STAT6175

Linear Models

Session 1, Online-scheduled-In person assessment, Exam centre within Australia 2023

School of Mathematical and Physical Sciences

Contents

General Information

Unit convenor and teaching staff
Unit Convenor and lecturer
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12 Wally's Walk Level 6 Room 629
Please refer to iLearn

Credit points
10

Prerequisites
((STAT6170 or STAT670) and (BCA802 or STAT8602 or MATH604 or MATH6904)) or
(Admission to MDataSc and (STAT6170 or STAT670))

Corequisites
STAT6180 or STAT680 or STAT6183 or STAT683

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.

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%

Assignment Submission

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.
- You should upload one single PDF file.
- Please note the quick guide on how to upload your assignments provided on the iLearn page.
- If there are technical obstructions to your submission online, please email us to let us know.

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 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

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 ask.mq.edu.au.

FINAL EXAM POLICY

It is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period. The only excuse for not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these special circumstances, you may apply for special consideration via ask.mq.edu.au.

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during this 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.

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignment 1	15%	No	Week 4
Assignment 2	15%	No	Week 8
Assignment 3	15%	No	Week 12
Final examination	55%	No	Formal Examination Period

Assignment 1

Assessment Type [1]: Quantitative analysis task
Indicative Time on Task [2]: 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 [1]: Quantitative analysis task
Indicative Time on Task [2]: 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 [1]: Quantitative analysis task
Indicative Time on Task [2]: 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 [1]: Examination
Indicative Time on Task [2]: 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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[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

There is one one hour on campus lecture which will be recorded and one online two hour SGTA each week. **Lectures begin in Week 1 and SGTAs in Week 2.** Please consult iLearn for time and zoom link for the online two hour SGTA.

In addition to the one hour lecture there are online resources including videos which should be viewed prior to the one hour lecture.

Technologies used and required

Lecture material will be placed on iLearn. The statistical package R will be used.

SGTA

SGTAs are held online and allow you to practice techniques learnt in lectures and from above mentioned online resources. You will complete worksheets as part of the learning process.

Text book

The recommended text (available from the Co-op Bookshop) is: Chatterjee S & Hadi AS (2012). Regression Analysis By Example, 5th Revised edition, Wiley. This is available online.

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.

Methods of Communication

We will communicate with you via your university email or through announcements on iLearn. Queries to the convenor can either be placed on the iLearn discussion board or sent to tania.prvan@mq.edu.au from your **university email** address.

Unit Schedule

Week	Topic/s
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).

Week	Topic/s
7	Confounding. Interaction.
	TWO WEEK BREAK
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). 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). 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) 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 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 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/.

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.