

## MODULE DESCRIPTOR

### Module Title

Microprocessor Based Systems

Reference	EN2542	Version	2
Created	December 2022	SCQF Level	SCQF 8
Approved	June 2022	SCQF Points	15
Amended	August 2023	ECTS Points	7.5

### Aims of Module

To provide the student with the ability to describe the operation of microprocessor-based systems and develop, test and document programs for the microcontrollers.

### Learning Outcomes for Module

On completion of this module, students are expected to be able to:

- 1 Revise the architecture of Microprocessor to explain the principle of operations.
- 2 Practice technical literature of microcontroller system using principles of operation.
- 3 Write a firmware of real-world peripheral interfaces of microcontroller devices.
- 4 Use practical laboratory and workshop skills to show a real world prototype of embedded system, recognizing their risks and limitations.

### Indicative Module Content

Microprocessor: operation of the CPU, registers, ALU, control unit, address, data and control buses, memory, input/output ports, system clock and timing, the fetch-execute cycle and memory maps. Machine instructions: opcodes, operands and addressing modes, data transfer, arithmetic and logical operations, control structures, flags, subroutines. Microcontroller firmware: edit-compile-execute cycle, the syntax of a high-level language, input, process, output program operation, selection and repetition structures. Introduction to microcontroller interfacing: I/O ports types and their use.

### Module Delivery

This module is delivered using a structured programme of lectures, tutorials and laboratory exercises supplemented by directed reading and student-centred learning.

<b>Indicative Student Workload</b>	Full Time	Part Time
Contact Hours	40	40
Non-Contact Hours	110	110
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
<b>TOTAL</b>	<b>150</b>	<b>150</b>
<i>Actual Placement hours for professional, statutory or regulatory body</i>		

**ASSESSMENT PLAN**

*If a major/minor model is used and box is ticked, % weightings below are indicative only.*

**Component 1**

Type: Coursework Weighting: 50% Outcomes Assessed: 1, 3, 4  
 Description: Logbook of practical activities and mini-project.

**Component 2**

Type: Examination Weighting: 50% Outcomes Assessed: 2  
 Description: Closed book examination.

**MODULE PERFORMANCE DESCRIPTOR**

**Explanatory Text**

The module has 2 components and to gain an overall pass a minimum D grade must be achieved in each component. The component weighting is as follows: C1 is worth 50% and C2 is worth 50%.

		Coursework:						
		A	B	C	D	E	F	NS
Examination:	<b>A</b>	A	A	B	B	E	E	
	<b>B</b>	A	B	B	C	E	E	
	<b>C</b>	B	B	C	C	E	E	
	<b>D</b>	B	C	C	D	E	E	
	<b>E</b>	E	E	E	E	E	F	
	<b>F</b>	E	E	E	E	F	F	
	<b>NS</b>	Non-submission of work by published deadline or non-attendance for examination						

**Module Requirements**

Prerequisites for Module	EN1541 or Equivalent
Corequisites for module	None.
Precluded Modules	None.

**INDICATIVE BIBLIOGRAPHY**

- 1 Richard J. Smythe, 2021, *Arduino in Science: Collecting, Displaying, and Manipulating Sensor Data*, Apress, Berkeley, CA.
- 2 Jack Purdum, 2015, *Beginning C for Arduino*, Apress, Berkeley, CA.
- 3 Bob Dukish, 2018, *Coding the Arduino: Building Fun Programs, Games, and Electronic Projects*, Apress, Berkeley, CA.