

Module specification

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Module Code	ENG6E2
Module Title	Systems Engineering and Management
Level	6
Credit value	20
Faculty	FACE
HECoS Code	100185
Cost Code	GAME
Pre-requisite module	N/A

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
BEng (Hons) Industrial Engineering (Mechanical)	Core
BEng (Hons) Industrial Engineering (Electrical)	
BEng (Hons) Mechanical Engineering with Manufacture	
BEng (Hons) Electrical Engineering with Manufacture	

Breakdown of module hours

Learning and teaching hours	36 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	0 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 deepens students' understanding of advanced concepts through critical analysis and synthesis of knowledge gained in earlier study. Learners explore specialised topics, evaluate current practices, and consider innovative approaches within their field. The emphasis is on independent enquiry and professional application of complex ideas.

This module aims to engage students in the application of a systems engineering approach to problem-solving. It prepares students to work effectively on multidisciplinary projects within their chosen industry, integrating technical knowledge across engineering domains.

Module Learning Outcomes

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

1	Demonstrate a systematic understanding of systems engineering principles, including system lifecycle concepts and system representation techniques, applied to complex engineering systems.
2	Analyse and evaluate engineering systems using systems thinking approaches, incorporating environmental and sustainability principles, resource efficiency, and the environmental impact of engineering decisions within system design and operation (AHEP-4 C7).
3	Apply and critically describe processes involved in the management of engineering systems, including project planning, financial and statutory requirements (including H&S), and environmental and sustainability considerations.

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

The module is assessed through a single piece of coursework designed to demonstrate students' understanding of the application of systems engineering methods to a high-level engineering project. The assessment requires consideration of environmental and societal impacts, as well as compliance with relevant statutory and regulatory requirements.

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 and teaching focus on critical engagement with advanced topics through seminars, lectures, and directed research activity. Students analyse and evaluate complex information to develop higher-level understanding and independent thought. Online resources complement in-person sessions, enabling flexible study and preparation for project-based or professional application. Tutorials and supervision encourage academic independence and critical reflection.

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

Systems Engineering Principles and Lifecycle Integration: Introduction to systems engineering principles and their application across the full programme and product lifecycle, including concept development, design, implementation, operation, and decommissioning.

System Representation and Process Modelling: Development and use of block diagrams, process flows, and system models to represent complex engineering systems and their operational and economic relationships.

Systems Thinking and Process Economics: Application of systems thinking methodologies to analyse interactions between technical, economic, and operational elements within engineering projects.

Project Evaluation and Decision Making: Use of structured evaluation techniques, including return on investment (ROI), payback period, net present value (NPV), and comparison of alternatives, incorporating risk and uncertainty in decision-making.

Project and Contract Management: Examination of project management principles, including coordination of activities, planning processes, and the use of different types of contracts within engineering projects.

Health, Safety, and Risk Management: Application of health and safety policies, safety systems engineering, and structured risk assessment methods, including hazard analysis and failure modes and effects analysis (FMEA), to ensure compliance with statutory and regulatory requirements.

Indicative Bibliography

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

Essential Reads:

Hopkins, M. (ed.) (2018) Systems engineering : concepts, tools and applications. New York, [New York: Novinka.

Other indicative reading:

Anon (2024) Systems Engineering. IntechOpen.

Forsberg Kevin J et al. (2015) Systems Engineering Handbook - A Guide for System Life Cycle Processes and Activities (4th Edition). Fourth edition. Hoboken, New Jersey: John Wiley & Sons.

Sage, A. P. & Rouse, W. B. (eds.) (2010) Handbook of systems engineering and management. 2nd ed. Hoboken, New Jersey: Wiley.

Plus, various others to be signposted on Moodle.

Administrative Information

For office use only	
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With effect from date	September 2026
Date and details of revision	
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