This Version is No Longer Current
The latest version of this module is available here

MODULE DESCRIPTOR

Module Title

Power Systems Analysis and Protection

Reference	EN4563	Version	1
Created	February 2022	SCQF Level	SCQF 10
Approved	June 2022	SCQF Points	15
Amended		ECTS Points	7.5

Aims of Module

To provide students with the ability to assess the operation of electrical power systems, analyse their performance under steady state and transient conditions, devise methods for their protection, and evaluate their economic operation.

Learning Outcomes for Module

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

1	Demonstrate comprehensive understanding of how electrical energy is produced, transmitted, distributed and traded within the electrical power system.
2	Critically analyse the power systems operation and stability under both normal steady state and short circuit operating conditions.
3	Analyse the different power system protection strategies.
4	Evaluate the economics of electrical power systems operation
5	Use MATLAB and/or any software-based environment to apply advanced techniques of power systems load flow analysis on a case study

Indicative Module Content

Conventional and Renewable Technologies used in the Electrical energy production. The Power system basic components and its operation. Power systems representation using single-line diagrams and the per-unit system. Power systems short circuit analysis. Analytical techniques used for the power system load flow and stability analysis. Basic components for the Power System Protection and characteristics of protection systems. Power Systems Economic operation.

Module Delivery

This module is a lecture-based module supplemented by tutorials and student centred learning.

Module Ref:	EN4563 v1

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
Actual Placement hours for professional, statutory or regulatory body		

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:	5
Description:	Case Study Analysis				

Component 2

Type:	Examination	Weighting:	70%	Outcomes Assessed:	1, 2, 3, 4
Description:	Closed Book Examination				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

The module has 2 components, 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	EN2560 Electrical Power or Equivalent
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	J. Duncan Glover, Mulukutla S. Sarma, Thomas Overbye, Adam Birchfield, 2022, 7th Edition. Power System Analysis and Design. Publisher: Cengage, Place of publication: USA
3	Wood, A. J., Wollenberg, B. F., & Sheble, G. B., 2013. 3rd ed. Power Generation, Operation, and Control. IEEE and Wiley. Hoboken, New Jersey
4	GEC ALSTHOM Ltd, 1987. Protective Relays - Application Guide. 4th ed. Stafford: EEC
5	CONEJO, A. J. and BARINGO, L., 2018. Power System Operations, Springer. Cham, Switzerland.
6	BIGGAR, D.R. and HESAMZADEH, M.R., 2014. The Economics of Electricity Markets. IEEE and Wiley. Chichester.
7	BAYLISS, C. R. and HARDY, B. J., 2012. 4th ed. Transmission and Distribution Electrical Engineering. Oxford, UK: Elsevier.
8	TWIDELL, J. and WEIR, T., 2022, 4th Edition. Renewable Energy Resources. Routledge. Published Abingdon, Oxon: Routledge.