

## Liverpool John Moores University

Title: INSTRUMENTATION AND CONTROL SYSTEMS  
Status: Definitive  
Code: **5508ENGHAL** (106671)  
Version Start Date: 01-08-2016

Owning School/Faculty: Maritime and Mechanical Engineering  
Teaching School/Faculty: Maritime and Mechanical Engineering

Team	Leader
Russell English	Y

**Academic Level:** FHEQ5  
**Credit Value:** 12  
**Total Delivered Hours:** 26  
**Total Learning Hours:** 120  
**Private Study:** 94

### Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	18
Practical	3
Tutorial	3

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	2
Essay	AS2	Assignment	15	
Essay	AS3	Assignment	15	

### Aims

*To introduce the concepts of analogue and digital measurement system, and the fundamental concepts of control and instrumentation of engineering systems.*

### Learning Outcomes

After completing the module the student should be able to:

- 1 Explain the principles of electronic measurement systems.
- 2 Specify power supply and electronic amplification systems.
- 3 Specify and appreciate the range of sensors for transducers to perform various measurements.
- 4 Explain the function of digital data logging and recording systems.
- 5 Design feedback systems for the control of variables in engineering situations and processes.

### **Learning Outcomes of Assessments**

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

EXAM	1	2	3	4	5
CW	3	4			
CW	2	4	5		

### **Outline Syllabus**

*Signal conditioning circuits: Wheatstone Bridge systems. Amplifiers. Operational Amplifiers - modes of operation.*

*Filters - Techniques. Noise reduction systems.*

*Review of transducers for temperature, pressure, force, torque, displacement, velocity and acceleration measurements. Digital codes and conversion processes.*

*DAC and ADC systems. Interfaces for industrial I/O. Data logging and data acquisition systems. Value of digital signal processing.*

*PC-based systems. Review of Boolean logic for digital systems.*

*Software techniques for instrumentation and control.*

*Importance of the compatibility in the information flow from transducer through signal conditioning and processing of data to control and analysis.*

### **Learning Activities**

Lectures, tutorials and laboratory work.

### **Notes**

This module provides the basic technical expertise to allow the student to specify instrumentation systems for controlling processes. It also provides a firm foundation and lead-in to further studies in control engineering at a higher level.