

Module code

SPM-2201

Type of module

Undergraduate: Mathematical Sciences – Major Core

Advanced Mathematical Methods for the Sciences



Modular credits

4

Total student
engagement

56 hours

Prerequisite

SPM-1201
Mathematical
Methods for the
Sciences

Anti-requisite

None

Aims

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

Module learning outcomes (MLO)

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

MLO 1

Analyse and evaluate sequences and series by applying limits, convergence tests, and the Squeezing Theorem, and by constructing power and Taylor series representations of functions.

MLO 2

Formulate and construct Fourier series by computing Fourier coefficients and distinguishing between odd, even, and general functions

MLO 3

Apply advanced integration techniques such as partial fractions and trigonometric substitution to compute integrals, areas, and volumes of surfaces and solids of revolution

MLO 4

Model and solve differential equations by formulating and analysing first-order linear and separable equations for physical and scientific problems

MLO 5

Select and implement appropriate mathematical problem-solving strategies independently in scientific contexts.

Module contents

Sequences and Series: limits, convergence tests, power series, and Taylor series

Fourier Series: Fourier coefficients, sine, cosine, and complex series

Techniques of Integration: partial fractions, trigonometric substitution, areas, and volumes of revolution

Differential Equations: introduction, separation of variables, and first-order linear equations

Assessment

60%

Examination

40%

Coursework



■ Examination — 60% ■ Class tests — 30% ■ Assignment — 5% ■ Tutorial participation — 5%

Formative assessment

Weekly discussion and feedback

Summative assessment

COMPONENT	WEIGHTING
Examination	60%
Coursework	40%
Individual	40%
Class tests	30%
Assignment	5%
Tutorial participation	5%

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)

- Learning Management Systems (e.g. Canvas)
- Communication Software (e.g. MS Teams)

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)**