

## Liverpool John Moores University

Title: Further Electrical Machines & Drives  
Status: Definitive  
Code: **5512NCCG** (129445)  
Version Start Date: 01-08-2021  
  
Owning School/Faculty: Engineering  
Teaching School/Faculty: Nelson Campus

Team	Leader
Christian Matthews	Y

**Academic Level:** FHEQ5      **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	48
Practical	12

**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

*The aim of this module is to continue developing the skills in the use and application of electrical machines, particularly direct current (DC) and alternating current (AC) drives. Among the topics included in this module are: an introduction to electrical machines and drives, and their characteristics, starting and braking, loading conditions, ratings, and their control. On successful completion of this module students will be able to explain the operation of different motors used in industry,*

*describe the different types of industrial drives used in various disciplines, assess the importance of electrical machines and their drives for a given industrial application, analyse their performances and suggest appropriate solutions using a variety of possible methods.*

## **Learning Outcomes**

After completing the module the student should be able to:

- 1 Explore the principles of operation and the characteristics of electrical machines and their industrial applications.
- 2 Illustrate the fundamentals of power electronics converters used in power processing units for electric drives.
- 3 Demonstrate an understanding of the fundamentals of DC drives and their industrial applications.
- 4 Demonstrate an understanding of the fundamentals of AC drives and their industrial applications.

## **Learning Outcomes of Assessments**

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

Assignment	2	3	4
NCC Group Pass/Fail	1		

## **Outline Syllabus**

*Principles of operation and characteristics: DC machines, three-phase induction machines, synchronous machines, introduction to special machines*

*Fundamentals of power electronics converters used: concepts of electrical drives and their classification, DC to DC converters, AC to DC converters, DC to AC converters, AC to AC converters*

*Simulation using Matlab/Simulink or similar software*

*Fundamentals of DC drives and their industrial applications: introduction to DC drives, operating modes of DC drives, drives fro single-phase AC, drives from 3-phase AC, chopper drives, two/four quadrant operation drives, closed loop control of DC drives*

*Fundamentals of AC drives and their industrial applications: introduction to AC drives*

*Induction motor drives: voltage controls, frequency controls, current controls, voltage, current and frequency control, and closed loop control induction motor*

*Synchronous motor drives: frequency control and closed loop control of synchronous motor drives*

## **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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