

## Module specification

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Module Code	ENG5B7
Module Title	Analytical Techniques
Level	5
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
WGU Summer School aligned to BEng (Hons) Electrical and Electronic Engineering for QA and assessment purposes	Core

## Pre-requisites

None

## Breakdown of module hours

Learning and teaching hours	30 hrs
Supervised learning e.g., practical classes, workshops	0 hrs
<b>Total active learning and teaching hours</b>	30 hrs
Guided independent study	170 hrs
<b>Module duration (total hours)</b>	200 hrs

For office use only	
Initial approval date	18/05/2023
With effect from date	18/05/2023
Date and details of revision	
Version number	1

## Module Aim

The module aims to further develop knowledge of functions suitable for solving a range of mathematical problems. To demonstrate a repertoire of problem-solving skills and an ability to generalise and transfer ideas, appropriate to various STEM applications of mathematical concepts.

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

1	Apply partial differentiation for analysing functions of two and more variables.
2	Solve differential equations (linear second order and partials) and apply mathematical methods of theory to solve STEM related problems.
3	Manipulate linear algebra involving matrices, determinants, and their applications.

**Assessment**

Indicative Assessment Tasks:

This module will be assessed by means of an online Quiz. It is an unseen time-constrained online quiz of 90 minutes with a fixed number of multiple-choice questions. The assessment will cover all learning outcomes.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1, 2, 3	In-class test	100%

**Derogations**

N/A

**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**

The syllabus will be reviewed regularly but the focus for students will always be how to identify mathematical analyse on current issues in computing and engineering.

Typical content, based on current directions, could include:

**Partial differentiation:** Partial differentiation rules, total differentials, and partial fractions. Minimum, maximum and saddle points of functions of 2 independent variables.

**Second Order Differential Equations with Constant Coefficients:** Method of undetermined coefficients for finding particular integrals.

**Partial Differential Equations:** Methods of direct integration and separation of variables. Initial and boundary value problems.

**Linear Algebra:** Matrices and their properties, manipulation and applications, involving determinants, inverses.

## **Indicative Bibliography:**

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### **Essential Reads**

J. Bird, Bird's Higher Engineering Mathematics, 9th ed. Routledge, 2021.

### **Other indicative reading**

K.A. Stroud, Advanced Engineering Mathematics, 6th ed. Red Globe Press, 2020.

S. Attaway, Matlab: A Practical Introduction to Programming and Problem Solving, 6th ed. Oxford: Butterworth-Heinemann, 2022.

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  
Enterprising  
Creative  
Ethical

### **Key Attitudes**

Commitment  
Curiosity  
Resilience  
Confidence  
Adaptability

### **Practical Skillsets**

Digital Fluency  
Organisation  
Leadership and Team working  
Critical Thinking  
Emotional Intelligence  
Communication