

## Liverpool John Moores University

Title: Marine Electrical Systems  
Status: Definitive  
Code: **5123ENG** (120097)  
Version Start Date: 01-08-2019

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

Team	Leader
Michael Shaw	Y
Christian Matthews	

**Academic Level:** FHEQ5      **Credit Value:** 20      **Total Delivered Hours:** 74  
**Total Learning Hours:** 200      **Private Study:** 126

### Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	48
Tutorial	24

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS2	Examination	70	2
Test	AS1	Portfolio	30	

### Aims

*The aim of this module is to provide a comprehensive introduction to Marine Instrumentation and Electrical Engineering, the module will concentrate on the principles, construction and operation of marine instrumentation, ac and dc motors and generators, and associated distribution and protection systems.*

## Learning Outcomes

After completing the module the student should be able to:

- 1 Select appropriate sensors for an application and demonstrate an understanding of their characteristics and practical interfacing requirements.
- 2 Select appropriate actuators for an application and demonstrate an understanding of their characteristics and drive requirements
- 3 Explain the principles of magnetism and electromagnetism induction and solve related problems
- 4 Demonstrate knowledge of the principles and application of dc, ac motors and generators and solve related problems
- 5 Discuss typical arrangements of marine dc and ac distribution systems and solve related problems

## Learning Outcomes of Assessments

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

Examination	1	2	3	4	5
VLE Test	1	2	3	4	5

## Outline Syllabus

### Sensors

- *Measured Physical Quantity*
  - o *Temperature*
  - o *Position, Displacement and Velocity*
  - o *Acceleration*
  - o *Pressure and Force*
  - o *Fluid Flow Rates*
- *Transducer Types*
  - o *Resistive*
  - o *Capacitive*
  - o *Inductive*
  - o *Piezo Electric*
- *Signal Type*
  - o *Analogue*
  - o *Digital*
- *Characteristics*
  - o *Range and Span*
  - o *Sensitivity*
  - o *Precision, Accuracy, Repeatability*

### Actuators

- *Electro-mechanical*
  - o *Motors*
  - o *Solenoids*

- *Pneumatic and Hydraulic*
- *Mechanisms (for connecting loads to actuators)*
  - o *Screws*
  - o *Racks*
  - o *Gears*
  - o *Linkages*
- *Pumps*
- *Heating and Cooling*
  - o *Peltier and Thermo-electric devices*
  - o *Resistive heaters*
- *Loading*
  - o *Mechanical loads on electro-mechanical, pneumatic and hydraulic actuators*
  - o *Thermal loads on heaters/coolers*
  - o *Fluid loads on pumps*

### *Power (10 credits)*

- *AC waveform, phasor diagrams and power factor*
- *Single phase and three phase ac circuits*
- *Principles of electromagnetic induction*
- *AC and DC motors*
  - o *Type*
  - o *Construction*
  - o *Operation*
  - o *Application*
- *AC generators*
  - o *Type*
  - o *Construction*
  - o *Operation*
  - o *Load/speed control*
  - o *Excitation*
  - o *Protection*
  - o *Synchronizing*
- *Switch boards and distribution arrangements of marine dc and ac systems*
- *Transformers*

### **Learning Activities**

A series of lectures and tutorials.

### **Notes**

The module is designed to give Marine Engineering students a comprehensive understanding of electrical and control equipment and systems heavily utilised in the marine engineering sector.

