Prifysgol Wrecsam
Wrexham University

Module specification

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Module Code	ENG6C8
Module Title	Energy Modelling and Simulation
Level	6
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
BEng (Hons) Sustainable Energy Engineering BEng (Hons) Renewable Energy Engineering	Core

Breakdown of module hours

Learning and teaching hours	0 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	36 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 immerses students in a fully applied environment where knowledge is demonstrated through independent investigation and experimentation. Learners plan, implement, and analyse practical work to address defined challenges, showing mastery of specialist techniques. The approach promotes innovation, professional integrity, and confidence in leading complex projects.

This module aims to introduce students to the principles, methods, and tools of energy modelling and simulation, enabling them to analyse, predict, and optimise the performance of energy systems under realistic and dynamic operating conditions.

Module Learning Outcomes

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

1	Construct and validate models of energy systems using mathematical techniques, demonstrating accuracy and relevance to real-world applications (AHEP-4 C1, C3).
2	Evaluate and justify the selection of computational and analytical techniques for modelling and simulation, recognising limitations and proposing improvements (AHEP-4 C3).
3	Critically interpret and integrate simulation outputs to develop evidence-based recommendations for optimising the performance of energy systems, demonstrating professional judgement and consideration of practical constraints.

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 comprising a modelling and simulation project, a 3000-word technical report. This element evaluates students' ability to analyse, design, and justify energy system performance, as well as communicate their findings effectively.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1-3	Coursework	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 is fully immersive and practice-driven, requiring students to apply advanced knowledge through sustained experimental and investigative work. Independent planning, execution, and analysis of complex tasks are central to study. Digital learning tools support data handling and reflection, while supervision ensures critical engagement and alignment with professional and research standards.

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

Energy System Modelling Principles:
Application of fundamental modelling approaches, including steady-state and dynamic simulation methods, to represent and analyse complex energy systems.

Computational Tools and Numerical Methods:
Use of industry standard computational tools and numerical techniques to develop and implement

Model Validation and Uncertainty Analysis:
Evaluation of model accuracy through validation techniques, sensitivity analysis, and the treatment of uncertainty in energy system simulations.

Critical Assessment of Modelling Assumptions:
Analysis of modelling assumptions, data quality, and result interpretation to identify limitations and support sound engineering judgement.

Optimisation of Energy Systems:
Application of optimisation techniques to improve energy system performance, efficiency, and sustainability, based on simulation outcomes.

Engineering Decision-Making Using Simulation:
Use of modelling and simulation results to inform and justify engineering design decisions, considering realistic operational and practical constraints.

Indicative Bibliography

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

Essential Reads:

Srinivas, *Modelling of Energy Systems*, 1st ed. London, UK: CRC Press, 2025

Other indicative reading:

Industry Software

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