The University of Southern Queensland

Course specification

Description: Operations Research 2						
Subject	Cat-nbr	Class	Term	Mode	Units	Campus
MAT	3201	50289	1, 2006	ONC	1.00	Toowoomba

Academic group: FOSCI
Academic org: FOS003
Student contribution band: 2
ASCED code: 010101

STAFFING

Moderator: Peter Dunn

REQUISITES

Pre-requisite: MAT1200 or USQIT16

RATIONALE

Decision making under conditions of uncertainty, or in competitive environments, or in situations in which variables of interest evolve through time is enhanced by the application of specialised operations research techniques. This course emphasises the applications of deterministic, probabilistic and simulation techniques to problems which arise in complex decision making. The course is of special interest to those concerned with management, organizational systems, production/manufacturing systems and communication networks.

SYNOPSIS

This course requires students to be capable of applying managerial control techniques to the outputs of projects; to understand the implications of decision making under uncertainty; to formulate and solve dynamic programming models; to model and solve queueing and inventory problems. Concepts in simulation are developed through the design of probabilistic simulation models for inventory and queueing problems. This course is normally offered only in odd years.

OBJECTIVES

On successful completion of this course students will be able to:

1. demonstrate an understanding of deterministic, probabilistic and stochastic processes;
2. develop models and apply the necessary analytical techniques for inventory, queueing and Markov process problems;
3. understand and apply the technique of dynamic programming to various problems;
4. recognise problems which may require simulation in their solution;
5. demonstrate understanding of the key concepts and stages in simulation modelling;
6. show increasing awareness of the consequence of decision making in complex systems.

TOPICS

	Description	Weighting (%)
1.	Deterministic Inventory Models - deterministic and probabilistic processes - structure of inventory systems - formulations of inventory models - the basic Economic Order Quantity Model - effect on optimality of discounts - continuous-rate EOQ Models - EOQ models with back orders allowed	16.00
2.	Probabilistic Inventory Models - single period decision models - discrete and continuous demand models - EOQ models with uncertain demand	16.00
3.	Markov Processes - stochastic processes and definition of a Markov chain - systems defined as Markov processes - formulation of Markov process model - transition probabilities - steady state probabilities - absorbing chains - queueing problems as Markov processes	16.00
4.	Queueing Theory - the structure of queueing systems - modelling arrival and service processes - probability distributions in queueing models - single server queueing models - multi server queueing models - finite queue length models - finite source models	16.00
5.	Dynamic Programming - elements of the DP model - system states - recursion - applications	16.00
6.	Fundamentals of Systems Simulation - functions and classification of simulation models - structure of system models, simulation model formulation, implementation and performance appraisal - generation of random variates - model formulation and execution of inventory problems - model formulation and execution of a probabilistic queueing problem - validation and sensitivity analysis	16.00
7.	Implementation - roles of manager and OR specialists in decision making - factors affecting successful implementation of OR recommendations - phases of implementation and review	4.00

TEXT and MATERIALS required to be PURCHASED or ACCESSED

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at http://bookshop.usq.edu.au click 'Semester', then enter your 'Course Code' (no spaces).

Introductory Book 2006, *Course MAT3201 Advanced Operations Research*, USQ Distance and e-Learning Centre, Toowoomba.

Study Book 2006, *Course MAT3201 Advanced Operations Research*, USQ Distance and e-Learning Centre, Toowoomba.

Winston, W.L. 2004, *Operations Research: Applications and Algorithms*, 4th edn, Duxbury Press, Belmont CA.

REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

Ecker, J. & Kupferschmid, M 1991, *Introduction to Operations Research*, Krieger, Malabar, FL.

Hillier, F. & Liebermann, G 2001, *Introduction to Operations Research*, 7th edn, McGraw-Hill, New York.

Ravindran, A., Phillips, D. & Solberg, J 1987, *Operations Research, Principles and Practice*, 2nd edn, John Wiley, New York.

Taha, H.A. 2003, *Operations Research - an introduction*, 7th edn, MacMillan, New York.

STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessment	15.00
Examinations	3.00
Lectures	39.00
Private Study	100.00
Tutorials	13.00

ASSESSMENT DETAILS

Description	Marks out of	Wtg(%)	Due date
ASSIGNMENT 1	100.00	15.00	10 Apr 2006
ASSIGNMENT 2	100.00	15.00	15 May 2006
ASSIGNMENT 3	100.00	15.00	19 Jun 2006
3HR RESTRICTED EXAMINATION	100.00	55.00	END S1 (see note 1)

NOTES

1. Examination dates will be available during the Semester. Please refer to Examination timetable when published.

IMPORTANT ASSESSMENT INFORMATION

1 Attendance requirements:
It is the students' responsibility to attend and participate appropriately in all activities (such as lectures, tutorials, laboratories and practical work) scheduled for them, and to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.

2 Requirements for students to complete each assessment item satisfactorily:

To complete each of the assessment items satisfactorily, students must obtain at least 50% of the marks available for each assessment item.

3 Penalties for late submission of required work:
If students submit assignments after the due date without prior approval then a penalty of 20% of the total marks gained by the student for the assignment will apply for each working day late.

4 Requirements for student to be awarded a passing grade in the course:
To be assured of receiving a passing grade a student must achieve at least 50% of the available weighted marks for the summative assessment items.

5 Method used to combine assessment results to attain final grade:
The final grades for students will be assigned on the basis of the weighted aggregate of the marks obtained for each of the summative assessment items in the course.

6 Examination information:
The only materials that candidates may use in the restricted examination for this course are: writing materials (non-electronic and free from material which could give the student an unfair advantage in the examination); notes, books (it is expected that students will have at least the study book and textbook with them; calculators which cannot hold textual information (students must indicate on their examination paper the make and model of any calculator(s) they use during the examination); mathematical tables. Students whose first language is not English, may, with the Examiner's approval, take an appropriate non-electronic translation dictionary into the examination. Students who wish to use a translation dictionary MUST request and receive written approval from the Examiner at least one week before the examination date. Translation dictionaries will be subject to perusal and may be removed from the candidate's possession until appropriate disciplinary action is completed if found to contain material that could give the candidate an unfair advantage. Computers are not permitted in examinations, although they may be used in assignments.

7 Examination period when Deferred/Supplementary examinations will be held:
Any Deferred or Supplementary examinations for this course will be held during the next examination period.

8 University Regulations:
Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL http://www.usq.edu.au/corporateservices/calendar/part5.htm or in the current USQ Handbook.

ASSESSMENT NOTES

9 The due date for an assignment is the date by which a student must despatch the assignment to the USQ. The onus is on the student to provide proof of the despatch date, if requested by the Examiner. Students must retain a copy of each item submitted for assessment. This should be despatched to USQ within 24 hours of receipt of a request to do so.The examiner may grant an extension of the due date of an assignment in extenuating circumstances.