Liverpool John Moores University

Title:	Foundation Mathematics for Engineering and Technology 1
Status:	Definitive
Code:	**3102CIT** (125322)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	Changshu Institute of Technology

Team	Leader
Clifford Mayhew	Y

Academic Level:	FHEQ3	**Credit Value:**	20	**Total Delivered Hours:**	82
Total Learning Hours:	200	**Private Study:**	118		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	80

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	60	2
Practice	AS2	Practical	20	
Report	AS3	Report	20	

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.

Learning Outcomes

After completing the module the student should be able to:

1	Evaluate limits and continuity.
2	Apply arithmetic operations to manipulate numbers and calculate values
3	Manipulate and solve a range of equations algebraically and numerically
4	Represent functions in a graphical form
5	Apply geometrical principles to engineering and technology applications

Learning Outcomes of Assessments

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

Examination	1	2	3
Practical	4	5	
Report	4	5	

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.

Learning Activities

A series of lectures

Notes

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 classroom