

Liverpool John Moores University

Title: ACTUATION SYSTEMS
Status: Definitive
Code: **5510ENGHAL** (106673)
Version Start Date: 01-08-2016

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

| 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 1

| 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 | lab assignment | 15 | |
| Essay | AS3 | lab assignment | 15 | |

Aims

To develop the students understanding of the principles of hydraulic, pneumatic and electrical actuation within the context of mechanical equipment and automation systems.

Learning Outcomes

After completing the module the student should be able to:

- 1 explain the characteristics of the elements of actuation systems.
- 2 discuss circuit design and recall international standards.
- 3 employ appropriate theory to the design and appraisal of actuation systems.
- 4 use hydraulic, pneumatic and electrical actuators in the design of mechanical systems
- 5 discuss the electrical and electronic interfaces necessary to control hydraulic and pneumatic systems

Learning Outcomes of Assessments

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

| | | | | | |
|------|---|---|---|---|---|
| EXAM | 1 | 2 | 3 | 4 | 5 |
| CW | 1 | 2 | 3 | | |
| CW | | 4 | 5 | | |

Outline Syllabus

Cylinders, rotary and linear actuators, hydraulic power units. International standards, understanding and analysing circuit diagrams. Force analysis for mechanical applications. Flow, pressure and energy considerations in circuit design. Valve actuation and control, electrical interfaces including different types of transducers. Electrical actuation systems. The use of PLC control, the design of integrated electrical/electronic/fluid systems and cost considerations in circuit design. Commercial equipment, selection criteria and software for circuit design.

Learning Activities

A series of lectures supported by tutorials and laboratories.

Notes

The module provides a broad view of hydraulic, pneumatic and electrical actuation systems. On completion a student should be able to competently design or analyse a basic system including specification, circuit, mechanical analysis and electrical interfaces.