

Hong Kong Baptist University
Faculty of Science
Department of Mathematics

Title (Units): MATH 2230 OPERATIONS RESEARCH I (3,3,0)

Course Aims: This course aims to introduce students some fundamental topics in operations research. Students will learn theory, techniques and applications of linear programming, network programs, dynamic programming and inventory control problems.

Prerequisite: MATH1120

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Learning Outcomes (LOs):

Upon successful completion of this course, students should be:

No.	Learning Outcomes (LOs)
	Knowledge
1	Able to understand operations research model building procedure
2	Able to understand the mathematical theory of linear programming
3	Able to understand the modeling techniques of linear programming
4	Able to understand the mathematical techniques of network models
5	Able to understand the modeling techniques of dynamic programming
6	Able to understand the solution schemes of dynamic programming
7	Able to understand the modeling techniques of inventory control
	Skills
8	Able to apply the mathematical theory and modeling techniques to design operations research models
9	Able to manipulate the software LINGO (or other related operations research software) to solve operations research problems
	Attitudes
10	Able to identify some operations research problems
11	Able to solve problems independently

Assessment:

No.	Assessment Methods	Weighting	Remarks
1	Continuous Assessment (assignments, midterm test)	40%	Assignments are designed to measure students understanding of the theory, techniques, and applications of linear programming, network models, dynamic programming and inventory control problems. The midterm test is conducted to measure students' understanding of some course materials in a timely manner.
	Final Examination	60%	The final examination is designed to see how far students have achieved their intended learning outcomes especially in the knowledge domain. Students should have a thorough understanding of the knowledge and apply them correctly in both depth and width in order to perform well in the final exam.

Learning Outcomes and Weighting:

Content	LO No.	Teaching (in hours)
I. Operations Research Model Building	1,8,9	1
II. Linear Programming	2,3,8,9,10,11	15
III. Network Models	4,8,9,10,11	10
IV. Dynamic Programming	5,6,8,9,10,11	8
V. Inventory Control	7,8,9,10,11	8

Textbook: F.S. Hillier and G.J. Lieberman, Introduction to Operations Research, 9th Ed., McGraw-Hill, 2010.

References: H.A. Taha, Operations Research, an Introduction, 6th Ed., Prentice Hall, 2003.
W. Winston, Operations Research: Applications and Algorithms, 4th Ed., 2004.

Software: LINGO and Matlab

Course Content in Outline:

	<u>Topic</u>	Hours
I.	An Introduction to Operations Research	1
II.	Linear Programming	15
	A. Models and applications	
	B. Simplex method	
	C. Duality theory	
	D. Optimality conditions	
III.	Network Models	10
	A. Shortest route and maximal flow problems	
	B. PERT and CPM	
	C. Assignment and transportation problems	
IV.	Dynamic Programming	8
	A. Dynamic programming models	
	B. Characteristics of dynamic programming	
	C. Principle of optimality	
	D. Computation in dynamic programming	
V.	Inventory Control	8
	A. Components of inventory models	
	B. Deterministic models	
	C. Stochastic models	