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Title: Further Mathematics
Status: Definitive
Code: **5503NCCG** (129436)
Version Start Date: 01-08-2021

Owning School/Faculty: Engineering
Teaching School/Faculty: Nelson Campus, Nelson and Colne College

Team	Leader
Christian Matthews	Y

Academic Level: FHEQ5 **Credit Value:** 20 **Total Delivered Hours:** 62
Total Learning Hours: 200 **Private Study:** 138

Delivery Options

Course typically offered: S1, S2, Sum, NS2 (S2 for Jan)

Component	Contact Hours
Lecture	60

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Test	Test	Online Test	40	1
Exam	Exam	Exam	60	2

Aims

The module will prepare students to analyse and model engineering situations using mathematical techniques. Among the topics included in this module are: number theory, complex numbers, matrix theory, linear equations, numerical integration, numerical differentiation, and graphical representations of curves for estimation within an engineering context. Finally, students will expand their knowledge of calculus to discover how to model and solve engineering problems using first and

second order differential equations. On successful completion of this module students will be able to use applications of number theory in practical engineering situations, solve systems of linear equations relevant to engineering applications using matrix methods, approximate solutions of contextualised examples with graphical and numerical methods, and review models of engineering systems using ordinary differential equations.

Learning Outcomes

After completing the module the student should be able to:

- 1 Use applications of number theory in practical engineering situations
- 2 Solve systems of linear equations relevant to engineering applications using matrix methods
- 3 Approximate solutions of contextualised examples with graphical and numerical methods.
- 4 Review models of engineering systems using ordinary differential equations.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Online Test	1	2
Exam	3	4

Outline Syllabus

Number theory: types of numbers (Natural, Integer, Rational, Real, Complex), the modulus, argument and conjugate of complex numbers, polar and exponential forms of complex numbers, the use of de Moivre's Theorem in engineering, complex number applications

Matrix methods: introduction to matrices and matrix notation, the process for addition, subtraction and multiplication of matrices, the determinant of a matrix, using the inverse of a square matrix to solve linear equations, Gaussian elimination to solve systems of linear equations.

Graphical and numerical methods: standard curves of common functions, including quadratic, cubic, logarithm and exponential curves, systematic curve sketching knowing the equation of the curve, using sketches to approximate solutions of equations, numerical analysis using a variety of formal methods.

Differential equations: formation and solutions of first-order differential equations, applications of first-order differential equations, formation and solutions of second-order differential equations, applications of second-order differential equations, Laplace transform solutions of linear ordinary differential equations, applications of Laplace transforms

Learning Activities

Lectures

These will not normally be traditional didactic lectures in which the student plays little active part, but will be delivered in small groups of up to 20 students in which their interaction with their tutor is a key ingredient of their learning experience.

Students will receive approximately 30 hours of taught material, supported by in-class exercises and discussions designed to help student assimilate learning and to provide early informal feedback on their progress.

Independent Study

Students are expected to undertake personal reading and research into topic areas that have been stimulated from the lectures and seminars. This reading will enhance their academic work and enable valid contribution to lectures and seminars.

VLE support

This will provide links to academic web-sites and on-line journals, facilitate group discussion outside of the classroom, access to outline lecture notes, and provide students with assessment details.

Notes

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