STAT279
Operations Research I
S1 Day 2016
Dept of Statistics

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General Information

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Area 2-369, Australian Hearing Hub Building
Monday 4–6pm

Unit Convenor
David Bulger
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Room 2-361, Australian Hearing Hub Building
Monday 12–1 and Wednesday 10–11

Credit points
3

Prerequisites
STAT150(P) or STAT170(P) or STAT171(P)

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 Microsoft Excel 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

<table>
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<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
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<tr>
<td>Homework</td>
<td>15%</td>
<td>Weeks 2, 4, 6, 8, 10, 11 &amp; 12</td>
</tr>
<tr>
<td>Electronic Quizzes</td>
<td>15%</td>
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</tr>
<tr>
<td>Assignment</td>
<td>15%</td>
<td>Week 7</td>
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<tr>
<td>Final Examination</td>
<td>55%</td>
<td>University Examination Period</td>
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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). For your own records, label your submissions with your student ID, name and the number of the Homework (e.g., “Week 2”). 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 homework exercise). Altogether the Homework exercises are worth 15% of the total unit grade.

On successful completion 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
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. Links to the Quizzes can be found on the STAT279 iLearn site.

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.) Your highest score in each Quiz will be used in grading.

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 do well in all of the Quizzes, and get a very high mark.

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 Discussion Forum 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 6, 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.

On successful completion you will be able to:
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• Interpret output and write up conclusions based on the output, in the language of the original problem

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.

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:
• 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
Delivery and Resources

Classes

Each student enrols in one 3-hour Lecture and one 1-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:


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.

iLearn Page

STAT279 has an iLearn (Online Unit) page, which students can access by logging on at [https://iLearn.mq.edu.au](https://iLearn.mq.edu.au). Homework exercises and other materials will be uploaded for students to download. The Discussion Forum will be used for out-of-class communications. The Forum is essentially an online chat between the students, tutors and lecturers. Questions can be asked in the 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 via 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.

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, to give students more time to work on the mid-semester Assignment, there are no Practicals classes in the last week before the mid-semester break.

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


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/](https://students.mq.edu.au/support/student_conduct/)

**Results**

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in *eStudent*. For more information visit ask.mq.edu.au.

**Student Support**

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

**Learning Skills**

Learning Skills ([mq.edu.au/learningskills](http://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](http://ask.mq.edu.au)

**IT Help**

For help with University computer systems and technology, visit [http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

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

**Graduate Capabilities**

**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**
- Homework
- Assignment
- Final Examination

**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.

**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**
- Homework
- Electronic Quizzes
- Assignment
- Final Examination

**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
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**
- Homework
- Assignment

**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.

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**
- Homework
- Electronic Quizzes
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**

- 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**

- Homework
- Electronic Quizzes
- Assignment
- Final Examination

**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.

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**

- 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**

- Homework
- Electronic Quizzes
- Assignment
- Final Examination

**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**

- 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.

Changes from Previous Offering

The 2016 offerings of STAT279 will not differ substantially from the 2015 offerings.