



STAT170

Introductory Statistics

S1 External 2019

Dept of Mathematics and Statistics

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Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

General Information

Unit convenor and teaching staff

Lecturer and convenor

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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 discussion based on the results of a statistical analysis
- Apply statistical techniques to problems arising from diverse fields of research

General Assessment Information

HURDLES: You must pass the mid-semester online exam to pass this unit. This is a hurdle requirement.

IMPORTANT: If you apply for Special Consideration for the final examination, you must make yourself available for the Supplementary Examination as organised by the Faculty of Science & Engineering. If you are not available at that time, there is no guarantee that an additional examination time will be offered. Specific examination dates and times will be determined at a later date.

LATE SUBMISSION OF WORK: All assessment tasks must be submitted by the official due date and time. No marks will be given for late work unless an extension has been granted following a successful application for Special Consideration. Please contact the unit convenor for advice as soon as you become aware that you may have difficulty meeting any of the assessment deadlines.

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Online Test 1</u>	10%	No	Week 4
<u>Mid-semester exam</u>	25%	Yes	Week 7
<u>Online Test 2</u>	25%	No	Week 12
<u>Final Examination</u>	40%	No	University Examination Period

Online Test 1

Due: **Week 4**

Weighting: **10%**

The first Online Test will be held in Week 4. Students will complete the test online, at a time they choose, during Week 4. The test must be completed within 40 minutes, once it is begun. Each

student will need access to a computer with a reliable internet connection and Minitab installed. Minitab should be used to answer the questions of the test.

The test will assess:

- all the topics of Module 1 (Weeks 1 and 2)
- ability to use Minitab to solve the exercises.

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

Mid-semester exam

Due: **Week 7**

Weighting: **25%**

This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)

Warning: this is a hurdle assessment. To pass the unit, students need to achieve 50% or more in this assessment task.

The mid-semester exam will be held in Week 7. Students will complete the exam online, at a time they choose, during Week 7. The exam must be completed within 40 minutes, once it is begun. Each student will need access to a computer with a reliable internet connection and a scientific calculator. A document containing formulae and statistical tables will be provided before the exam for students' reference; you may wish to print a copy before beginning the exam.

The exam will assess:

- all the topics of Modules 1 and 2 (Weeks 1–6)

*As the mid-semester exam is a hurdle assessment, if students fail but have made a serious first attempt, they will be given one more opportunity. **A serious first attempt in a hurdle assessment is defined in STAT170 as the achievement of a mark of 30% or greater. The 30% threshold is firm and cannot be changed or relaxed.***

Students will be able to re-sit the exam during the semester break. This will allow time for failing students to withdraw without academic penalty.

On successful completion you will be able to:

- Use appropriate techniques to analyse data
- Draw conclusions from the results of data analysis

Online Test 2

Due: **Week 12**

Weighting: **25%**

The second Online Test will be held in Week 12. Students will complete the test online, at a time they choose, during Week 12. The test must be completed within 40 minutes, once it is begun. Each student will need access to a computer with a reliable internet connection and Minitab installed. Minitab should be used to answer the questions of the test.

The test will assess:

- all the topics of Modules 3 and 4 (Weeks 7–10)
- ability to use Minitab to solve the exercises.

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

Final Examination

Due: **University Examination Period**

Weighting: **40%**

The Final Examination will be a two-hour written exam (plus ten minutes' reading time) and will be held during the examination period. A page of formulae and relevant statistical tables will be attached to the final examination. Students will be permitted to take **one A4 sheet (any colour), 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. See additional information posted on iLearn for more details on preparing for the final exam.

The exam will assess:

- all the topics of STAT170, but mainly Modules 3, 4, 5 (Weeks 7–13)

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/>.

Important:

If you receive [special consideration](#) for the final exam, a supplementary exam will be scheduled in the supplementary examination period. By making a special consideration application for the

final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the [policy](#) prior to submitting an application. You can check the supplementary exam information page on FSE101 in iLearn (bit.ly/FSESupp) for dates, and approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

On successful completion you will be able to:

- Use appropriate techniques to analyse data
- Draw conclusions from the results of data analysis
- Write a discussion based on the results of a statistical analysis
- Apply statistical techniques to problems arising from diverse fields of research

Delivery and Resources

Classes

STAT170-EXT will be delivered remotely, and no classes are scheduled.

Students will be given the opportunity to watch STAT170-INT lecture recordings on iLearn.

Please note: there are no practical and SGTA classes, but students are expected to work through the practical and SGTA notes, asking for assistance when this is needed.

Administrative Assistance

For help with STAT170-related administrative matters, students should contact the STAT170 admin officer, via stat170.admin@mq.edu.au.

Required and Recommended Texts and/or Materials

- A calculator with statistics mode is essential and should be used during all learning activities and assessment tasks.
- Software:
 - For students with PCs, the statistical software package Minitab can be downloaded from the student portal. This can be accessed from the web page for Student IT services: http://students.mq.edu.au/it_services/. For students with Mac computers, iLab can be used to access Minitab. Information on using iLab can also be found on the Student IT services web page.

Recommended 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).

Other recommended reading:

- 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

iLearn (which is a version of Moodle) is used for delivery of STAT170 course material and can be accessed at: <http://ilearn.mq.edu.au>.

Prizes

Don McNeil Prize for Introductory Statistics is named in honour of the foundation Professor of Statistics at Macquarie University. The prize is awarded twice a year to the student with the best overall performance in a first-year statistics unit.

Unit Schedule

PART	MODULE	WEEK	LECTURE TOPIC	IN-CLASS ASSESSMENT
Basics	1	1	Introduction to statistics; Graphing data	Online Test 1 [10 marks] <ul style="list-style-type: none"> • Time: Week 4 • Duration: 40 minutes • Topics: Module 1 + Minitab Mid-semester online exam [25 marks] <ul style="list-style-type: none"> • Time: Week 7 • Duration: 40 minutes • Topics: Modules 1, 2
		2	Numerical summaries	
	2	3	The Normal distribution	
		4	Distribution of means and proportions	
		5	Confidence intervals	
		6	More on populations and samples; Review of Modules 1, 2	
Hypothesis testing	3	7	One-sample hypothesis test for a population mean	Online Test 2 [25 marks] <ul style="list-style-type: none"> • Time: Week 12 • Duration: 40 minutes • Topics: Modules 3, 4 + Minitab
			2 wks break	
		8	Hypothesis tests for comparing population means	
	4	9	Simple linear regression (Part 1)	
		10	Simple linear regression (Part 2)	

	5	11 12	Hypothesis tests for a population proportion: z-test and chi-squared goodness-of-fit Chi-squared test of independence	
		13	Review of STAT170	

SGTA and practical activities by week:

WEEK	LECTURE	SGTA	PRACTICAL
1	L1	T1: Intro	P1: Intro
2	L2	T2: on L1	P2: on L1
3	L3	T3: on L2	P3: on L2
4	L4	T4: on L3	P4: on L3 + Online Test 1
5	L5	T5: on L4	P5: on L4
6	L6	T6: on L5	P6: on L5
7	L7	T7: on L6	P7: Mid-Semester Online Exam
8	L8	T8: on L7	P8: on L7
9	L9	T9: on L8	P9: on L8
10	L10	T10: on L9	P10: on L9
11	L11	T11: on L10	P11: on L10
12	L12	T12: on L11	P12: on L11 + Online Test 2
13	L13	T13: on L12	P13: on L12

Learning and Teaching Activities

Lectures

Lectures begin in Week 1. All lectures will be available students via Echo recordings on iLearn. Copies of the lecture slides will be made available via iLearn and students should bring them to lectures each week in electronic or printed format. The lectures are live-streamed and recorded via 'echo360', and can be accessed on iLearn (under Echo Recordings).

SGTAs

SGTAs (previously known as 'tutorials') are compulsory for the internal students. As an external student, you are not expected to attend a class or submit any work, but you should diligently complete each SGTA exercise, during the corresponding week, asking for help as necessary. All relevant material can be found on the iLearn site.

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Practicals are compulsory for the internal students. As an external student, you are not expected to attend a class or submit any work, but you should diligently complete each SGTA exercise, during the corresponding week, asking for help as necessary. All relevant material can be found on the iLearn site.

Staff consultation (office) hours

Members of the Statistics Department have consultation hours each week during which they are available to help students enrolled in Introductory Statistics. The Statistics Department is located in 12 Wally's Walk (E7A). A list of consultation times will be made available both on iLearn and on the Statistics Department website. No appointments are necessary during these hours.

Numeracy Centre

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 E7B (12 Wally's Walk) G88. 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. Please check their website at <https://www.mq.edu.au/about/about-the-university/faculties-and-departments/faculty-of-science-and-engineering/departments-and-centres/departments-and-centres/mathematics/numeracy-centre>.

Computing Laboratories

Minitab will be used in practical sessions and for completing assignments. Assignments and quizzes can be completed in the computing labs in E4B (6 Eastern Road). Computing labs use iLab, so work undertaken must be saved to the iLab desktop and then emailed. Opening hours of computing laboratories during semester: 8am–10pm Mon–Fri; 9am–5pm Sat–Sun. For opening hours during semester breaks, see the notice boards outside the computing laboratories. Look for additional information on the whiteboards in the labs. Please note that computing labs may be booked for classes. Check the timetable on the door of the lab to make sure that the room is free.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)

- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) 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 or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

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

Learning Skills

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

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

Student Services and Support

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

Student Enquiries

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

If you are a Global MBA student contact globalmba.support@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/.

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 outcomes

- Write a discussion based on the results of a statistical analysis
- 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 discussion based on the results of a statistical analysis
- Apply statistical techniques to problems arising from diverse fields of research

Assessment task

- Final Examination

Learning and teaching activity

- Lectures begin in Week 1. All lectures will be available students via Echo recordings on iLearn. Copies of the lecture slides will be made available via iLearn and students should bring them to lectures each week in electronic or printed format. The lectures are live-streamed and recorded via 'echo360', and can be accessed on iLearn (under Echo

Recordings).

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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 task

- Mid-semester exam

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 discussion based on the results of a statistical analysis
- Apply statistical techniques to problems arising from diverse fields of research

Assessment tasks

- Online Test 1
- Mid-semester exam
- Online Test 2
- Final Examination

Learning and teaching activities

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<https://www.mq.edu.au/about/about-the-university/faculties-and-departments/faculty-of-science-and-engineering/departments-and-centres/department-of-mathematics/numeracy-centre>.

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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
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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

- Use appropriate techniques to analyse data
- Use Minitab to manipulate and analyse data
- Draw conclusions from the results of data analysis
- Write a discussion based on the results of a statistical analysis
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Assessment tasks

- Online Test 1
- Mid-semester exam
- Online Test 2
- Final Examination

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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

- Organise and summarise data graphically and numerically
- Write a discussion based on the results of a statistical analysis
- Apply statistical techniques to problems arising from diverse fields of research

Assessment tasks

- Mid-semester exam
- Final Examination

Learning and teaching activities

- Lectures begin in Week 1. All lectures will be available students via Echo recordings on iLearn. Copies of the lecture slides will be made available via iLearn and students should bring them to lectures each week in electronic or printed format. The lectures are live-

streamed and recorded via 'echo360', and can be accessed on iLearn (under Echo Recordings).

- SGTAs (previously known as 'tutorials') are compulsory for the internal students. As an external student, you are not expected to attend a class or submit any work, but you should diligently complete each SGTA exercise, during the corresponding week, asking for help as necessary. All relevant material can be found on the iLearn site.
- Practicals are compulsory for the internal students. As an external student, you are not expected to attend a class or submit any work, but you should diligently complete each SGTA exercise, during the corresponding week, asking for help as necessary. All relevant material can be found on the iLearn site.
- Members of the Statistics Department have consultation hours each week during which they are available to help students enrolled in Introductory Statistics. The Statistics Department is located in 12 Wally's Walk (E7A). A list of consultation times will be made available both on iLearn and on the Statistics Department website. No appointments are necessary during these hours.

Changes from Previous Offering

No substantial changes are planned for Session 1, 2019. One cosmetic change is that the classes previously called "tutorials" are now called "SGTAs" ("small-group teaching activities") throughout the Faculty of Science and Engineering.