Module specification

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Refer to guidance notes for completion of each section of the specification.

Module code	AUR533
Module title	Civil Engineering Maths
Level	5
Credit value	20
Faculty	Arts Science and Technology
Module Leader	Maria Kochneva
HECoS Code	101028
Cost Code	GABE

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BSc Civil Engineering Studies	Core

Pre-requisites

N/A

Breakdown of module hours

Learning and teaching hours	48 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	**48**hrs
Placement / work based learning	0 hrs
Guided independent study	152 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	Sep 2018

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With effect from date	01/09/21
Date and details of revision	13/4/21 – Revalidation approved
Version number	2

Module aims

To enable students to apply mathematical principles including algebra, trigonometry, differential equations, calculus and statistics and their relevance to civil engineering, providing a mathematical base for civil engineering theory and application studies.

To develop the ability to use the results of analysis to solve engineering problems, apply technology and implement engineering processes.

To demonstrate problem-solving skills and an ability to generalise and transfer ideas, appropriate to engineering applications of mathematical concepts.

To develop an ability to analyse data for linear trends and statistical properties to provide an understanding of commercial and economic context

To develop an ability to apply quantitative methods and computer software relevant to their engineering technology discipline.

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

1	Apply trigonometric functions and polar coordinates systems to solve surveying / construction civil engineering problems.
2	Solve algebraic equations relating to construction/ civil engineering problems
3	Apply knowledge and understanding of differential equations to solve construction/ engineering problems.
4	Apply knowledge and understanding of calculus to support application of key engineering principles in construction and civil engineering.
5	Apply knowledge and understanding of statistical techniques to construction/civil engineering problems using appropriate computer software

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 will comprise of a series of construction / engineering / surveying scenario problems to be solved using analytical methods via an in-class test and will account for 50% of the total allocated marks. (2 hrs)

Assessment 2 will comprise of an In-class test, a timed online quiz, undertaken via the VLE and will account for 50% of the total allocated marks. (2 hrs)

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1 & 5	In-class test	50
2	2, 3, & 4	In-class test	50

Derogations

Credits shall be awarded by an Assessment Board for those modules in which a pass mark (40%) has been achieved, **with a minimum mark of 35% in each element of assessment.**
None

Learning and Teaching Strategies

Lectures and problem-solving sessions will be delivered to provide the underlying knowledge of the subject. Students, in general will work individually but group work may be beneficial for statistical sessions. The delivery of this module will be enhanced by use of appropriate maths software (Mathscad) and VLE quizzes.

Indicative Syllabus Outline

Trigonometric functions: graphs; sum waves; identities.

Polar Coordinate systems relating to Surveying/ setting out problems.

Linear algebraic equations: matrix form of simultaneous linear equations; solution of linear simultaneous equations, inverse matrices, Gaussian elimination

Non-linear algebraic equations: bisection.

Calculus: partial differentiation; integration; by parts, substitution and partial fractions: stationary points; Areas and volumes: calculation using definite integrals to solve Construction/Structural/Engineering problems.

Differential equations: modelling using differential equations; solutions (eg analytical solutions of linear constant coefficient differential equations, initial and boundary conditions, numerical solutions of differential equations, Euler's method.

Statistical techniques: sampling; linear regression (including line of best fit); confidence intervals; discrete and continuous distributions (binomial, Poisson, normal) to provide solutions for material testing, quality control, forecasting, commercial / economic decision making

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Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads

Jordan, D. and Smith, P. (2008) Mathematical Techniques: An Introduction for the Engineering, Physical, and Mathematical Sciences, 4th Edn., Oxford: Oxford University Press.

Stroud, K.A., Booth, D.J. (2013) Engineering Mathematics, 7th Edn., Basingstoke: Palgrave MacMillan.

Stroud, K.A., Booth, D.J. (2011) Advanced Engineering Mathematics, 5th Edn., Basingstoke: Palgrave MacMillan.

Other indicative reading

Key Website References:

Mathworld – Mathematics resources

mathcentre - Mathematics resources

sigma – Network for excellence in mathematics and statistics support

Engineering Maths First-Aid Kit

HELM – Helping Engineers Learn Mathematics:

https://learn.lboro.ac.uk/archive/olmp/olmp_resources/pages/wbooks_fulllist.html

Other indicative reading will be made available via the VLE.

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
Leadership and Team working
Critical Thinking
Emotional Intelligence
Communication