

<b>Short Title:</b>	Software Engineering <b>APPROVED</b>
<b>Full Title:</b>	Software Engineering
<b>Module Code:</b>	MIOT H6013
<b>ECTS credits:</b>	5
<b>NFQ Level:</b>	9
<b>Module Delivered in</b>	<a href="#">2 programme(s)</a>
<b>Module Contributor:</b>	Benjamin Toland
<b>Module Description:</b>	This module will equip the learner with the key Software Development skills required in developing an IoT system including language skills, analysis and design skills and application of appropriate software lifecycle models.
<b>Learning Outcomes:</b>	
<i>On successful completion of this module the learner will be able to</i>	
<ol style="list-style-type: none"> <li>1. demonstrate programming skills in the key languages of the IoT.</li> <li>2. critically evaluate diverse programming languages for use within an IoT system</li> <li>3. analyse, design and test a software system.</li> <li>4. apply basic data mining algorithms to gathered data.</li> </ol>	

**Module Content & Assessment**

<b>Indicative Content</b>
<b>Programming Language Pragmatics</b> Programming language Spectrum; Programming Models: Functional, Logic, Concurrency, Scripting; Run-time Program Management: Virtual Machines, Binding, Performance Analysis; Comparison of C/C++, Java, JavaScript and python execution.
<b>IoT Software Engineering</b> Software Development Lifecycles for IoT; OO Analysis and Design for IoT Systems: OO Concepts Review; Functional, Structural and Behavioral Modelling; The Unified Modelling Language; Implementation of OO concepts in Java/C++/JS & Python; Software testing in an IoT environment
<b>IoT Programming Models</b> Message Driven; REST; Reactive Programming; Abstract Task Graph; Emerging IoT programming models
<b>Event Driven Programming Concepts.</b> Finite State Machines; Event Handlers; NodeJS/Javascript for event driven programming
<b>Python for Data Analysis</b> Python Vs R; Python Language Fundamentals; Python IDEs; Python for Data Analysis: Numpy, Pandas; Matplotlib

<b>Indicative Assessment Breakdown</b>	<b>%</b>
Course Work Assessment %	100.00%

<b>Course Work Assessment %</b>				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Written Report	Learners will produce a written report detailing an in-depth evaluation of a range of programming languages that can be used as solutions to a given problem within the context of an IoT environment.	1,2	15.00	n/a
Practical/Skills Evaluation	Learners will work their way through a number of practical worksheets introducing the Python programming language. Learners will have to implement a Data Analysis solution using Python.	1,4	10.00	n/a
Practical/Skills Evaluation	Learners will work their way through a series of tasks which will help develop the learners IoT software development skills. One of the deliverables will form part of a cross module CA with Embedded Systems and Information Transmission & Management	1,3	25.00	n/a
Project	Learners will analyse and design an Object Oriented software solution to a given problem. Deliverables of this mini-project are the full system specification & design documentation; including appropriate UML diagrams and software system Test Plan. Learners will also implement and test the software as per documentation.	1,3	50.00	n/a

No Final Exam Assessment %
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<b>Indicative Reassessment Requirement</b>
<b>Coursework Only</b> <i>This module is reassessed solely on the basis of re-submitted coursework. There is no repeat written examination.</i>

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

**Indicative Module Workload & Resources**

<b>Resources</b>
<i>Supplementary Book Resources</i>
<p>Michael L. Scott 2009, <i>Programming language pragmatics</i>, Amsterdam ; Elsevier/Morgan Kaufmann Pub. [ISBN: 9780123745149]</p> <p>Wes McKinney, <i>Python for Data Analysis</i>, O'Reilly Media [ISBN: 9781449319793]</p>
<i>Recommended Article/Paper Resources</i>
<p>Namiot, D. Sneps-Sneppe, M. 2014, <i>On IoT Programming</i>, International Journal of Open Information Technologies</p>
<i>This module does not have any other resources</i>

**Module Delivered in**

Programme Code	Programme	Semester	Delivery
BN_EMIOT_M	<a href="#">Master of Engineering in Internet of Things Technologies [BN535M 30 credits taught with a 60 credit research project]</a>	1	Mandatory
BN_EMIOT_R	<a href="#">Master of Engineering in Internet of Things Technologies [BN535R 60 credits taught with a 30 credit research project]</a>	1	Mandatory