



STAT6190

Statistical Methods for Data Science

Session 1, In person-scheduled-weekday, North Ryde 2025

School of Mathematical and Physical Sciences

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General Information

Unit convenor and teaching staff

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Credit points

10

Prerequisites

Corequisites

Co-badged status

Unit description

This unit provides a broad introduction to statistical concepts and data analysis techniques, with a focus on application to real-world analysis and report typesetting skills. With the support of a coding language for statistical computing and graphics like R, students will learn about data collection and summarisation, basic probability, random variables, statistical models like the normal distribution, sampling distributions and statistical inferences about means and proportions. Students will then learn how to model the relationships between categorical or continuous explanatory variables and a continuous response variable using the techniques of one-way and two-way analysis of variance and simple and multiple linear regression.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals ([UNSDGs](#)) Industry, Innovation and Infrastructure

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: Create, assess, and interpret numerical and visual summaries for various data types, including extensive or intricate datasets.

ULO2: Apply basic concepts of probability, random variables and sampling distributions to solve practical problems.

ULO3: Identify, justify and implement appropriate parametric or non-parametric statistical tests.

ULO4: Formulate, validate, evaluate and interpret appropriate linear models to describe the correlations among multiple factors.

ULO5: Create a reproducible report to communicate statistical insights using a literate programming tool.

ULO6: Create specific questions tailored to the context or domain and determine the suitable statistical methods for analysis.

General Assessment Information

Requirements to Pass this Unit

To pass this unit you must achieve a total mark equal to or greater than 50%.

To enable students more time to focus on learning, understanding and reflecting on the content of our unit we have designed the assessment structure as follows. There are now only two assessments: a mid-session exam (the Problem Set) and the final assignment (the Case Study). Although no marks are associated with attendance, all activities provide you with key content designed to help you complete the assessments. Therefore, we strongly encourage all students to actively participate in all learning activities. Regular engagement is crucial for your success in this unit, as these activities directly prepare you for the assessment tasks, provide opportunities to solve assessment-like questions, deepen your understanding of the material, collaborate with peers, and receive valuable feedback from instructors. Your active participation not only enhances your own learning experience but also contributes to a vibrant and dynamic learning environment for everyone.

Late Assessment Submission Penalty

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied for each day a written report or presentation assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. The submission time for all uploaded assessments is 11:55 pm. A 1-hour grace period will be provided to students who experience a technical concern. For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, please apply for [Special Consideration](#).

Assessments where Late Submissions will be accepted.

- Problem set – NO, unless Special Consideration is granted
- Case study – YES, Standard Late Penalty applies

Special Consideration

The [Special Consideration Policy](#) aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and

which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through <https://connect.mq.edu.au>.

Description of Assessment Activities

- **Mid-session exam (Problem Set)**
 - Paper-based, i.e., you won't be allowed to use a computer
 - During the SGTA class of week 7
 - Closed-books
 - One 2-sided page of notes allowed (handwritten or typed)
- **Final assignment (Case Study)**
 - Due date in the first week of the exam period
 - Submission on iLearn via Turnitin
 - Only PDF files accepted
 - The required format is a report typeset in RMarkdown

Assessment Tasks

Name	Weighting	Hurdle	Due
Problem Set	50%	No	07/04/2025
Case study	50%	No	15/06/2025

Problem Set

Assessment Type ¹: Quantitative analysis task

Indicative Time on Task ²: 15 hours

Due: **07/04/2025**

Weighting: **50%**

This task will test the ability of students to analyse and solve provided problems.

On successful completion you will be able to:

- Create, assess, and interpret numerical and visual summaries for various data types, including extensive or intricate datasets.
- Apply basic concepts of probability, random variables and sampling distributions to solve practical problems.
- Identify, justify and implement appropriate parametric or non-parametric statistical tests.

- Formulate, validate, evaluate and interpret appropriate linear models to describe the correlations among multiple factors.

Case study

Assessment Type ¹: Case study/analysis

Indicative Time on Task ²: 20 hours

Due: **15/06/2025**

Weighting: **50%**

Students are required carry out a case study on a real-world dataset. Students will ultimately communicate their findings in a reproducible report.

On successful completion you will be able to:

- Create, assess, and interpret numerical and visual summaries for various data types, including extensive or intricate datasets.
- Apply basic concepts of probability, random variables and sampling distributions to solve practical problems.
- Identify, justify and implement appropriate parametric or non-parametric statistical tests.
- Formulate, validate, evaluate and interpret appropriate linear models to describe the correlations among multiple factors.
- Create a reproducible report to communicate statistical insights using a literate programming tool.
- Create specific questions tailored to the context or domain and determine the suitable statistical methods for analysis.

¹ 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.

² 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

Classes

- Workshops: Students are strongly encouraged to attend one one-hour workshop each

week.

- SGTA classes: Students are strongly encouraged to attend one two-hour class per week.

Students can use the [Class Finder tool](#) in [eStudent](#) to see when and where the classes are being held and if they have space. Enrolment can be managed using eStudent at: <https://students.mq.edu.au/support/technology/systems/estudent>

Week 1 classes

In week one, both workshop and SGTA classes are delivered. Week 1 SGTA class is offered on Monday 24 February, 4pm-6pm. Week 1 workshop is offered on Friday 28 February, 9am-10am.

Suggested textbooks

The following textbook is useful as supplementary resources, for additional questions and explanations. They are available from the Macquarie University library:

- Moore, D.S., 2017. *Introduction to the Practice of Statistics*. WH Freeman and company.

Technology Used and Required

This subject requires the use of the following computer software:

- **R:** R is a free statistical software package. Access and installation instructions may be found at: <https://www.r-project.org/>
- **RStudio:** RStudio is an open-source tool that is used to manage and present work performed using R. Access and installation instructions may be found at <https://rstudio.com/products/rstudio/download/>

Methods of Communication

We will communicate with you via your university email and through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent to the unit convenor via the contact email on iLearn.

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.

Unit Schedule

This is a draft schedule and is subjected to change.

Week	Topics	Assessment
1	Statistical Learning. Research questions, population, samples, data types and summaries; Introduction to R/RStudio	

Week	Topics	Assessment
2	Random variables and distributions; normal distribution, binomial distribution	
3	Statistical inference, sampling distributions and the concept of hypothesis test	
4	Multiple regression: how to write and run a model	
5	Multiple regression: assumptions, transformations and predictions	
6	Parametric and non-parametric hypothesis tests	
7	Analysis of 1 continuous variable: one-sample t-test and Wilcoxon one-sample signed-rank test	Mid-Session Exam during SGTA class
Session Break		
8	Analysis of 1 categorical variable: chi-squared goodness of fit test	
9	Analysis of 2 categorical variables: chi-squared test of independence, Fisher's exact test	
10	Analysis of 1 continuous and 1 categorical variable: two-sample t-test, 1-way ANOVA, Tukey's HSD, Mann-Whitney U test, Kruskal-Wallis test	
11	Analysis of 1 continuous and 1 categorical variable: two-sample t-test, 1-way ANOVA, Tukey's HSD, Mann-Whitney U test, Kruskal-Wallis test	
12	Analysis of 1 continuous and 2 categorical variables: 2-way ANOVA	
13	Revision and QA for the final assignment	
14		Assignment Due

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 connect.mq.edu.au or if you are a Global MBA student contact 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 the [Service Connect Portal](#), 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/.

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 from Previous Offering

This is the first offering of this unit.

We value student feedback to be able to continually improve the way we offer our units. As such we encourage students to provide constructive feedback via student surveys, to the teaching staff directly, or via the FSE Student Experience & Feedback link in the iLearn page.

Unit information based on version 2025.03 of the [Handbook](#)