

## Module Specification

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Module Code	ENG740
Module Title	Engineering Research Methods and Postgraduate Studies
Level	Level 7
Credit value	20
Faculty	FAST
HECoS Code	100184
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	21 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

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

<b>For office use only</b>	
Initial approval date	Jun 2018
With effect from date	Sept 2022
Date and details of revision	Aug 2022: Learning outcomes update in engineering revalidation
Version number	V4

## Module aims

- To enable students to critically analyse major sources of knowledge and hierarchies relating to research.
- To develop further the students' knowledge of research design, data collection, analysis, and research publication.
- To prepare students to undertake research at postgraduate level.
- To provide students with a critical awareness of the components of project management and its application in a variety of contexts.
- To enable students to master writing skills for review paper, research proposal, and dissertation.

## 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: **M4 & M7**

1	Recognise inductive, deductive, and other philosophy of science concepts and use these to formulate and justify the selection and application of a research methodology
2	Interpret and analyse the concepts of repeatability, reliability, validity, and explain the value of peer review in the research context. Summarise the knowledge already obtained, evaluating any weakness or gaps, and explaining personal conclusions in writing
3	Discuss advanced research problems, and formulate appropriate research questions, conduct qualitative and quantitative data analyses, and apply engineering science principles to test possible solutions to those questions.
4	Demonstrate a critical awareness of the overall process of planning and management of an independent research project, and the ability to communicate these through writing, including awareness of intellectual property requirements (correct referencing of sources, respect for copyright, etc.).

## Assessment

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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 review paper of published research outputs, demonstrating a qualitative and/or quantitative research assessment of prior art to a current theme or topic of generic relevance to the engineering profession. Assessment one is a written assignment (2500 words) and represents 50% of the overall mark.

**Assessment Two:** An individually prepared research proposal demonstrating the research strategy, critical literature review, methodology, and overall process of planning and management of an independent research project. Assessment two is a written assignment (2500 words) and represents 50% of the overall mark.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1-2	Written Assignment	50%
2	3-4	Written Assignment	50%

## Derogations

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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

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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

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- Major sources of knowledge, an overview of philosophy of science, and an exploration of the positive, negative outcomes.
- Quantitative and qualitative approaches in the research process; validity and reliability in quantitative and qualitative research.
- Methods of sampling, research design including the experimental approach.
- Surveys, correlation studies, systematic reviews.
- Data analysis in quantitative and qualitative research.
- Research methods, project planning and management, including preparation of a project proposal.

## Indicative Bibliography:

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### Essential Reads

D. V. Thiel, *Research Methods for Engineers*. Cambridge: Cambridge University Press, 2014.

### Other indicative reading

P.D. Leedy and J.E. Ormrod, *Practical Research Planning and Design*. 10th Ed. New Jersey: Pearson, Merill Prentice Hall, 2013

H. Kerzner, *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*. 11th Ed. John Wiley & Sons, 2013.

A.M. Dean and D.T. Voss, *Design and Analysis of Experiments*. New York: Springer-Verlag, 2017.

C.L. Dym, *Engineering Design: A Synthesis of Reviews*. Cambridge University Press, 1994.

C. Robson, *Real World Research*. 2<sup>nd</sup> ed. Oxford: Blackwell, 2000.

P. Urbach and J. Gibson, *Novum Organum*, Open Court Publishing Company, 1994.

T.S. Kuhn, *The Structure of Scientific Revolutions*, 3<sup>rd</sup> ed. The University of Chicago Press, 1996.

Plus, various others to be signposted on Moodle.

## Employability skills – the Glyndŵr Graduate

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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

Resilience

Confidence

Adaptability

### Practical Skillsets

Digital Fluency

Organisation

Critical Thinking

Emotional Intelligence

Communication