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Module Definition Form (MDF)

Module code: MOD007956	**Version:** 2 **Date Amended:** 07/Feb/2023

1. Module Title
Power Engineering

2a. Module Leader
Kahtan Aziz

2b. School
School of Engineering and the Built Environment

2c. Faculty
Faculty of Science and Engineering

3a. Level
6

3b. Module Type
Standard (fine graded)

4a. Credits
15

4b. Study Hours
150

5. Restrictions

Type	Module Code	Module Name	Condition
Pre-requisites:	None		
Co-requisites:	None		
Exclusions:	None		
Courses to which this module is restricted:	None		

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

The module covers power system hardware, transformers, and electromechanical machinery and an introduction to power system operation. Power system concepts: single- and three-phase systems, phasor representation in sinusoidal steady-state, real and reactive power, per unit system are broadens the opportunities for employment in power engineering industry and national grid.

You will learn the fundamentals and modelling of power system components, that include, generators, loads, transformers, transmission lines, efficiency, and power loss. In the area of power flow analysis, you will gain knowledge and critical thinking around admittance matrix, power flow equations, and Newton-Raphson method. Moreover, the fundamentals of power system operation and smart grid technologies will be covered in this module, that are key to a career in power engineering industry.

The module provides you with the technical aspects of power systems to ensure your knowledge is ready for the world of work across the full energy lifecycle. This includes extraction, production, conversion, transmission, and distribution. Your knowledge will help you play an integral role in processing energy from a variety of sources, such as, solar, wind and geothermal power, nuclear power, water, oil, gas and biofuels.

6b. Outline Content

• Review of sinusoidal steady state, complex power and three-phase circuits.
• Transmission line parameters.
• Transmission line modelling and capacity
• Magnetic circuits and transformers.
• Generalized rotating machines.
• Induction machines.
• Synchronous generators.
• Power flow.

6c. Key Texts/Literature

The reading list to support this module is available at: https://readinglists.aru.ac.uk/

6d. Specialist Learning Resources

Specialist laboratory equipment

7. Learning Outcomes (threshold standards)		
No.	**Type**	**On successful completion of this module the student will be expected to be able to:**
1	Knowledge and Understanding	Understand and appreciate the trends in power engineering including single and three-phase transformers and load flow analysis.
2	Intellectual, practical, affective and transferrable skills	Apply knowledge of mathematics and engineering principles to solve complex problems in power engineering.
3	Intellectual, practical, affective and transferrable skills	Analyse complex power problems to reach substantiated conclusions using the first principles of mathematics and engineering principles.
4	Intellectual, practical, affective and transferrable skills	Use laboratory activity to conduct preliminary design and analysis of the different aspects of the complex power systems.

8a. Module Occurrence to which this MDF Refers				
Year	**Occurrence**	**Period**	**Location**	**Mode of Delivery**
2025/6	ZZF	Template For Face To Face Learning Delivery		Face to Face

8b. Learning Activities for the above Module Occurrence			
Learning Activities	**Hours**	**Learning Outcomes**	**Details of Duration, frequency and other comments**
Lectures	24	1-3	Lecture 3 hrs for 8 weeks
Other teacher managed learning	12	3-4	Lab 3 hrs for 4 weeks
Student managed learning	114	1-4	Self-study
TOTAL:	150		

9. Assessment for the above Module Occurrence					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
010	Coursework	3-4	30 (%)	Fine Grade	30 (%)
Report (1500 words) maps to Engineering Council Learning Outcomes C2, C12					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
011	Examination Chelmsford	1-2	70 (%)	Fine Grade	30 (%)
Exam (1.5 hours) maps to Engineering Council Learning Outcome C1					

In order to pass this module, students are required to achieve an overall mark of 40% (for modules at levels 3, 4, 5 and 6) or 50% (for modules at level 7*).

In addition, students are required to:
(a) achieve the qualifying mark for each element of fine graded assessment as specified above
(b) pass any pass/fail elements

[* the pass mark of 50% applies for all module occurrences from the academic year 2024/25 – see Section 3a of this MDF to check the level of the module and Section 8a of this MDF to check the academic year]