STAT279

Operations Research I

S2 Evening 2014

Statistics

Contents

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General Information

Unit convenor and teaching staff
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Tuesday 3–5pm

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Monday, 11am–1pm

Credit points
3

Prerequisites
STAT170(P) or STAT171(P) or admission to GCertSc

Corequisites

Co-badged status

Unit description
This unit surveys the field of operations research, which is the practical application of scientific method to the operational, organisational and economic problems of business and industry. An elementary knowledge of algebra is assumed. Students are expected to use a computer package to find solutions to formulated problems. Topics are model construction; linear programming; transportation and assignment problems; simulation; network analysis (critical path and PERT); inventory analysis; and waiting line models.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Apply mathematical models to business scenarios, and 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

Assessment Tasks

Name	Weighting	Due
Electronic Quizzes	15%	Weeks 3, 5, 9, 13
Assignment	15%	Week 7
Final Examination	55%	University Examination Period
Homework	15%	Weeks 2, 4, 6, 8, 10, 11 & 12

Electronic Quizzes

Due: **Weeks 3, 5, 9, 13**
Weighting: **15%**

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 on the STAT279 web site (http://www.stat.mq.edu.au/undergraduate_programs/stat_units/stat_units200/stat279/) and there is also a link on the iLearn site. Click on E_Quiz to start a new quiz.

There are four electronic Quizzes, as follows:

Quiz 1: Assumed knowledge questions. (Due in Week 3).

Quiz 2: Questions on linear programming. (Due in Week 5).

Quiz 3: Questions on sensitivity analysis, project planning and simulation. (Due in Week 9).

Quiz 4: Questions on inventory and queuing. (Due in 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 15% 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 15%.

The Quizzes are online, and therefore may be attempted on campus, in the Library, the Numeracy Centre or the various computing labs, or at home depending on your system configuration. 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 iLearn.

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.

On successful completion you will be able to:
- Apply mathematical models to business scenarios, and formulate problems

Assignment

Due: **Week 7**
Weighting: **15%**

There will be an individual assignment due in Week 7, worth 15% of total unit grade.

The assignment will be issued via iLearn. Submission instructions will be included in the set assignment. No extensions will be granted, but special consideration may be given to documented cases of unavoidable disruption.

Three core criteria will be used to assess students' work:

- Knowledge development: understanding of key ideas and concepts
- Application: ability to apply operations research methods to actual problems
- Presentation: the extent to which work has been written and presented in a manner consistent with academic standards.

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Final Examination

Due: **University Examination Period**
Weighting: **55%**

The Final Exam will be held during the exam period. It will be worth 55% of the total unit grade and will cover the whole semester's work. The exam duration is three hours, plus ten minutes' reading time. In the exam, students will be provided with copies of the z-table and formula sheet, but these are also available on iLearn 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.

Special Consideration for missed or impeded examinations will only be granted to students whose performance in all parts of the coursework is satisfactory. For example, a student must pass all four Quizzes, submit all Homeworks, obtain a good mark in the Assignment and attend at least nine of the Practicals to be eligible for Special Consideration.

Although the Exam is nominally worth 55%, marks are **not** simply added together from the various assessments to produce the final grade. A student must achieve the performance standard defining a particular grade (described at http://mq.edu.au/policy/docs/grading/policy.html) in **both** the coursework **and** the examination sections of the unit in order to earn that grade. In particular, as in all units in the Statistics Department, students must pass the exam in order to pass the unit.

On successful completion you will be able to:

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Homework

Due: **Weeks 2, 4, 6, 8, 10, 11 & 12**
Weighting: **15%**

All Homework problems will be available in electronic form on iLearn for students to download. Students should solve the problems and submit their solutions via iLearn as Microsoft Word (.doc or .docx) or Adobe Portable Document Format (.pdf) files. Hand-written solutions are not encouraged, but may be scanned to create pdf documents (a scanner is available for student use 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. Your homework submission will be recorded automatically, and email submissions cannot be accepted. If you foresee difficulty submitting your homework electronically, please contact the unit convenor as early as possible. The submitted Homework will NOT be marked or returned; however, a model solution will be made available on iLearn as feedback to students. This solution will be made available a few days after the Homework is due.

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 a little over two marks for each Homework exercise submission (a solution or a serious attempt to solve a home work exercise). Altogether the Homework exercises are worth 15% of the total unit grade.

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Delivery and Resources

Classes

Each student enrols in three hours of Lectures and one one-hour Practical. (Note that 'Practicals' are sometimes called 'tutorials.') The Lectures begin in Week 1 and the Practicals begin in Week 2.

Required and Recommended Texts and/or Materials

- Students should purchase the Study Pack online which includes Lecture notes and Practical material.
- Students must download the Homework Exercises from STAT279 iLearn site.
- Reference books available in the library include:

Quantitative Decision Making with Spreadsheet Applications (7th Ed) by Lawrence L. Lapin, William D. Whisler, 2002 (Library Call Number: HD30.23 .L36/2002) or *Quantitative methods for business decisions: with cases* (6th edition) by Lawrence L. Lapin, 1994 (Library Call Number: HD30.23 .L36/1994)

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)

Technology Used and Required

Microsoft Excel

Some of the learning and assessment activities will require students to use the spreadsheet application *Excel*. This application is ubiquitous in modern organisations, and it is anticipated that exposure to *Excel* in STAT279 will directly benefit many students in their future careers. *Excel* is available on student workstations throughout the campus.

Unit Web Page

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

iLearn Page

STAT279 has an iLearn (Online Unit) page, which students can access by logging on at https://il

earn.mq.edu.au. Homework exercises and other materials will be uploaded for students to download. The "Forums" will be used for out-of-class communications. There is a discussion Forum corresponding to each module and assessment, as well as a main Forum for discussion relating to the unit as a whole. The Forums are essentially online chats between the students, tutors and lecturers. Questions can be asked in the relevant Forum, and might be answered by classmates, tutors or lecturers.

Questions not of interest to or appropriate for the rest of the class (questions about marks, missed classes, et cetera) should be sent by e-mail to one of the lecturers using Macquarie University student e-mail accounts.

The lecturers will make announcements via the iLearn page. Accordingly, students should be sure to log in and read the posts at least twice a week.

Teaching and Learning Strategy

Students must attend the Lectures each week at which new material is introduced. Due to Labour Day on 6 October, there is no lecture in Week 8.

From Week 2 onward, there will be one assessment task due each week, which will be either a Homework exercise, an Electronic Quiz or an Assignment.

Students are expected to attend one Practical class each week. Practicals begin in Week 2. Also, due to Conception Day on 12 September, there are no Practicals classes in Week 6.

Changes from previous offerings

The project planning topic has been updated and brought into better agreement with the methods used in STAT321.

The content of the study pack for this year has been updated to enhance students' engagement.

Unit Schedule

Please see the *iLearn* site's first section for an approximate weekly schedule.

Learning and Teaching Activities

Lectures

Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.

Practicals

Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals run in Weeks 2–5 and 7–13 only. These sessions are compulsory, and attendance will be taken.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central.

Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://informatics.mq.edu.au/help/.

When using the University's IT, you must adhere to the Acceptable Use Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcome

- Apply mathematical models to business scenarios, and formulate problems

Assessment tasks

- Electronic Quizzes
- Assignment
- Final Examination
- Homework

Learning and teaching activities

- Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.
- Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals run in Weeks 2–5 and 7–13 only. These sessions are compulsory, and attendance will be taken.

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Assessment tasks

- Assignment
- Homework

Learning and teaching activities

- Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.
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Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Apply mathematical models to business scenarios, and 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?

Assessment tasks

- Electronic Quizzes
- Assignment
- Final Examination
- Homework

Learning and teaching activities

- Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.
- Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals run in Weeks 2–5 and 7–13 only. These sessions are compulsory, and attendance will be taken.

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

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Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

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Assessment tasks

- Electronic Quizzes
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Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcome

- Apply mathematical models to business scenarios, and formulate problems

Assessment tasks

- Assignment
- Final Examination
- Homework

Learning and teaching activities

- Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.
- Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals run in Weeks 2–5 and 7–13 only. These sessions are compulsory, and attendance will be taken.

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess,

write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Apply mathematical models to business scenarios, and formulate problems
- Interpret output and write up conclusions based on the output, in the language of the original problem?

Assessment tasks

- Assignment
- Final Examination
- Homework

Learning and teaching activities

- Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.
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