Module Title:	Embedded Systems 1
Language of Instruction:	English

Credits:	5

NFQ Level:	6

Module Delivered In	5 programme(s)

Teaching & Learning Strategies:	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

Module Aim:	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.

Learning Outcomes
On successful completion of this module the learner should be able to:

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

Pre-requisite learning
Module Recommendations   *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules   *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements   *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
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

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
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	Bachelor of Engineering (Honours) in Biomedical Electronics	4	Mandatory
CW_EESYS_B	Bachelor of Engineering (Honours) in Electronic Engineering	4	Mandatory
CW_EEROB_B	Bachelor of Engineering (Honours) in Robotics and Automated Systems	4	Mandatory
CW_EEBEE_D	Bachelor of Engineering in Biomedical Electronics	4	Mandatory
CW_EEROO_D	Bachelor of Engineering in Robotics and Automated Systems	4	Mandatory

Programme Code	Programme	Semester	Delivery