

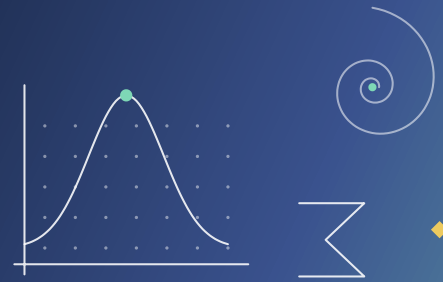
Module code

SPM-3413

Type of module

Undergraduate: Mathematical Sciences – Elective

Applied Mathematical Methods II



Modular credits

4

Total student
engagement

56 hours

Prerequisite

**SPM-2206
(Multivariate Calculus)**

Anti-requisite

None

Aims

To develop students' ability to analyse and apply advanced mathematical methods, including vector calculus, Fourier transforms, and integral equation techniques, to solve mathematical modelling and applied science problems.

Module learning outcomes (MLO)

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

MLO 1

Analyse vector and tensor fields using gradient, divergence, curl, Laplacian, and curvilinear coordinate systems to solve multidimensional mathematical problems.

MLO 2

Apply Fourier transform techniques, including exponential, sine, and cosine transforms, to analyse mathematical functions and systems.

MLO 3

Apply integral transform methods to solve ordinary differential equations, partial differential equations, and boundary value problems arising in mathematical physics.

MLO 4

Analyse and solve Volterra and Fredholm integral equations using appropriate analytical methods, including integral transforms and iterative techniques.

MLO 5

Formulate, analyse, and solve mathematical models involving partial differential and integral equations in applied science and engineering contexts.

Module contents

Vector, dyadic and higher order tensor representations	The grad operator	Curvilinear coordinates
Stokes and Divergence theorems	Green identities	Fourier integral theorem
Exponential, cosine and sine Fourier transforms	Convolution theorem	Application of integral transforms to boundary value problems
Solving Volterra and Fredholm integral equations	Solving integral equations by integral transforms	Solving integral equations by conversion to differential equations
Neumann iterative method	Separable kernels and the Fredholm method	

Assessment

60% **40%**

Examination

Coursework

Examination
60%

Class tests
40%

■ Examination — 60% ■ Class tests — 40%

Formative assessment

Weekly tutorial sessions, 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)		

Sustainability concept addressed

4	SDG 4 Quality Education
9	SDG 9 Industry, Innovation and Infrastructure

Digital skills/software used (not limited to)

- Mathematical document preparation software (e.g. Scientific Word, LaTeX)
- Spreadsheet and numerical analysis software (e.g. Microsoft Excel)
- Learning management and collaboration platforms (e.g. Canvas)

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 **26 June 2026** Status **New** Approval **GBF (12/02/2026)**