MACQUARIE UNIVERSITY
DIVISION OF EFS

UNIT OUTLINE

STAT279 Operations Research I

Year and Semester: 2006 Semester 2

Unit convenors: David Bulger & Sibba Gudlaugsdottir

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 David Bulger E4A 517 Phone 9850 8546
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  Sibba Gudlaugsdottir E4A 516 Phone 9850 8582
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- Other lecturers Nino Kordzakhia E4A 537 Phone 9850 8549
  Ayse Bilgin E4A 515 Phone 9850 8509

Student should initially direct all their enquiries to Sibba Gudlaugsdottir who is the administrator for this unit.

CLASSES

LECTURES	
STREAM A	***STREAM B***
Mon 18 E7B Mason	Fri 12 E7B T4
Mon 19 E7B Mason	Fri 13 E7B T4
Mon 20 E7B Mason	Fri 14 E7B T4

PRACTICALS
Tue 16 E7BT5
Tue 17 E7BT5
Tue 18 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 7th 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

STUDENT E-MAIL ADDRESSES

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.

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 attend one practical class each week.

- They should have solved the homework problems that have been prescribed for that week and hand in a copy of their solution.
- During the practical, new problems will be presented and solved under the guidance of the instructor.
- A 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. Note that these may be called tutorials in your timetable.
The practicals are meant to be learning exercises. Participation in the practicals 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.

Before the practical each students should prepare the set of homework problems as stipulated in the STAT279 Homework Exercises. Students must hand in a photocopy of their solution during the practical. The practical demonstrator will go through some further problems as outlined in the Study Guide.

Homework

All homework problems will be given in a separate handout in Week one. Students must complete and hand in a COPY of their 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 students to assimilate the procedures, content and methodology covered in the preceding weeks and apply them to solving 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.

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

Examinations, Tests, and Electronic quizzes

Class Test:
There will be a class test in this unit, worth 12% of total assessment.
The Class Test will be held in **Week 6** in the

Monday 18 LECTURE for Stream A
Friday 12 LECTURE for Stream B.

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

If a student misses the class test he/she must submit relevant documentation or he/she may receive a fail grade for the unit. A valid absence will mean the other coursework marks will be scaled up.

The Class Test covers lecture material from weeks 1-5 inclusive and will be 40 minutes in duration. **Students should bring to the test a calculator, writing implements and a ruler.**

Students can pick up their marked Class Test papers from ERIC –E4B. 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 students to get feedback about their 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 E_Quiz.

Or students can go directly to the quiz website by using:
http://rutherglen.ics.mq.edu.au/~macqtex/STAT279quizzes.html

There are 4 (four) electronic quizzes, each worth 2% of total assessment. 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 each time. A Quiz is considered to be "passed" if at most two parts are wrong. This allows for inadvertent errors that can be made in questions that require a typed answer.

If a student cannot pass a quiz by the due date, he/she should consult the lecturers for advice. **Students must *pass all four quizzes* by the due dates or have made alternative arrangements with Sibba Gudlaugsdottir (E4A 516), otherwise they risk being downgraded during the final grading for this unit.** If a student has problems accessing the quizzes from his/her home computer, then he/she should do the quizzes on campus, in the Library, the Numeracy Centre or the E6A computing labs. Having technical problems with a home computer does ***not*** constitute any reasonable excuse for not having completed a quiz by the deadline. Students are advised to start work early.

Final Examination:

The Final Exam will be closed book and held during the end-of-year exam period. It will be worth 80% of the total assessment and will cover the whole semester's work. Students may bring into the Final Exam **one A4 sheet of paper handwritten on both sides**. This sheet can contain any formulae, notes and diagrams students might think necessary. It must be written by hand, **not typed**.

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 the test and the online quizzes will be used in determining the final grade.
The Final Examination enables students to display their assimilation and understanding of the learning objectives for each topic and to demonstrate their analytic skills in identifying the methods appropriate to solving problems in a wider context.
The Examination period in second semester commences on 15th November.

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 exception to sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances students 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/APSCons.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.
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.

Summary of Assessment:

Summary of Assessment	
Class Test (in week 6 lecture)	12%
Electronic Quiz 1 (due Friday week 3)	2%
Electronic Quiz 2 (due Friday week 5)	2%
Electronic Quiz 3 (due Friday week 9)	2%
Electronic Quiz 4 (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 lectures)

WEEK	Commences	TOPIC	CHAPTER	Homework Exercise Due. Electronic Quizzes Due.
1	31 July	Introduction LP Formulation	1, 8.1-6	
2	7 August	LP Formulation Graphical Solutions	8.7-12	Homework Exercise for week 2 due.
3	14 August	QuickQuant Simplex Method	9.1-4	Homework Exercise for week 3 due. Electronic Quiz 1 due.
4	21 August	Sensitivity & Duality	10.1-10.5	Homework Exercise for week 4 due.
5	28 August	Project Planning	14.1-5, 7	Homework Exercise for week 5 due. Electronic Quiz 2 due.
6	4 September	Monday 18:00: Class test, ***during lecture***		No Homework due, however there ***is*** a practical session this week.
7	11 September	Simulation	18.1,3,8,9	Homework Exercise for week 7 due.
Semester Break 16th September – 2nd October				
8	3 October	Monday, public holiday. No lecture.		Homework Exercise for week 8 due.
9	9 October	Transportation Transshipment Assignment models	12.1, 2, 12.4-7	Homework Exercise for week 9 due. Electronic Quiz 3 due.
10	16 October	Inventory Decisions	15.1 - 4	Homework Exercise for week 10 due.
11	23 October	Queuing	17.1-3	Homework Exercise for week 11 due.
12	30 October	Queuing	17.4 17.6, 17.9	Homework Exercise for week 12 due.
13	6 November	Revision		No Homework due, however there ***is*** a practical session this week. Electronic Quiz 4 due.

SCHEDULE for Stream B (Friday lectures)

WEEK	Commences	TOPIC	CHAPTER	Homework Exercise Due. Electronic Quizzes Due.
1	31 July	Introduction LP Formulation	1, 8.1-6	
2	7 August	LP Formulation Graphical Solutions	8.7-12	Homework Exercise for week 2.
3	14 August	QuickQuant Simplex Method	9.1-4	Homework Exercise for week 3. Electronic Quiz 1 due.
4	21 August	Sensitivity & Duality	10.1-10.5	Homework Exercise for week 4.
5	28 August	Project Planning	14.1-5, 7	Homework Exercise for week 5. Electronic Quiz 2 due.
6	4 September	Friday 12:00: Class test, ***during lecture***		No Homework due, however there ***is*** a practical session this week.
7	11 September	Friday, conception day (after 12noon). No lecture.		Homework Exercise for week 7 due.
Semester Break 16th September – 2nd October				
8	3 October	Simulation	18.1,3,8,9	Homework Exercise for week 8.
9	9 October	Transportation Transshipment Assignment models	12.1, 2, 12.4-7	Homework Exercise for week 9. Electronic Quiz 3 due.
10	16 October	Inventory Decisions	15.1 - 4	Homework Exercise for week 10.
11	23 October	Queuing	17.1-3	Homework Exercise for week 11.
12	30 October	Queuing	17.4 17.6, 17.9	Homework Exercise for week 12.
13	6 November	Revision		No Homework due, however there ***is*** a practical session this week. Electronic Quiz 4 due.