STAT6175

Linear Models

Session 1, Special circumstances 2021

Archive (Pre-2022) - Department of Mathematics and Statistics

Contents

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Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and other small group activities on campus, and most will keep an online version available to those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face activities for your unit, please go to timetable viewer. To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff
Convener / Lecturer
Hassan Doosti
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12WW 534
See iLearn for consultation hours

Lecturer
Tania Prvan
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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.

ULO3: Fit a linear model to obtain estimates together with their standard errors in applied problems.

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

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

ASSIGNMENT SUBMISSION: Assignment submission will be online through the iLearn 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. You should upload this as a single scanned PDF file.
- Please note the quick guide on how to upload your assignments provided on the iLearn page.
- Please make sure that each page in your uploaded assignment corresponds to only one A4 page (do not upload an A3 page worth of content as an A4 page in landscape). If you are using an app like Clear Scanner, please make sure that the photos you are using are clear and shadow-free.
- It is your responsibility to make sure your assignment submission is legible.
- If there are technical obstructions to your submitting 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 interests to make

frequent submissions of your partially completed work as insurance against technical or other problems near the submission deadline.

LATE SUBMISSION OF WORK: All assessment tasks must be submitted by the official due date and time. In the case of a late submission for a non-timed assessment (e.g. an assignment), if special consideration has NOT been granted, 20% of the earned mark will be deducted for each 24-hour period (or part thereof) that the submission is late for the first 2 days (including weekends and/or public holidays). For example, if an assignment is submitted 25 hours late, its mark will attract a penalty equal to 40% of the earned mark. After 2 days (including weekends and public holidays) a mark of 0% will be awarded. Timed assessment tasks (e.g. tests, examinations) do not fall under these rules.

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.

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignment 1	15%	No	Week 4
Assignment 2	15%	No	Week 8
Assignment 3	15%	No	Week 12
Report of activities in SGTA	5%	No	Weeks 2-12
Final examination	50%	No	Formal Examination Period

Assignment 1

Assessment Type [1]: Case study/analysis
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.
- Fit a linear model to obtain estimates together with their standard errors in applied problems.
- Formulate and solve theoretical problems in linear modelling (using matrix notation when necessary).
- 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]: Case study/analysis
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.
- Fit a linear model to obtain estimates together with their standard errors in applied problems.
- Formulate and solve theoretical problems in linear modelling (using matrix notation when necessary).
- 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]: Case study/analysis
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.

- Fit a linear model to obtain estimates together with their standard errors in applied problems.

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

- 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.

Report of activities in SGTA

Assessment Type [1]: Report
Indicative Time on Task [2]: 3 hours
Due: **Weeks 2-12**
Weighting: **5%**

Students are required to submit a short report of the activities in the computer laboratory Small Group Teaching Activities (SGTA)

On successful completion you will be able to:

- 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.

Final examination

Assessment Type [1]: Examination
Indicative Time on Task [2]: 20 hours
Due: **Formal Examination Period**
Weighting: **50%**

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.
- Fit a linear model to obtain estimates together with their standard errors in applied problems.
- Formulate and solve theoretical problems in linear modelling (using matrix notation when necessary).
- 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

You should attend the following classes each week:

· one 1 hour synchronous online lecture

· one 2 hour SGTA class

Check timetables.mq.edu.au or the unit iLearn page for class details.

Lectures begin in Week 1. Lecture notes are available on iLearn prior to the lecture.

SGTA classes begin in week 2 and are based on work from the current week's lecture. SGTA classes are held in computing labs and allow you to practice techniques learnt in lectures. We will mainly use SPSS, but we will supplement this with other statistical software. You will complete worksheets as part of the learning process.

In Session 1 2021 our units will run tutorials, seminars and other small group learning activities face-to-face, while keeping an online version available for those students who choose to continue their studies online.

To check the availability of face to face activities for your unit, please go to timetable viewe r, before enrolling in eStudent. To check detailed information on unit assessments, visit the unit i Learn site.

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 from the university library, as well as paper copies.

Software The statistical software SPSS will be used.

- You may access SPSS via AppStream: https://mq.okta.com/ and then select Appstream - Student Applications
- You may wish to buy a copy of SPSS for home use. The Co-op Bookshop has SPSS Grad Pack, a full version with a one-year licence. You should purchase the Premium or Standard version.

Staff consultation hours Members of the Department of Mathematics and Statistics have consultation hours each week when they are available to help students. These consultation hours are available on iLearn.

Unit Schedule

Week	Topic	Text chapter	Task Due
1	Simple linear regression	1,2	
2	Simple linear regression contd, introduction to multiple linear regression	2	
3	The model in matrix form, hypothesis tests, residuals, residual & partial regression plots	3,4	
4	Diagnostics contd: extreme observations (leverage, DFBETAs, Cook's distances); transformations	4, 6	Assignment 1
5	Transformations contd; collinearity	6, 9	
6	Polynomial regression; categorical covariates	5	
7	Analysis of change		
	Mid-semester break		
8	Interaction and confounding	5	Assignment 2
9	Variable selection, model building	11	
10	Introduction to generalized linear models; Logistic regression	12	
11	Logistic regression ; Poisson regression	12, 13	
12	Poisson regression	13	Assignment 3
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

- Grade Appeal Policy

- Complaint Management 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

Student Support

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

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- Getting help with your assignment

- Workshops

- StudyWise

- 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

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

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 since First Published

Date	Description
12/02/2021	Updated General Assessment Section