Liverpool John Moores University

Title:	Foundation Mathematics for Engineering and Technology 2
Status:	Definitive
Code:	**3103CIT** (125323)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	Changshu Institute of Technology

Team	Leader
Ian Jarman	Y

Academic Level:	FHEQ3	**Credit Value:**	20	**Total Delivered Hours:**	81.5
Total Learning Hours:	200	**Private Study:**	118.5		

Delivery Options
Course typically offered: Semester 2

Component	Contact Hours
Lecture	80

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	60	1.5
Report	AS3	Report	20	
Practice	AS2	Practical	20	

Aims

This module aims to build upon the material covered in Mathematics 1 by exploring more advanced topics in Mathematics. This includes an introduction to elementary techniques in Calculus. After completing this module, students should be prepared with the prerequisite mathematical ability required to embark upon a BEng or BSc degree programme in an engineering or technology subject.

Learning Outcomes

After completing the module the student should be able to:

1	Apply basic trigonometric formula to solve problems applicable to engineering and technology
2	Apply differentiation to solve problems relevant to engineering and technology
3	Apply techniques of integration in problems relevant to engineering and technology
4	Use techniques of numerical integration in solving problems applicable to engineering and technology.

Learning Outcomes of Assessments

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

Examination	1	2	3
Report	4		
Programming	4		

Outline Syllabus

1. Vector Algebra and Space Analytic Geometry
• The three dimensional rectangular coordinate system;
• Vectors and operations (including addition, subtraction and scalar multiplication; dot product, cross product and scalar triple product);
• Surfaces and equations;
• Space curves and equations;
• Planes and equations;
• Space lines and equations;
• Quadratic surfaces.

2. Multivariable Differential Calculus
• Basic concepts of multivariable functions;
• Partial derivatives;
• Total differential and applications;
• The chain rule;
• Implicit differentiation;
• Applications of the differential calculus for geometry;
• Directional derivatives and gradient;
• Extrema of multivariable functions;
• Taylor's theorem for functions of two variables.

3. Multivariable Integral Calculus
• Concepts, properties and calculation of double integrals (in both rectangular coordinate system and polar coordinate system);

• Applications of double integrals;
• Concepts, properties and calculation of triple integrals;
• Triple integrals in cylindrical coordinates and spherical coordinates;
• Line integrals with respect to arc length and coordinates (concepts, calculation and relationship);
• Green's theorem and applications;
• Surface integrals with respect to area and coordinates (concept, calculation and relationship);
• The divergence theorem and Stokes' theorem;
• Introduction to flux and divergence, circulation and rotation.

4. Infinite Series
• Concepts, properties, and convergence tests of infinite series;
• Power series;
• Taylor series and applications;
• Fourier series;
• Sine series and cosine series;
• The Fourier series expansion with period of 21;
• Fourier series in complex form.

Learning Activities

A series of lectures

Notes

The modules introduces students vector algebra and space analytic geometry, multivariable differential and integral calculus, and infinite series.
Classroom Performance is based on in class assessment activity