Foundation Mathematics for Engineering and Technology 2

Module Information

2022.01, Approved

Summary Information

Module Code	3103CIT
Formal Module Title	Foundation Mathematics for Engineering and Technology 2
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 3
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
Changshu Institute of Technology

Learning Methods

Learning Method Type	Hours
Lecture	80

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-PAR	PAR	January	12 Weeks

Aims and Outcomes

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.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Know how to find the equations of the plane and line.
MLO2	2	Perform techniques of differentiation in problems relevant to engineering and technology.
MLO3	3	Perform techniques of integration in problems relevant to engineering and technology.
MLO4	4	Perform Green theorem to evaluate line integrals.
MLO5	5	Know how to expanding function into power series.

Module Content

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.
Module Overview	
Additional Information	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 activityReports are 2500 maximum word count.Examinations are 2 hour duration.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Exam	Examination	40	1.5	MLO1, MLO2, MLO3, MLO4, MLO5
Artefacts	Report	60	0	MLO1, MLO2, MLO3, MLO4, MLO5

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Ian Jarman	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings