

MODULE DESCRIPTOR

Module Title

Electrical Power and Energy Systems

Reference	EN3561	Version	7
Created	August 2021	SCQF Level	SCQF 9
Approved	March 2004	SCQF Points	15
Amended	August 2021	ECTS Points	7.5

Aims of Module

To provide the student with the ability to assess the operation and control of electrical power and energy systems.

Learning Outcomes for Module

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

- 1 Explain how electrical energy is produced, supplied and traded.
- 2 Analyse the operation of synchronous generators and power systems under normal steady state and short circuit operating conditions.
- 3 Explain the principles of control of power, reactive power, voltage and frequency for synchronous generators and power supply systems.
- 4 Demonstrate understanding of power systems under different operating conditions in a case study.

Indicative Module Content

Electrical energy production, conventional and modern approaches, energy sources used for electrical generation. Power system operation, matching of supply and demand, energy trading. Basic components of electrical power systems, generation, power transformers, lines and cables, circuit breakers, loads. Representation using single-line diagrams and the per-unit system, steady-state and short circuit analysis. Synchronous generator operation, equivalent circuit, phasor diagrams; operation on infinite busbars. Control of real power and frequency, control of reactive power and voltage. Introduction to embedded (distributed) generation. Introduction to High Voltage DC transmission and DC grids.

Module Delivery

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

Indicative Student Workload

	Full Time	Part Time
Contact Hours	42	42
Non-Contact Hours	108	108
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	150
<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.

Component 1

Type:	Coursework	Weighting:	30%	Outcomes Assessed:	4
Description:	Class based quizzes.				

Component 2

Type:	Examination	Weighting:	70%	Outcomes Assessed:	1, 2, 3
Description:	Closed book examination.				

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:	A	A	A	B	B	E	E	
	B	B	B	B	C	E	E	
	C	B	C	C	C	E	E	
	D	C	C	D	D	E	E	
	E	E	E	E	E	E	F	
	F	F	F	F	F	F	F	
	NS	Non-submission of work by published deadline or non-attendance for examination						

Module Requirements

Prerequisites for Module	Electrical Power (EN2560) or equivalent is a prerequisite.
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

- 1 WEEDY, B.M. and CORY, B.J., 2012. 5th ed. Electric Power Systems. Chichester: Wiley
- 2 GLOVER, J. D.SARMA, M. S.and OVERBYE,T.J., 2011. Power System Analysis and Design. 5th ed. New York: Nelson Engineering
- 3 HARRISON, J. A., 1996. The Essence of Electric Power Systems. London: Prentice-Hall