

Module specification

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Module Code	ENG7A4
Module Title	Engineering Design & Innovation
Level	Level 7
Credit value	20
Faculty	FACE
HECoS Code	100182
Cost Code	GAME
Pre-requisite module	N/A

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
MSc Engineering (Advanced Manufacturing)	Core
MSc Engineering (Sustainable Energy)	Core
MSc Engineering (Electrical)	Core

Breakdown of module hours

Learning and teaching hours	9 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	27 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 focuses on advanced applied investigation supported by selective theoretical input. Learners undertake complex technical or research tasks requiring innovation, precision, and critical reflection. The experiential emphasis enhances capability in designing and evaluating sophisticated systems, contributing to professional and research excellence.

This module aims to develop a comprehensive and critical understanding of innovative engineering design methodologies, modern design strategies, and professional practices,

empowering students to apply advanced design principles creatively to real-world challenges through a group project that showcases initiative, innovation, and impactful problem-solving, ideal preparation for ambitious learners seeking to lead in engineering design.

Module Learning Outcomes

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

1	Demonstrate a systematic understanding of the design and innovation process and its drivers, design and innovate a new sustainable product or service, critically assess it for a range of criterion and develop it for market.
2	Critically evaluate the trade-offs that are made in the design of innovative products to achieve a balance of the technical, sustainable, market, socio-economic and environmental constraints.
3	Function effectively as an individual and as a member or leader of a team in engineering design, critically evaluating performance and communicating and reflecting on design practice and reflective processes to support clarity, creativity, and continuous improvement (AHEP-4 M16).

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:

Group Project

Could include a group presentation where students collaboratively develop and present a comprehensive engineering design solution, assessing their ability to create and justify outcomes, communicate effectively, and work as a team. Structured peer review may be used to evaluate individual contributions, team performance, and the overall quality of the design.

Assessment 2:

Written Assignment

Each student submits an individual reflection on their contribution, team dynamics, and learning progress, explicitly addressing the effectiveness of their own and team performance, and identifying strategies for improvement. This supports the outcome on communication and reflection and reinforces professional development

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1-2	Group Project	3000	80	N/A
2	3	Written Assignment	1000	20	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

Teaching is predominantly research-active and laboratory-based, emphasising experimentation, analysis, and technical precision. Learners apply theory critically to design and evaluate complex systems or investigations. Online collaboration and digital resources extend research capability, while tutorials and supervision provide targeted feedback to support scholarly and professional excellence.

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

- Communicate and reflect on design proposals and professional practice through structured presentations and a reflective log, demonstrating clarity, creativity, and continuous improvement.
- Analysis of emerging trends and disruptive technologies to assess their potential impact on future engineering design strategies.
- Application of structured design processes and methodologies (e.g., Double Diamond) to develop innovative solutions for complex problems.
- Integration of sustainability, ethics, and user-centred principles into design proposals, supported by evidence-based justification.
- Collaborative project planning and role allocation strategies to optimise team performance and accountability.

- Techniques for evaluating team dynamics and effectiveness, including peer review and reflective analysis of group outcomes.
- Development of professional presentation skills for communicating design concepts to technical and non-technical audiences.
- Structured reflective practice to identify personal strengths, areas for improvement, and strategies for continuous professional development.
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Indicative Bibliography

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

Essential Reads:

IDEO.org (2015) The Field Guide to Human-Centered Design. 1st ed. Available at:<https://design-kit-production.s3.us-west-1.amazonaws.com/Field_Guides/Field+Guide+to+Human-Centered+Design_IDEOorg_English.pdf>.

Other indicative reading:

Design Council (2015) Design Methods for Developing Services. Available at:

<https://www.designcouncil.org.uk/fileadmin/uploads/dc/Documents/DesignCouncil_Design%20methods%20for%20developing%20services.pdf>

Van Boeijen, A., Daalhuizen, J. and Zijlstra, J. (2020) Delft Design Guide: Perspectives, Models, Approaches, Methods. 2nd ed. Amsterdam: BIS Publishers.

Van der Lugt, R., Stappers, J. and Sleeswijk Visser, F. (2017) Design Innovation and Integration: Research, Methods and Tools. Amsterdam: BIS Publishers.

Administrative Information

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