

Module Specification

When printed this becomes an uncontrolled document. Please access the **Module Directory** for the most up to date version by clicking on the following link: [Module directory](#)

Module Code	ENG765
Module Title	Engineering Design & Innovation
Level	Level 7
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
MSc Engineering (Aeronautical) MSc Engineering (Aeronautical) with Advanced Practice MSc Engineering (Mechanical Manufacture) MSc Engineering (Mechanical Manufacture) with Advanced Practice MSc Engineering (Automotive) MSc Engineering (Automotive) with Advanced Practice MSc Engineering (Renewable & Sustainable Energy) MSc Engineering (Renewable & Sustainable Energy) with Advanced Practice MSc Engineering (Electrical & Electronic) MSc Engineering (Electrical & Electronic) with Advanced Practice MSc Engineering (Management) MSc Engineering (Management) with Advanced Practice MSc Composite Materials Engineering MSc Composite Materials Engineering with Advanced Practice MSc Unmanned Aircraft System (UAS) Technology MSc Unmanned Aircraft System (UAS) Technology with Advanced Practice	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	3 hrs
Placement tutor support	0 hrs
Supervised learning e.g., practical classes, workshops	18 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs

Total active learning and teaching hours	21 hrs
Placement / work-based learning	0 hrs
Guided independent study	179 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	Jun 2018
With effect from date	Sept 2022
Date and details of revision	Aug 2022: learning outcomes, assessment and syllabus update in engineering revalidation
Version number	2

Module aims

- Develop a rigorous understanding of innovative engineering design methodology, modern design tactics and practice.
- Critically analyse the drivers for innovation past, present and future.
- Demonstrate initiative, innovation, and creativity to solve a complex engineering problem in your dissertation project.

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

In addition, to the module learning outcomes, student will also cover the following accreditation of higher education programme (AHEP) fourth edition learning outcomes: **M5, M7, M16 & M17**

1	Demonstrate a systematic understanding of the design and innovation process and its drivers.
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	Design and innovate a new sustainable product or service, critically assess it for a range of criterion and develop it for market.
4	Critically reflect and report on personal performance, group working and project performance.

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 One: A group presentation on an innovative engineering product. A specification will be supplied to the group and students will need to develop a product up to preliminary design phase that fully satisfies the brief. A group presentation (30 min) will be given to communicate the design process and final product. The presentation represents 80% of the overall mark.

Assessment Two: An individually prepared report demonstrating their participation in the group project work. This will take the form of a reflective log where students will identify their activities each week and how they worked within the team. Assessment two is a written assignment (1500 words) and represents 20% of the overall mark.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1-3	Presentation	80%
2	4	Written Assignment	20%

Derogations

Credits shall be awarded by an assessment board for those Level 7 modules in which an overall mark of at least 50% has been achieved with a minimum mark of 40% in each assessment element.

Learning and Teaching Strategies

A series of workshop style lectures with student-led seminars and small group activities. Directed learning using library and internet resources will be facilitated using Moodle and MS Teams. This module will also follow the ALF (Active Learning Framework) guidelines, which will include alternative methods of assessment and a blended approach to delivery, with some theory and software sessions being delivered online (depending on requirements and student experience).

Indicative Syllabus Outline

- Why innovation? The drivers that motivate innovation.
- Investigation of the design and innovation process. Introduction of invention. How invention starts, how the process of design and invention works, technology push and market pull, etc. Overcoming obstacles to innovation, diffusion of innovations, sustaining and disruptive innovation, phases, and waves of innovation). Inventors and organisations. Impact of new technologies. Forecasting the future of innovation.
- Markets - Designing for people: Making products that sell. Who buys products? Ways of finding out about markets (Role of marketing, marketing decision support systems, understanding the market environment, market research, quantitative and qualitative information, etc.). Markets and design (Using market information in design, marketing mix and the four Ps-Product, Price, Place, Promotion, new P factors, product life cycle). Designing the user experience. Selling the product, product-service relationship, designing product ranges. Markets, cultures, and design
- Cultural contexts, cultures and markets, markets and organisations. Global production and world markets.

- Products - New Product development and sustainable design: new product development processes, organisation for new product development, strategies for new product development. Environmental context, strategic responses to the environment, designing for the environment, eco-design processes and organisation, sustainable design and innovation.
- Circular Economy – How the design of a product must be influenced by its disposal, reuse, recycle and regeneration of natural resources.
- Personal Reflection – How engineers can reflect on their own performance within the group and how the tasks that they have undertaken. Particular reference will be on how the students could improve their work and practice.

Indicative Bibliography:

Essential Reads

N. Cross, *Engineering design methods: strategies for product design*. Fifth edition. Hoboken, NJ: John Wiley & Sons, Ltd., 2021.

Other indicative reading

J. Bessant and J. Tidd, *Innovation and Entrepreneurship*. 3rd ed. Hoboken, New Jersey: Wiley-Blackwell, 2015.

M. Robertson, *Sustainability Principles and Practice*. London: Routledge, 2017.

S. Walker, *Sustainable by Design Explorations in Theory and Practice*. London: Earthscan Ltd., 2006.

Plus, various others to be signposted on Moodle.

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
Confidence
Adaptability

Practical Skillsets

Digital Fluency
Organisation

Leadership and Team working
Critical Thinking
Communication