Prifysgol Wrecsam
Wrexham University

Module specification

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Module Code	ENG7B3
Module Title	Low Carbon Technology & Storage Integration
Level	Level 7
Credit value	20
Faculty	FACE
HECoS Code	100175
Cost Code	GAME
Pre-requisite module	N/A

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
MSc Engineering (Sustainable Energy)	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 fuses advanced theoretical study with applied experimentation, enabling learners to interrogate, test, and extend current professional and research practice. Through a combination of conceptual exploration and laboratory enquiry, students cultivate critical evaluation, leadership, and evidence-based decision-making skills suitable for professional or doctoral progression.

This module aims to equip MSc engineering students with the knowledge and practical skills to evaluate, design, and integrate low-carbon energy technologies and storage systems within resilient, efficient, and economically viable energy infrastructures

Module Learning Outcomes

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

1	Critically evaluate low-carbon energy generation and storage technologies, demonstrating systematic engineering understanding of their performance, limitations, role in net-zero energy systems and new developments in the industry (AHEP-4 M1).
2	Design and analyse integrated low-carbon and energy-storage solutions using appropriate mathematics modelling, statistic data analysis, and engineering principles to meet technical, economic, and environmental constraints (AHEP-4 M1).
3	Assess the sustainability, ethical, and societal implications of deploying low-carbon and storage technologies, including regulatory frameworks, lifecycle impacts, and professional responsibilities.

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:

Coursework

Assessment is by coursework enabling students to demonstrate technical understanding, applied analysis, and professional communication skills.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1-3	Coursework	4000	100	N/A

Derogations

Credits shall be awarded by an Assessment Board for those modules in which a mark of at least 50% has been achieved, with a minimum mark of 40% in each element of assessment

Learning and Teaching Strategies

Learning integrates advanced theoretical study with applied experimentation, enabling students to test and extend current professional and research practice. Face-to-face sessions are complemented by virtual discussions, simulations, and case studies to support analytical depth. Tutorials and supervision focus on independent enquiry, innovation, and leadership in addressing complex challenges.

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

- Principles, performance characteristics, and limitations of low-carbon generation (e.g. wind, solar, hydro, heat pumps) and energy-storage technologies (electrical, thermal, hydrogen).
- Comparative assessment of technologies using efficiency, reliability, lifecycle emissions, and cost metrics.
- System integration of generation, storage, and demand within buildings, communities, and microgrids, including control strategies and optimisation.
- Modelling, simulation, and data-driven analysis of low-carbon energy systems under technical and economic constraints.
- Policy, standards, and regulatory frameworks relevant to low-carbon and energy-storage deployment in the UK and internationally.
- Environmental, ethical, and societal considerations, including lifecycle assessment, energy justice, and professional engineering responsibilities.

Indicative Bibliography

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

Essential Reads:

A. Mirkouei, Net-Zero and Low Carbon Solutions for the Energy Sector: A Guide to Decarbonization Technologies, 1st ed., John Wiley & Sons, 2024, ISBN: 978-1-119-98216-6.

Other indicative reading:

Software Open source (Moodle)

Administrative Information

For office use only	
Initial approval date	June 2026
With effect from date	September 2026
Date and details of revision	
Version number	1