



# FOSE1015

## Statistical Concepts for Science

Session 1, In person-scheduled-weekday, North Ryde 2023

*Science and Engineering Faculty level units*

### Contents

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<a href="#"><u>General Information</u></a>	2
<a href="#"><u>Learning Outcomes</u></a>	2
<a href="#"><u>General Assessment Information</u></a>	3
<a href="#"><u>Assessment Tasks</u></a>	4
<a href="#"><u>Delivery and Resources</u></a>	7
<a href="#"><u>Unit Schedule</u></a>	8
<a href="#"><u>Policies and Procedures</u></a>	9
<a href="#"><u>Changes since First Published</u></a>	11

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#### **Disclaimer**

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## General Information

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Credit points

10

Prerequisites

Corequisites

Co-badged status

STAT6170, FOSE1015, FOSX1015

Unit description

This unit provides a broad introduction to statistical concepts and data analysis techniques. You will develop an understanding of statistical practice through a study of those techniques most commonly used in the sciences, social sciences and humanities. Topics covered in this unit include data collection methods, data quality, data summarisation, and statistical models such as the normal distribution, followed by sampling distributions and statistical inferences about means and proportions. 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. However, no prior computing knowledge is assumed. This unit introduces vital skills for tertiary learning and explores their relationship to success in future careers.

## 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:

**ULO1:** Organise and summarise data graphically and numerically.

**ULO2:** Analyse and solve problems about distributions and sampling distributions.

**ULO3:** Evaluate and apply statistical strategies to answer a research question.

**ULO4:** Draw conclusions from the results of a statistical analysis.

**ULO5:** Evaluate the appropriateness of statistical methodologies when analysing a variety of problems arising from other fields of research.

**ULO6:** Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

## General Assessment Information

The "Indicative Time on Task" for each task is automatically generated, and potentially confusing. The times given for the tests (2 hours each) are just estimates; for each student, this will depend on how many times the test is attempted. The times allocated to activity participation (each 0 hours) should be ignored.

### REQUIREMENTS TO PASS THIS UNIT

To pass this unit you must:

- For each Module Basic Test, achieve a total mark equal to or greater than 50/60, and
- Participate in, and undertake all the Practice-based activities for a minimum of 10 of the 12 weekly SGTAs
- Participate in, and undertake all the Practice-based activities for a minimum of 10 of the 12 weekly Practicals, and
- Pass the Employability quizzes.

### HURDLE ASSESSMENTS

- Assessment 1: Practice-based skills for SGTA classes (0%). Development of knowledge and skills requires continual practice. During SGTAs you will practice a range of statistical techniques. To pass this hurdle assessment, you must be able to demonstrate your progress in developing and communicating knowledge and skills in 9 out of 11 SGTAs. This is a hurdle assessment meaning that failure to meet this requirement may result in a fail grade for the unit. Students are permitted up to two absences: additional absences will require an approval from "[stat1170.admin@mq.edu.au](mailto:stat1170.admin@mq.edu.au)".
- Assessment 2: Practice-based skills for Practical classes (0%) Development of knowledge and skills requires continual practice. During Practicals you will practice a range of statistical & computational techniques. To pass this hurdle assessment, you must be able to demonstrate your progress in developing and communicating knowledge and skills in 10 out of 12 Practicals. This is a hurdle assessment meaning that failure to meet this requirement may result in a fail grade for the unit. Students are permitted up to

two absences: additional absences will require an approval from

**"stat1170.admin@mq.edu.au"**

- Assessment 3: Module Tests (100%) Low-stake quizzes serve as a formative assessment, providing a regular opportunity to demonstrate understanding and receive feedback for progress. This unit has FIVE module quiz tests, and you must show your mastery in acquiring statistical knowledge by completing and obtaining the required passing mark for each quiz by its due date. These are hurdle assessments meaning that failure to meet this requirement may result in a fail grade for the unit. Please contact **stat1170.admin@mq.edu.au** if you fail to meet the hurdle requirement.

### LATE ASSESSMENT SUBMISSION PENALTY

This unit has submitted work so LATE ASSESSMENT POLICY does not apply. For missing Module Quizzes, please see the details of "Assessment 3" give above.

### SPECIAL CONSIDERATION

The Special Consideration Policy aims to support students who have been impacted by shortterm circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment.

For this unit, a student will apply for a Special Consideration ONLY if this student miss a Module Test for more than 3 days. If a student miss a Module test for less than or equal to 3 days, they should apply for an extension through "stat1170.admin@mq.edu.au".

**EMPLOYABILITY SKILLS:** This unit has been designed so that 20% of student workload is allocated to employability skills. The employability skills modules are not graded, but the modules are hurdle tasks: you must complete the activities as outlined in order to pass this unit. Some activities will be automatically graded, but all will ask you to apply the modules to your work in this unit, general university studies and your personal goals. You will be informed of any due dates, but most modules can be completed in your own time. See your iLearn unit for detailed information on how to complete the skills modules.

**FINAL EXAM POLICY:** There is no final exam for this unit.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#"><u>Practice Based Skills for SGTA classes</u></a>	0%	Yes	Each SGTA class
<a href="#"><u>Practice Based Skills for practical classes</u></a>	0%	Yes	Each practice class

Name	Weighting	Hurdle	Due
<a href="#">Module Tests</a>	100%	Yes	week 4, week 6, week 8, week 10, week 12
<a href="#">Foundation activities</a>	0%	Yes	Weeks 1, 2, 3, 5, 7

## Practice Based Skills for SGTA classes

Assessment Type <sup>1</sup>: Practice-based task

Indicative Time on Task <sup>2</sup>: 0 hours

Due: **Each SGTA class**

Weighting: **0%**

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

Development of knowledge and skills requires continual practice. During SGTAs you will practice a range of statistical techniques. To pass this hurdle assessment, you must be able to demonstrate your progress in developing and communicating knowledge and skills in 10 out of 12 SGTAs.

On successful completion you will be able to:

- Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

## Practice Based Skills for practical classes

Assessment Type <sup>1</sup>: Practice-based task

Indicative Time on Task <sup>2</sup>: 0 hours

Due: **Each practice class**

Weighting: **0%**

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

Development of knowledge and skills requires continual practice. During Practicals you will practice a range of statistical & computational techniques. To pass this hurdle assessment, you must be able to demonstrate your progress in developing and communicating knowledge and skills in 10 out of 12 Practicals.

On successful completion you will be able to:

- Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

## Module Tests

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 10 hours

Due: **week 4, week 6, week 8, week 10, week 12**

Weighting: **100%**

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

This unit consists of modules. At the end of each module there is a Module test, in which the student is required to demonstrate mastery of the material covered in that module.

On successful completion you will be able to:

- Organise and summarise data graphically and numerically.
- Analyse and solve problems about distributions and sampling distributions.
- Evaluate and apply statistical strategies to answer a research question.
- Draw conclusions from the results of a statistical analysis.
- Evaluate the appropriateness of statistical methodologies when analysing a variety of problems arising from other fields of research.

## Foundation activities

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 0 hours

Due: **Weeks 1, 2, 3, 5, 7**

Weighting: **0%**

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

Activities related to foundational employability and self-directed learning skills

On successful completion you will be able to:

- Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## Delivery and Resources

Off-shore students must email [stat1170.admin@mq.edu.au](mailto:stat1170.admin@mq.edu.au) as soon as possible to discuss study options.

## Classes

The statistics content will be delivered in classes from Week 1 to Week 11. Specifically, students should work through the following material on a weekly basis:

- A 1-hour lecture – recorded **Weeks 1–10**.
- A 1-hour SGTA on the topics of the previous lecture – **Weeks 1–11**. (Week 1 will introduce the employability module.)
- A 1-hour practical on the topics of the previous one or two lectures – **Weeks 1–11**. (Week 1 will introduce the employability module.)

Some activities will be available in connection to the employability modules, especially near the end of semester. Details will be announced via iLearn.

## Communication

We will communicate with you via your university email or through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent to your lecturers [or [stat1170.admin@mq.edu.au](mailto:stat1170.admin@mq.edu.au)] from your university email address.

## COVID Information

For the latest information on the University's response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: <https://www.mq.edu.au/about/coronavirus-faqs>.

Remember to check this page regularly in case the information and requirements change during semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

## Assistance

For help with any matters related to this unit, students should contact the appropriate department

staff, by emailing [stat1170.admin@mq.edu.au](mailto:stat1170.admin@mq.edu.au).

## Required and Recommended Texts and/or Materials

- A calculator with statistics mode may be useful during lectures.
- Software:
  - The software used in this unit is *Excel*, the spreadsheet application from Microsoft's *Office* suite. For students with Mac or Windows computers, this application 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\\_service\\_s/](http://students.mq.edu.au/it_service_s/). Students using other operating systems might find *Google Sheets* or *OpenOffice Calc* to be a workable alternative.

Recommended textbook for this unit:

- *Modern Statistics: An introduction*, Don McNeil and Jenny Middledorp (ISBN 9781486007011). This can be purchased in hard copy from [www.booktopia.com.au/coolshop/](http://www.booktopia.com.au/coolshop/) 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 (a version of Moodle) is used for delivery of course material and can be accessed at: <http://ilearn.mq.edu.au>.

## Prizes

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

## Unit Schedule

In Weeks 1–10, the lectures will introduce the following topics. Each topic will be developed in SGTAs and Practicals in the following week.



Week 1	Data, research questions, graphics
Week 2	Numerical data
Week 3	Introduction to distributions
Week 4	Sampling distributions
Week 5	Hypothesis tests for a population mean
Week 6	Comparing population means
Week 7	Simple linear regression
Week 8	Simple linear regression
Week 9	Categorical data analysis
Week 10	Categorical data analysis

Employability activities and assessment will occur throughout the semester, including Weeks 11–13.

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). 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](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

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

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/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](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

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

## The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault

- [Social support including information about finances, tenancy and legal issues](#)
- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

## Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

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

## Changes since First Published

Date	Description
16/02/2023	to match the version of STAT1170