

Module specification

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Module Code	ENG6B5
Module Title	Advanced Engineering Design and Manufacturing
Level	6
Credit value	20
Faculty	FAST
HECoS Code	100209
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng (Hons) Mechanical Engineering	Core
MEng Mechanical Engineering	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	24 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	0 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	24 hrs
Placement / work based learning	0 hrs
Guided independent study	0 hrs
Module duration (total hours)	176 hrs

For office use only	
Initial approval date	22 nd Aug 2022
With effect from date	Sept 2022

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Date and details of revision	
Version number	1

Module aims

- To develop a critical awareness of engineering design and manufacturing for sustainable development, product life cycle engineering and life cycle impact analysis, and the effects of public perceptions of sustainability, energy efficiency and recycling on design.
- To develop systematic understanding of lean in engineering manufacturing.

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

1	Critically analyse sustainable product design principles and apply life cycle engineering concept for sustainable design.
2	Critically evaluate the environmental effects of engineering design and manufacturing.
3	Recognise opportunities for continuous improvement and use relevant tools to aid this process, such as FMEA and PDRA cycle, and Analyse and present the origins and concepts of the Toyota Production System (TPS).
4	Critically analyse production and manufacturing processes and develop a lean manufacturing system.

In addition to the module learning outcomes, students will also cover the following accreditation of higher education programme (AHEP) fourth edition learning outcomes: C4, C6, C7, C13, C14, C17, M4, M6, M7, M13, M14 & M17

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.

The assessment will be a critical reflective written assignment on advanced engineering design and manufacturing for sustainable development, and lean manufacturing systems.

Word count 4000 words

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1, 2, 3, 4	Written Assignment	100%

In addition, to the module learning outcomes, student will also cover the following accreditation of higher education programme (AHEP) fourth edition learning outcomes: M1, M4, M6, M7, M12, M13 and M17

Derogations

A derogation from regulations has been approved for this programme 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 is taught through a combination of lectures and workshops. 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

Sustainable engineering design principles: Energy efficiency, low-environment impact materials, design for recycle and design for disassembly, eco-design standards, eco-design processes and organisation, impact of new technologies on eco-design, economic effectiveness of eco-design.

Life cycle engineering: Life cycle cost analysis, life cycle inventory analysis, life cycle impact analysis (LCIA), impact category selection, impact category indicators, LCIA impact interpretation and design specifications.

Lean manufacturing: History and Modern Applications of Lean Manufacturing. Line Layout and Workstation Identification with Process Linking and Balancing. Time motion analysis, TAKT time. Managing the Lean Manufacturing Line. Eliminating Waste in the Product Development Value Stream. Value Stream Mapping. Build a Culture to Support Excellence and Relentless Improvement Fully Integrate Suppliers into the Product Development System.

Case study to incorporate how lean manufacture into a traditional manufacturing setup is implemented.

Indicative Bibliography:

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

Essential Reads

J. Penty, *Product Design and Sustainability: Strategies, Tools and Practice*. Routledge, 2019

Other indicative reading

N. Slack, and A. Brandon-Jones, *Operations Management*, 9th ed. Harlow: Pearson Education, 2019.

N. Cross, *Engineering Design Methods: Strategies for Product Design*, 5th ed. Wiley, 2021.

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
Enterprising
Creative
Ethical

Key Attitudes

Commitment
Curiosity
Resilience
Confidence
Adaptability

Practical Skillsets

Digital Fluency
Organisation
Leadership and Team working
Critical Thinking
Communication