Module specification

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Module Code	ENG6C5
Module Title	Generative Design & Artificial Intelligence
Level	6
Credit value	20
Faculty	FAST
HECoS Code	100048
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BA (Hons) Product Design	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	14 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	10 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	176 hrs
Module duration (total hours)	**200 hrs**

For office use only	
Initial approval date	17/03/2023
With effect from date	Sept 2023
Date and details of revision	17/03/2023 APSC approval for module to replace ENG60F Design for X on the BA (Hons) Product Design programme

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	07/9/2023 APSC approval of change to module title and learning objectives
Version number	2

Module aims

To support the development of the student in the following areas:

- This module is aimed at introducing students to the concepts of generative design, topology modelling and how artificial intelligence can be used within design in the context of real-world applications and industrial practise.
- The modelling and formulation of generative design problems and artificial intelligence inputs will be practically examined via design exploration implemented by design optimization and artificial intelligence tools.
- Parametric 3D design and modelling will be demonstrated to students using computer-aided design (CAD) tools.

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

1	Use artificial intelligence (AI) tools and approaches to help address a product design problem.
2	Critically evaluate real-world applications for AI and generative design.
3	Systematically investigate a product design problem using generative design methodologies and formulate/model a real-world generative design solution to the problem.

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 – An individually prepared portfolio consisting of a range of assessments such as case studies, laboratory work and Moodle Quiz, introducing the topic areas of each learning outcomes. Guidance material will be provided, which the students will use to generate a Portfolio of work. Assessment one is an individual prepared portfolio and represents 100% of the overall module mark.

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

Derogations

None

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

- Programming and inputs for a generative design study (formulation of generative design problems (objective functions, constraint functions and penalized functions); topology optimization for generative design (parametric modelling and design and topological evolution).

- Guided laboratory work (generative design of a product and the use of artificial intelligence tools and approaches).

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update. Please *ensure correct referencing format is being followed as per University Harvard Referencing Guidance.*

Essential Reads

J. R. R. A. Martins, et. al., *Engineering Design Optimization.* Cambridge: Cambridge University Press, 2022.

Other indicative reading

S. Aukstakalnis, *Practical Augmented Reality: A Guide to the Technologies, Applications, and Human Factors for AR and VR.* Boston: Addison-Wesley Professional, 2017.

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
Resilience
Confidence
Adaptability

Practical Skillsets
Digital Fluency
Organisation
Critical Thinking