STAT170
Introductory Statistics
D2 2012

Statistics

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General Information

<table>
<thead>
<tr>
<th>Unit convenor and teaching staff</th>
<th>Unit Convenor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anne Karpin</td>
<td><a href="mailto:anne.karpin@mq.edu.au">anne.karpin@mq.edu.au</a></td>
</tr>
<tr>
<td>Contact via <a href="mailto:anne.karpin@mq.edu.au">anne.karpin@mq.edu.au</a></td>
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Credit points
3

Prerequisites

Corequisites

Co-badged status

Unit description
This unit provides a broad introduction to statistical concepts and data analysis techniques. The unit is concerned with the development of an understanding of statistical practice and is illustrated by a study of those techniques most commonly used in the sciences, social sciences and humanities. The aim of statistical practice is to make the scientific research process efficient; for this reason statistics is used in disciplines ranging from accountancy to zoology. Whilst this unit may be taken as a terminating unit, it provides only basic statistical knowledge. Students intending to complete a major in statistics, or those wishing to acquaint themselves with the practical application of statistical techniques, are advised to include STAT270 Applied Statistics and STAT273 Introduction to Probability in their program. Topics covered in this unit include: data collection methods; data quality; data summarisation; and statistical models like the normal distribution, followed by sampling distributions and statistical inferences about means, proportions and quantiles. Also studied are methods of analysis relating to comparisons, counted data and relationships, including regression and correlation. Statistical computer packages are used for handling and analysing data along with word processing for reporting the results. However, no prior computing knowledge is assumed.

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. organise and summarise data graphically and numerically
2. use appropriate techniques to analyse data
3. use Minitab to manipulate and analyse data
4. draw conclusions from the results of data analysis
5. write a report based on the results of a statistical analysis
6. use the Internet for obtaining information and communicating with other students in online discussions
7. work co-operatively as a member of a team
8. apply statistical techniques to problems arising from diverse fields of research

Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1</td>
<td>5%</td>
<td>Week 6</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>10%</td>
<td>Week 11</td>
</tr>
<tr>
<td>2 StatQuizzes</td>
<td>5%</td>
<td>Week 4, 9</td>
</tr>
<tr>
<td>4 PracQuizzes</td>
<td>10%</td>
<td>Week 5, 7, 10, 13</td>
</tr>
<tr>
<td>Class Test</td>
<td>15%</td>
<td>Week 8</td>
</tr>
<tr>
<td>Final Examination</td>
<td>55%</td>
<td>University Examination Period</td>
</tr>
</tbody>
</table>

Assignment 1
Due: **Week 6**
Weighting: **5%**

This Assessment Task relates to the following Learning Outcomes:
- organise and summarise data graphically and numerically
- use appropriate techniques to analyse data
- use Minitab to manipulate and analyse data
- draw conclusions from the results of data analysis
- use the Internet for obtaining information and communicating with other students in online discussions
- apply statistical techniques to problems arising from diverse fields of research

Assignment 2
Due: **Week 11**
Weighting: **10%**
This Assessment Task relates to the following Learning Outcomes:

• organise and summarise data graphically and numerically
• use appropriate techniques to analyse data
• use Minitab to manipulate and analyse data
• draw conclusions from the results of data analysis
• write a report based on the results of a statistical analysis
• use the Internet for obtaining information and communicating with other students in online discussions
• apply statistical techniques to problems arising from diverse fields of research

2 StatQuizzes

Due: **Week 4, 9**
Weighting: **5%**

The StatQuizzes will be made available on iLearn. StatQuiz1 and StatQuiz2 should be completed in your own time (within available dates) on any PC that is connected to the internet. Each of the StatQuizzes will be made available on iLearn two weeks prior to the due dates. Students are allowed three attempts at each StatQuiz. The highest score obtained will count towards the grade. Each time a student downloads a StatQuiz a new version of it will be generated. The quizzes are designed to give students an opportunity to practice theoretical and mechanical aspects of statistics. Each StatQuiz is worth 2.5%.

This Assessment Task relates to the following Learning Outcomes:

• use appropriate techniques to analyse data
• draw conclusions from the results of data analysis
• apply statistical techniques to problems arising from diverse fields of research

4 PracQuizzes

Due: **Week 5, 7, 10, 13**
Weighting: **10%**

The PracQuizzes will be made available on iLearn. All four PracQuizzes should be completed in your own time (within available dates) on any PC that is connected to the internet. Each of the PracQuizzes will be made available on iLearn two weeks prior to the due dates. The PracQuizzes are based on the questions posed in the Practical material. It is therefore very important that students complete the relevant practical worksheets prior to attempting the PracQuizzes. Students are allowed two attempts at each PracQuiz. The highest score obtained will count towards the grade. Each PracQuiz is worth 2.5%.

This Assessment Task relates to the following Learning Outcomes:

• use appropriate techniques to analyse data
Unit guide STAT170 Introductory Statistics

- use Minitab to manipulate and analyse data
- draw conclusions from the results of data analysis
- apply statistical techniques to problems arising from diverse fields of research

Class Test
Due: **Week 8**
Weighting: **15%**

The Class Test will be held in your tutorial class in week 8. You must sit the class test in the tutorial class you are registered in. A page of formulae and relevant statistical tables will be attached to the class test. A statistics calculator may be taken into the class test. No other material (apart from writing equipment) will be permitted in the class test.

This Assessment Task relates to the following Learning Outcomes:
- use appropriate techniques to analyse data
- draw conclusions from the results of data analysis
- apply statistical techniques to problems arising from diverse fields of research

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

The Final Examination will be a three hour written exam (plus ten minutes reading time) and will be held during the examination period which runs from 12th June 2012 to 29th June 2012. A page of formulae and relevant statistical tables will be attached to the final examination. Students will be permitted to take one A4 sheet, handwritten on both sides, into the final examination. A statistics calculator may also be taken into the final examination. Please note that students must perform satisfactorily in the final examination in order to pass the unit.

The University Examination 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 at: http://www.timetables.mq.edu.au/exam

This Assessment Task relates to the following Learning Outcomes:
- use appropriate techniques to analyse data
- draw conclusions from the results of data analysis
- apply statistical techniques to problems arising from diverse fields of research

Delivery and Resources

Classes
Students should attend the following classes each week:
• 1 x 2 hour lecture beginning in Week 1
• 1 x 1 hour tutorial beginning in Week 2
• 1 x 1 hour practical beginning in Week 2

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

Students can change their tutorial and practical classes by using eStudent at:
https://student1.mq.edu.au/

Prizes
Don McNeil Prize for Introductory Statistics

This prize is named in honour of the foundation Professor of Statistics at Macquarie University, Don McNeil, who has had an enormous impact on the teaching of first year statistics. The prize is awarded each semester to the student with the best overall performance in the unit.

Required and Recommended Texts and/or Materials

• A calculator with statistics mode is essential and should be brought to all classes.
• The statistical software package Minitab can be downloaded from:

Suggested texts and recommended reading:

• Intro Stat – Macquarie University (ISBN 978 1 4425 4258 7)
• Introduction to the Practice of Statistics, Moore, D.S. and McCabe, G. P (W.H. Freeman)
• Statistics without Tears by Rowntree (Penguin)
• Mind on Statistics by Utts & Heckard (Thomson, 2004)
• Elementary Statistics by Johnson & Kuby (Thomson, 2007)
• Statistics: The Art & Science of Learning from Data by Agresti & Franklin (Prentice Hall, 2007)
• The Statistical Sleuth by Ramsey and Schafer (Duxbury, 2002)

Technology Used and Required

Unit Web Page

Information relating to Stat170 can be found by visiting the Macquarie University Statistics Department web site. The URL for this site is: http://www.stat.mq.edu.au/

iLearn (which is a version of Moodle) is used extensively in STAT170 and can be accessed at:
http://ilearn.mq.edu.au

The Forums on iLearn can be used to communicate with other students and staff.
Teaching and Learning Strategy

Lectures
Lectures begin in Week 1. Students should attend one 2-hour session per week. Copies of the lecture slides will be made available via iLearn. Students should print out the lecture slides and bring the printout to lectures. The lectures are also recorded via ‘echo360’, and can be accessed on iLearn (under Echo Recordings).

Tutorials
Tutorials begin in Week 2. Each tutorial is based on work from the previous week’s lecture. The aim of tutorials is to practise techniques and understand concepts learned in lectures. Tutorials are designed for students to work together in groups. The emphasis on group work is to explore ideas, devise and ask questions and plan ways to answer them. We believe that working within a group framework will be beneficial for the educational and personal development of students. Tutorial material will be made available via iLearn. Students should print out their tutorial material and bring the printout to their tutorial class each week.

Practicals
Practicals begin in Week 2. Each practical session is based on work from the previous week’s lecture. During these sessions you will use the statistical computer package Minitab and the techniques learned during lectures to help solve statistical problems. Practical material, and the required datasets, will be made available via iLearn. Students should print out their practical material and bring the printout to their practical session each week. Prior to (or during) each practical session, students will need to download the weekly Minitab data files onto a storage device (such as a USB).

Unit Schedule

<table>
<thead>
<tr>
<th>WEEK</th>
<th>LECTURE TOPIC</th>
<th>Assessment Due</th>
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</thead>
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<tr>
<td></td>
<td></td>
<td><em>Note that the Assignments, the StatQuizzes and the PracQuizzes are due by 5pm on Wednesday in relevant weeks.</em></td>
</tr>
<tr>
<td>W1</td>
<td>Introduction to statistics</td>
<td>-</td>
</tr>
<tr>
<td>W2</td>
<td>Graphing data</td>
<td>-</td>
</tr>
<tr>
<td>W3</td>
<td>Numerical summaries</td>
<td>StatQuiz Demo (does not count towards assessment)</td>
</tr>
<tr>
<td>W4</td>
<td>The Normal distribution</td>
<td>StatQuiz 1 (based on Lecture material from Weeks 1 - 3)</td>
</tr>
<tr>
<td>W5</td>
<td>Distribution of means and proportions</td>
<td>PracQuiz 1 (based on Practical material from Weeks 2 - 4)</td>
</tr>
<tr>
<td>Week</td>
<td>Topic</td>
<td>Assessment</td>
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<tr>
<td>W6</td>
<td>Confidence intervals</td>
<td>Assignment 1</td>
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<td></td>
<td><strong>SEMESTER BREAK</strong></td>
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<tr>
<td>W7</td>
<td>One sample hypothesis test for a population mean</td>
<td>PracQuiz 2 (based on Practical material from Weeks 5 and 6)</td>
</tr>
<tr>
<td>W8</td>
<td>Hypothesis tests for comparing population means</td>
<td>Class Test (held during Tutorials in Week 8)</td>
</tr>
<tr>
<td>W9</td>
<td>One and two sample hypothesis tests for population proportions</td>
<td>StatQuiz 2 (based on Lecture material from Weeks 4 – 8)</td>
</tr>
<tr>
<td>W10</td>
<td>Simple linear regression (Part 1)</td>
<td>PracQuiz 3 (based on Practical material from Weeks 7 - 9)</td>
</tr>
<tr>
<td>W11</td>
<td>Simple linear regression (Part 2)</td>
<td>Assignment 2</td>
</tr>
<tr>
<td>W12</td>
<td>Categorical data analysis</td>
<td>-</td>
</tr>
<tr>
<td>W13</td>
<td>Review of STAT170</td>
<td>PracQuiz 4 (based on Practical material from Weeks 10 - 12)</td>
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### Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](http://www.mq.edu.au/policy/docs/). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- **Special Consideration Policy** [http://www.mq.edu.au/policy/docs/special_consideration/policy.html](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](http://www.mq.edu.au/policy/docs/) 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/](http://students.mq.edu.au/support/).

**UniWISE provides:**

- Online learning resources and academic skills workshops [http://www.mq.edu.au/learning](http://www.mq.edu.au/learning)
Student Enquiry Service
Details of these services can be accessed at [http://www.student.mq.edu.au/ses/](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**

**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**

- organise and summarise data graphically and numerically
- use appropriate techniques to analyse data
- use Minitab to manipulate and analyse data
- draw conclusions from the results of data analysis
- write a report based on the results of a statistical analysis
- apply statistical techniques to problems arising from diverse fields of research

**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**

- use appropriate techniques to analyse data
- use Minitab to manipulate and analyse data
- draw conclusions from the results of data analysis
- write a report based on the results of a statistical analysis
- apply statistical techniques to problems arising from diverse fields of research

**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**

- use appropriate techniques to analyse data
- use Minitab to manipulate and analyse data
- draw conclusions from the results of data analysis
- write a report based on the results of a statistical analysis
- apply statistical techniques to problems arising from diverse fields of research

**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 outcomes**

- write a report based on the results of a statistical analysis
- apply statistical techniques to problems arising from diverse fields of research

**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**

- use the Internet for obtaining information and communicating with other students in online discussions
- work co-operatively as a member of a team
- apply statistical techniques to problems arising from diverse fields of research

**Engaged and Ethical Local and Global citizens**

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

**Learning outcome**

- apply statistical techniques to problems arising from diverse fields of research

**Socially and Environmentally Active and Responsible**

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

**Learning outcome**

- apply statistical techniques to problems arising from diverse fields of research

**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 outcomes

- draw conclusions from the results of data analysis
- write a report based on the results of a statistical analysis
- apply statistical techniques to problems arising from diverse fields of research

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:

Learning outcome

- apply statistical techniques to problems arising from diverse fields of research