

Module Outline	Part 1- as validated
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1.	Title	Electrical Power Systems
2.	Level	6
3.	Credits	20
4.	Indicative Student Study Hours	36 hours lectures 164 hours self-directed learning
5.	Core (must take and pass), Compulsory (must take) or Optional	Optional

5. Brief Description of Module (purpose, principal aims and objectives)
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Students are introduced to power system analysis methods with emphasis on modern tools used by practicing engineers to design, modify and control a complex system incorporating typical industrial components.

This module provides students with the capability to analyse generation, distribution and transmission systems at 11kV and above forming the 'supply' side of electrical power networks, under both steady state and transient conditions. Frequency and voltage control, and protection schemes are covered for both normal and fault conditions.

There is also a series of practical sessions as part of lectures, using industry standard software to analyse power flow and fault levels which incorporate examples of current industry practice.

6. Learning Outcomes - On successful completion of this module a student will be able to:	
<i>(Add more lines if required)</i>	
	Specific Learning Outcomes
1.	Analyse and evaluate the nature of the UK electrical power network
2.	Identify and solve complex problems related to aspects of system design
3.	Use, analyse and interpret power flow and fault levels
4.	
Generic Learning Outcomes	
4.	Take responsibility for own learning and development using reflection and evaluation
5.	Work with ideas and concepts by evaluating information from a range of perspectives

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7. Assessment

Pass on aggregate or Pass all components <i>(modules can only be pass all components if this is a PSRB requirement)</i>	Pass on aggregates
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Summary of Assessment Plan

#	Type	% Weighting	Anonymous Yes / No	Word Count/ Exam Length	Learning Outcomes Coverage	Comments
1.	Examination	40%	Yes	2 hours	LO 1, 5	
2.	Report	60%	Yes	2000	LO 2, 3, 4	

Further Details of Assessment Proposals

Give brief explanation of each assessment activity listed
<ol style="list-style-type: none"> 1. The examination will involve an investigation and analysis of the current UK power network from a generation, distribution and transmission basis. 2. The report is based on using calculations and software to solve industrial problems related to system design. It will include an analysis of typical control and protection schemes.

8. Summary of Pre and / or Co Requisite Requirements

Not applicable

9. For use on following programmes

BSc Engineering (Electrical)

Module Specification

Part 2- to be reviewed annually

1.	Module Leader	John Dorward, Othello Deemi
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2.	Indicative Content
	<p>This module covers electrical network basics: current, voltage, resistance, analysis of resistive circuits, capacitance, inductance, sinusoidal-steady state analysis. Power System Analysis: AC power, transformers, generators, loads, three-phase systems, power lines, power flow analysis, reliability and stability including power system structure, important aspects of power system operation, operating states, complex power, the symmetrical three-phase system, per unit system power system components, synchronous generators, power and control transformers, transmission lines, the characteristics of the loads, network analysis, voltages, currents and powers at sending and receiving ends.</p> <p>Power System Operation: planning, scheduling, distributed generation, electricity markets, smart grid such as power system economics, embedded or dispersed generation, issues and technical impacts of embedded generation.</p>

3. Delivery Method <i>(please tick appropriate box)</i>					
Classroom Based	Supported Open Learning	Distance Learning	E-Learning	Work Based Learning	Other (specify)
yes					
<i>If the Delivery Method is Classroom Based please complete the following table:</i>					
	Activity (lecture, seminar, tutorial, workshop)	Activity Duration - Hrs	Comments	Learning Outcomes	
1	Lectures with practical break-out sessions	36h		LO 1-5	
	Total Hours	36h			
If delivery method is <i>not</i> classroom based state lecturer hours to support delivery				Two 20 minutes academic tutorials per student per module	

4. Learning Resources
<i>To include contextualised Reading List.</i>

Highly Recommended

Baylis, C. and Hardy, B. (2012) *Transmission and Distribution Electrical Engineering*. Oxford: Newnes

Breeze, P. A. (2014) *Power Generation Technologies*. 2nd Edition. Oxford: Newnes

Recommended

Schavemaker, P. and van der Sluis, L. (2016) *Electrical Power System Essentials*. Chichester: John Wiley & Sons Ltd.

Weedy, B.M. et al (2012) *Electric Power Systems*. Chichester: John Wiley & Sons Ltd.