

<b>Module Title:</b>	Embedded Systems 1
<b>Language of Instruction:</b>	English
<b>Credits:</b>	5
<b>NFQ Level:</b>	6
<b>Module Delivered In</b>	<a href="#">5 programme(s)</a>
<b>Teaching &amp; Learning Strategies:</b>	A combination of lectures, class discussion, tutorial, laboratory exercises and demonstrations will be used. Emphasis will be placed on active learning including problem / project bases learning
<b>Module Aim:</b>	To advance the students knowledge in software development using a high-level programming language and to equip them with the skills and techniques required to develop software using an industry standard integrated development environment (IDE) and to utilise with programmable electronics and embedded systems.
<b>Learning Outcomes</b>	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Demonstrate an understanding of software development and the building blocks of a high-level programming language.
LO2	Utilise modular programming, flowcharts, pseudocode and debugging techniques in software development.
LO3	Produce clearly documented source code using a neat programming style.
LO4	Design, develop, and report on the hardware and software elements of a microcontroller-based embedded system project
<b>Pre-requisite learning</b>	
<b>Module Recommendations</b>	
<i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
<b>Incompatible Modules</b>	
<i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
<b>Co-requisite Modules</b>	
No Co-requisite modules listed	
<b>Requirements</b>	
<i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
No requirements listed	

## Module Content & Assessment

### Indicative Content

#### Embedded Systems

Definition of embedded systems.

#### Architectures

Introduction to structure of a microcontroller, internal structure, memory, peripherals, I/O, communications, and interrupts.

#### Embedded Language Programming

Cross compiler, Program top-down design, flowcharts, variables and constants, I/O, operators and expressions, control statements, functions, pointers, bitwise operators, arrays, and LUTs.

#### Interfacing and Communications

I/O, Pullup/Pulldown, UART, RS-232, I2C/SPI, Displays/Keyboards, ADC/DAC, Sensors/Motors (On/Off/PWM).

#### System Development, Testing and Debug

The Integrated Development Environment (IDE) and debugging (breakpoints, single step).

Assessment Breakdown	%
Continuous Assessment	40.00%
Project	40.00%
Practical	20.00%

### Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Other	Various assessments to reinforce learnings given throughout the semester.	1,2,3,4	40.00	n/a

### Project

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	A group/solo (depending on complexity) project based on real-world scenarios.	1,2,3,4	40.00	n/a

### Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	A set of practical exercises to complement the theory elements of the module.	1,2,3,4	20.00	n/a

No End of Module Formal Examination

### Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Other	Various assessments to reinforce learnings given throughout the semester.	1,2,3,4	40.00	n/a

### Project

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	A group/solo (depending on complexity) project based on real-world scenarios.	1,2,3,4	40.00	n/a

### Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	A set of practical exercises to complement the theory elements of the module.	1,2,3,4	20.00	n/a

No End of Module Formal Examination

**Module Workload**

<b>Workload: Full Time</b>		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Every Week	2.00
Practicals	Every Week	2.00
Total Hours		4.00

**Module Delivered In**

Programme Code	Programme	Semester	Delivery
CW_EEBEE_B	<a href="#">Bachelor of Engineering (Honours) in Biomedical Electronics</a>	4	Mandatory
CW_EESYS_B	<a href="#">Bachelor of Engineering (Honours) in Electronic Engineering</a>	4	Mandatory
CW_EEROB_B	<a href="#">Bachelor of Engineering (Honours) in Robotics and Automated Systems</a>	4	Mandatory
CW_EEBEE_D	<a href="#">Bachelor of Engineering in Biomedical Electronics</a>	4	Mandatory
CW_EEROO_D	<a href="#">Bachelor of Engineering in Robotics and Automated Systems</a>	4	Mandatory