

## MODULE DESCRIPTOR

### Module Title

Electrical Machines And Drives 2

Reference	EN4560	Version	5
Created	August 2021	SCQF Level	SCQF 10
Approved	March 2004	SCQF Points	15
Amended	August 2021	ECTS Points	7.5

### Aims of Module

To provide the student with the ability to analyse the performance and operation of ac machines and drive systems, and to apply simulation techniques to aid this analysis.

### Learning Outcomes for Module

On completion of this module, students are expected to be able to:

- 1 Apply 2-axis analysis to the performance of 3-phase synchronous and induction motors.
- 2 Understand and analyse the operation of AC drive systems as applied to 3-phase induction motors.
- 3 Utilise simulation tools to analyse the transient performance of AC machines.

### Indicative Module Content

Salient pole synchronous machines. Principles of operation, application and analysis. Two-axis analysis. Generalised machine theory. Application to the transient analysis of both synchronous and induction machines. AC drives: induction motor operation on variable-voltage variable frequency supplies, principles of self-commutated, variable-frequency inverter operation, control of output voltage, frequency and harmonics. Principles of braking and regeneration, slip energy recovery, stator voltage control, cycloconverters. Introduction to flux-vector control of ac machines Matlab and Simulink analysis of ac machines and drive systems in steady-state and transient operation.

### Module Delivery

This is a lecture-based course supplemented with tutorial sessions, laboratory work and student-centred learning.

<b>Indicative Student Workload</b>	Full Time	Part Time
Contact Hours	49	49
Non-Contact Hours	101	101
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
<b>TOTAL</b>	<b>150</b>	<b>150</b>
<i>Actual Placement hours for professional, statutory or regulatory body</i>		

**ASSESSMENT PLAN**

*If a major/minor model is used and box is ticked, % weightings below are indicative only.*

<b>Component 1</b>			
Type:	Coursework	Weighting:	30%
Description:	Laboratory report.		
Outcomes Assessed:	3		
<b>Component 2</b>			
Type:	Examination	Weighting:	70%
Description:	Closed book examination.		
Outcomes Assessed:	1, 2		

**MODULE PERFORMANCE DESCRIPTOR**

**Explanatory Text**

The module has 2 components and to gain an overall pass a minimum D grade must be achieved in each component. The component weighting is as follows: C1 is worth 30% and C2 is worth 70%.

		Coursework:						
		A	B	C	D	E	F	NS
Examination:	<b>A</b>	A	A	B	B	E	E	
	<b>B</b>	B	B	B	C	E	E	
	<b>C</b>	B	C	C	C	E	E	
	<b>D</b>	C	C	D	D	E	E	
	<b>E</b>	E	E	E	E	E	F	
	<b>F</b>	F	F	F	F	F	F	
	<b>NS</b>	Non-submission of work by published deadline or non-attendance for examination						

**Module Requirements**

Prerequisites for Module	Electrical Machines and Drives 1 (EN3560) or equivalent.
Corequisites for module	None.
Precluded Modules	None.

**INDICATIVE BIBLIOGRAPHY**

1	FITZGERALD, A.E., KINGSLEY, C. and UMANS, S.D., 2003.6th ed. Electric Machinery. Singapore: McGraw-Hill
2	MOORTHY, V.R., 2005. Power Electronics. New Delhi: Oxford University Press.
3	ONG, CHEE-MUN., 1998. Dynamic Simulation of Electric Machinery. Upper Saddle River, NJ: Prentice Hall PTR