



# STAT6175

## Linear Models

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

STAT6170 and (MATH6904 or Admission to MDataSc)

Corequisites

STAT6180 or STAT6183

Co-badged status

STAT3175

Unit description

This unit discusses statistical modelling in general and in particular demonstrates the wide applicability of linear and generalized linear models. Topics include multiple linear regression, logistic regression and Poisson regression. The emphasis is on practical issues in data analysis with some reference to the theoretical background. Statistical packages are used for both model fitting and diagnostic testing.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals ([UNSDGs](#)) Good Health and Well Being; Quality Education; 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:** Define relevant terminology and describe the main concepts of linear models and simple generalized linear models.

**ULO2:** Formulate and solve theoretical problems in linear modelling (using matrix notation when necessary).

**ULO3:** Fit a linear model to obtain estimates together with their standard errors in

applied problems.

**ULO4:** Analyse the adequacy of a linear model and suggest appropriate modifications when needed.

**ULO5:** Formulate and solve applied problems using linear modelling.

**ULO6:** Use standard statistics packages to carry out these analyses.

**ULO7:** Communicate clearly your knowledge of the subject matter of linear models and their solutions to problems involving linear modelling.

## General Assessment Information

### Requirements to Pass this Unit

To pass this unit you must:

- Attempt all assessments, and
- Achieve a total mark equal to or greater than 50%

### Attendance and participation

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 provide opportunities to deepen your understanding of the material, collaborate with peers, and receive valuable feedback from instructors, to assist in completing the unit assessments. Your active participation not only enhances your own learning experience but also contributes to a vibrant and dynamic learning environment for everyone.

### Assignment Submission and Feedback

Assignment submission will be online through the iLearn page. Your name and Student ID should appear on the first page. Submit assignments online via the appropriate assignment link on the iLearn page. A personalised cover sheet is not required with online submissions. Read the submission statement carefully before accepting it as there are substantial penalties for making a false declaration.

- Assignment submission is via iLearn.
- Please make sure that your assignment is word processed (i.e. not hand written).
- You should upload one single PDF file.
- Please note the quick guide on how to upload your assignments provided on the iLearn page.
- Feedback to submissions will be provided within 2-3 weeks of the submission, specific dates can be found in iLearn under Unit Assessment Overview section.

You may submit as often as required prior to the due date/time. Please note that each submission will completely replace any previous submissions. It is in your best interest to make frequent submissions of your partially completed work as insurance against technical or other

problems near the submission deadline.

## 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

In this unit, late submissions will be accepted as follows:

- Assignment 1 – YES, Standard Late Penalty applies
- Assignment 2 – YES, Standard Late Penalty applies
- Assignment 3 – YES, Standard Late Penalty applies
- Final Examination - NO, unless Special Consideration is Granted

## Final Exam

Final exam will be scheduled during the official final exam period by the Exam Office. Its duration is 2 hours and an additional 10 minutes reading time. It is an on-campus invigilated exam where students are required to write answers to exam questions on a paper. It will include questions from week 1 to week 13 of the unit to ensure the learning outcomes are achieved by the students. A list of authorised materials, which the students can take into the exam, include "An A4 sheet of notes, handwritten or typed on both sides. This Sheet will be collected with exam paper at the end of the exam." More details will be provided in iLearn in Week 13 or earlier. Please note that laptops or other electronic devices, except calculators, are not allowed.

## 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>.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Assignment 1</a>	15%	No	Week 4

Name	Weighting	Hurdle	Due
<a href="#">Assignment 2</a>	15%	No	Week 8
<a href="#">Assignment 3</a>	15%	No	Week 12
<a href="#">Final examination</a>	55%	No	Formal Examination Period

## Assignment 1

Assessment Type <sup>1</sup>: Quantitative analysis task

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

Due: **Week 4**

Weighting: **15%**

Reinforce and apply the concepts covered in lectures and the skills learned in SGTA classes, through data analysis.

On successful completion you will be able to:

- Define relevant terminology and describe the main concepts of linear models and simple generalized linear models.
- Formulate and solve theoretical problems in linear modelling (using matrix notation when necessary).
- Fit a linear model to obtain estimates together with their standard errors in applied problems.
- Analyse the adequacy of a linear model and suggest appropriate modifications when needed.
- Formulate and solve applied problems using linear modelling.
- Use standard statistics packages to carry out these analyses.
- Communicate clearly your knowledge of the subject matter of linear models and their solutions to problems involving linear modelling.

## Assignment 2

Assessment Type <sup>1</sup>: Quantitative analysis task

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

Due: **Week 8**

Weighting: **15%**

Reinforce and apply the concepts covered in lectures and the skills learned in SGTA classes, through data analysis.

On successful completion you will be able to:

- Define relevant terminology and describe the main concepts of linear models and simple generalized linear models.
- Formulate and solve theoretical problems in linear modelling (using matrix notation when necessary).
- Fit a linear model to obtain estimates together with their standard errors in applied problems.
- Analyse the adequacy of a linear model and suggest appropriate modifications when needed.
- Formulate and solve applied problems using linear modelling.
- Use standard statistics packages to carry out these analyses.
- Communicate clearly your knowledge of the subject matter of linear models and their solutions to problems involving linear modelling.

## Assignment 3

Assessment Type <sup>1</sup>: Quantitative analysis task

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

Due: **Week 12**

Weighting: **15%**

Reinforce and apply the concepts covered in lectures and the skills learned in SGTA classes, through data analysis.

On successful completion you will be able to:

- Define relevant terminology and describe the main concepts of linear models and simple generalized linear models.
- Formulate and solve theoretical problems in linear modelling (using matrix notation when necessary).
- Fit a linear model to obtain estimates together with their standard errors in applied problems.
- Analyse the adequacy of a linear model and suggest appropriate modifications when needed.

- Formulate and solve applied problems using linear modelling.
- Use standard statistics packages to carry out these analyses.
- Communicate clearly your knowledge of the subject matter of linear models and their solutions to problems involving linear modelling.

## Final examination

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 23 hours

Due: **Formal Examination Period**

Weighting: **55%**

Formal invigilated examination testing the learning outcomes of the unit.

On successful completion you will be able to:

- Define relevant terminology and describe the main concepts of linear models and simple generalized linear models.
- Formulate and solve theoretical problems in linear modelling (using matrix notation when necessary).
- Fit a linear model to obtain estimates together with their standard errors in applied problems.
- Analyse the adequacy of a linear model and suggest appropriate modifications when needed.
- Formulate and solve applied problems using linear modelling.
- Use standard statistics packages to carry out these analyses.

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<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

### Lectures and SGTAs

There is one hour face-to-face lecture and two hours SGTA each week. You are encouraged to attend all of the face-to-face classes to achieve best learning outcomes from this unit. You are expected to view weekly content videos (which are available in iLearn) prior to any face-to-face class to be able to interact with the Lecturer and your peers to support your learning.

**Lectures begin in Week 1 and SGTAs in Week 2.** Please consult the timetable for the scheduling of these activities. Attendance for each Lecture and SGTA will be recorded.

**SGTAs** are held in computing labs and allow you to practice techniques learnt in lectures, including pre-recorded lecture videos. Weekly completion of all SGTA will allow you to identify where you need help to improve your learning.

### Technologies used and required

[iLearn](#) will be used for sharing learning and teaching materials including assessment documents. The [statistical package R](#) will be used.

### Text book

The recommended text book is: Chatterjee, Samprit and Ali S Hadi, *Regression Analysis by Example* (Wiley, Fifth edition., 2012) which is available online through MQ library. The link to the text book and other readings can be found in iLearn right hand side section "[Unit Readings - Leganto](#)".

### Methods of Communication

We will communicate with you via your university email and/or through announcements on iLearn. iLearn discussion forum should be used for any questions, except for personal circumstances emails. *Private message to Unit Contacts* (a private and confidential discussion forum) can be used for sending messages to specific staff (Lecturer and/or Teaching Associate) instead of sending emails. Any emails sent from non-mq domain will go to junk mail therefore students should use their *MQ student email* to send emails to teaching staff. Teaching staff contact details will be in iLearn.

## Unit Schedule

Week	Topics
1	Simple linear regression. Multiple linear regression.
2	The model in matrix form. Diagnostics.
3	Diagnostics. Transformations.
4	Transformations. Collinearity.
5	Polynomial regression. Categorical covariates.



6	Analysis of change. Analysis of covariance (ANCOVA).
7	Confounding. Interaction.
	<b>Two Weeks Break</b>
8	Variable selection. Model building.
9	Introduction to generalized linear models. Logistic regression.
10	Logistic regression. Poisson regression.
11	Poisson regression. Negative binomial regression.
12	Negative binomial regression. Gamma regression.
13	Revision

## 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](https://connect.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 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/](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

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. Student feedback from the previous offering of this unit was very positive overall, with students pleased with the clarity around assessment requirements and the level of support from teaching staff. We continue to strive to improve the level of support and the level of student engagement. The main changes for this session are

1. The pre-recorded Lecture slides are annotated to provide more information to the students.
2. New weekly interactive Lecture activities are designed so that student learning from prerecorded lectures can be consolidated with in-depth discussions during the Lecture sessions.

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Unit information based on version 2025.04 of the [Handbook](#)