Module: Linear Programming 181

Module name:	Linear Programming 181
Code:	LPR181
NQF level:	5
Type:	Core – Bachelor of Computing (all streams)
Contact time:	48 hours
Structured time:	8 hours
Self-directed time:	54 hours
Notional hours:	110 hours
Credits:	11
Prerequisites:	MAT181

Purpose

Linear Programming is a scientific approach to decision making that seeks to best design and operate a system, under conditions requiring the allocation of scarce resources. It is an interdisciplinary mathematical science that focuses on the effective use of technology by organisations. In contrast, many other science and engineering disciplines focus on technology, giving secondary considerations to its use.

Outcomes

Upon successful completion of this module, the student will be able to:

- Demonstrate an informed understanding of linear programming of one or more fields, disciplines or practices, and an informed understanding of the key terms, concepts, facts, general principles, rules and theories of that field, discipline or practice.
- Show an awareness of how knowledge or a knowledge system develops and evolves within linear programming.
- Select and apply standard formulations, algorithms or solutions within linear programming, and to plan and manage an implementation process within a well-defined, familiar and supported environment.
- Identify, evaluate and solve defined, routine and new problems within a familiar context, and to apply solutions based on relevant evidence and procedures or other forms of explanation appropriate to linear programming, demonstrating an understanding of the consequences.
- Gather information from a range of sources, including oral, written or symbolic texts, to select information appropriate to the task, and to apply basic processes of analysis, synthesis and evaluation on that information.
- Operate in a range of familiar and new contexts, demonstrating an understanding of different kinds of systems, their constituent parts and the relationships between these parts, and to understand how actions in one area impact on other areas within the same system.

Assessment

Assessment is performed using a variety of instruments:

- Continuous evaluation of theoretical work through written assignment, formative, and summative test.
- Final assessment through a written examination.
- The assignments or projects collectively will count 20% of your class mark.
- All tests will collectively account for 80% of your class mark.
- Your class mark contributes 30% towards your final mark for the subject, while the final assessment accounts for 70% of your final mark.

Teaching and Learning

Learning materials
Prescribed Book (EBSCO)

    📖 Wayne L. Winston. 2004. Operations Research - Applications and Algorithms. Fourth Edition. ISBN 0-534-52020-0.

Additional Material

    📖 Hamdy A. Taha. 2007. Operations Research - An Introduction. Eigth Edition. ISBN 0-13-188923-0.

    📖 Frederick S. Hillier. 2010. Introduction to Operations Research. Ninth Edition. ISBN 978-9814577205.

    📖 Frederick S. Hillier. 2010. Introduction to Operations Research. Seventh Edition. ISBN 978-9814577205.

Learning activities

The teaching and learning activities consist of a combination of formal lectures on theoretical concepts, exercises and discussions. Three mandatory assignments must be completed during the course. The experiences and progress on these practical components form the content of class discussions.

Notional learning hours

Activity	Units	Contact Time	Structured Time	Self-Directed Time
Lecture		40.0		21.0
Formative feedback		8.0		
Project				
Assignment	3			9.0
Test	3		6.0	11.0
Exam	1		2.0	13.0
		48.0	**8.0**	**54.0**

Syllabus

- Introduction to Linear Programming
- Maximisation Linear Programming Models
- Minimisation Linear Programming Models
- Graphical Solutions
- Diet Linear Programming Models
- Work Scheduling Linear Programming Models
- Microsoft Excel Solver

- Primal Simplex Algorithm
- Two-Phase Simplex Algorithm
- Degeneracy
- Unrestricted Signs