



Department of Statistics

STAT279 Operations Research I

Second Semester 2008
Unit Outline

The cover of the 7th edition of 'Quantitative Decision Making' by Lapin and Whisler. It features a collage of images including a calculator, a person at a computer, a large stack of yellow items, and a person in a red shirt. The text 'QUANTITATIVE DECISION MAKING' is prominent at the top, with '7TH EDITION' and 'LAPIN & WHISLER' at the bottom.	The cover of the 6th edition of 'Quantitative Methods for Business Decisions with Cases' by Lawrence L. Lapin. It has a blue background with a central image of a pyramid of white birds. The text 'Sixth Edition' is at the top, 'Quantitative Methods for Business Decisions with Cases' is in the middle, and 'Lawrence L. Lapin' is at the bottom.
7 th edition	6 th edition

Lecturer-in-charge: David Bulger

Students in this unit should read this unit outline carefully at the start of semester. It contains important information about the unit. If anything in it is unclear, please consult one of the teaching staff in the unit.

About this unit

- Unit Value: Three (3) credit points.
- This unit aims to introduce students to a variety of techniques and solution methods used for optimisation. The techniques require the formulation of problems, logical reasoning and interpretation of results. Linear programming, graphical solutions, the simplex method, transportation models, inventory, queuing, project planning and simulation are the topics covered. A statistical computer package is used to analyse data, solve linear programming problems and produce reports.
- Unit rationale: The formulation of problems, their solution and analysis are integral parts of business decision making. This unit provides the background for making informed decisions about complex problems based on the principle of optimisation.

TEACHING STAFF

			
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REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

- The set text is *Quantitative Decision Making with Spreadsheet Applications (7th Ed)* by Lawrence L. Lapin, William D. Whisler, 2002 (Library Call Number: [HD30.23 .L36/2002](#)).
- Alternatively, the earlier version of the book could be consulted. *Quantitative methods for business decisions: with cases (6th edition)* by Lawrence L. Lapin, 1994 (Library Call Number: [HD30.23 .L36/1994](#))
- You should purchase the **Study Pack** (from the Co-op Bookshop) which includes Lecture notes and Practical material.
- You must download the Homework Exercises from STAT279 Blackboard site.
- Reference books available in the library include
Operations Research Applications and Algorithms (3d Ed), 1994 by Winston W. L. (PWS Kent) (Library Call Number: [T57.6 .W645/1994](#)) or *Operations Research (4th Ed)*, 2004 by Winston W. L. (Duxbury Press)

Operations Research: An Introduction (8th edition) 2007 by Hamdy A. Taha (Pearson/Prentice Hall) (Library Call Number: [T57.6 T3 2007](#))

UNIT WEB PAGE

The web page for this unit is http://www.stat.mq.edu.au/ug/stat_units/stat_units200/stat279. It includes this unit outline, a link to the Blackboard site and more.

CLASSES

You will enrol in **one Lecture** (either the Monday Lecture or the Friday Lecture) and **one Practical**. Thus each week you will attend **one** three-hour Lecture and **one** one-hour Practical. Note that "Practicals" are sometimes called "tutorials".

<i>LECTURES</i>	
Monday 6–9pm E7B Mason	Friday 12–3pm C5C T2

<i>PRACTICALS</i>
Tuesday 4pm E7B T2
Tuesday 5pm E7B T2
Tuesday 6pm E7B T2
Tuesday 7pm E7B T2

- Students must attend the class in which they are enrolled.
- Attendance at Practicals is compulsory; poor attendance will jeopardise your final grade.

The timetable for classes can be found on the University web site at <http://www.timetables.mq.edu.au/>.

TEACHING AND LEARNING STRATEGY

- Students must attend the Lecture each week at which new material is introduced.
- Students are expected to attend one Practical class each week.
 - They should have solved the Homework problems that have been prescribed for that week and submit an electronic copy of their solutions through Blackboard (see the details below under Homework).
 - During the Practical, new problems will be presented and solved under the guidance of the tutor.

A week-by-week list of the topics to be covered is available at the end of this document.

BLACKBOARD PAGE

STAT279 has a Blackboard (Online Unit) page, which you can access by logging on at <http://learn.mq.edu.au>. The homework exercises and solutions will be uploaded on a timely basis for students to download. The discussion board will be used for out of class communications. There are different sections under the discussion board corresponding to each module and assessment, as well as a main discussion and a suggestion box. The discussions are essentially an online chat between you, your classmates, your tutors and your lecturers. If you have a question related to the unit, you can ask questions under the relevant section of the discussion board. The questions might be answered by classmates, or by tutors and lecturers.

If you have a personal question, please send an e-mail to one of the lecturers using your Macquarie University student e-mail account.

The lecturers will make announcements via the Blackboard. Accordingly, you should make sure you log in and read the posts at least twice a week.

STUDENT E-MAIL ADDRESSES

If Blackboard is down, students can send ordinary e-mail. However, students should at all times use their Macquarie University student e-mail accounts when contacting lecture staff. **E-mails from hotmail, yahoo and similar accounts will not be read** even if they pass through our spam filter. Furthermore, students should check and read their Macquarie University student e-mail on a regular basis (at least twice a week).

LEARNING OUTCOMES

The learning outcomes of this unit are outlined at the beginning of each section of the Lecture Modules. However, there are some overall outcomes which are listed below.

Students must be able to:

- formulate problems,
- use a computer package to find solutions to formulated problems,
- interpret output and write up conclusions based on the output, in the language of the original problem.

In addition to the discipline-based learning objectives, all academic programs at Macquarie seek to develop students' generic skills in a range of areas. One of the aims of this unit is that students develop their skills in the areas of:

- literacy, numeracy and information technology,
- communication skills,
- critical analysis,
- problem-solving,
- creative thinking.

RELATIONSHIP BETWEEN ASSESSMENT AND LEARNING OUTCOMES

While attendance at classes is important, it is only a small proportion of the total workload for the unit; reading, completing assessments, using computers and private study are all part of the work involved. At Macquarie it is expected that the average student should spend four hours per week per credit point.

Practicals

Practicals will commence in Week 2 of the semester. Note that these may be called tutorials in your timetable. The Practical classes are meant to be learning exercises. Participation in the Practical classes is essential for students' understanding of the course content and the solution of problems.

Attendance is compulsory and will be monitored. If a student misses more than two Practical classes he or she may be excluded from the unit, resulting in a Fail grade.

Homework

All Homework problems will be available in an electronic form on Blackboard for students to download. The students should solve and submit their solutions via Blackboard as Microsoft Word (.doc) or Adobe Portable Document Format (.pdf) files. If they are hand written, they may be scanned to create pdf documents. A scanner is available for student use (free of charge) in the Library photocopy room. Your student ID, name and the number of the Homework (e.g., "Week 2") should appear in the header or footer of every page of your submission. When naming files, please adopt the following convention:

StudentID-(Your Surname)(Initial of Your First Name)-HomeworkWeek(week of Homework)

e.g., 4000000-BulgerD-HomeworkWeek2.pdf

No other format of naming the homework exercises will be accepted. Your homework will be collected automatically, and **the computer will only find your work if the file is named correctly!** If you foresee difficulty submitting your homework electronically, please contact the lecturer-in-charge as early as possible. No late submissions will be accepted. The submitted Homework will NOT be returned; however, a model solution will be made available on Blackboard as feedback to students. This solution will be made available a few days after the last Practical class each week.

Each Homework task requires students to understand the procedures, content and methodology covered in the preceding weeks and to apply them to the problems presented. If students have satisfied all of the learning objectives for a topic, they will be able to successfully complete the corresponding Homework. Non-submission of Homework will jeopardise your final grade.

You will be given $\frac{1}{2}$ a mark for each homework exercise submission (a solution or a serious attempt to solve a home work exercise). Since each homework exercise is worth $\frac{1}{2}$ a mark, altogether they are worth **5% of the total unit grade**.

Electronic Quizzes

Electronic Quizzes will be provided for practice of new skills acquired during the course. These will be available via the web. They can be found either on the STAT279 web site (<http://www.stat.mq.edu.au/units/stat279/index.htm>) or under Blackboard **Weblinks**. Click on **E_Quiz** to start a new quiz.

There are four electronic Quizzes. The closing dates for the Quizzes are as follows:

Quiz 1: Assumed knowledge questions: Must be completed by **Friday 22 August (Week 3)**.

Quiz 2: Questions on linear programming: Must be completed by **Friday 5 September (Week 5)**.

Quiz 3: Questions on sensitivity analysis, project planning and simulation: Must be completed by **Friday 17 October (Week 9)**.

Quiz 4: Questions on inventory and queuing: Must be completed by **Friday 14 November (Week 13)**.

The Quizzes may be attempted as many times as you wish before the due date. (A different Quiz will be generated for each attempt.) A Quiz is considered to be “passed” if no more than two parts are wrong.

Altogether, the Quizzes are worth **10% of total unit grade**. Because you can have as many attempts as you wish, you should be able to pass all of the Quizzes, and get the whole 10%.

The Quizzes are online, and therefore may be attempted from home or on campus, in the Library, the Numeracy Centre or the various computing labs. Waiting until the due date and then having technical problems does *not* constitute a reasonable excuse for not completing a Quiz on time. Students are advised to start work early.

If you have a question regarding Quizzes, post it to the “Quizzes” section of the Discussions on Blackboard.

Be responsible and complete your Quizzes on time. No extensions for Quizzes will be granted unless satisfactory documentation outlining illness or misadventure covering the entire week before the due date is submitted.

Class Test

There will be a one-hour Class Test in this unit in **Week 7**, worth **20% of total unit grade**.

The Class Test will be held in the same time and place as your lecture. **You must go to the lecture in which you are enrolled.** After the Test is completed, there is no lecture; you may go.

The Class Test is **closed book**. The Class Test is **compulsory** and there will be NO make-up tests.

A student who misses the class test must submit relevant documentation, or risk receiving a fail grade for the unit. In cases of valid absence, the other coursework marks will be scaled up.

The Class Test covers lecture material from weeks 1-5 inclusive and will be one hour in duration. **Students should bring their student ID, a calculator and a ruler as well as writing equipment (such as pen, highlighter).**

Students will be able to pick up their marked Class Test papers from ERIC (E4B 106) in Week 8. Students will have to show student ID in order to get their papers back. Solutions to the Class Test will be summarised in the Practical in Week 8. The Class Test will enable students to get feedback about their progress in this unit.

Final Examination

The Final Exam will be held during the exam period. It will be worth **65% of total unit grade** and will cover the whole semester's work. In the exam, students will be provided with copies of the z-table and formula sheet, but these are also available on Blackboard and in the Study Pack, and students should familiarise themselves with the z-table and formula sheet before the Exam. Students may bring into the Final Exam any additional formulae, notes and diagrams they might think necessary on **one A4 sheet of paper handwritten on both sides**. It must be written by hand, **not typed**.

The final examination enables students to display their understanding of each topic and to demonstrate their analytic skills in identifying the statistical methods appropriate to solving problems in a wider context.

Students are expected to present themselves for examination at the time and place designated in the University Examination Timetable. The timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in Final form approximately four weeks before the commencement of the examinations. The timetable can be found at

<http://www.timetables.mq.edu.au/exam>.

The only exemptions to sitting an examination at the designated time are because of documented illness or unavoidable disruption. In these circumstances, students may wish to consider applying for Special Consideration. Information about unavoidable disruption and the Special Consideration process is available at

<http://www.reg.mq.edu.au/Forms/APSCons.pdf>.

Special Consideration will only be granted to students whose performance in all parts of the coursework is satisfactory. In particular, you must complete all four quizzes and attend at least seven (7) of the Practicals to be eligible for Special Consideration. If a Supplementary Examination is granted as a result of the Special Consideration process, the examination will be scheduled after the conclusion of the official examination period.

Note that there is a Division policy regarding requests for special consideration for examinations and granting of supplementary examinations, which can be found at

http://www.efs.mq.edu.au/student_support/important_processes/special_consideration

Students are advised that it is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period.

OVERALL ASSESSMENT

Students are expected to gain a reasonable level of proficiency in weekly topics by attending and participating in lectures and practicals and completing their homework exercises. A student's raw overall mark for STAT279 is a combination of the following assessments:

Homework Exercises	5%
Class Test	20%
Electronic Quizzes	10%
Final Exam	65%

Note that a mark of less than 15 in the coursework is considered to be unsatisfactory.

UNIVERSITY POLICY ON GRADING

Academic Senate has a set of guidelines on the distribution of grades across the range from fail to high distinction. Your final result will include one of these grades plus a standardised numerical grade (SNG).

On occasion your raw mark for a unit (i.e., the total of your marks for each assessment item) may not be the same as the SNG which you receive. Under the Senate guidelines, results may be scaled to ensure that there is a degree of comparability across the university, so that units with the same past performances of their students should achieve similar results.

It is important that you realise that the policy does not require that a minimum number of students are to be failed in any unit. In fact it does something like the opposite, in requiring examiners to explain their actions if more than 20% of students fail in a unit.

The process of scaling does not change the order of marks among students. A student who receives a higher raw mark than another will also receive a higher final scaled mark.

For an explanation of the policy, see

<http://senate.mq.edu.au/rules/Guidelines2003.doc> or
<http://senate.mq.edu.au/rules/detailedguidelines.doc>.

PLAGIARISM

The University defines plagiarism in its rules: "Plagiarism involves using the work of another person and presenting it as one's own." Plagiarism is a serious breach of the University's rules and carries significant penalties. You must read the University's practices and procedures on plagiarism. These can be found in the *Handbook of Undergraduate Studies* or on the web at:

<http://www.student.mq.edu.au/plagiarism/>

The policies and procedures explain what plagiarism is, how to avoid it, the procedures that will be taken in cases of suspected plagiarism, and the penalties if you are found guilty. Penalties may include a deduction of marks, failure in the unit, and/or referral to the University Discipline Committee.

STUDENT SUPPORT SERVICES

Macquarie University provides a range of Academic Student Support Services. Details of these services can be accessed at <http://www.student.mq.edu.au>.

There are specific workshops for international students that help them to integrate into Australian Education System: <http://www.international.mq.edu.au/studentservices/studysupport/adviser>.

The Macquarie University Writing Skills Program can help you with your writing problems in several ways. The details of the Program and the time table can be accessed at http://www.ling.mq.edu.au/support/writing_skills/brochure.htm

SCHEDULE for Monday Lecture Stream

	Week	Commences	Topic	Chapter	Due
Lecturer: Nan Carter	1	4 August	Introduction LP Formulation	1, 8.1-6	
	2	11 August	LP Formulation Graphical Solutions	8.7-12	Homework Exercise for Week 2 due.
	3	18 August	QuickQuant Simplex Method	9.1-4	Homework Exercise for Week 3 due. Electronic Quiz 1 due.
	4	25 August	Sensitivity & Duality	10.1-10.5	Homework Exercise for Week 4 due.
	5	1 September	Project Planning	14.1-5, 7	Homework Exercise for Week 5 due. Electronic Quiz 2 due.
	6	8 September	Simulation	18.1, 3, 8, 9	Homework Exercise for Week 6 due.
	7	15 September	<i>NO LECTURE</i>		<i>NO PRACTICAL</i>
Semester Break 22nd September–6th October					
	8	7 October	<i>NO LECTURE</i>		Homework Exercise for Week 8 due.
Lecturer: Nino Kordzakhia	9	13 October	Transportation, Transshipment & Assignment	12.1, 2, 4–7	Homework Exercise for Week 9 due. Electronic Quiz 3 due.
	10	20 October	Inventory	15.1–4	Homework Exercise for Week 10 due.
	11	27 October	Queuing	17.1-3	Homework Exercise for Week 11 due.
	12	3 November	Queuing	17.4 17.6, 17.9	Homework Exercise for Week 12 due.
	13	10 November	Revision		No Homework due, however there <u>is</u> a practical session this week. Electronic Quiz 4 due.

SCHEDULE for Friday Lecture Stream

	Week	Commences	Topic	Chapter	Due
Lecturer: David Bulger	1	4 August	Introduction LP Formulation	1, 8.1-6	
	2	11 August	LP Formulation Graphical Solutions	8.7-12	Homework Exercise for Week 2 due.
	3	18 August	QuickQuant Simplex Method	9.1-4	Homework Exercise for Week 3 due. Electronic Quiz 1 due.
	4	25 August	Sensitivity & Duality	10.1-10.5	Homework Exercise for Week 4 due.
	5	1 September	Project Planning	14.1-5, 7	Homework Exercise for Week 5 due. Electronic Quiz 2 due.
	6	8 September	Simulation	18.1, 3, 8, 9	Homework Exercise for Week 6 due.
	7	15 September	<i>NO LECTURE</i>		<i>NO PRACTICAL</i>
Semester Break 22nd September–6th October					
	8	7 October	<i>NO LECTURE</i>		Homework Exercise for Week 8 due.
Lecturer: Ayse Bilgin	9	13 October	Transportation, Transshipment & Assignment	12.1, 2, 4–7	Homework Exercise for Week 9 due. Electronic Quiz 3 due.
	10	20 October	Inventory	15.1–4	Homework Exercise for Week 10 due.
	11	27 October	Queuing	17.1-3	Homework Exercise for Week 11 due.
	12	3 November	Queuing	17.4 17.6, 17.9	Homework Exercise for Week 12 due.
	13	10 November	Revision		No Homework due, however there <i>is</i> a practical session this week. Electronic Quiz 4 due.