MODULE DESCRIPTOR

Module Title

Electrical Power

Reference	EN2560	Version	8
Created	March 2023	SCQF Level	SCQF 8
Approved	March 2004	SCQF Points	15
Amended	August 2023	ECTS Points	7.5

Aims of Module

To provide the student with an understanding of electric power circuits and the ability to apply fundamental electromechanical energy conversion principles to drive problems.

Learning Outcomes for Module

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

1	Use knowledge of real and reactive power and power factor when analysing electric circuits in single and 3-phase circuits.
2	Calculate the performance of the single-phase transformer using equivalent circuit model.
3	Evaluate the performance of DC and AC machines when loaded.
4	Compute the basic operation of 1-phase rectifiers and 1-phase controlled rectifiers.
5	Use the understanding of transformer and DC machine characteristics in a laboratory setup or by using a software package.

Indicative Module Content

1-phase and 3-phase circuits, real and reactive power, principle of three phase generation. Characteristics of single-phase ideal and practical transformers. Principle of operation, concept of leakage inductance and influence on transformer operation, use of equivalent circuit for performance analysis. DC machines, equivalent circuit, emf and torque equations, motor drive characteristics, motor control. 3-phase induction motor, construction and operating principle, basic drive characteristics. Synchronous machine principles, construction, simple equivalent circuit, phasor diagram with constant terminal voltage. Power rectification, single-phase rectifier circuits, single-phase controlled rectifier, principles of operation, voltage and current relationships, resistive and inductive loads, waveform analysis. Introduction to an engineering software package (e.g. MATLAB/Simulink, COMSOL Multiphysics, ANSYS).

Module Delivery

This is a lecture based course supplemented with tutorial sessions, laboratory work and directed study.

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Indicative Student Workload	Full Time	Part Time
Contact Hours	50	50
Non-Contact Hours	100	100
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:	100%	Outcomes Assessed:	1, 2, 3, 4, 5
Description:	Closed book examination.				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

Component 1 comprises 100% of the module grade. To pass the module, a D grade is required.

Module Grade	Minimum Requirements to achieve Module Grade:
A	A
B	B
C	C
D	D
E	E
F	F
NS	Non-submission of work by published deadline or non-attendance for examination

Module Requirements

Prerequisites for Module	EN1560 or equivalent.
Corequisites for module	None.
Precluded Modules	None.

ADDITIONAL NOTES

An Indicative Bibliography will normally reference the latest edition of a text. In some cases, older editions are equally useful for students and therefore, those are the editions that may be stocked.

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INDICATIVE BIBLIOGRAPHY

1	WILDI, T., 2013, Electrical Machines, Drives and Power Systems. 6th ed. London: Prentice Hall.
2	BIRD, J.O., 2017. Electrical and Electronic Principles and Technology. 6th ed. Oxford: Newnes.
3	O'MALLEY, J., 1990. Schaum's outline of theory and problems of basic circuit analysis. 2nd ed. New York, NY: McGraw-Hill.
4	CHAPMAN, S. J., 2011. Electric Machinery Fundamentals. 5th ed. New York, NY: McGraw-Hill.
5	MELKEBEEK, J. A., 2018. Electrical Machines and Drives Fundamentals and Advanced Modelling. Switzerland: Springer