STAT279
Operations Research I
D2 2012

Statistics

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Credit points
3
Prerequisites
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 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://students.mq.edu.au/important-dates

Learning Outcomes
1. Apply mathematical models to business scenarios, and formulate problems
2. Use a computer package to find solutions to formulated problems
3. Interpret output and write up conclusions based on the output, in the language of the
   original problem

Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
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<tbody>
<tr>
<td>Final Examination</td>
<td>55%</td>
<td>University Examination Period</td>
</tr>
<tr>
<td>Assignment</td>
<td>15%</td>
<td>Week 7</td>
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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>
<td>Weeks 3, 5, 9, 13</td>
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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.

This Assessment Task relates to the following Learning Outcomes:

- Apply mathematical models to business scenarios, and formulate problems
- Use a computer package to find solutions to formulated problems
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**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.

This Assessment Task relates to the following 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

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 convener 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.

This Assessment Task relates to the following 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

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.

This Assessment Task relates to the following Learning Outcomes:

• Apply mathematical models to business scenarios, and formulate problems

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 (from the Co-op Bookshop) 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.

**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://ilearn.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.

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 (except Weeks 1 & 7).

**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 2-6 and 8-13 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://www.mq.edu.au/policy/docs/academic_honesty/policy.html
Special Consideration Policy http://www.mq.edu.au/policy/docs/special_consideration/policy.html

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

Student Support
Macquarie University provides a range of Academic Student Support Services. Details of these services can be accessed at: http://students.mq.edu.au/support/.

UniWISE provides:
• Online learning resources and academic skills workshops http://www.mq.edu.au/learning_skills/
• Personal assistance with your learning & study related questions.
• The Learning Help Desk is located in the Library foyer (level 2).
• Online and on-campus orientation events run by Mentors@Macquarie.

Student Enquiry Service
Details of these services can be accessed at http://www.student.mq.edu.au/ses/.

Equity Support
Students with a disability are encouraged to contact the Disability Support Unit who can provide appropriate help with any issues that arise during their studies.
IT Help

If you wish to receive IT help, we would be glad to assist you at [http://informatics.mq.edu.au/help](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 and it outlines what can be done.

Graduate Capabilities

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**

- Final Examination
- Assignment
- 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 2-6 and 8-13 only. These sessions are compulsory, and attendance will be taken.

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**

- Final Examination
- Assignment
- 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 2-6 and 8-13 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**

- Final Examination
- Assignment
- 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 2-6 and 8-13 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

- Final Examination
- Assignment
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Learning and teaching activities

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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

- 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
• Final Examination
• Assignment
• 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 2-6 and 8-13 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
• Final Examination
• Assignment
• 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
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.
- Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals run in Weeks 2-6 and 8-13 only. These sessions are compulsory, and attendance will be taken.

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<tr>
<th>Date</th>
<th>Description</th>
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<tr>
<td>01/08/2012</td>
<td>Revisibilised and evacuated the &quot;unit schedule.&quot;</td>
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