

MODULE DESCRIPTOR

Module Title

Microprocessors and Microcontrollers

Reference	EN2540	Version	6
Created	April 2017	SCQF Level	SCQF 8
Approved	March 2004	SCQF Points	15
Amended	May 2017	ECTS Points	7.5

Aims of Module

To provide the student with the ability to describe and use microcontrollers and microprocessor-based systems and to develop software in C & assembly language.

Learning Outcomes for Module

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

- 1 Describe the architecture of a microcontroller and microprocessor-based system, explain their principles of operation, and describe its application in embedded systems.
- 2 Represent data using various formats, convert between these, and perform simple arithmetic operations on binary numbers.
- 3 Develop software in C & assembly language, including simple interfacing and control programs.
- 4 Design, build, test and document a software project.

Indicative Module Content

Architecture: CPU registers, ALU, control unit, data, address and control buses, memory, input/output ports, system clock. Memory maps. The fetch-execute cycle. Embedded systems: programmable interfaces, serial and parallel data transmission, data formats and transmission rates, introduction to timers and real-time clocks, D/A and A/D conversion. Outline design of embedded systems. Data representation: signed and unsigned integers, ASCII code. Binary arithmetic: addition, subtraction using one's and two's complement, multiplication and division as shift operations. C & Assembly language: data transfer, arithmetic, logic and test operations, control structures, addressing modes, functions and subroutines, the stack, input/output using polling.

Module Delivery

The module is taught using a structured programme of lectures, tutorials, student-centred learning and practical exercises, which will culminate in a mini-project.

Indicative Student Workload

	Full Time	Part Time
Contact Hours	57	36
Non-Contact Hours	93	114
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	150
Actual Placement hours for professional, statutory or regulatory body		

ASSESSMENT PLAN

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

Component 1

Type:	Coursework	Weighting:	25%	Outcomes Assessed:	3
Description:	Logbook of practical and tutorial work.				

Component 2

Type:	Coursework	Weighting:	25%	Outcomes Assessed:	4
Description:	A mini-project report and product demonstration.				

Component 3

Type:	Examination	Weighting:	50%	Outcomes Assessed:	1, 2
Description:	Closed book examination				

MODULE PERFORMANCE DESCRIPTOR**Explanatory Text**

The module grade is calculated as the weighted average of the component marks. To pass the module the student must achieve a minimum of a grade D and at least 35% in component 3.

Module Grade	Minimum Requirements to achieve Module Grade:
A	70% - 100%
B	60% - 69%
C	50% - 59%
D	40% - 49%
E	35% - 39%
F	0% - 34%
NS	Non-submission of work by published deadline or non-attendance for examination

Module Requirements

Prerequisites for Module	Introduction to Computer Engineering (EN1540) or its equivalent.
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

- 1 CADY, F. M. and SIBIGTROTTH J. M., 2000. Software and Hardware Engineering: Motorola M68HC12. London: Oxford University Press.
- 2 PACK, D. J. and BARRETT, S. F., 2007. Microcontroller Theory and Applications: HC12 and S12. New Jersey: Prentice Hall.