

Business Decision Models G – 6550

Unit Outline 2009 Semester 2

School of Information Sciences and Engineering

Division of Business, Law and Information Sciences

University of Canberra

Australian Government Higher Education (CRICOS)

Registered Provider number: #00212K

This Unit Outline must be read in conjunction with:

- a) *Studying at the University of Canberra: A Guide to Policies and Procedures*, which sets out University-wide policies and procedures, including information on matters such as plagiarism, grade descriptors, moderation, feedback and deferred exams, and is available at <http://www.canberra.edu.au/student-services>
- b) *Guide to Student Services at the University of Canberra*, which is available at <http://www.canberra.edu.au/student-services>
- c) Any additional information specified in section 6f.

1: General Information

- 1a **Unit title:** Business Decision Models G
- 1b **Unit number:** 6550
- 1c **Semester and year offered:** Semester 2 2009
- 1d **Credit point value:** 3
- 1e **Unit level:** G
- 1f **Name of Unit Convenor and contact details (including telephone and email)**

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You are strongly urged to use email for contact

Moderator: Mary Hewett, 11C8, 6201 2951, Mary.Hewett@canberra.edu.au
- 1g **Administrative contact details (including name, location, telephone and email)**
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2: Academic Content

2a Unit description and learning outcomes

This unit is an introduction to the modelling of management scenarios using spreadsheets and other software. It deals with the application of mathematical modelling techniques to management problems of realistic size. The emphasis is on formulation and interpretation of models. Topics will be drawn from decision-making, project scheduling, analyses of inventories and queues, and linear programming techniques. Situations of certainty and uncertainty are considered.

Students will be expected to be able to recognise real-world scenarios, which can be modelled by the techniques covered; to be able to implement these scenarios in a quantitative model; and to be able to interpret the results of the model and evaluate their reliability.

Generic Skills

This unit develops your generic skills such as your ability to:
identify problems and analyse the main features of problems relevant to your professional field;
apply appropriate problem solving processes, arguments, critical and creative thinking;
implement and evaluate strategies for the resolution of problems...
and use appropriate information and communication technology to retrieve, manipulate and present information.

2b Prerequisites

Mathematical Methods and Business Statistics, or equivalent.

3: Delivery of Unit and Timetable

3a Delivery mode

Traditional mode. Participation in face-to-face classes on-campus during a standard semester is required to undertake this [unit](#).

Lecture	Tuesday	10:30 – 11:30	11B24
Lecture	Wednesday	9:30 – 10:30	11C43
Tutorial	Wednesday	10:30 – 11:30	11C43
Computer Lab	Wednesday	10:30 – 11:30	11A46

The pattern of tutorials and computer labs is:

W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15
-	C	T	C	T	C	T	-	-	T	C	C	T	T	T

There is no tutorial in week one.

3b Schedule of topics/lectures/tutorials/practicals/field classes by week

Week	Activity
1	Quantitative decision problems and their characteristics. Variables, constraints, objective. Non-negativity. Implementation in Excel.
2	Graphing constraints and objective in 2-d and 3-d. Max vs. min. Constraints with \leq, \geq Constraints with $=$. Slack variables. Graphical representation.
3	Setting up a more substantial LP. Linearity assumptions - proportionality, additivity, continuity. Using additional variable to handle cases where being "under" differs from being "over".
4	Sensitivity I:- Response of LP solution to changes in problem data. Changes in constraints. Shadow prices. Sensitivity II:- Changes in constraints, shadow prices. Changes in objective coefficient. Reduced costs.
5	Sensitivity III:- Interpreting Excel's Sensitivity Report. Pricing out a new variable.
6	Integer and mixed-integer LPs. Sample problem setup. Computational complexity. Binary Variables.
7	Projects and their scheduling. Activities and sequencing requirements. Project networks. Critical Path:- Simple example. Finding earliest / latest start / finish times. Network labelling procedure -- forward (ES,EF) and backward (LS,LF) sweeps. Slack:- Critical activities = those with 0 slack. Implications, examples.
8 & 9	Mid-Semester Class Free Period
10	Speeding up project completion. Crash durations. LP formulation for crashing to a deadline. Implementation in Excel.
11	Uncertain Durations I:- Optimistic, pessimistic and most likely estimates of activity durations. Estimates of mean & variance for activity durations. Estimating critical path with uncertain durations. Uncertain Durations II:- Estimating critical path with uncertain durations. Estimates of mean and variance of project duration. Normal approximation for project duration.
12	Random processes:- Conditional waiting time for event. Poisson process and its memoryless property. Exponential distribution of time between events. Queues - single server :- Arrival distribution, service time distribution, queue discipline. Stationarity. FIFO queue. Offered load. M/G/1 queue.
13	Formula for M/G/1 queue. Congestion. Effect of mean vs. effect of variance. Queues - multiple server:- M/G/c queue. Offered load, waiting time and queue length. Queuing table for M/M/c case.
14	Effect of pooling queues. Loss systems:- M/G/c loss systems. Busyness is independent of service distribution. Loss fraction.
15	Review

4: Unit Resources

4a Lists of required texts/readings

Recommended text:

Frederick S. Hillier and Mark S. Hillier. *Introduction to Management Science. A Modelling and Case Studies Approach with Spreadsheets*, 3rd ed, McGraw Hill 2008.

4b Materials and equipment

A scientific calculator is required.

4c Unit website

<http://learnonline.canberra.edu.au/> Your OSIS site will have all your units listed and linked to their respective websites.

5: Assessment

5a Assessment overview

Assessment Item	Week Issued	Due Date of Item	Weighting
Assignment 1	Week 5	Friday week 8	25%
Assignment 2	Week 10	Friday week 13	25%
Final Exam	n/a	Exam Period	50%

5b Details of each assessment item

1. Assignments.

The assignments will consist of questions covering formulation, solution and interpretation of quantitative decision scenarios. Spreadsheet implementations will be required for several questions. It is essential that you realize that "getting the right answer" counts only about 1/3 of the assignment marks. Other factors taken into account include clarity and conciseness of *explanations*, clearly exhibited *working*, and clear *spreadsheet design*.

Assignments can be done by individual students or by *pairs* of students. Note that 3 is not a pair. If you choose to work in pairs:

- Submit one set of answers. Both students receive the same mark.
- Include a cover sheet signed by both students affirming that you discussed *all* questions, and that you each contributed approximately equally to the work submitted.

Assignments will be returned with both a numerical mark and a letter grade.

Late Penalties:

Assignments are due in the lecturer's mailbox at 5:30pm on the stated date. Assignments submitted late may be penalized unless an extension has previously been negotiated with the lecturer. You will not be asked to re-submit assignments.

2. Final Examination.

There will be a 2 1/2 hr exam in the exam period at the end of semester, covering the entire content of the unit as reviewed in Week 15. Permitted materials are calculator (non-alpha), 2 A4 sides of handwritten original notes and a language dictionary (non-electronic). A calculator is *required*.

Students should keep a copy of any assessment item that has been submitted.

5c Special assessment requirements

To obtain a passing grade in the unit a satisfactory performance on the final exam is also required.

If your final exam performance is satisfactory then the numerical marks for all assessment items will be combined according to the weights shown in 5a, to give a composite unit score. Grades will be determined from your composite unit score.

5d Supplementary assessment

Supplementary examinations at UC are not routinely available. To be eligible to undertake supplementary assessment in a unit, a student must:

- Be enrolled in their final semester of study;
- Have failed a single unit, with a final mark between 45–49% in the unit;
- Have passed all other units in that semester.
- The failed unit must be the final unit required to complete the academic requirements of their course.

5e Text-matching software

Not applicable.

6: Student Responsibility

6a Workload

The amount of time you will need to spend on study in this Unit will depend on a number of factors including your prior knowledge, learning skill level and learning style. Nevertheless, in planning your time commitments you should note that for a 3cp Unit the total notional workload over the fifteen-week semester is assumed to be 150 hours or an average of 10 hours per week. These hours include time spent in classes.

6b Special needs

Students who need assistance in undertaking the unit because of disability or other circumstances should inform their Unit Convenor or the Disabilities Office as soon as possible so the necessary arrangements can be made.

6c Attendance requirements

You are expected to attend all classes. Tutorials begin in week 2. There are no penalties for absences. However, if you miss more than a few classes for some good reason, please let us know your circumstances.

6d Required IT skills

It is assumed that all students can access the unit website, and can create and edit spreadsheets.

6e Costs

There are no additional costs associated with participating in this unit other than purchase costs for the textbook, a calculator, and some print costs.

6f Additional information

The lecture schedule may be varied if circumstances such as staff absence, illness, etc. warrant. Any such information will be prominently displayed on the unit website and communicated by email. Students are expected to access both the website and their email regularly: announcements circulated by email to your UC student accounts will be deemed to have been communicated to the whole group.

7: Student Feedback

All students enrolled in this unit will have an opportunity to provide anonymous feedback on the unit at the end of semester via the Unit Satisfaction Survey, which will be presented to you on OSIS. Your lecturer or tutor may also invite you to provide more detailed feedback through an anonymous questionnaire administered through the University's Teaching and Learning Centre (TLC).

8: Authority of this Unit Outline

Any change to the information contained in Section 2 (Academic content), Section 3 (Delivery of Unit and timetable) and Section 5 (Assessment) of this document, will only be made by the Unit Convenor if the written agreement of staff and a majority of students has been obtained; and if written advice of the change is then forwarded to each student enrolled in the Unit, either by email to their student address or by mail to their registered term address. Any individual student who believes himself/herself to be disadvantaged by a change is encouraged to discuss the matter with the Unit Convenor.