

Module code

SPM-1201

Type of module

Undergraduate: Mathematical Sciences – Major Core

Mathematical Methods for the Sciences



Modular credits 4	Total student engagement 56 hours	Prerequisite None	Anti-requisite None
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Aims

To develop students' ability to apply advanced mathematical concepts and techniques to analyse and solve problems in applied mathematics and the physical and applied sciences.

Module learning outcomes (MLO)

On successful completion of this module, a student will be expected to be able to:

MLO 1

Apply algebraic, trigonometric, and calculus techniques to solve problems in functions, limits, differentiation, and integration.

MLO 2

Construct and justify mathematical proofs using logical reasoning, set theory, and equivalence relations.

MLO 3

Analyse and solve problems in linear algebra, including vector geometry and systems of linear equations using matrices.

MLO 4

Evaluate the use of mathematical methods in applied and physical science contexts.

MLO 5

Select and implement appropriate mathematical problem-solving strategies independently.

Module contents

Revision of pre-calculus algebra and function theory

Brief introduction of formal logic, quantifiers and negation, sets and its theoretic construction and its operations, equivalence relation. Formal Proof: Prove by contradiction

Complex numbers: modulus, argument and complex conjugate; multiplication and division of complex numbers; De Moivre's theorem and its applications in solving polynomial equations

Vector algebra: scalar, dot and cross products, norm and unit vectors; Use of vectors to define lines, planes and spheres; finding distances from a point to a line, a point to a plane, a line to a line and a line to a plane

Matrices: matrix transpose and matrix inverse; determinant, systems of linear equations

Limits: limits of functions; continuous functions; one-sided limits; limits at infinity

Differentiation: standard derivatives, application to finding maxima and minima, curve tracing; L'Hopital's rule

Integration: integral as anti-derivative; integration by substitution and by parts; improper integrals

Assessment

60%

Examination

40%

Coursework

Examination
60%

Class tests
40%

■ Examination — 60%

■ Class tests — 40%

Formative assessment

Weekly discussion and feedback

Summative assessment

COMPONENT	WEIGHTING
Examination	60%
Coursework	40%
Individual	40%
Class tests	40%

Graduate attributes and skills

Programme learning objectives (PLO) addressed

1	PLO 1 (Core Mathematical Knowledge)	2	PLO 2 (Analytical Problem-Solving)
4	PLO 4 (Mathematical Communication)	6	PLO 6 (Adaptability and Lifelong Learning)

Sustainability concept addressed

4	SDG 4 Quality Education
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Digital skills/software used (not limited to)

- Organisational tools (e.g. MS Word, MS Teams, MS Excel, Outlook calendar)
- Learning management system (e.g. Canvas)
- Computational tools (e.g. MATLAB, Mathematica)

Micro-credentialling option No	Stackable towards GenBESTARI Undergraduate Degree Programme or other relevant Lifelong Learning Programmes No
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Document details

Office **ODVCE** Document date **24 June 2026** Status **New** Approval **GBF (12/02/2026)**