



STAT6190

Statistical Methods for Data Science

Session 2, In person-scheduled-weekday, North Ryde 2026

School of Mathematical and Physical Sciences

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General Information

Unit convenor and teaching staff

Convenor

Maurizio Manuguerra

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Contact via email

12WW 6.30

By appointment

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, you 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. You 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 your 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:

1. 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 only two assessments: a mid-session exam (the Problem Set) and a Data analysis tasks in professional setting. 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

Late assessments are not accepted in this unit unless a Special Consideration has been submitted and approved.

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>.

Short Extensions

Automatically approved short extensions are not allowed in this unit, as all the assessment tasks are in-class invigilated.

Description of Assessment Activities

- **Problem Set**
 - Paper-based, i.e., you won't be allowed to use a computer
 - During the SGTA class of week 6 (2 hours)
 - Closed-books and AI observed
 - One 2-sided page of notes allowed (handwritten or typed)
- **Data analysis in professional setting**
 - Computer-based
 - During the workshop and the SGTA class of week 13 (4 hours)
 - Open-books and AI observed
 - Submission of a report in PDF format on iLearn via Turnitin

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
<u>Problem Set</u>	50%	No	02/ 09/ 2026	Individual	No	Observed
<u>Data analysis in professional setting</u>	50%	No	04/ 11/ 2026	Individual	No	Observed

Problem Set

Assessment Type ¹: Problem-based task

Indicative Time on Task ²: 15 hours

Due: **02/09/2026**

Weighting: **50%**

Groupwork/Individual: Individual

Short extension ³: No

AI Approach: Observed

This task will test your ability 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.

Data analysis in professional setting

Assessment Type ¹: Professional task

Indicative Time on Task ²: 20 hours

Due: **04/11/2026**

Weighting: **50%**

Groupwork/Individual: Individual

Short extension ³: No

AI Approach: Observed

You are required to carry out a case study on a dataset with real-world characteristics. The dataset and the research questions will be introduced by the lecturer (playing the role of the client), and you, acting as statistical consultant, will analyse the data and write a reproducible report in class, with limited time at your disposal.

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
- [Academic Success](#) 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.

³ An automatic short extension is available for some assessments. Apply through the [Service Connect Portal](#).

Delivery and Resources

Unit Design

STAT6190 is delivered in flipped-classroom mode. Students are required to read the material before coming to classes. During classes, students are invited to actively work at problems similar to those included in the assessment tasks, under the teaching staff supervision and lead.

Classes

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

The timetable for classes can be found on the University website at: <https://publish.mq.edu.au/>. 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. They start on Wednesday 29 July, 10am-12pm (workshop) and 12pm-2pm (SGTA).

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	
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	Mid-Session Exam during SGTA class
7	Analysis of 1 continuous variable: one-sample t-test and Wilcoxon one-sample signed-rank test	
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		Data analysis in professional setting during workshop and SGTA class

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/>

Academic Success

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

- [Ask a Study Coach](#)
- [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 <https://students.mq.edu.au/support/technology/service-desk>.

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

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.

Based on student feedback, the final take-home assignment has been replaced by an in-class assessment task which challenges students with a more realistic data analysis scenario.

Unit information based on version 2026.03 of the [Handbook](#)