

## Liverpool John Moores University

Title: Automation  
Status: Definitive  
Code: **5504ENGRIV** (117218)  
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:** 20      **Total Delivered Hours:** 44  
**Total Learning Hours:** 200      **Private Study:** 156

### Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	28
Practical	10
Tutorial	4

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam		60	2
Report	Report 1		20	
Report	Report 2		20	

### Aims

*To develop the students understanding of the equipment and techniques used to implement automatic control of industrial machinery.*

### Learning Outcomes

After completing the module the student should be able to:

- 1 Explain the characteristics of the elements of automation systems
- 2 Discuss the social and economic impact of industrial automation
- 3 Analyse automation problems and design suitable solutions
- 4 Understand the electronic, electrical and pneumatic devices needed to control industrial equipment
- 5 Explain the basic concepts of dynamic system response and closed loop control
- 6 Simulate the behaviour and tuning of PID controllers

### **Learning Outcomes of Assessments**

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

Exam	1	2	4	5
Report 1	3			
Report 2	6			

### **Outline Syllabus**

*Economic drivers behind industrial automation. Health and safety issues related to industrial automation. Electrical actuation systems. Selection and use of motor drive systems, DC - servo and stepper motors. Positional feedback systems – absolute and incremental rotary shaft encoders. De-bouncing of signals sourced from electromechanical devices. Pneumatic and hydraulic valve actuation and control. Electrical interfaces including different types of transducers. The design of integrated electrical/electronic/fluid systems and cost considerations in circuit design. Commercial equipment, selection criteria and software for circuit design. Introduction to control, concepts of transient and steady state response, open loop and closed loop control, PID control and empirical controller parameter tuning.*

### **Learning Activities**

A series of lectures supported by tutorials and laboratories.

### **Notes**

The module provides a broad view of the automation systems found in an industrial environment. On completion a student should be able to competently design or analyse a basic system including specification, circuit, mechanical analysis and electrical interfaces. The module also introduces students to basic control system concepts.