Liverpool John Moores University

Title:	Microcontrollers and Interfacing
Status:	Definitive
Code:	**5007ELE** (120117)
Version Start Date:	01-08-2016
Owning School/Faculty:	Electronics and Electrical Engineering
Teaching School/Faculty:	Electronics and Electrical Engineering

Team	Leader
Princy Johnson	Y

Academic Level:	FHEQ5	**Credit Value:**	20	**Total Delivered Hours:**	74
Total Learning Hours:	200	**Private Study:**	126		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	48
Tutorial	24

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Exam	70	2
Report	AS1	Practical Work Report	30	

Aims

To enhance knowledge and understanding of Microcontrollers, the technique and method for Interfacing with them.

Learning Outcomes

After completing the module the student should be able to:

1	Identify & describe the fundamental components of a Microcontroller, a typical Architecture and associated instruction set.
2	Identify & describe Microcontroller based memory subsystem, I/O Interfacing and Data transfer.
3	Appraise the use of PIC programming using C
4	Design and produce a simple application using a standard PIC and associated accessories.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Examination	1	2	3
Practical Work Report	4		

Outline Syllabus

Typical Microcontroller architecture: MIPs architecture; Princeton and Harvard architectures; pipelining; hazards in using pipelining and mitigation; Reduced Instruction Set Computing (RISC) and Complex Instruction Set Computing (CISC) in processor designs for Microcontrollers and microprocessors.

Microcontroller-based system interfacing and data transfer: parallel and serial data transfer techniques; types of interfacing between processor and peripheral devices; planning and design of an example interfacing problem.

C programming & PIC specific programming: Embedded C programming; compiler programming and signal processing techniques; Use of multi-function, single cycle instructions; Use of macros; use of Timer interrupts; planning and design of flowchart or pseudo code; writing program and execution to complete a set of automation tasks; troubleshooting.

Microcontrollers in Wireless applications: Using current wireless protocols for microcontrollers; web applications using microcontrollers.

Digital to analogue and analogue to digital converter.

PLC Architecture; RAM, ROM, EEPROM, PSU, CPU, bus, I/O address structure.
PLC Scanning and batch I/O update process; I/O images, biphase error, watchdog timer, housekeeping cycle, scanning effects on programs.
Program formats to IEC 61131 standards; Basic logic function and ladder logic programming, mnemonic codes, function block.;
Internal devices; memory bits, timers, counters.
Combinational and sequential problem.

Learning Activities

By series of lectures, tutorials and practical lab work.

Notes

This module extends the knowledge of Microcontrollers, including their programming and interface.