Prifysgol Wrecsam
Wrexham University

Module specification

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Module Code	ENG5D6
Module Title	Energy Infrastructure Systems & Governance
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 technical, regulatory, policy, and governance frameworks that underpin modern energy infrastructure systems, with particular emphasis on system integration, sustainability, and resilience.

Module Learning Outcomes

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

1	Analyse the structure, operation, and performance of energy infrastructure systems, including grids, transmission networks, and distributed energy resources.
2	Evaluate governance frameworks, policy instruments, and regulatory mechanisms that influence energy infrastructure development, market operation, and system planning.
3	Apply engineering principles to assess technical and socio-economic factors in energy infrastructure decision-making, considering sustainability, resilience, and stakeholder perspectives.

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: Portfolio

This module will be assessed through a portfolio in which students analyse an energy infrastructure challenge, evaluate the governance context, and apply engineering principles to justify solutions.

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

Energy Infrastructure Fundamentals:
Analysis of the structure and operation of electrical grids, transmission and distribution networks, and microgrids, including their role within modern energy systems.

System Interaction and Performance:
Evaluation of the interaction between generation, energy storage, and electrical loads, and the resulting impacts on system stability, performance, and operational efficiency.

Energy Policy, Regulation, and Market Structures:
Examination of policy frameworks, regulatory mechanisms, and market structures, including tariffs, network costs, and incentive schemes that influence energy infrastructure development and operation.

Institutional Roles and Governance:
Analysis of the roles of institutions and governance mechanisms within national and regional energy systems, and their influence on planning, investment, and system management.

Technical and Economic Assessment Methods:
Application of engineering and analytical methods, including cost–benefit analysis and reliability indices, to evaluate energy infrastructure solutions.

Sustainability and Resilience in Energy Planning:
Evaluation of sustainability and resilience criteria in energy infrastructure design and decision-making, incorporating broader socio-economic considerations and stakeholder impacts.

Indicative Bibliography

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

Essential Reads:

D. van Doren, B. Droste-Franke, and G. Fohr, *Towards Energy System Resilience: Theory, Governance and Practice*, 1st ed. Cham, Switzerland: Springer, 2026.

Other indicative reading:
N/A

Administrative Information

For office use only	
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Date and details of revision	
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