



Department of Statistics

STAT279 Operations Research I

First Semester 2008

Unit Outline

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

Lecturer-in-charge: Ayse Bilgin

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

		
Dr Ayse Bilgin Room: E4A 515 Phone: 9850 8509 e-mail: abilgin@efs.mq.edu.au	Dr Nino Kordzakhia Room: E4A 537 Phone: 9850 8549 e-mail: nkordzak@efs.mq.edu.au	Ms Sibba Gudlaugsdottir Room: E4A 516 Phone: 9850-8582 e-mail: sgudlaug@efs.mq.edu.au

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 purchased. *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 slides and Practical material.
- You must download and print the Homework Exercises from STAT279 Blackboard site.
- Reference books available in the library are as follows:
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 where you can download this unit outline.

CLASSES

You will enrol in **one Lecture stream** (either Class 01 or Class 02) and **one Practical**. Thus each week you will attend **three** one-hour Lectures and **one** one-hour Practical. Note that "Practicals" are sometimes called "tutorials" in the timetable.

<i>LECTURES</i>		<i>PRACTICALS</i>
<i>Class 01</i>	<i>Class 02</i>	Wednesday 2pm E7BT5
Monday 10am C5C T2	Tuesday 1pm Macquarie Theatre (W5B)	Wednesday 3pm E7BT5
Wednesday 11am E7B Mason	Friday 9am Macquarie Theatre (W5B)	Wednesday 4pm E7BT5
Wednesday 1pm E7B Mason	Friday 1pm Macquarie Theatre (W5B)	Wednesday 5pm E7BT2
		Wednesday 7pm E7BT2

- Students must attend the class to which they have been allocated.
- 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 three Lectures 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://online.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 assessments (i.e. quizzes) 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 through Blackboard e-mail facility or alternatively you could send a normal e-mail by 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 e-mail through normal e-mail servers. However, students should at all times use their Macquarie University student e-mail accounts when contacting lecture staff. Furthermore, students should check and read their Macquarie University student e-mail on a regular basis (at least once 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, working with other students in groups, completing assessments, using the computer 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/she may be excluded from the unit resulting in a fail grade.

Homework

All Homework problems will be available in an electronic form under Blackboard for students to download. The students should solve and submit their solutions via Blackboard as Microsoft Word files (doc) or if they are hand written then as Adobe files (pdf) (they need to be scanned as a pdf document before submitted to Blackboard). 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 should appear in the header and/or footer of every page of your submission. When naming files please adopt the following convention:

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

e.g., 4000000-BilginA-Homework Week 2

No other format of naming the homework exercises will be accepted. If it is not possible to submit a home work electronically, it can be submitted to ERIC staff. Make sure that they mark your name on the list when you submit your homework. No late submissions will be accepted. The submitted Homework will NOT be returned, however a model solution will be made available under Blackboard as feedback to students. This solution will be 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 the problems presented. If students have satisfied all the learning objectives for a topic they will be able to successfully complete the Homework based on that week's topic. Non-submission of Homework will jeopardise your final grade.

A student will be given $\frac{1}{2}$ mark for each homework exercise submission (for his/her solution or any serious attempt to solve a home work exercise). Since each homework exercise is worth $\frac{1}{2}$ mark of unit grade, altogether they are worth **5% of 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 4 (four) electronic quizzes. The closing dates for the quizzes are as follows:

Quiz 1: Assumed knowledge questions: Must be completed by **Friday of Week 3**.

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

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

Quiz 4: Questions on inventory and queuing: Must be completed by **Friday of 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 any questions regarding quizzes, post your question/s into discussion board Quizzes section. These will be answered weekly by Sibba Gudlaugsdottir.

Be responsible and complete your quizzes on time. No extensions for quizzes will be granted unless satisfactory documentation outlining illness or misadventure is submitted as soon as possible after the due date for any quiz.

Class Test

There will be a Class Test in this unit, worth **20% of total unit grade**.

The Class Test will be held in **Week 7** in the

Wednesday 1 pm Lecture for Class 01

Friday 1 pm Lecture for Class 02.

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 1-6 inclusive and will be 40 minutes 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 their 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 which is provided as an electronic copy under Blackboard. 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 exceptions 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/detaileddguidelines.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 Class 01 (Monday & Wednesday Lectures)

Week	Commences	Topic	Chapter	Due
1	25 February	Introduction LP Formulation	1, 8.1-6	
2	3 March	LP Formulation Graphical Solutions	8.7-12	Homework Exercise for Week 2 due.
3	10 March	QuickQuant Simplex Method	9.1-4, 9.11	Homework Exercise for Week 3 due. Electronic Quiz 1 due.
4	17 March	Sensitivity & Duality	10.1-10.5	Homework Exercise for Week 4 due.
5	24 March	Monday: Public Holiday Wednesday 11am No Lecture Wednesday 1pm Sensitivity & Duality	10.1-10.5	Homework Exercise for Week 5 due. Electronic Quiz 2 due.
6	31 March	Project Planning	14.1-5, 7	Homework Exercise for Week 6 due.
7	7 April	Monday: Project Planning Wednesday 11am: Revision Wednesday 1 pm: Class Test, during lecture.	14.1-5, 7	No Homework due, however there <i>is</i> a practical session this week.
Semester Break 12 th –27 nd April				
8	28 April	Simulation	18.1,3,8,9	Homework Exercise for Week 8 due.
9	5 May	Transportation & Transshipment & Assignment	12.1, 2, 12.4-6, 12.7	Homework Exercise for Week 9 due. Electronic Quiz 3 due.
10	12 May	Inventory Decisions	15.1-4	Homework Exercise for Week 10 due.
11	19 May	Queuing	17.1-3	Homework Exercise for Week 11 due.
12	26 May	Queuing	17.4 17.6, 17.9	Homework Exercise for Week 12 due.
13	2 June	Revision		No Homework due, however there <i>is</i> a practical session this week. Electronic Quiz 4 due.

SCHEDULE for Class 02 (Tuesday & Friday lectures)

Week	Commences	Topic	Chapter	Due
1	25 February	Introduction LP Formulation	1, 8.1-6	
2	3 March	LP Formulation Graphical Solutions	8.7-12	Homework Exercise for Week 2 due.
3	10 March	QuickQuant Simplex Method	9.1-4	Homework Exercise for Week 3 due. Electronic Quiz 1 due.
4	17 March	Tuesday 1pm: Sensitivity & Duality Friday: Public Holiday	10.1-10.5	Homework Exercise for Week 4 due.
5	24 March	Sensitivity & Duality	10.1-10.5	Homework Exercise for Week 5 due. Electronic Quiz 2 due.
6	31 March	Project Planning	14.1-5, 7	Homework Exercise for Week 6 due.
7	7 April	Tuesday: Project Planning Friday 9am: Revision Friday 1 pm: Class Test , <i>during lecture.</i>	14.1-5, 7	No Homework due, however there <i>is</i> a practical session this week.
Semester Break 12 th –27 nd April				
8	28 April	Simulation	18.1,3,8,9	Homework Exercise for Week 8 due.
9	5 May	Transportation & Transshipment & Assignment	12.1, 2, 12.4-6, 12.7	Homework Exercise for Week 9 due. Electronic Quiz 3 due.
10	12 May	Inventory Decisions	15.1, 2,3,4	Homework Exercise for Week 10 due.
11	19 May	Queuing	17.1-3	Homework Exercise for Week 11 due.
12	26 May	Queuing	17.4 17.6, 17.9	Homework Exercise for Week 12 due.
13	2 June	Revision		No Homework due, however there <i>is</i> a practical session this week. Electronic Quiz 4 due.