MODULE SPECIFICATION

Module Code:	ENG349

Module Title:	Analytical Methods for Engineering

Level:	3	**Credit Value:**	20

Cost Centre(s):	GAAE	JACS3 **code**:	H100

Faculty:	Faculty of Arts, Science and Technology	**Module Leader:**	O. Durieux

Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered (not including exit awards)	Core	Option
BEng (Hons) Aeronautical and Mechanical Engineering (with Foundation Year)	✓	☐
BEng (Hons) Electrical and Electronic Engineering (with Foundation Year)	✓	☐
BEng (Hons) Automotive Engineering (with Foundation Year)	✓	☐
BEng (Hons) Renewable and Sustainable Engineering (with Foundation Year)	✓	☐
BEng (Hons) Automation Engineering (with Foundation Year)	✓	☐
BSc (Hons) Construction Management (with Foundation Year)	✓	☐
BSc (Hons) Architectural Design Technology (with Foundation Year)	✓	☐

Pre-requisites
None

Office use only

Initial approval: 12/12/2018 Version no:2

With effect from: 01/09/2019

Date and details of revision: 28/09/2022 APSC approval of the addition of the BSc (Hons) Construction Management (with Foundation Year) and BSc (Hons) Architectural Design Technology (with Foundation Year) programme titles Version no:

Module Aims

1. To provide a foundation of mathematical techniques required to solve practical engineering problems including by means of computer modelling software;
2. To develop key transferable skills which are essential components for use in other modules on the programme and beyond.

Intended Learning Outcomes

Key skills for employability

KS1	Written, oral and media communication skills
KS2	Leadership, team working and networking skills
KS3	Opportunity, creativity and problem solving skills
KS4	Information technology skills and digital literacy
KS5	Information management skills
KS6	Research skills
KS7	Intercultural and sustainability skills
KS8	Career management skills
KS9	Learning to learn (managing personal and professional development, self-management)
KS10	Numeracy

At the end of this module, students will be able to		Key Skills	
1	Apply the use of numbers, arithmetical operations, percentage.	KS10	KS3
2	Utilise at an introductory level algebra, areas and volumes of plane figures.	KS1	KS3
		KS5	KS10
3	Use engineering Formulae, visualizing engineering formulae, application of engineering graphs.	KS1	KS3
		KS5	KS10
4	Understand functions in Engineering, trigonometric functions, angles of any size.	KS1	KS3
		KS5	KS10

Transferable skills and other attributes

To develop logical and mathematical argument;

To improve learning and performance skills (e.g.: ability to organise study time, to study independently, to learn from feedback, and to meet deadlines);
To develop skills for communicating mathematical ideas including the use of mathematical language and terminology in sentences;
To be able to appreciate mathematical models of simple situations.

Derogations
None

Assessment:
Indicative Assessment Tasks:
Assessment One: is by means of an in-class test covering outcomes 1,2,3 and 4. The test will examine the level of knowledge and understanding the student has attained relating to the principles and theoretical aspects of the module. It is an unseen time -constrained one with a fixed number of questions. Formative tests which will underpin summative the final assessments takes place throughout the module.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1-4	In-class test	100%	1.5 hrs	n/a

Learning and Teaching Strategies:
The module will be presented to the students through a specified series of lectures, supported by problem-solving practice carried out in interactive tutorials. Formative assessment takes place throughout the module during tutorials and feedback is given during these tutorials. Diagnostic quizzes will also be set up so that feedback is issued in response to each answer in order to maximise the formative potential of this activity.

Syllabus outline:
Number systems: Numbers, place value, scientific notation and significant figures. Fractions. Use of calculator. **Areas and Volumes:** Areas of common shapes, the circle, volumes and surface areas of common solids. **Algebra:** Laws of algebra, removing brackets, factorization, simultaneous linear equations, quadratic equations, basic trigonometry. Laws of indices. **Functions and Graphs:** Straight-line law quadratic graphs, curve sketching, use computer package.

Applications: Contextualising the application of the topics considered in this module to make them relevant to the chosen technology specialism.

Indicative Bibliography: Reading lists will be provided in advance of each lecture as per subject basis, along with relevant academic papers and articles.

Essential reading

Bird, J. (2017), *Engineering Mathematics*. 8th ed. London: Routledge, Taylor & Francis Group.

James, G. (2015), Modern Engineering Mathematics. 5th ed. Prentice Hall.

Other indicative reading

Croft, A. et al., (2017), *Engineering Mathematics: A Foundation for Electronic, Electrical, Communications and Systems Engineers.* 5th ed. Harlow: Pearson.

Singh, K. (2011) *Engineering Mathematics through Applications*, 2nd Edn., Palgrave Macmillan.

Stroud, K. (2013), *Engineering Mathematics*. 7th ed. Basingstoke, United Kingdom: Palgrave Macmillan.