LIVERPOOL JOHN MOORES UNIVERSITY

Module Proforma

Approved, 2022.02

Summary Information

Module Code	4101MATHS
Formal Module Title	Mathematical Methods
Owning School	Computer Science and Mathematics
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 4
Grading Schema	40

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Vincent Kwasnica	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings

Partner Module Team

Contact Name	Applies to all offerings	Offerings

Teaching Responsibility

LJMU Schools involved in Delivery
Computer Science and Mathematics

Learning Methods

Learning Method Type	Hours

Lecture	33
Practical	2
Tutorial	20

Module Offering(s)

Offering Code	Location	Start Month	Duration
JAN-CTY	CTY	January	12 Weeks

Aims and Outcomes

Aims	To provide a thorough grounding in the basic mathematical concepts and methodsneeded to solve a range of problems with scientific, business and statisticalapplications.To develop a firm foundation for single variable calculus.To provide a basic grounding in vector algebra.To introduce the concepts of complex numbers and their application.To introduce multivariable calculus.To introduce methods for solving ordinary first and second order differentialequations.

Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Apply the theory of differentiation, integration, complex numbers, partial differentiation, differential equations and elementary vector algebra to solving problems.
MLO2	Formulate and solve problems using fundamental mathematical methods.

Module Content

Outline Syllabus
Differentiation: Limits, continuity, derivatives from first principles, differentiability.Rules of Differentiation: Product, Quotient, Chain, Implicit, Parametric, Logarithmic.Applications of Differentiation: maxima and minima, curve sketching, finding normals and tangents.Series: Maclaurin series, Taylor series and regions of convergence. L'Hopital's rule: derivation and application. Integration: The Riemann Sum, the fundamental theorem of calculus, rules of integration, applications of integration.Complex Numbers: Arithmetic of, conjugates, modulus and arguments, Argand diagram, Cartesian and polar form, Euler's formula.Multivariable calculus: Introduction to Partial differentiation; Ordinary differential equations: First order; variables separable, integrating factor.Second order; constant coefficients, complementary function, particular integral.Vectors: Vector algebra, equation of a line, scalar product, vector product, equation of a plane, volume of parallelepiped using determinants.

Module Overview

This module will provide the basic mathematical concepts and methods needed to solve a range of problems with scientific, business and statistical applications. You will be introduced to concepts of complex numbers and their application and introduced to methods for solving ordinary first and second order differential equations.

Additional Information

The foundations of mathematics (concentrating particularly on calculus, complex numbers and vectors) are covered here using an online text and assessment software support as appropriate. The module provides an introduction to some of the mathematical methods required for the solution of problems in Applied Mathematics.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Test	Problem solving	40	0	MLO1
Centralised Exam	Examination	60	2	MLO1, MLO2