



# STAT170

## Introductory Statistics

MQC3 Evening 2014

*Statistics*

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#### **Disclaimer**

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## General Information

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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, providing basic statistical knowledge. 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.

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://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

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

- 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

## Assessment Tasks

| Name                     | Weighting | Due                            |
|--------------------------|-----------|--------------------------------|
| <u>5 Hurdle Tests</u>    | 10%       | Week 2, 4, 7, 10 and 13        |
| <u>Assignment 1</u>      | 6%        | Week 6                         |
| <u>Assignment 2</u>      | 12%       | Week 11                        |
| <u>Class Test</u>        | 12%       | Week 8                         |
| <u>Final Examination</u> | 60%       | City Campus Examination Period |

### 5 Hurdle Tests

Due: **Week 2, 4, 7, 10 and 13**

Weighting: **10%**

The Hurdle Tests are online quizzes that will be made available on iLearn. The tests should be completed in your own time (within available dates) on any computer that is connected to the internet. Each of the quizzes will be made available on iLearn two weeks prior to the due dates. Students are allowed 3 attempts at each test until the deadline. If a student cannot pass the test, he/she should seek help from the lecturer or the Support Class helper. The highest score obtained will count towards the grade. Each time a student attempts a test a new version of it will be generated. The quizzes are designed to give students an opportunity to practice theoretical, mechanical and interpretational aspects of statistics. Each test is worth 2%.

On successful completion you will be able to:

- 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

## Assignment 1

Due: **Week 6**

Weighting: **6%**

Assignment 1 provides students with an opportunity to develop and to apply sound statistical practice. This assessment task reinforces the concepts covered in lectures and the skills learned from the practical material. The assignment will be made available on iLearn two weeks prior to the due date. Submission must be made before the due date and time; more details will be made available in the assignment. Penalties apply for late submissions and no extensions will be granted except for cases in which an application for special consideration has been approved.

On successful completion you will be able to:

- 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: **12%**

As for Assignment 1, Assignment 2 provides students with an opportunity to develop and to apply sound statistical practice. It reinforces the concepts covered in lectures and the skills learned from the practical material. Part of this assignment must be submitted in the form of a statistical report. The assignment will be made available on iLearn two weeks prior to the due date. Submission must be made before the due date and time, more details will be made available in the assignment. Penalties apply for late submissions and are as for Assignment 1.

On successful completion you will be able to:

- 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

## Class Test

Due: **Week 8**

Weighting: **12%**

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 formulas 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. Extensions will not be granted except for cases in which an application for special consideration is made and approved.

On successful completion you will be able to:

- 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: **City Campus Examination Period**

Weighting: **60%**

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 the 17 Feb to 25 Feb 2015. A page of formulas and relevant statistical tables will be attached to the final examination. Students will be permitted to take **one A4 sheet issued by MQC, handwritten on both sides** (using pens and/or pencils) into the final examination. This sheet must be submitted with your final exam paper at the conclusion of the exam. A statistics calculator may also be taken into the final examination.

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. You can find these under *Exam Information* on the [Student Portal Noticeboard](#).

Students 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, i.e. the final day of the official examination period.

The only accepted excuses for not sitting an examination at the designated time are documented illness or unavoidable disruption. In these special circumstances you may wish to consider applying for **Disruption to Studies**.

A supplementary examination will only be granted if a student has a satisfactory coursework (Assignments, Hurdle quizzes, Class Test) record (**i.e. at least 20 marks out of 40**). 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.

Note that there is a University policy regarding requests for special consideration for examinations and the granting of supplementary examinations, which can be found at: [http://students.mq.edu.au/student\\_admin/exams/disruption\\_to\\_studies/](http://students.mq.edu.au/student_admin/exams/disruption_to_studies/).

Students can submit a special consideration request(s) through the following link: <https://ask.mq.edu.au/index.php>.

### Grading in this Unit

The final Standardised Numerical Grade (SNG) in Stat170 will be based on students' work during the semester and in the Final Examination. The determination of the final SNG will be based on performance of individual assessment tasks against criteria and standards as detailed in the Grading Policy (see <http://mq.edu.au/policy/docs/grading/policy.html>). Final grades will be awarded on the basis of students' overall performance and the extent to which they demonstrate fulfillment of the learning outcomes listed for this unit.

***Please note that students must perform satisfactorily in the Final Exam as well as the coursework in order to pass the unit.***

On successful completion you will be able to:

- 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 MQC Student Portal at: <http://student.mqc.edu.au/>

### 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: <http://students.mq.edu.au/home/> (click on Information Technology, then Software Downloads).

Textbook used in this unit:

- *Modern Statistics: An introduction*, Don McNeil and Jenny Middledorp (ISBN 9781486007011). This can be purchased in hard copy from, for example, the Coop

Bookshop or in e-format (ISBN 9781486022120, access details to be provided in class).

Recommended reading:

- *Introduction to the Practice of Statistics*, Moore, D.S. and McCabe, G. P (W.H. Freeman)
- *Statistics without Tears*, Rowntree (Penguin)
- *Mind on Statistics*, Utts & Heckard (Thomson, 2004)
- *Elementary Statistics*, Johnson & Kuby (Thomson, 2007)
- *Statistics: The Art & Science of Learning from Data*, Agresti & Franklin (Prentice Hall, 2007)
- *The Statistical Sleuth*, Ramsey and Schafer (Duxbury, 2002)

## Technology Used and Required

### Unit Web Page

Information relating to Stat170 can be found by visiting iLearn which is used extensively in STAT170 and can be accessed at: <http://ilearn.mq.edu.au>

## 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.

### 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 purpose of 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

Every week throughout the semester students will be required to work through practical material that teaches them how to apply techniques learned during lectures by using the statistical computer package, Minitab. The weekly practical material is based on work from the previous week's lecture. Practical material, and the required datasets, will be made available via iLearn.

Practical classes begin in Week 2. During these sessions students will be introduced to Minitab. Students should print out their practical material (available on iLearn) and bring it to their practical session each week. Minitab data files required for each practical session may be downloaded from iLearn.

Students preferring to use their own personal computers to do the practical work will have to download Minitab V.17 from <http://students.mq.edu.au/home/> (click on Information Technology, then Software Downloads). This download only works in Windows. Students using Apple Mac will have to download *Minitab Express* instead.

Extra help is available for students enrolled in Stat170. Students can seek help from the following sources:

## Help with STAT170 related administrative matters

For help with STAT170 related administrative matters students should contact lecturing staff.

## Staff consultation hours

The best time for consultation is during the Practical sessions. For other times, you need to make an appointment with your lecturer.

## Numeracy Centre (In North Ryde Macquarie main campus)

The Numeracy Centre exists to help students who are experiencing difficulties with numeracy-based subjects such as STAT170. Any student who lacks the knowledge of mathematics needed for STAT170 is encouraged to seek the help of the Centre, which is located in C5A 225. The Centre offers a number of services including individual help, supplementary workshops that run each week and an opportunity to meet with other students to discuss problems.

## Computing Laboratories

Minitab will be used in practical sessions and for completing assignments. Assignments and quizzes can be completed in the computing labs. Students may download the software program, Minitab, from <http://students.mq.edu.au/home/> (click on Information Technology then Software Download) and install it on a home personal computer.

## What Has Changed

From semester 1 2014, hurdle tests replace StatQuizzes and PracQuizzes and some course content is different to 2013.

## Unit Schedule

| WEEK | LECTURE TOPIC              | Assessment Due   |
|------|----------------------------|--|
|      |                            | <i>Hurdle Test quizzes are due by 5pm on Friday in relevant weeks.<br/>Assignments are due on Wednesday in the relevant weeks.</i> |
| W1   | Introduction to statistics | -  |
| W2   | Graphing data              | <b>Hurdle 1</b>  |
| W3   | Numerical summaries        |  |
| W4   | The Normal distribution    | <b>Hurdle 2</b>  |



|     |  |   |
|-----|--|---|
| W5  | Distribution of means and proportions  | -   |
| W6  | Confidence intervals   | <b>Assignment 1</b>                                 |
| W7  | One sample hypothesis test for a population mean                                     | <b>Hurdle 3</b>                                     |
| W8  | Hypothesis tests for comparing population means                                      | <b>Class Test (held during Tutorials in Week 8)</b> |
| W9  | Simple linear regression (Part 1)  |   |
| W10 | Simple linear regression (Part 2)  | <b>Hurdle 4</b>                                     |
| W11 | Hypothesis tests for a population proportion: z-test and chi-squared goodness-of fit |   |
| W12 | Chi-squared test of independence   | <b>-Assignment 2</b>                                |
| W13 | Review of STAT170  | <b>Hurdle 5</b>                                     |

## 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](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](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](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/)

### Grades

Macquarie University uses the following grades in coursework units of study:

- HD - High Distinction
- D - Distinction
- CR - Credit
- P - Pass
- F – Fail

Grade descriptors and other information concerning grading are contained in the Macquarie University Grading Policy which is available at:

<http://www.mq.edu.au/policy/docs/grading/policy.html>

For further information, please refer to the following link:

<http://universitycouncil.mq.edu.au/legislation.html>

### Grade Appeals and Final Examination Script Viewing City Campus

If, at the conclusion of the unit, you have performed below expectations and are considering lodging an appeal of grade and/or viewing your final exam script, please refer in the first instance to the following website, which provides information about these processes and the cut off dates. Please read the instructions provided concerning what constitutes valid grounds for appeal before appealing your grade.

<http://www.city.mq.edu.au/reviews-appeals.html>

### Attendance at Macquarie City Campus

All Students are required to attend at least 80% of the scheduled course contact hours each Session. Additionally Macquarie City Campus monitors the course progress of international students to ensure that the student complies with the conditions of their visa relating to attendance.

This minimum level of attendance includes all lectures and tutorials. Tutorial attendance will be recorded weekly. If any scheduled class falls on a public holiday this will be rescheduled as advised by your Lecturer.

Attendance at any mid-Session or in-class test is compulsory unless otherwise stated. Unavoidable non-attendance due to illness or circumstances beyond your control must be supported by appropriate documentation to be considered for a supplementary test. Other non-

attendance will obtain zero for the test. You should refer to the Disruptions Policy for more details about this.

## 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](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 Support at Macquarie City Campus

Students who require assistance are encouraged to contact the Student Services Manager at Macquarie City Campus. Please see reception to book an appointment.

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

At any time students (or groups of students) can book our Student Advising rooms on Level 6 by emailing [info@city.mq.edu.au](mailto:info@city.mq.edu.au) with a day and time and nominated contact person. There are additional student study spaces available on Level 1.

Macquarie University Campus Wellbeing also has a presence on the City Campus each week. If you would like to make an appointment, please email [info@city.mq.edu.au](mailto:info@city.mq.edu.au) or visit their website at: <http://www.campuslife.mq.edu.au/campuswellbeing>

StudyWISE provides:

- Online learning resources and academic skills workshops [http://www.mq.edu.au/learning\\_skills](http://www.mq.edu.au/learning_skills)
- Personal assistance with your learning & study related questions

## 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://informatics.mq.edu.au/help>

p/.

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.

### IT Help at Macquarie City Campus

If you wish to receive IT help, we would be glad to assist you at <http://informatics.mq.edu.au/help/> or call 02 9850-4357.

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.

Students must use their Macquarie University email addresses to communicate with staff as it is University policy that the University issued email account is used for official University communication.

Students are expected to act responsibly when utilising Macquarie City Campus IT facilities. The following regulations apply to the use of computing facilities and online services:

- Accessing inappropriate web sites or downloading inappropriate material is not permitted.
- Material that is not related to coursework for approved unit is deemed inappropriate.
- Downloading copyright material without permission from the copyright owner is illegal, and strictly prohibited. Students detected undertaking such activities will face disciplinary action, which may result in criminal proceedings.

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

If you would like to borrow headphones for use in the Macquarie City Campus computer labs (210, 307, 311, 608) at any point, please ask at Level 2 Reception. You will be required to provide your MQC Student ID card. This will be held as a deposit while using the equipment.

For assistance in the computer labs, please see a Lab Demonstrator (usually they can be found in Lab 311, otherwise ask at Level 2 Reception).

## 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 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

### **Assessment tasks**

- 5 Hurdle Tests
- Assignment 1
- Assignment 2
- Final Examination

## **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

### **Assessment tasks**

- 5 Hurdle Tests
- Assignment 2
- Class Test
- Final Examination

## **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

## **Assessment tasks**

- 5 Hurdle Tests
- Assignment 1
- Assignment 2
- Class Test
- Final Examination

## **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

## **Assessment tasks**

- 5 Hurdle Tests
- Assignment 1
- Assignment 2
- Class Test
- Final Examination

## **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

## Assessment tasks

- 5 Hurdle Tests
- Assignment 1
- Assignment 2
- Class Test
- Final Examination

## 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

## Assessment tasks

- Assignment 1
- Assignment 2
- Final Examination

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

## Assessment tasks

- Assignment 1
- Assignment 2
- Final Examination

## 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

### Assessment tasks

- 5 Hurdle Tests
- Assignment 2
- Final Examination

## 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

### Assessment tasks

- 5 Hurdle Tests
- Assignment 2



- Final Examination