

Module specification

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Module Code	ENG5C7
Module Title	Electrical Power Engineering
Level	5
Credit value	20
Faculty	FACE
HECoS Code	100164
Cost Code	GAME
Pre-requisite module	N/A

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
FdEng Industrial Engineering (Electrical) BEng (Hons) Electrical Engineering with Manufacture BEng (Hons) Electrical Engineering	Core

Breakdown of module hours

Learning and teaching hours	18 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	18 hrs
Project supervision hours	0 hrs
Active learning and teaching hours total	36 hrs
Placement hours	0 hrs
Guided independent study hours	164 hrs
Module duration (Total hours)	200 hrs

Module aims

This module develops applied understanding through a balance of theory and practice. Learners undertake both classroom study and supervised practical activity to explore design, implementation, and evaluation processes. Collaborative work and enquiry-based learning foster communication, teamwork, and the confidence to apply problem-solving techniques in varied contexts.

This module aims to provide students with a comprehensive understanding of the operation of electrical power systems and devices, and to develop the necessary engineering techniques to analyse, design, implement, and optimise power system solutions.

Module Learning Outcomes

At the end of this module, students will be able to:

1	Analyse operation of electrical power systems for the modern industry including generation, transmission and distribution.
2	Apply appropriate analysis techniques and design methods to develop, assess and optimise the electrical power systems and devices.
3	Utilise the power engineering equipment and components to install, test and maintain electrical power systems.

Assessment

Indicative Assessment Tasks:

This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

Assessment 1: Portfolio

The assessment could comprise of a portfolio that includes a series of practical laboratory investigations, problem-solving activities, and a quiz covering key topics in electrical power engineering.

The portfolio is designed to demonstrate both a broad understanding of fundamental concepts and detailed analysis of specific electrical power systems. It requires the application of circuit design principles, use of appropriate instrumentation, data acquisition, and the analysis and evaluation of electrical power system performance.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1-3	Portfolio	3000	100	N/A

Derogations

Credits shall be awarded by an Assessment Board for those modules in which a pass mark 40% has been achieved, with a minimum mark of 30% in each assessment element.

Learning and Teaching Strategies

Learning integrates conceptual study with practical investigation to deepen understanding and enhance problem-solving ability. Students participate in lectures, laboratory work, and team-based projects that encourage collaboration and communication. Online materials, recordings, and discussion forums support blended engagement. Tutorials promote reflective learning and increasing autonomy in preparation for advanced study.

Welsh Elements

This module will be delivered through the medium of English; however, students have the option to submit their assessments in the medium of Welsh. While this module is not currently offered fully through Welsh, Welsh language support and guidance are available, and some learning materials or tutorial discussions may incorporate Welsh elements where appropriate. To further promote bilingual learning, all students have the opportunity to take the 20-credit *Welsh for STEM* short course, designed to develop confidence and subject-specific language skills in both English and Welsh.

Indicative Syllabus Outline

Three-Phase Systems and Power Generation:

Analysis of the generation of three-phase electromotive forces (e.m.f.s), star and delta connected loads, and the behaviour of balanced and unbalanced three-phase systems, including transformer configurations and their operational characteristics.

Electricity Generation and Power System Operation:

Study of synchronous generators, including construction, operation, equivalent circuits, excitation, efficiency, and performance characteristics, alongside power plant operation and key economic considerations such as tariffs, load factors, and demand.

Power System Networks and Transmission:

Analysis of two-port networks, transmission line modelling, and equivalent circuits, including impedance-based methods and ABCD parameters to evaluate system performance and optimise power transmission and distribution.

Power Factor and System Efficiency:

Application of analytical methods to evaluate active, reactive, and apparent power, alongside techniques for power factor correction and efficiency improvement in electrical power systems.

Power System Protection and Fault Analysis:

Application of per-unit systems, equivalent circuit models, and short-circuit analysis techniques to assess electrical faults and support testing and protection strategies in power systems.

Testing, Measurement, and Maintenance Practices:

Use of instrumentation and testing methods to measure power, analyse system performance, and support the installation, operation, and maintenance of electrical power system equipment

Indicative Bibliography

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads:

J. Bird, *Electrical Circuit Theory and Technology*, 7th Ed. Oxon: Routledge, 2022

Other indicative reading:

J.L. Kirtley, *Electric Power Principles: Sources, Conversion, Distribution and Use*, 2nd Ed. Hoboken: Wiley, 2020.

T. Wildi, *Electrical Machines, Drives and Power Systems*. 6th ed. Pearson, 2014

Administrative Information

For office use only	
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