



## **DIVISION OF ECONOMIC AND FINANCIAL STUDIES**

### **STAT379: Operations Research II**

**First Semester, 2007 – D1**

#### **UNIT OUTLINE**

**Unit convenor:** Dr Tania Prvan

**Prerequisites:** STAT279(P)

*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 build on students' knowledge in a variety of techniques and solution methods used for optimisation. The techniques require the formulation of problems, logical reasoning and interpretation of results. Integer programming, decision making under uncertainty, game theory, probabilistic inventory and Markov processes are the topics covered. Use is made of a statistical package to analyse data, solve integer programming problems and produce reports.
- **Unit rationale:** Dealing with uncertainty, using indicator variables in problems, solving and analysis of integer based problems and understanding the use of probabilistic models 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.

### Software

QuickQuant

## TEACHING STAFF

**Lecturer in charge:** Dr Tania Prvan  
Room: E4A 510  
Phone: 9850 8561  
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Consultation hours: To be advised

**Other lecturer:** Ms Sibba Gudlaugsdottir  
Room: E4A 516  
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Consultation hours: To be advised

**Tutors:** To be advised.

Please note that any communication with staff via email will only be conducted using your official university email address. Other teaching staff and times for consultation hours will be finalised at the end of Week 1. These will be posted on the web site.

Ms Sibba Gudlaugsdottir will be teaching the first six weeks. Dr Tania Prvan will start teaching in week 7 and will present 6 weeks of material concluding at the end on the first lecture in Week 13. The next two hours of lectures in Week 13 is revision.

## CLASSES

### Lectures

Lectures begin in Week 1. Lectures are held on Tuesdays between 9:00am and 11:00pm in room X5B T1 and Wednesdays between 9am and 10am in room X5B T1.

## **Tutorials**

One 1 hour tutorial each week. Tutorials will start in the second week. Tutorial participation is worth 5% of the final mark in this unit.

Students must attend the class to which they have been allocated.

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

## **REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS**

### **Prescribed texts**

Students should purchase the study guides consisting of Lecture overheads. It is available from the Co-op bookshop.

The following list provides useful references, which are available in Special Reserve in the Library.

### **Recommended texts:**

*Quantitative Decision Making with Spreadsheet Applications*, Lapin and Whisler 7<sup>th</sup> Ed.  
*Operations Research Applications and Algorithms 3rd Ed*, Winston W. L.(PWS Kent)

## **UNIT WEB PAGE**

<http://www.stat.mq.edu.au/units/stat379>

## **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 involving integer and indicator variables
- Use a computer package to solve formulation problems.
- Interpret output and write up conclusions based on the output.
- Solve probabilistic based problems

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

The unit is taught in traditional mode; that is, on campus in standard semesters with weekly lectures and tutorials (in the computer laboratory).

Students are expected to

- attend all the lectures and the tutorials;
- have read through the material to be covered using the lecture notes provided in the study guides.
- submit assignment solutions due in weeks 4, 9 and 12 to ERIC (Economic Resource & Information Centre) E4B 106;
- submit on-line quizzes available from unit web homepage by due dates, these will be due in weeks 3, 7 and 13 ;
- contact the convenor in advance if for any reason, students cannot hand in their assessment tasks on time;
- collect their marked assessment from ERIC (Economic Resource & Information Centre) E4B 106.

Refer to end of this handout for a week-by-week list of topics to be covered in this unit.

## 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.

The assessment is based on performance in the tutorials, assignments, test, on-line quizzes, and the final examination.

Assessment	Weighting	Due
Three on-line quizzes	5%	Weeks 3, 7 and 13
Three Assignments	15%	Weeks 4, 9 & 12
Tutorial Participation	5%	Each week
Class Test	15%	Week 6 tutorials
Final Examination	60%	As timetabled

Late assessments will only be accepted with the agreement of the lecturer and may be subject to the deduction of some marks.

### Class Test

This will be worth 15% of the total assessment. This will be held during the week 6 tutorials.

Students may take into the test **ONE** A4 page of notes hand written on **ONE** side only. This summary must be submitted with your test paper and is marked.

Failure to attend the test without relevant documentation to explain the absence will result in zero marks being awarded for the test and the possibility of exclusion from the unit. 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 that other coursework marks will be scaled up.

The Class Test covers lecture material from weeks 1-5 inclusive and will be of 50 minutes duration.

***Students should bring to the test a calculator, writing implements and a ruler.***

Marked class test papers will be available for collection from ERIC in week 7.

Solutions to the class test will be made available from the STAT379 website in week 7.

### **Electronic Quizzes**

Electronic Quizzes will be provided for practice of new skills acquired during the course as well as assumed knowledge. These will be available via the web and must be completed successfully. A link to the electronic quizzes can be found on the STAT379 web site.

There are 3 (three) electronic quizzes, together worth 5% of total assessment. The closing dates for the quizzes are as follows:

***Quiz 1:*** Assumed knowledge: ***Friday, 16 March, 2007.***

***Quiz 2:*** Inventory models, Markov processes and Game theory: ***Friday, 27 April, 2007.***

***Quiz 3:*** Integer programming and Decision making: ***Friday, 8 June, 2007.***

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. After you have passed a quiz it will be automatically made available for you until the end of the exam period.

If a student cannot pass a quiz by the due date, they should consult the lecturers for advice. Students must ***pass all three quizzes*** by the due dates or have made alternative arrangements with lecturing staff of 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.

## Assignments

There will be three assignments due in weeks 4, 9 and 12. These will count 15% towards your final mark in this unit. You may do the assignment in pairs (i.e. groups of two students) and then submit only one set of solutions with both student I.D.s clearly stated.

## Final Examination

The final examination will be held during the end of year exam session. It will be worth 60% of the total assessment and will cover all topics in the unit. Students may take into the final exam **ONE** A4 page of notes written on **BOTH** sides.

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.

**NOTE: To obtain a passing grade, both coursework and exam performance must be satisfactory. Each component of coursework must be satisfactory.**

The University Examination period in First Half Year 2006 is from 13<sup>th</sup> June to 29<sup>th</sup> June.

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. 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.

## 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. Students 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 a student is 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 the raw mark for a unit (i.e., the total of your marks for each assessment item) may not be the same as the SNG received. 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 students 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>.

## COMPUTER LABS AND CONDITIONS OF USE

### Location:

All EFS Student Computing Labs are located in Building E4B. As some labs have restricted access, students may find the following table a helpful guide:

Room	Capacity	Access
102	24 PCs + 1 Printer	All students
104	24 PCs + 1 Printer	All students
111	35 PCs + 1 Printer	All students
118	80 PCs + 2 Printers	All students
206	36 PCs + 1 Printer	Postgraduate Students only
208	35 PCs + 1 Printer	All students
214	80 PCs + 2 Printers	All students
306	36 PCs + 1 Printer	Postgraduate Students only

Students should be aware that classes will be scheduled intermittently in these rooms. During these times, students not involved in the relevant classes must immediately vacate the rooms, and refrain from taking any action that may disrupt a class in progress. Students may occupy rooms for individual coursework when no classes are scheduled, subject to both the access restriction listed above, and the Conditions of Use stated below.

### Opening Hours:

Normally, Student Computing Labs will be open during the following times:

<u>During Term:</u>	
8:00am – 10:00pm	Mon – Fri
9:00am – 5:00pm	Sat & Sun
<u>Outside of Term:</u>	
9:00am – 7:00pm	Mon – Fri
9:00am – 5:00pm	Sat & Sun

Term times include normal semester teaching periods, including exam periods; periods outside of this include mid-semester, mid-year, start and end-of-year breaks. Specific labs may be closed when demand is low, or for maintenance purposes.

### Method of Access:

Access to these facilities will be via individual student user accounts. Login usernames are students ID numbers. Passwords for these accounts are synchronised with students' MyMQ passwords; this is the one used to access the Student Portal. Students who have changed their password via the Student Portal should use their current password. For new students, and those who have not changed their password via the student portal, it will be

the two characters supplied at enrolment followed by their date of birth. As a safety net, generic accounts will be available until the mid-semester break to assist students who may experience initial login problems.

Student Computing Laboratory Demonstrators will be available to assist students with computing related problems. However, they will not respond to course related, or other academic or administrative, issues.

Undergraduate access will be granted on a semester basis for students enrolled in current approved units only. Students will be provided with a Home Directory (Q:) to store files related to coursework for approved units. At the end of each semester, undergraduate accounts will be disabled, and all data will be removed.

*Students should keep external copies of all files stored on their Home Directories (Q:). The University will not be liable for any loss of data.*

### **Conditions of Use:**

The University has limited resources with which to provide for the IT requirements of its students. To best guard the interests of all of our students, our aim is to maintain high availability and functional consistency of equipment. However, this can be compromised by student misuse. Hence, students are expected to act responsibly at all times when utilising University IT facilities. In particular, they are expected to comply with the following:

- These facilities are provided for use exclusively for coursework in units offered by the Division of Economic and Financial Studies, and other specified units that have been authorised to use these rooms.
- Student ID cards must be displayed at all times.
- These facilities must be used in accordance with University and Division policies and rules relevant at the time.
- The University reserves the right to monitor all student activities from these facilities.
- Use of mass storage devices, such as USB memory sticks, is strictly prohibited.
- Attempting to alter the normal function, tampering with or removing any equipment or consumables will be deemed an act of vandalism, and will be dealt with accordingly.
- Accessing inappropriate web sites, or downloading inappropriate material, are not permitted. Material that is not related to coursework in units authorised to use these facilities is deemed to be inappropriate.
- Students must adhere to all instructions from Demonstrators and other officers of the University given in the course of their duty.

Non-compliance with these conditions may result in disciplinary action without further notice.

## Unit Schedule

<b>Week</b>	<b>TOPIC</b>	<b>CHAPTER</b>	<b>Work Due</b>
1 (26 Feb)	<b>Inventory Models</b>	<b>15 + 279 revision + Lecture Notes</b>	
2 (5 Mar)	<b>Inventory Models</b>	<b>16 + Lecture Notes</b>	
3 (12 Mar)	<b>Inventory Models</b>	<b>16 + Lecture Notes</b>	<b>On-line Quiz 1</b>
4 (19 Mar)	<b>Markov Process</b>	<b>30 (6<sup>th</sup> Ed) + Lecture Notes</b>	<b>Assignment 1</b>
5 (26 Mar)	<b>Markov Process / Game Theory</b>	<b>28 (6<sup>th</sup> Ed) + Lecture Notes</b>	
6 (2 April)	<b>Game Theory</b>	<b>28 (6<sup>th</sup> Ed) + Lecture Notes</b>	<b>Class Test to be held during tutorials</b>
<b>TWO WEEK BREAK</b>			
7 (23 April)	<b>Integer Programming</b>	<b>11.1 + Lecture Notes</b>	<b>On-line Quiz 2</b>
8 (30 April)	<b>Integer Programming</b>	<b>11.1 + Lecture Notes</b>	
9 (7 May)	<b>Integer Programming</b>	<b>11.1 + Lecture Notes</b>	<b>Assignment 2</b>
10 (14 May)	<b>Integer Programming Decision Making</b>	<b>11.1 + Lecture Notes 6 + Lecture Notes</b>	
11 (21 May)	<b>Decision Making</b>	<b>6 + Lecture Notes</b>	
12 (28 May)	<b>Decision Making</b>	<b>5 + Lecture Notes</b>	<b>Assignment 3</b>
13 (4 June)	<b>Decision Making (1 hr) Review (2hrs)</b>	<b>5 + Lecture Notes</b>	<b>On-line Quiz 3</b>