Module Title **Microprocessors And Microcontrollers** **Keywords** Microprocessor, Microcontroller, C and Assembly Language, Interfacing.	Reference EN2540 SCQF Level SCQF 8 SCQF Points 15 ECTS Points 7.5 Created May 2002 Approved March 2004 Amended September 2012 Version No. 4

This Version is No Longer Current

The latest version of this module is available

Prerequisites for Module

Introduction to Computer Engineering (EN1540) or its equivalent.

Corequisite Modules

None.

Precluded Modules

None.

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

C & Assembly language: data transfer, arithmetic, logic and test operations, control structures, addressing modes, functions and subroutines, the stack, input/output using polling.

Indicative Student Workload

Contact Hours	Full Time	Part Time
Assessments	3	3
Lectures	12	10
Practical exercises	33	22
Tutorials	12	4
Directed Study		
Practical Exercises	12	23
Self Study Activities	14	24
Private Study		
Private Study	64	64

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.

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.

Mode of 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.

Assessment Plan

	Learning Outcomes Assessed
Component 1	3
Component 2	3
Component 3	1,2

Component 1. Logbook of practical and tutorial work. (25% weighting)

Component 3. Closed book examination. (50% weighting)

Component 2. A project report. (25% weighting)

Indicative Bibliography

1. CADY, F. M. and SIBIGTROTH J. M., 2000. Software and Hardware Engineering: Motorola M68HC12. London: Oxford University Press.

Binary arithmetic: addition, subtraction using one's and two's complement, multiplication and division as shift operations.

2. PACK, D. J. and BARRETT, S. F., 2007. Microcontroller Theory and Applications: HC12 and S12. New Jersey: Prentice Hall.