Prifysgol Wrecsam
Wrexham University

Module specification

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Module Code	ENG4C9
Module Title	Engineering Design and CAD
Level	4
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
FdEng Industrial Engineering (Mechanical) FdEng Industrial Engineering (Electrical) BEng (Hons) Mechanical Engineering with Manufacture BEng (Hons) Electrical Engineering with Manufacture BEng (Hons) Sustainable Energy Engineering BEng (Hons) Aerospace Engineering BEng (Hons) Mechanical Engineering BEng (Hons) Motorsport Engineering BEng (Hons) Electrical 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**
Guided independent study hours	164 hrs
Module duration (Total hours)	200 hrs

Module aims

This module immerses students in practical learning environments where understanding is developed primarily through doing. Learners are encouraged to experiment, reflect, and draw connections between observed results and underlying principles. The focus on applied activity nurtures curiosity, precision, and the confidence to translate fundamental concepts into tangible outcomes.

This module aims to develop students' ability to apply engineering design principles using industry-standard CAD tools and engineering design methodologies, enabling them to create precise 2D drawings and 3D models while integrating theoretical knowledge with practical design applications.

Module Learning Outcomes

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

1	Recognise engineering design principles to produce accurate 2D drawings and 3D parametric models using CAD software.
2	Select and identify appropriate computational and analytical techniques to model a defined problem, recognising the limitations of the techniques employed.
3	Recognise consideration to discrete issues in engineering design to satisfy customer specifications.

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

The portfolio is a suite of assessments that could include the following. This assessment evaluates students' understanding of engineering design principles and their ability to apply CAD-based computational and analytical techniques within an engineering context.

Students could undertake an in-class multiple-choice test supported by the use of CAD software. The assessment focuses on the application of engineering design principles required to produce accurate 2D drawings and 3D parametric models, alongside the selection and application of appropriate computational and analytical techniques to model a defined engineering problem. Questions are designed to test students' knowledge of CAD workflows, parametric modelling concepts, design intent, and the interpretation of technical features, while also encouraging awareness of the limitations associated with specific modelling approaches.

This assessment evaluates students' ability to apply engineering design principles while considering discrete design issues in order to meet defined customer specifications.

Students could complete a portfolio comprising a structured report that documents the development of an engineering design solution. The report will demonstrate how customer requirements are interpreted and translated into design decisions, with explicit consideration

given to key issues such as functionality, constraints, materials, manufacturability, tolerances, performance, engineering ethics and sustainability. Students are expected to justify design choices and show how competing requirements are balanced to satisfy the customer specification.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1,2,3	Portfolio	2000	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 takes place almost entirely within a practical setting where understanding is developed through direct engagement with tools, processes, and experimentation. Students are encouraged to explore, record, and evaluate their outcomes, supported by digital resources for reflection and feedback. Tutorial support ensures the development of essential practical and professional competencies for further 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

- **2D Engineering Drawings:** Introduction to technical drawing standards, dimensioning, and tolerances, using CAD tools to produce accurate and compliant 2D engineering drawings.
- **3D Parametric Modelling:** Creation of components and assemblies using parametric features, with an emphasis on modelling strategies that support design intent and optimisation.
- **Engineering Design and CAD:** Integration of engineering design principles with CAD workflows, examining how computational techniques support and inform design decisions.

- **Design Process**: Understanding and application of structured stages of the engineering design cycle to develop, test, and refine design solutions.
- **Design Thinking:** Use of iterative and creative design approaches to address user needs, functional requirements, and competing design constraints.
- **Design Evaluation:** Consideration of key design issues such as usability, manufacturability, and performance to ensure alignment with customer specifications.

Indicative Bibliography

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

Essential Reads:

Dassault Systèmes, "SOLIDWORKS Introduction," SOLIDWORKS Guide, 2023. [Online]. Available: https://my.solidworks.com/solidworks/guide/SOLIDWORKS_Introduction_EN.pdf.

Other indicative reading:

D. A. Norman, The Design of Everyday Things. Cambridge, MA, USA: MIT Press, 2013. [Online]. Available: https://mitpress.mit.edu/9780262525671/the-design-of-everyday-things/.

K. T. Ulrich and S. D. Eppinger, Product Design and Development. London, U.K.: Springer, 2008. [Online]. Available: https://link.springer.com/book/10.1007/978-1-84628-319-2.

K. T. Ulrich, S. D. Eppinger and M. C. Yang, Product Design and Development, 7th ed. New York: McGraw Hill. 2020.

Plus, various others to be signposted on Moodle.

Administrative Information

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