

## Liverpool John Moores University

Title: MEASUREMENT AND CONTROL  
Status: Definitive  
Code: **5510TECSBC** (113901)  
Version Start Date: 01-08-2018

Owning School/Faculty: Electronics and Electrical Engineering  
Teaching School/Faculty: The Sino-British College

Team	Leader
Dingli Yu	Y

**Academic Level:** FHEQ5      **Credit Value:** 12      **Total Delivered Hours:** 37  
**Total Learning Hours:** 120      **Private Study:** 83

### Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	20
Practical	5
Tutorial	10

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	60	2
Report	AS2	Coursework	40	

### Aims

*To develop an understanding of the application and design of measurement systems and techniques.*

*To introduce the principles of control systems, their analysis and design.*

### Learning Outcomes

After completing the module the student should be able to:

- 1 explain the basic concepts of dynamic system response and closed loop control.
- 2 develop models for dynamic plants
- 3 select sensors and design signal processing circuits for measurement systems.
- 4 demonstrate ability to design controllers and analyze system stability for simple linear systems.
- 5 explain the operation of and design PID controllers

### **Learning Outcomes of Assessments**

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

EXAM	1	2	3	4
CW	2	4	5	

### **Outline Syllabus**

*Introduction: concepts of transient and steady-state response, open-loop and closed-loop control.*

*Modelling dynamic systems by deriving differential equations, transfer functions, and simplifying block diagrams. Simulate systems with Matlab/Simulink.*

*Measurement: concept of sensors, transducers and measurement systems. Static characteristics of sensors. Temperature, force and displacement measurement, and their signal conditioning circuits design.*

*Time response analysis: characteristics of first order and second order systems, system response to step and ramp input.*

*Controller design: design specification in time domain, direct synthesis method, functions of PID control, empirical method for PID controller parameter setting.*

*Stability: concept of absolute and relative stability, system poles, Routh's stability criterion.*

### **Learning Activities**

By a series of lectures, tutorials, and laboratory experiments.

### **Notes**

This module develops an understanding of the modelling, design, analysis and simulation of control systems, as well as some simple measurement systems.