LONDON CAPITAL COMPUTER COLLEGE

Advanced Diploma in Computer Science (907) – Management Science

Prerequisites: Good computing knowledge	**Corequisites:** A pass or better in Diploma in System Analysis & Design or equivalence.
Aim: Decision-making is a complex system which requires analysis of data, the formulation of mathematical models and the selection of optimal values of decision variables according to appropriate criteria. The course introduce candidates to the theory, algorithms, and applications of optimisation. Optimisation methodologies include linear programming, network optimisation, integer programming, decision trees, and dynamic programming. Major topics include Linear Programming, Simplex Algorithm, Sensitivity Analysis, Critical Path Method/Program Evaluation Review Technique (CPM/PERT) and Decision Trees.	
Required Materials: Recommended learning resources.	**Supplementary Materials:** Lecture notes and tutor extra reading recommendations.
Special Requirements: This is a difficult subject which combines theory and use of Excel program.	
Intended Learning Outcomes:	**Assessment Criteria:**
1 Analyse and differentiate Operations Research and Management Science.	1.1 Describe operations research and how it originated 1.2 Describe management science 1.3 Demonstrate examples of management science in practice 1.4 Demonstrate optimisation
2 Define linear programming	2.1 Demonstrate the objective function of a linear program 2.2 Describe a non-linear program 2.3 Define linear programming terminology
3 Describe major issues of the Simplex Algorithm	3.1 Demonstrate how to get the linear programming into the correct start form 3.2 Understand how to recognise optimality and unboundedness 3.3 Describe how to move to the next corner point solution 3.4 Describe a linear program in standard form
4 Describe how the simplex method is used in optimisation	4.1 Describe simplex algorithm phases 4.2 Describe simplex algorithm "engineering" aspects
5 Describe sensitivity analysis	5.1 Demonstrate how to use Excel to determine information 5.2 Demonstrate how to determine upper and lower bounds 5.3 Describe changes in cost coefficients
6 Describe duality in linear programming.	6.1 Describe prices as part of linear programming 6.2 Analyse the dual problem 6.3 Describe the rules for creating dual linear programs
7 Describe the rules and techniques for	7.1 Define network analysis

drawing network diagrams.		7.2 7.3 7.4	Define the rules for drawing network diagrams Define activities and events Define a dummy activity
8	Describe how to calculate a critical path.	8.1 8.2 8.3 8.4 8.5 8.6	Define how a critical path is determined Define float Describe Earliest Start Time(EST) and Latest Start Time (LST) Define network cost analysis Define the rule of least cost scheduling Define a resource aggregation profile
9	Use Excel solver to solve integer programs	9.1 9.2 9.3	Illustrate how to add integrality constraints Demonstrate how to set the solver tolerance Describe how integer programming improves the modelling capability
10	Understand integer programming	10.1 10.2 10.3 10.4	Describe how integer programming can model linear constraints Describe how integer programming can model logical constraints Describe how integer programming can model non-lineorities Demonstrate how to solve integer programming
11	Demonstrate the use of decision trees	11.1 11.2	Describe how decision trees can be mapped Describe value of information

Recommended Learning Resources: Management Science

Text Books	• Introduction to Management Science with Student CD, 9/E, Bernard W. Taylor, ISBN 10: 0131888099 • An Introduction to Management Science: Quantitative Approaches to Decision ISBN 13: 9780324399806 • Introduction to Management Science ISBN: 0073211257 by Frederick Hillier, Mark Hillier
Study Manuals 	BCE produced study packs
CD ROM 	Power-point slides
Software 	Microsoft Excel