

Module specification

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Module Code	ENG5C5
Module Title	Renewable Energy System Design
Level	5
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	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 develops applied understanding through a balance of theory and practice. Learners undertake both classroom study and supervised practical activity to explore design, implementation, and evaluation processes. Collaborative work and enquiry-based learning foster communication, teamwork, and the confidence to apply problem-solving techniques in varied contexts.

This module aims to introduce students to the fundamental principles of renewable energy system design, with emphasis on system integration, performance evaluation, component selection, and optimisation to achieve technical effectiveness alongside environmental and economic sustainability.

Module Learning Outcomes

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

1	Analyse and evaluate the performance of renewable energy systems, applying engineering principles and modelling techniques to assess efficiency, suitability, and capacity.
2	Select and justify appropriate renewable energy system configurations, considering technical, environmental, and economic factors in design decisions.
3	Communicate engineering ideas and solutions effectively, presenting technical analyses and system design proposals using diagrams, reports, and structured arguments.

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

This module will be assessed through coursework in which students analyse and design a renewable energy system, demonstrating the application of engineering principles, justification of component selection, and effective communication of technical and environmental considerations to address the module's learning outcomes.

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 integrates conceptual study with practical investigation to deepen understanding and enhance problem-solving ability. Students participate in lectures, laboratory work, and team-based projects that encourage collaboration and communication. Online materials, recordings, and discussion forums support blended engagement. Tutorials promote reflective learning and increasing autonomy in preparation for advanced study.

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

Modelling and Simulation of Renewable Energy Systems: Application of modelling and simulation techniques to analyse renewable energy systems, including solar, wind, and hydro technologies, to assess system behaviour under varying operating conditions.

Performance Analysis and Evaluation: Evaluation of key system performance metrics such as efficiency, reliability, and capacity factor, using appropriate engineering methods to assess system suitability and effectiveness.

Component Selection and System Configuration: Selection and analysis of components and system configurations for different renewable energy technologies, informed by technical requirements and operational constraints.

Design Decision Evaluation: Critical evaluation of environmental, technical, and economic factors influencing renewable energy system design, supporting justified and sustainable engineering decisions.

Technical Communication and Reporting: Preparation of clear and accurate technical diagrams and written reports to present renewable energy system designs and analyses.

Design Justification and Presentation: Structured presentation and discussion of design assumptions, justification of engineering decisions, and identification of potential improvements, communicated through coherent and well-supported arguments.

Indicative Bibliography

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

Essential Reads:

M. Järvinen and H. Paulomäki, *Designing Renewable Energy Systems within Planetary Boundaries: A Textbook for Energy Engineers*, 1st ed. Cham, Switzerland: Springer, 2025

Other indicative reading:

Retscreen online education

Administrative Information

For office use only	
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