Module specification

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Module Code	ENG4B2
Module Title	CAD and Production Science
Level	4
Credit value	20
Faculty	FAST
HECoS Code	100182
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng Aeronautical Engineering MEng Aeronautical Engineering	Core
BEng Automotive Engineering MEng Automotive Engineering	Core
BEng Mechanical Engineering MEng Mechanical Engineering	Core
BEng Electrical and Electronic Engineering MEng Electrical and Electronic Engineering	Core
BEng Renewable Energy and Sustainable Engineering MEng Renewable Energy and Sustainable Engineering	Core
BEng Industrial Engineering Design (Mechanical)	Core
BEng Industrial Engineering Design (Electrical)	Core
BEng Production Engineering	Core
BEng Low Carbon Energy, Efficiency and Sustainable Engineering	Core
FdEng Industrial Engineering (Mechanical)	Core
FdEng Industrial Engineering (Electrical)	Core

Pre-requisites

N/A

Breakdown of module hours

Learning and teaching hours	12 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	24 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	**36** hrs
Placement / work based learning	0 hrs
Guided independent study	164 hrs
Module duration (total hours)	200 hrs

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Initial approval date	22/08/2022
With effect from date	September 2022
Date and details of revision	March 25 AM2 to change learning objective 2 and include FdEng and Degree Apprenticeship programmes titles.
Version number	2

Module aims

- To learn the basics of 3D and 2D CAD and to apply the skills to solve a specific contemporary problem.
- To support the development of the student in the following areas:
  1. Experience in the use of up-to-date commercial computer software for the 3D design, assembly and presentation.
  2. To contextualise activities in accordance with professional standards and codes of practice for the engineering profession, and to develop the engineering communication skills.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Use with confidence a given CAD package to develop and communicate any technological aspect of a part or system.
2	Develop an understanding of and implement Engineering Design principles including sustainability and ethical practices.
3	Select the suitable basic production process(es) for a given task and identify the(ir) limitation(s).

1	Use with confidence a given CAD package to develop and communicate any technological aspect of a part or system.
2	Develop an understanding of and implement Engineering Design principles including sustainability and ethical practices.
4	Select the best suitable assembly technique or process for typical applications.

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: A portfolio to cover all learning outcomes. An example of portfolio would be the design of a specific product or system to meet a defined brief, or the evaluation of a product. Sustainability and ethics will be at the fore of the engineering design process and final concept. This could include an online CAD assessment, and final report.

The portfolio should have a word count of 2000 or equivalent.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1-4	Portfolio	100%

Derogations

A derogation from regulations has been approved for this module which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%.

Learning and Teaching Strategies

The module will be delivered through a combination of interactive lectures and workshops (in our 3D CAD lab, workshop and machine shop).
The lectures will deliver key concepts, ideas, theories and examples.
Case studies, practical demonstrations and practical exercises will allow the further exploration of the concepts.
Relevant videos will also be used to aid the learning process.

Self-study exercises and readings will be proposed to assist the willingness to learn and develop extra skills.

An active and inclusive approach is used to engage learners in the topics and will involve individual, group work and flipped learning experiences aligned to the university's Active Learning Framework (ALF). The approach offers students a flexible and adaptive learning experience that can accommodate a range of options that includes both on campus learning and remote learning where appropriate.

The Moodle VLE and other on-line materials and resources will be available to support learning. ALF offers a balance between the classroom elements and digitally enabled activity incorporating flexible and accessible resources and flexible and accessible feedback to support learning.

Indicative Syllabus Outline

CAD:

- General CAD system interface, views, tools and files
- Collaborating systems – shared projects
- Basic 2D: Sketches and dimensions, 2D lines, polylines, canevas
- Basic 3D: Extrusions and operations with extrusions, rounding, rendering, moving parts.
- Assembly generation. Joins, relative movements
- Exploded view, projected view and bill of materials.

Production Science:

- ISO 128-1:202 Technical product documentation (orthogonal views, dimensions, scale, projections...)
- Surface finishing, tolerances and fit
- Nuts, bolts, screws and washers fastener, rivets, adhesives and welding techniques.
- Bearing designation
- Moulding and casting techniques

Design:

- Phases of design,
- Evaluation, Design considerations.
- Engineering codes and standards. Ethical considerations.
- Designing for export: standards, regulations and quality.

Sustainability

- Environmental,
- Economic and societal sustainability.
- Current and future responsibilities as an engineer to inclusivity and diversity

Indicative Bibliography:

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

Essential Reads

H. Simmons, et al., *Manual of Engineering Drawing to British and International Standards*, 5th ed. Butterworth Heinemann, 2020.

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas.

Core Attributes
Engaged
Creative
Ethical

Key Attitudes
Commitment
Curiosity
Confidence
Adaptability

Practical Skillsets
Digital Fluency
Critical Thinking
Communication