSA_R	Master of Science in Computing in Applied Data Science & Analytics	3	Elective