

Mathematical Methods and Applications

Module Code:	ENM4004-B
Academic Year:	2018-19
Credit Rating:	20
School:	(OUT OF USE FROM 2018/9) School of Engineering
Subject Area:	Engineering Mathematics
FHEQ Level:	FHEQ Level 4

Pre-requisites:

Co-requisites:

Contact Hours

Type	Hours
Lectures	48
Tutorials	24
Directed Study	128

Availability Periods

Occurrence	Location/Period
BDA	University of Bradford / Academic Year (Sept - May)

Module Aims

Outline Syllabus

SEMESTER 1

Algebra: manipulation, linear and quadratic equations; powers and roots; exponential and logarithmic forms.

Co-ordinate geometry: 2D Cartesian and polar coordinates, familiar geometric shapes and equations (line, circle, ellipse, hyperbola). Parametric curves. 3D Cartesian and spherical coordinates.

Functions: concepts and notation, graphs of specific functions (polynomial, trigonometric, exponential, logarithm), transformations, composition, inverses, hyperbolic functions.

Limits:

Differentiation: definitions, tables, rules (sum, product, quotient, chain), techniques (implicit, parametric, logarithmic), application to engineering (e.g. related rates, maxima and minima).

WEEK 7 FORMATIVE TEST (2ND HOUR)

Integration: definitions, tables, rules, techniques (substitution, by parts), application to engineering (e.g. area, surface and volume of rotation, arc length, centroid, mean value).

Complex numbers: properties, algebra, polar and exponential forms, roots, loci, application to engineering.

WEEK 11 (SKILLS FOR ENGINEERS LABS)

Vector algebra: properties, unit vector, lines and planes, i,j,k, scalar product, vector product, applications to engineering (e.g. forces, work done, moments).

Matrix algebra: definitions, basic algebra, linear transformations, linear systems.

SEMESTER 2

WEEK 1 FORMATIVE (1ST & 2ND HOUR)

Matrix algebra: eigenvalues and eigenvectors, applications to engineering (e.g. material deformation).

WEEK 4 REVISION

Ordinary Differential Equations: 1st-order ODEs (direct, separable, linear and integrating factor), specific non-linear ODEs, constant-coefficient 2nd-order ODEs (complementary function, particular integral), application to engineering.

Sequences: sequences, series and power series.

Numerical methods: errors, solution to equations, numerical integration.

WEEKS 8 AND 9 REVISION

WEEK 10 FORMATIVE (1ST & 2ND HOUR)

WEEKS 11 AND 12 REVISION

Module Learning Outcomes

On successful completion of this module, students will be able to...

- 1 Understand and explain mathematical concepts and techniques underpinning aspects of their course of study.
- 2 Apply a range of mathematical principles and techniques to describe, model, analyse and evaluate engineering problems related to your engineering discipline.
- 3 Carry out systematic problem solving

Learning, Teaching and Assessment Strategy

Theory, calculation methodologies and applications are delivered in lectures with worked examples.

Exercise classes and discipline tutorial groups are used to reinforce knowledge and skills using a range of pre-set tutorial exercises.

Structured formative assessments will support timely and constructive interim feedback, providing student with the opportunity for self-gap-analysis.

The VLE will be used to provide access to online resources, lecture notes and external links to websites of interest and use.

ESD learning opportunities will be provided via discipline-based examples and exercises, emphasising where modelling and analysis can support achievement of low-impact high-performance engineering solutions.

Discipline skills are assessed in formative and summative classroom tests to facilitate

written feedback.

The wider learning outcomes of the module area assessed in the final closed-book examination.

Mode of Assessment

Type	Method	Description	Length	Weighting	Final Assess'
Summative	Examination - closed book	Answer selection of questions covering full syllabus. 6 from 9 questions	2 hours	60%	Yes
Referral	Examination - closed book	Answer selection of questions covering full syllabus	3 hours	100%	Yes
Formative	Classroom test	All questions test on Sem 1 material with live worked solutions in the 2nd lecture hour	60 minutes	%	No
Formative	Classroom test	All questions test on calculus and Sem 2 material with live worked solutions in the 2nd lecture hour	60 minutes	%	No
Summative	Classroom test	12 question class test reinforcing formative plus new material	60 minutes	10%	No
Summative	Classroom test	Answer all questions test covering Sem 1 material	90 minutes	30%	No
Formative	Classroom test	All questions test with immediate live worked solutions for self-marking and gap analysis	30 minutes	%	No

Legacy Code (if applicable)

Reading List

To view Reading List, please go to [rebus:list](#).