

MTH367 Network Optimization and Modelling

Level: 3

Credit Units: 5 Credit Units

Language: ENGLISH

Presentation Pattern: EVERY JULY

Synopsis:

MTH367 Network Optimization and Modelling will complement MTH355 Basic Mathematical Optimization by studying optimization problems which can be formulated using graphs and networks. These optimization problems may be solved using linear or integer programming techniques but due to its graphical structure, it is easier to use network algorithmic approaches. Additionally, the course will teach students how such algorithms are implemented using the software Gurobi.

Topics:

- The Transportation Problem
- The Assignment Problem
- Terminology of Networks
- The Shortest-Path Problem
- The Minimum Spanning Tree Problem
- The Maximum Flow Problem
- The Minimum Cost Flow Problem
- The Network Simplex Method
- Network Models
- Characteristics of Dynamic Programming Problems
- Deterministic Dynamic Programming
- Probabilistic Dynamic Programming

Textbooks:

Frederick Hillier and Gerald Lieberman: Introduction to Operations Research 11th Edition McGraw Hill
ISBN-10: 1259872998

Learning Outcome:

- Formulate a given word problem mathematically as a network optimization problem.
- Apply the optimality test to justify a solution is optimal.
- Draw the network representation of a given network optimization word problem.
- Employ the shortest-path algorithm, minimum spanning tree algorithm or maximum flow algorithm to network optimisation problems.
- Use dynamic programming to find the optimal solution(s) of a given optimization problem.
- Solve network optimisation problems by the network simplex method.

Assessment Strategies (Evening Class):

Components	Description	Weightage Allocation (%)
Overall Continuous Assessment	COMPUTER MARKED ASSIGNMENT 1	10
	TUTOR-MARKED ASSIGNMENT 1	20
Overall Examinable Components	Written Exam	70
Total		100