UNIVERSITY OF LONDON

Course information 2020-21

MN2032 Management science methods

General information

COURSE LEVEL: 5

CREDIT: 30

NOTIONAL STUDY TIME: 300 hours

Summary

Management science deals with decision making within a managerial context. It encompasses a number of systematic approaches to making decisions in problems often encountered by managers. In the modern world, intuition in decision making can be an unsafe guide. The distinctive feature of management science is the construction of an explicit, simplified model of relevant aspects of the decision making situation under study. Such models are often based on quantitative mathematical approaches, but may at times have a more qualitative character.

Conditions

Prerequisites: If taken as part of a BSc degree, the following courses must be passed before this course may be attempted:

- ST104a Statistics 1 **AND**
- **EITHER** MT105a Mathematics 1 **OR** MT1174 Calculus **OR** MT1186 Mathematical methods

Aims and objectives

The aims and objectives of this course are to:

- enable students to see that many managerial decision making situations can be addressed using standard techniques and problem structuring methods
- provide a comprehensive and concise introduction to the key techniques and problem structuring methods used within Management Science that are directly relevant to the managerial context
- enable students to see both the benefits, and limitations, of the techniques and problem structuring methods presented

Learning outcomes

At the end of the course and having completed the essential reading and activities students should be able to:

- discuss the main techniques and problem structuring methods used within Management Science
- critically appraise the strengths and limitations of these techniques and problem structuring methods

Please consult the current EMFSS Programme Regulations for further information on the availability of a course, where it can be placed on your programme's structure, and other important details.

- carry out simple exercises using such techniques and problem structuring methods themselves (or explain how they should be done)
- commission more advanced exercises.

Essential reading

For full details please refer to the reading list.

Anderson, D.R., D.J. Sweeney and T.A. Williams An Introduction to Management Science: Quantitative Approaches to Decision Making. (South-Western Publishing, 2017) third edition [ISBN 978-1473729322]

Rosenhead, J. and J. Mingers (eds) Rational Analysis for a Problematic World Revisited: Problem Structuring Methods for Complexity, Uncertainty and Conflict. (Chichester: John Wiley, 2001) [ISBN 978-0471495239]

Assessment

This course is assessed by a three-hour unseen written examination.

Syllabus

The topics dealt with in this course are:

Problem structuring and problem structuring methods: problem structuring methods such as JOURNEY (Jointly Understanding, Reflecting, and Negotiating strategy) making, Soft Systems Methodology and Strategic Choice.

Network analysis: planning and control of projects via the critical path; float (slack) times, cost/time trade off, uncertain activity completion times and resource considerations.

Inventory control: problems that arise in the management of inventory (stock); Economic Order Quantity, Economic Batch Quantity, quantity discounts, probabilistic demand, Materials Requirements Planning, Just-in-Time, Optimised Production Technology and supply chain issues.

Mathematical programming: formulation: the representation of decision problems using linear models with a single objective which is to be optimised; the formulation of both linear programs and integer programs.

Linear programming: solution: the solution of linear programs; the numeric solution of two variable linear programs, sensitivity analysis and robustness.

Data envelopment analysis: assessing the relative efficiency of decision making units in organisations; input/output definitions, basic efficiency calculations, reference sets, target setting and value judgements.

Multi-criteria decision making: approaches to decision problems that involve multiple objectives; analytic hierarchy process which considers the problem of making a choice, in the presence of complete information, from a finite set of discrete alternatives; goal programming which considers, via linear programming, multi-criteria decision problems where the constraints are ‘soft’.

Decision making under uncertainty: approaches to decision problems where chance (probability) plays a key role; payoff tables; decision trees; utilities and expected value of perfect information.

Markov processes: approaches used in modelling situations that evolve in a stochastic (probabilistic) fashion though time; systems involving both non-absorbing and absorbing states.

Queueing theory and simulation: the representation and analysis of complex stochastic systems where queueing is a common occurrence; M/M/1 queue; discrete event simulation.