Foundation Mathematics for Engineering and Technology 1

Module Information

2022.01, Approved

Summary Information

Module Code	3102CIT
Formal Module Title	Foundation Mathematics for Engineering and Technology 1
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
SEP-PAR	PAR	September	12 Weeks

Aims and Outcomes

Aims	This module aims to provide students with the mathematical knowledge, understanding and skills which are required to use mathematics as an analytical tool in engineering and technology subjects.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Understand the concept of limits and know the methods of finding limits.
MLO2	2	Understand the concept of derivatives and know the methods of finding derivatives.
MLO3	3	Represent functions in a graphical form.
MLO4	4	Understand the concept of integrals and know the methods of finding integrals
MLO5	5	Know how to solve a range of differential equations.

Module Content

Outline Syllabus	1. Functions, Limits and Continuity• Functions and elementary functions;• Limit of a sequence, limits of a function and limit laws;• Infinitesimal and infinity, infinitesimal order comparison;• Two important limit results (the squeeze theorem, the "e" limit);• Continuity; properties of continuous functions on closed intervals.2. Single Variable Differential Calculus• Concepts of derivatives and derivative laws (including derivatives of high orders, inverse function derivation, composite function derivation, implicit function derivation and function derivation determined by parameter equations);• Concepts of differentials, differential laws and applications to the approximate calculation;• Related rates of change;• The mean value theorem (Fermat-RoUe-Lagrange-Cauchy);• Indeterminate forms and L'Hospital's rule;• Taylor's theorem;• Applications of derivatives to monotonicity, local and global extrema;• Applications of derivatives to concavity, inflection point, and curvature;• Function graphing.3. Single Variable Integral Calculus• Definitions and properties of antiderivatives and indefinite integrals;• Integration by substitution and integration by parts;• Rational functions integration;• The fundamental theorem of calculus;• Improper integrals;• Numerical integration (the trapezoidal rule and Simpson's rule);• Applications of the definite integral (in geometry and physics).4. Ordinary Differential Equations• Basic concepts of ordinary differential equations;• Separable differential equations;• Homogeneous equations;• First -order linear differential equations;• Exact differential equations;• Reducible high-order differential equations;• High-order linear differential equations;• Nonhomogeneous second-order differential equations with constant coefficients;• Introduction to Euler's method and the power series method.
Module Overview	
Additional Information	The modules introduces students functions, limits and continuity, single variable differential and integral Calculus Ordinary, and differential equations.Classroom Performance is based on assessment activity in the classroomReports 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	2	MLO1, MLO2, MLO4, MLO5
Report	Report	60	0	MLO1, MLO2, MLO3, MLO4, MLO5

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Clifford Mayhew	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings