

## Liverpool John Moores University

Title: PRINCIPLES AND APPLICATIONS OF MICROCONTROLLERS  
Status: Definitive  
Code: **5505ICBTEL** (127024)  
Version Start Date: 01-08-2021  
Owning School/Faculty: Engineering  
Teaching School/Faculty: ICBT, Colombo

Team	Leader
Alison Cotgrave	Y

**Academic Level:** FHEQ5  
**Credit Value:** 15  
**Total Delivered Hours:** 62  
**Total Learning Hours:** 150  
**Private Study:** 88

### Delivery Options

Course typically offered: Semester 1 and Summer

Component	Contact Hours
Lecture	30
Practical	15
Tutorial	3
Workshop	12

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	50	2
Report	AS2	Coursework (2500 words)	50	

### Aims

*This unit will provide learners with an understanding of the applications of microcontroller based systems and will develop the skills required to design, write and test software and interface such systems.*

## Learning Outcomes

After completing the module the student should be able to:

- 1 Describe microcontroller internal architecture and based systems and interpret the design specification and requirement to solve an engineering problem(s), and choose the best fit microcontroller to design and solve the identified problem.
- 2 Develop the microcontroller suitable hardware by interconnecting sensors and actuators to solve engineering problem and interface with the software to control the system
- 3 Apply appropriate development tools (such as Programming IDE tools, and debug tools) to implement software that is fit for purpose.
- 4 Demonstrate knowledge of how to develop microelectronic systems to meet the legal, ethical, and social aspects of the environment they are intended to work within and present the developed system by using appropriate tools and communication.

## Learning Outcomes of Assessments

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

Examination	1	4
Coursework	2	3

## Outline Syllabus

*The relative merits of several commercially available microcontrollers e.g. 68HC11, ATMEL, PIC. A key exemplar for an embedded system for example an advanced PIC microcontroller will be discussed in depth, to outline the internal (Harvard) architecture, hardware capabilities and instruction set.*

*A detailed consideration of the onboard features will be addressed:  
Programming the ADC (Analogue to Digital Converter)  
Serial communications, the USART, synchronous and asynchronous communications, IIC to interface with PC Programming the PWM module.  
Programming the on board timers.  
Programming EEPROM*

## Learning Activities

Students will be supported in their learning, to achieve the above learning outcomes, in the following ways:

By a series of lectures and tutorials and through participation within practical sessions for problem solving.

Computer simulation used to simulate the microcontroller based design and application cover all the learning outcomes.

Microcontroller demo boards used to cover the real time practicals.

## **Notes**

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