

Module specification

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Module Code	ENG791
Module Title	Innovation Management & Transition Engineering
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 (Management) MSc Engineering (Management) with Advanced Practice	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	30 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	30 hrs
Placement / work-based learning	0 hrs
Guided independent study	170 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	22 nd Aug 2022
With effect from date	Sept 2022
Date and details of revision	
Version number	1

Module aims

This module provides a grounding in modern industrial practices and the Engineering Management skills required to support industrial research and capability acquisition, managing the process of innovation, and recognising that radical innovation requires a system engineering approach. An emerging new topic in this sphere is Transition Engineering, focussing on the need to find radical engineering solutions to the “wicked problems” presented by population growth, limited resources, and the need for Net Zero.

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

In addition to the module learning outcomes, students will also cover the following accreditation of higher education programme (AHEP) fourth edition learning outcomes: **M1 & M2**

1	Recognise and apply project management tools in the context of research and development programmes, including judging progress, recognising progress obstacles and select appropriate actions.
2	Identify the key parts of a patent, discriminate between a strong and a weaker patent, and use systematic tools (e.g., TRIZ) to improve the scope of a patent.
3	Describe the key principles of Systems Engineering and Transition Engineering. Apply these principles to engineering solution finding.

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: 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	1-3	Portfolio	100%

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

- Students will recognise and apply project management tools in the context of research and development programmes: Technology Readiness Levels, Waterfall charts, etc.
- They will learn to interpret and monitor project progress using Gantt Charts, Milestones, the Critical Path, Risk Review and Mitigation planning. They will judge progress, recognise progress obstacles, and select appropriate actions.
- Students will be able to explain the difficulty of managing a research team, where team members are likely to be highly trained experts. They will be able to interpret the meaning of “Leader” or “Manager” in this context and describe appropriate strategies for research leaders or managers to support research staff in their work.
- Students will learn to identify the key parts of a patent and discriminate between a strong and a weaker patent. They will learn to explain and assess the use of TRIZ as a method for systematic innovation in design.
- Students will gain an appreciation of Export Control and be able to relate those requirements to the needs of national security and regulations such as International Traffic in Arms, etc.
- Students will learn to describe the key principles of Systems Engineering and be able to explain (for example) the relevance of multidisciplinary teams, product lifecycle data management, and baselines in systems engineering management.
- Students will also learn about the concept of Transition Engineering. They will learn to explain what is meant by a “wicked problem” and the Transition Engineering process to find an engineering solution.

Indicative Bibliography:

Essential Reads

N. Patel, *Practical Project Management for Engineers*. Boston: Artech House, 2019.

Other indicative reading

S. Krumdieck, *Transition Engineering: Building a sustainable future*. Boca Raton: CRC Press, Taylor & Francis group, 2019.

D. Walden, et al., *International Council on Systems Engineering (INCOSE), “Systems Engineering Handbook: A guide for system life cycle processes and activities*. 4th ed. San Diego: Wiley, 2015.

E. De Bono, *De Bono's thinking course*. London: BBC Books, 1991.

K. Gadd, *TRIZ for engineers: enabling inventive problem solving*. Chichester: Wiley, 2011.

D. Bainbridge, *Intellectual Property*. Pearson Longman, 2007.

J. L. Erickson, *Dangerous Trade: Arms exports, human rights, and international reputation*. New York: Columbia University Press, 2015.

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

Creative

Key Attitudes

Commitment

Curiosity

Confidence

Adaptability

Practical Skillsets

Digital Fluency

Organisation

Leadership and Team working

Critical Thinking

Communication