

Short Title:	Geodata Provision APPROVED
Full Title:	Geodata Provision
Module Code:	MIOT H6019
ECTS credits:	5
NFQ Level:	9
Module Delivered in	1 programme(s)
Module Contributor:	Paul Stacey
Module Description:	This module will provide learners with the ability to develop interoperable IoT System-of-IoT-systems and IoT applications. This module emphasises the importance of location as a component of IoT enabled devices and IoT data; from acquisition to storage, data models, analytics. Learners will explore the latest interoperability standards and technologies relating to geographical data and information, and how they can be used within an IoT system and IoT applications. Learners are also introduced to the concept of the Web-of-things and associated technologies.
Learning Outcomes:	
<i>On successful completion of this module the learner will be able to</i>	
<ol style="list-style-type: none"> 1. Describe fundamental geographic concepts and principles underlying geographic data for GIS and IoT Systems 2. Demonstrate awareness and critical understanding of the challenges in realising IoT Applications and the Web of Things 3. Source and access current research and best practice relating to geospatial data capture & representation 4. Select and justify appropriate systems & techniques to enable interoperability and sharing of geo-data amongst IoT systems 5. Apply innovative approaches to the use geo-data and information standards to enable the development system-of-IoT systems 	

Module Content & Assessment

Indicative Content
Geo-Data Fundamentals Observations & Measurements; Coverages; Raster Data; Vector Data; Encoding; Serialisation; Data Quality; Data Formats
Geo Spatial Data Spatial Data Acquisition(GNSS, Radar, Laser Scanning, Photogrammetry); attributes and relationships of features and phenomena on the Earth's surface or in a building
Geographical Information Systems and Analysis Tools GIS, data input and output, map types, spatial databases, spatial relationships and patterns, spatial operations (e.g. proximity, buffer, clustering), spatial query language, spatial interpolation, spatial modelling. Desktop GIS, spatial database systems, exploratory and geo-visualisation tools, scripting for geo-processing and analysis
IoT Data Interoperability Ge-Data Standards; OGC's Sensor Web Enablement Framework (SWE); SensorThings API; Data Models; EU law around geo-data capture: INSPIRE Directive; Sensor Semantics; Knowledge level frameworks-Ontologies:SSNO;
IOT systems-of-systems Sensor Webs; Web of Things; Device-Cloud Interfaces; IOT Applications; Location based services (LBS)

Indicative Assessment Breakdown	%
Course Work Assessment %	50.00%
Final Exam Assessment %	50.00%

Course Work Assessment %				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Practical/Skills Evaluation	Practical projects and exercises that focus on GIS data capture, representation and visualisation	3,4,5	25.00	n/a
Practical/Skills Evaluation	Development of IoT system-of-systems and Web of Things applications	2,4,5	25.00	n/a

Final Exam Assessment %				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Formal Exam	End of semester terminal exam	1,2	50.00	End-of-Semester

Indicative Reassessment Requirement
Repeat examination <i>Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.</i>

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

Indicative Module Workload & Resources

Resources
<i>Recommended Book Resources</i>
<p>edited by John P. Wilson and A. Stewart Fotheringham 2008, <i>The handbook of geographic information science</i>, Blackwell Pub. Malden, MA [ISBN: 9781405107952]</p> <p>edited by Paul A. Longley... [et al.], <i>Geographical information systems</i>, New York Wiley 1999 [ISBN: 0471321826]</p>
<i>Supplementary Book Resources</i>
<p>Dominique D. Guinard and Vlad M. Trifa 2016, <i>Building the Web of Things</i>, Manning Publications MEAP [ISBN: 9781617292682]</p>
<i>Recommended Article/Paper Resources</i>
<p>Guinard, Dominique, and Vlad Trifa 2009, <i>Towards the web of things: Web mashups for embedded devices</i> http://webofthings.org/2009/04/20/web-mashups-mem/</p>
<i>Other Resources</i>
<p>Website: Open Geospatial Consortium http://www.opengeospatial.org/ogc</p> <p>Website: OGC SensorThings API https://github.com/opengeospatial/sensor-things</p> <p>Website: Infrastructure for Spatial Information in the European Community (INSPIRE) http://inspire.ec.europa.eu/</p>

Module Delivered in

Programme Code	Programme	Semester	Delivery
BN_EMIOT_R	Master of Engineering in Internet of Things Technologies [BN535R 60 credits taught with a 30 credit research project]	2	Elective