

Module specification

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Refer to the module guidance notes for completion of each section of the specification.

Module code	ENG435
Module title	Electrical Power
Level	4
Credit value	20
Faculty	FAST
Module Leader	Dr Y Vagapov
HECoS Code	100581
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
HNC Electrical & Electronic Technology	Optional

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	60 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	0 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	60 hrs
Placement / work based learning	0 hrs
Guided independent study	140 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	August 2016
With effect from date	September 2021

Date and details of revision	6 July 2021, revalidated
Version number	Version 2

Module aims

To develop knowledge and understanding of three phase supply and distribution systems.

To understand the basic mathematical models of performance and economics of transmission methods. To understand the impact of harmonics within the distribution system. To be able to analyse three-phase induction motors.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Analyse three-phase systems using mathematical techniques and performance economics
2	Investigate distribution methods and the effects of harmonics in distribution
3	Investigate and analyse three-phase induction machines

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 is 100% in-course.

Assessment One: Outcomes 1, 2 and 3 would be assessed using an in-class test based on the knowledge gained in the module (1hr 30mins)

Assessment Two: Outcomes 1 and 3 would be assessed using a short reports based on practical exercises performed by the student (2000 words).

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1, 2, 3	In class test - 1hr 30 mins	50%
2	1, 3	Practical - 2000 word reports	50%

Derogations

None

Learning and Teaching Strategies

The module will be presented to students through a specified series of lectures assisted by notes via VLE platform. Lectures will deliver key concepts, ideas, theories and examples. Series of interactive classes, problem based tutorials and practical investigations will assist to achieve learning outcomes. The learning element will be evaluated by carrying out the assessment laid out above which will ensure the learner has the opportunity to achieve all the stipulated outcomes.

Indicative Syllabus Outline

1. Three-phase System Analysis

Analysis of three-phase systems: j-notation for unbalanced star and delta loads from balanced supply; power measurement for balanced and unbalanced systems. Loss of connection: neutral in star load, one phase in three and four wire star systems. Phase sequence errors. Standard transformer connections (star, delta, zig-zag), 'clock' number. Economics of power systems: single-phase versus three-phase distribution; power factor correction, comparison between two motors having different capital costs and losses.

2. Power Distribution and Harmonics

Harmonics in power systems: Sources of harmonics in power systems, effects on power factor correction capacitors, 'triple-n' neutral currents in balanced 4-wire star systems. Harmonic filters. Methods of power distribution: Calculation and significance of power - real/reactive/ apparent/complex. AC ring, radial, parallel feeders: analysis and comparison re current distribution and voltage drop.

3. Three-phase Induction Machines

Operation and analysis of characteristics: operation, starting and control of three-phase induction machines. Torque equation: starting torque, maximum torque and slip at maximum torque. Effects of changes of stator voltage and frequency on motor operation. Torque-speed characteristics related to load, hence assess: static operating conditions, dynamic stability, acceleration time.

Indicative Bibliography:

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

Essential Reads

Kirtley, J. L. (2020) *Electric Power Principles: Sources, Conversion, Distribution and Use*. 2nd ed. Wiley.

Hughes, E. (2016) *Electrical and Electronic Technology*. 12th ed. Pearson.

Other indicative reading

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas. [Click here to read more about the Glyndwr Graduate attributes](#)

Core Attributes

Engaged
Creative

Key Attitudes

Curiosity
Resilience
Confidence

Practical Skillsets

Digital Fluency
Critical Thinking
Communication