

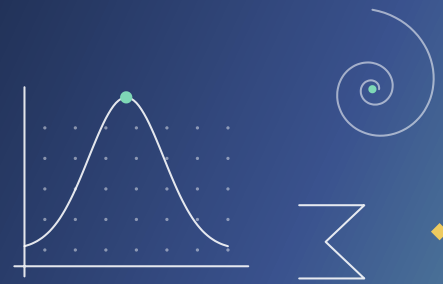
Module code

SPM-1202

Type of module

Undergraduate: Mathematical Sciences – Major Core

Discrete Mathematics



Modular credits

4

Total student
engagement

56 hours

Prerequisite

None

Anti-requisite

None

Aims

To develop students' foundational understanding of core discrete mathematical concepts and techniques, and their ability to apply logical reasoning, combinatorial methods, graph-theoretic models, and basic algorithmic analysis to solve well-defined problems in mathematics and introductory computer science contexts.

Module learning outcomes (MLO)

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

MLO 1

Apply propositional and predicate logic, including canonical normal forms (CNF, DNF) and rules of inference, to construct and verify formal mathematical proofs.

MLO 2

Analyse sets, multisets, relations, and counting techniques to solve problems involving permutations, combinations, subsets, and countable sets.

MLO 3

Manipulate relations and functions using Boolean matrices, digraphs, posets, and asymptotic growth representations to model discrete mathematical relationships.

MLO 4

Analyse the correctness and computational complexity of basic algorithms and graph-based structures, including trees, spanning trees, and network models.

MLO 5

Evaluate the validity and logical consistency of solutions involving graphs, algorithms, and models of computation.

Module contents

Logic statements, connectives, canonical forms (CNF, DNF), inference, formal proof, predicates

Sets, multi-sets, set of natural numbers, basic properties, countable sets

Counting techniques for counting permutations, combinations, bit strings and subsets

Relations: representations and manipulation through Boolean matrices, digraphs; Posets, Hasse diagrams

Functions and their growth

Algorithms: proof of correctness; computational complexity

Graphs: vertex, edge; incidence, adjacency matrices, vertex degree; complete bipartite graphs; subgraphs, graph isomorphism; paths, cycles, connected graphs; Euler circuits, Hamilton cycles

Trees: minimum-weight spanning trees, minimum-distance trees

Modelling computation: languages, grammars; finite-state machines; Turing machines

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)
3	PLO 3 (Computational and Digital Tools)	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)

■	Learning management system (e.g. Canvas)
■	Word processing software (e.g. Microsoft Word)
■	Spreadsheet program software (e.g. Microsoft Excel)
■	Team collaboration platform (e.g. Microsoft Teams)

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

Document details

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