



**MACQUARIE UNIVERSITY  
DIVISION OF EFS**

**UNIT OUTLINE**

**STAT279 Operations Research I**

**Year and Semester: 2005 Semester 2**

**Unit convenors: Michael Petersons & Sibba Gudlaugsdottir**

**Student Resource Centre  
Division of Economic & Financial Studies  
MACQUARIE UNIVERSITY**

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. Use is made of a statistical package to analyse data, solve linear programming problems and produce reports.
- Unit rationale: Formulation of problems, their solution and analysis are an integral part of business decision making. This unit provides the background for making informed decisions about complex problems based on the principle of optimisation.

### TEACHING STAFF

- Convenors Michael Petersons C5C 469 Phone 9850 8549  
mpeterso@efs.mq.edu.au  
Sibba Gudlaugsdottir C5C 456 Phone 9850 8582  
sgudlaug@efs.mq.edu.au
- Other lecturers David Bulger C5C 464 Phone 9850 8546  
Ayse Bilgin C5C 458 Phone 9850 8509

### CLASSES

<i>LECTURES</i>	<i>STREAM A</i>	<i>STREAM B</i>
	Mon 18 Mason	Fri 12 E7BT4
	Mon 19 Mason	Fri 13 E7BT4
	Mon 20 Mason	Fri 14 E7BT4

<i>PRACTICALS</i>		
	Tue 16 E7BT5	Tue 18 E7BT5
	Tue 17 E7BT5	Tue 19 E7BT5

- Students must attend the class to which they have been allocated.
- Attendance at practicals is compulsory and will be monitored.  
Non submission of homework or poor attendance will jeopardise your final grade.

### REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

- The set text is  
Quantitative Decision Making with Spreadsheet Applications  
by Lapin and Whisler 7<sup>th</sup> Ed.
- You must purchase the study guides consisting of  
Lecture overheads.  
Practical material
- Reference books available in the library are as follows:  
**Operations Research Applications and Algorithms (3d Ed)**  
by Winston W. L.(PWS Kent)  
**Operations Research: An Introduction**  
by H A Taha (Macmillan)

## UNIT WEB PAGE

- The web page for this unit is <http://www.stat.mq.edu.au/units/stat279/index.htm>

## LEARNING OUTCOMES

- The learning outcomes of this unit are outlined at the beginning of each section of the printed notes: However there are some generic 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 which are relevant to the original problem that was posed.

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 following:

*Foundation skills of literacy, numeracy and information technology;*  
*Communication skills;*  
*Critical analysis skills;*  
*Problem-solving skills;*  
*Creative thinking skills.*

## TEACHING AND LEARNING STRATEGY

- Students must attend three lectures each week at which new material is introduced
- Students are expected to have read through the material to be covered using the lecture notes provided in the study guides.
- Students are expected to attend one practical class each week for which they have attempted a solution to the homework problems that have been prescribed and during which they will solve any new problems presented under the guidance of the instructor.
- Week-by-week list of the topics to be covered is available at the end of this document.

## RELATIONSHIP BETWEEN ASSESSMENT AND LEARNING OUTCOMES

### **Practicals**

Practicals will commence in week 2 of the semester.

The practicals are meant to be a learning exercise. Participation in the practicals is essential for your understanding of the course content and the solution of problems.

**Attendance is compulsory and will be monitored. If you miss more than two practical classes you may be excluded from the unit resulting in a fail grade.**

Before the practical each week you should prepare the set of homework problems as stipulated in the STAT279 Homework Exercises. You must hand in a photocopy of your

solution during the practical. The practical demonstrator will go through some further problems as outlined in the Study Guide.

During the **PRACTICAL** in weeks 11 students will be asked to solve a set of questions called a **quiz**, made up of multiple choice questions (see section on **Practical Quiz** below).

### **Homework**

All homework problems will be given in a separate handout in week one.

You must complete and hand in a **COPY** of your homework solutions.

These must be submitted to the demonstrator in the week they are due. Late submission will not be accepted. The submitted homework will **NOT** be returned.

Each homework task requires you to assimilate the procedures, content and methodology covered in the preceding weeks and apply them to solving the problems presented. If you have satisfied all the behavioural objectives for a topic you will be able to successfully complete the homework based on that weeks' topic.

The feedback from the demonstrator during the practical class and the model solution provided in ERIC should be used to remediate any part of the subject matter with which you are having difficulty. This solution will be available a few days after the last practical class each week.

### **Examinations, Tests, Electronic quizzes and Practical Quiz**

#### **Class Test:**

There will be a class test in this unit, worth 10% of total assessment.

The class test will be held in **week 7** in the

**Monday 6pm LECTURE for Stream A**

**Friday 12noon LECTURE for Stream B.**

The class test is **closed book**. Any relevant formulae, if needed, will be given with the test papers. The class test is **compulsory** and there will be **NO** make up tests.

If you miss the class test you must submit relevant documentation or you may receive a fail grade for the unit. A valid absence will mean your other coursework marks will be scaled up.

~~The Class Test covers lecture material from weeks 1-6 inclusive and will be of 40 minutes duration.~~

~~You should bring to the test a calculator, writing implements and a ruler~~

Students can pick up their marked class test papers from ERIC -C5C244. 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 practicals in week 8.

The class test will enable you to get feedback and continuing information about your progress in this unit.

### Electronic Quizzes:

Electronic quizzes will be provided for practice of new skills acquired during the course. These will be available via the web and must be completed successfully.

They can be found on the STAT279 web site:

<http://www.stat.mq.edu.au/units/stat279/index.htm> , then click on Electronic Quizzes.

Or students can go directly to the quiz website by using:

<http://rutherglen.ics.mq.edu.au/~macqtex/STAT279quizzes.html>

There are 3 (three) electronic quizzes, each worth 2% of total assessment. The closing dates for the quizzes are as follows:

**Quiz 1:** Questions on linear programming:  
Must be completed by Friday of Week 4.

**Quiz 2:** Questions on sensitivity analysis, project planning and simulation:  
Must be completed by Friday of Week 9.

**Quiz 3:** Questions on inventory and queuing:  
Must be completed by Friday of Week 13.

The quizzes may be attempted as many times as you wish within the allocated time. A different quiz will be generated each time. A quiz is considered to be "passed" if you have at most two parts wrong. This allows for inadvertent errors you may make in questions that require a typed answer.

If you cannot pass a quiz in time, please consult the lecturers for advice. Students must *pass all three quizzes* by the due dates or have made alternative arrangements with Sibba Gudlaugsdottir (C5C 456), otherwise they will achieve a grade no better than PC 49. If you have problems accessing the quizzes from your home computer, then do the quizzes on campus, in the Library, the Numeracy Centre or the E6A computing labs. Having technical problems with your home computer does *not* constitute any reasonable excuse for not having completed a quiz by the deadline. You are advised to start work early.

### Practical Quiz: (Quiz done during the practical in week 11):

As mentioned earlier, during the **PRACTICAL** in week 11 students will be asked to solve a set of questions called a **quiz** made up of multiple choice questions.

They will be collected and marked. The questions given in this quiz are almost identical to the questions students solve when they do the **Electronic Quizzes** (see section above). The mark for this quiz done during the practical **DOES** count towards the final assessment. It is worth 4% of the total assessment. If a student misses the quiz relevant documentation must be submitted to the student enquiry centre. A valid absence will mean your other coursework marks will be scaled up.

### Final Examination:

The final exam will be closed book and held during the end of year exam session. It will be worth 80% of the total assessment and will cover the whole semesters work.

**NOTE:** To obtain a passing grade in the course a **satisfactory performance** will be required in the final exam irrespective of any marks gained during the semester.

Evidence from your test and quiz and online quizzes will be used in determining the final grade.

The final examination enables you to display your assimilation and understanding of the behavioural objectives for each topic and to demonstrate your analytic skills in identifying the statistical methods appropriate to solving problems in a wider context.

The Examination period in Second Semester commences on 16<sup>th</sup> November.

You are expected to present yourself 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.

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

The only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for Special Consideration.

**Special consideration will only be granted to students whose performance in all parts of the coursework is satisfactory.** Information about unavoidable disruption and the special consideration process is available at

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

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.

You 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.

### Summary of Assessment:

<i>Summary of Assessment</i>	
Class Test (in week 7 lecture)	10%
Practical Quiz (in week 11 practical)	4%
Electronic Quiz 1 (due Friday week 4)	2%
Electronic Quiz 2 (due Friday week 9)	2%
Electronic Quiz 3 (due Friday week 13)	2%
Final Exam	80%

## 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.

## 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://www.mq.edu.au/senate/MQUonly/Issues/Guidelines2003.doc> or  
<http://www.mq.edu.au/senate/MQUonly/Issues/detailedguidelines.doc>.

## 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>.

**SCHEDULE for Stream A (Monday lecture)**

WEEK	Commences	TOPIC	CHAPTER	Homework Exercise Due Electronic Quizzes Due or Practical Quiz.
1	1 August	Introduction LP Formulation	1, 8.1-6	
2	8 August	LP Formulation Graphical Solutions	8.7-12	Homework Exercise for week 2 due.
3	15 August	QuickQuant Simplex Method	9.1-4	Homework Exercise for week 3 due.
4	22 August	Sensitivity & Duality	10.1-10.5	Homework Exercise for week 4 due. Electronic Quiz 1 due.
5	29 August	Project Planning	14.1-5, 7	Homework Exercise for week 5 due.
6	5 September	Simulation	18.1,3,8,9	Homework Exercise for week 6 due.
7	12 September	Monday 6pm: Class test <i>during lecture</i>		No Homework due, however there <i>is</i> a practical session this week.
<b>Semester Break 19<sup>th</sup> September – 4<sup>th</sup> October</b>				
8	4 October	No lecture this week <i>However there is a practical this week. Students should bring their class test to the practical this week.</i>		Homework Exercise for week 8 due.
9	10 October	Transportation Transshipment Assignment models	12.1, 2, 12.4-7	Homework Exercise for week 9 due. Electronic Quiz 2 due.
10	17 October	Inventory Decisions	15.1 - 4	Homework Exercise for week 10 due.
11	24 October	Queuing	17.1-3	Practical Quiz - done during PRACTICAL. Homework Exercise for week 11 due.
12	31 October	Queuing	17.4 17.6, 17.9	Homework Exercise for week 12 due.
13	7 November	Revision		No Homework due, however there <i>is</i> a practical session this week. Electronic Quiz 3 due.



### SCHEDULE for Stream B (Friday lecture)

WEEK	Commences	TOPIC	CHAPTER	Homework Exercise Due, Electronic Quizzes Due or Practical Quiz.
1	1 August	Introduction LP Formulation	1, 8.1-6	
2	8 August	LP Formulation Graphical Solutions	8.7-12	Homework Exercise for week 2.
3	15 August	QuickQuant Simplex Method	9.1-4	Homework Exercise for week 3.
4	22 August	Sensitivity & Duality	10.1-10.5	Homework Exercise for week 4. Electronic Quiz 1 due.
5	29 August	Project Planning	14.1-5, 7	Homework Exercise for week 5.
6	5 September	Simulation	18.1,3,8,9	Homework Exercise for week 6.
7	12 September	Friday 12noon: Class test <u>during lecture</u>		No Homework due, however there <u>is</u> a practical session this week.
<b>Semester Break 19<sup>th</sup> September – 4<sup>th</sup> October</b>				
8	4 October	No lecture this week <i>However there is a practical this week. Students should bring their class test to the practical this week.</i>		Homework Exercise for week 8.
9	10 October	Transportation Transshipment Assignment models	12.1, 2, 12.4-7	Homework Exercise for week 9. Electronic Quiz 2 due.
10	17 October	Inventory Decisions	15.1 - 4	Homework Exercise for week 10.
11	24 October	Queuing	17.1-3	Practical Quiz - done during PRACTICAL. Homework Exercise for week 11.
12	31 October	Queuing	17.4 17.6, 17.9	Homework Exercise for week 12.
13	7 November	Revision		No Homework due, however there <u>is</u> a practical session this week. Electronic Quiz 3 due.

**DO NOT REMOVE  
THE STAPLES**