

## Module specification

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|                             |                                         |
|-----------------------------|-----------------------------------------|
| <b>Module Code</b>          | ENG4C3                                  |
| <b>Module Title</b>         | Core Engineering Skills and Application |
| <b>Level</b>                | 4                                       |
| <b>Credit value</b>         | 20                                      |
| <b>Faculty</b>              | FACE                                    |
| <b>HECoS Code</b>           | 100184                                  |
| <b>Cost Code</b>            | GAME                                    |
| <b>Pre-requisite module</b> | N/A                                     |

### Programmes in which module to be offered

| <b>Programme title</b>                                                                                                                                                                          | <b>Core/Optional/Standalone</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| BEng (Hons) Aerospace Engineering<br>BEng (Hons) Mechanical Engineering<br>BEng (Hons) Motorsport Engineering<br>BEng (Hons) Electrical Engineering<br>BEng (Hons) Renewable Energy Engineering | Core                            |

### Breakdown of module hours

|                                                             |                |
|-------------------------------------------------------------|----------------|
| Learning and teaching hours                                 | 30 hrs         |
| Placement tutor support hours                               | 0 hrs          |
| Supervised learning hours e.g. practical classes, workshops | 30 hrs         |
| Project supervision hours                                   | 0 hrs          |
| <b>Active learning and teaching hours total</b>             | <b>60 hrs</b>  |
| Placement hours                                             | 0 hrs          |
| Guided independent study hours                              | 140 hrs        |
| <b>Module duration (Total hours)</b>                        | <b>200 hrs</b> |

### Module aims

This module combines conceptual teaching with guided practical work to strengthen students' understanding of fundamental principles. Learners explore how theoretical knowledge connects with real-world practice through structured experimentation and applied tasks. The approach

builds confidence, technical awareness, and the ability to apply knowledge effectively within authentic learning contexts.

The module provides the core skills and knowledge for a foundation in engineering. With an overview of mechanical and electrical principles combined with the development of essential skills in technical report writing and the use of key engineering software tools.

## Module Learning Outcomes

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

|          |                                                                                                                                                                                                                 |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1</b> | Apply fundamental mechanical engineering principles to analyse simple problems involving forces, equilibrium, and basic stress and strain.                                                                      |
| <b>2</b> | Apply fundamental electrical engineering principles to analyse the behaviour of simple circuits using basic laws and relationships.                                                                             |
| <b>3</b> | Apply introductory fluid mechanics and thermodynamic concepts to describe and interpret simple engineering systems.                                                                                             |
| <b>4</b> | Produce structured technical report that demonstrates planning and recording of self-learning and development as a foundation for lifelong learning to include mitigations of security risks (AHEP-4 C10, C18). |

## 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 (100%)

This assessment evaluates students' development of core engineering knowledge and practical skills across mechanical, electrical, and energy-related topics, together with their ability to communicate technical work appropriately.

Students submit a portfolio of evidence built from a range of activities undertaken during the module. These activities may include laboratory work, practical exercises, short in-class tasks, problem-solving activities, and structured technical reports.

Minimum expectation: The portfolio must include a representative range of activities covering the different topic areas of the module. It must provide sufficient evidence of understanding, method, and communication to support academic judgement of achievement of the learning outcomes.

| Assessment number | Learning Outcomes to be met | Type of assessment | Duration/Word Count | Weighting (%) | Alternative assessment, if applicable |
|-------------------|-----------------------------|--------------------|---------------------|---------------|---------------------------------------|
| 1                 | 1-4                         | 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 and teaching combine classroom-based instruction with structured laboratory practice to reinforce theoretical understanding through application. Students participate in lectures, workshops, and supervised experiments that link principles to professional practice. Online materials and activities complement face-to-face sessions, supporting reflection and self-paced learning. Tutorials and group discussions promote collaboration and the development of analytical and communication skills.

## 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

- **Fundamental mechanical engineering principles:**  
Statics and equilibrium of force systems, including free-body diagrams. Introduction to stress and strain in simple components (axial, torsional, and flexural loading) and their application in basic engineering problems.
- **Fundamental electrical engineering principles:**  
Basic circuit theory, including voltage, current, resistance, and power. Application of Ohm's Law and Kirchhoff's Laws to analyse simple DC circuits, with an introduction to AC fundamentals.
- **Introductory fluid mechanics and thermodynamics:**  
Basic concepts of fluid behaviour and simple flow systems. Introduction to fundamental thermodynamic principles, including energy, heat, and simple system analysis in engineering contexts.
- **Technical communication, tools, and professional practice:**

Development of report writing skills, including structure, clarity, and referencing. Use of appropriate software tools for presenting technical work. Introduction to ethical considerations in engineering practice, including responsible use of information and emerging technologies and adequate security planning. Plan lifelong learning.

### Indicative Bibliography

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

#### Essential Reads:

J. Bird, *Bird's Electrical Circuit Theory and Technology*, 7th ed. Abingdon, U.K.: Routledge, 2021.

J. Wickert, *An Introduction to Mechanical Engineering*, 4th ed. Boston, MA, USA: Cengage, 2020.

#### Other indicative reading:

J. Bird and C. Ross, *Mechanical Engineering Principles*, 4th ed. London, U.K.: Routledge, 2020.

### 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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