

Module code

SPM-3401

Type of module

Undergraduate: Mathematical Sciences – Elective

Operations Research I



Modular credits

4

Total student
engagement

56 hours

Prerequisite

**SPM-2202 Linear
Algebra and its
Application**

Anti-requisite

None

Aims

To develop students' ability to formulate, analyse, and optimise real-world decision-making problems using operations research techniques and appropriate computational tools.

Module learning outcomes (MLO)

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

MLO 1

Formulate and solve linear programming models using appropriate optimisation techniques, including graphical and simplex methods.

MLO 2

Analyse and evaluate optimisation models using sensitivity analysis, duality principles, and complementary slackness to support decision-making.

MLO 3

Apply transportation, assignment, and dynamic programming techniques to solve real-world optimisation problems.

MLO 4

Evaluate and justify optimisation solutions by interpreting model assumptions, limitations, computational results, and their implications for strategic decision-making.

Module contents

Linear Programming fundamentals and convexity concepts	LP modelling and standard forms	Feasible region and optimality concepts
Graphical solution and sensitivity analysis	Simplex method and applications	Big-M and Two-Phase methods
Duality and dual formulation	Complementary slackness and interpretation	Transportation and transshipment models
Assignment and scheduling applications	Advanced LP techniques and revised simplex	Handling degeneracy and computational efficiency
Dynamic Programming principles and applications		

Assessment

60% **40%**
Examination Coursework



■ Examination — 60% ■ Class tests — 30% ■ Tutorial participation — 10%

Formative assessment

Weekly discussion and feedback

Summative assessment

COMPONENT	WEIGHTING
Examination	60%
Coursework	40%
Individual	40%
Class tests	30%
Tutorial participation	10%

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)
6	PLO 6 (Adaptability And Lifelong Learning)		

Sustainability concept addressed

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

Digital skills/software used (not limited to)

- Mathematical and optimisation software (e.g. RStudio)
- Spreadsheet and numerical analysis software (e.g. Microsoft Excel)
- Document preparation and presentation software (e.g. Microsoft Word, Microsoft PowerPoint)
- Learning management and collaboration platforms (e.g. Canvas, Microsoft Teams)

Micro-credentialling option

No

Stackable towards GenBESTARI Undergraduate Degree Programme or other relevant Lifelong Learning Programmes

No

Document details

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