

## Liverpool John Moores University

Title: ELECTRICAL MACHINES  
Status: Definitive  
Code: **4511NCCG** (129430)  
Version Start Date: 01-08-2021

Owning School/Faculty: Engineering  
Teaching School/Faculty: Nelson Campus

Team	Leader
Christian Matthews	Y

**Academic Level:** FHEQ4      **Credit Value:** 20      **Total Delivered Hours:** 60  
**Total Learning Hours:** 200      **Private Study:** 140

### Delivery Options

Course typically offered: S1, S2, Sum, NS2 (S2 for Jan)

Component	Contact Hours
Lecture	36
Practical	24

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	Assignment	Assignment	100	

<b>Competency</b>	NCC Group Pass/Fail
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### Aims

*This module introduces students to the characteristics and operational parameters of a range of electromagnetic powered machines that are used in a variety of applications. Among the topics included in this module are: principles underlying the operation and construction of transformers, induction motors, synchronous machines, electromagnetic transducers, actuators, and generators; and operating characteristics of electrical machines such as voltage, current, speed of operation,*

*power rating, electromagnetic interference (EMI) and efficiency.*

## **Learning Outcomes**

After completing the module the student should be able to:

- 1 Assess the features and applications of single and 3-phase transformers.
- 2 Analyse the characteristics, performance and applications of three-phase induction motors
- 3 Investigate the performance of synchronous machines
- 4 Analyse the operating characteristics of electromagnetic transducers and actuators.

## **Learning Outcomes of Assessments**

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

Assignment	3	4
NCC Group Pass/Fail	1	2

## **Outline Syllabus**

*Transformers: construction, application, characteristics, short circuit and no-load testing, equivalent circuit, star and delta configurations, calculations of torque, power and efficiency.*

*Induction motors: star and delta wirings, short circuit and no-load testing, equivalent circuit, calculations of torque, power and efficiency, construction of practical motors, starting, use as generator.*

*Synchronous machines: methods of excitation, equivalent circuit, calculations of torque power and efficiency, use as motors and generators.*

*(A selection of) electromagnetic transducers and actuators: types, construction, applications, performance*

## **Learning Activities**

### **Lectures**

These will not normally be traditional didactic lectures in which the student plays little active part, but will be delivered in small groups of up to 20 students in which their interaction with their tutor is a key ingredient of their learning experience.

The material of this module requires the development of significant practical skill. This will be taught within the lecture time, making these sessions a blend of lecture and workshop time. The sessions will be timetabled in spaces with physical resources appropriate to the delivered content.

Students will receive approximately 30 hours of taught material, supported by in-class exercises and discussions designed to help student assimilate learning and to

provide early informal feedback on their progress.

### Practical Work

This module contains directed practical work that students will undertake under the supervision of teaching staff and/or technicians. Some elements of this practical work will form part of the assessment for this module.

### Independent Study

Students are expected to undertake personal reading and research into topic areas that have been stimulated from the lectures and seminars. This reading will enhance their academic work and enable valid contribution to lectures and seminars.

### VLE support

This will provide links to academic web-sites and on-line journals, facilitate group discussion outside of the classroom, access to outline lecture notes, and provide students with assessment details.

### Notes

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