Level 6 Advanced Diploma in Computer Science (907)
203 Credits

Subject Title: Management Science **Exam Paper No.:** 3	**Total Qualification Time:** 220 **Duration:** 22
Prerequisites: Good computing knowledge	**Corequisites:** A pass or better in Diploma in System 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 unit specialises in using advanced computation and mathematical techniques to solve critical business problems. Its research and instruction strengths include operations management, information systems, and quantitative methods. The unit introduces learners 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 unit which combines theory and use of Excel program.	
Intended Learning Outcomes:	**Assessment Criteria:**
1 Understand the use of quantitative techniques to help solve business problems; including differentiating operating research and management science.	1.1 Define management science 1.2 Describe topics related to management science 1.3 Describe assignment allocation (assignment problem) 1.4 Define minimisation and maximisation 1.5 Describe the steps in steps in solving an assignment problem 1.6 Demonstrate solving assignment problems manually 1.7 Demonstrate solving assignment problems using Excel
2 Understand implementation/formulation of transportation problem and allocation of resources.	2.1 Define feasible solution characteristics 2.2 Demonstrate iteration process 2.3 Describe the steps in finding least cost method 2.4 Explain differences between implementing minimisation and maximisation in transportation problems 2.5 Demonstrate solving transportation problems manually 2.6 Demonstrate solving transportation problems using Excel
3 Understand linear programming and how allocation and transportation problems can be solved using linear programming.	3.1 Formulate decision variables 3.2 Formulate objectives 3.3 Formulate constraints 3.4 Formulate boundary lines 3.5 Calculate optimal value 3.6 Implement linear programming using general method 3.7 Implement linear programming using graphical method 3.8 Use Excel sensitivity analysis

	3.9 Explain how to use Excel solver 3.10 Demonstrate solving linear programming in Excel
4 Understand simulation of queues; operation and implementation of queues.	4.1 Explain advantages of simulation 4.2 Describe queue arrival, service type and service length 4.3 Calculate mean waiting time 4.4 Calculate percentage idle time 4.5 Calculate maximum queue 4.6 Create VLOOLUP function in Excel 4.7 Demonstrate creating simulation in Excel
5 Understand dynamic programming; including the types of problems it solves.	5.1 Describe implementation of dynamic programming 5.2 Describe shortest route problem 5.3 Describe knapsack 5.4 Describe production planning
6 The rules, techniques for drawing network diagrams; applications, theory; algorithms of the shortest path, maximum flow, minimum cost flow problems and calculating a critical path.	6.1 Define network analysis 6.2 Define the rules for drawing network diagrams 6.3 Define activities and events 6.4 Define a dummy activity 6.5 Define how a critical path is determined 6.6 Define float 6.7 Describe Earliest Start Time(EST) and Latest Start Time (LST) 6.8 Define network cost analysis 6.9 Define the rule of least cost scheduling 6.10 Define a resource aggregation profile
7 Understand how decision trees can be used in helping to make decisions.	7.1 Define decision trees 7.2 Explain the approach in implementing decision trees 7.3 Draw decision tree 7.4 Evaluate decision tree notes 7.5 Calculate information deduced from decision tree
8. Cogent reasons for holding adequate levels of inventory and strategies to minimise order costs and maximize use of storage capacity and space.	8.1 Describe reasons for holding stock 8.2 Define stock costs, inventory control, deterministic and stochastic models 8.3 Analyse the different types of control systems 8.4 Describe advantages and disadvantages of control systems
Methods of Evaluation: A 3-hour written essay examination paper with 5 questions, each carrying 20 marks. Candidates are required to answer all questions. Candidates also undertake project/coursework in Management Science with a weighting of 100%.	

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