



STAT680

Applied Statistics

S2 External 2019

Dept of Mathematics and Statistics

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Disclaimer

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General Information

Unit convenor and teaching staff

Unit Convenor

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See iLearn for consultation hours

Thomas Fung

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Credit points

4

Prerequisites

Admission to MAppStat or GradCertAppStat or GradDipAppStat or MSc or MDataSc or MLabQAMgt or GradDipLabQAMgt or GradCertLabQAMgt or MScInnovation

Corequisites

STAT670

Co-badged status

Unit description

This unit aims to extend and broaden statistical experience from STAT670, with a focus on application to real-world analysis. It covers 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. Data management, report writing, graphical presentation of results, and power analysis are described.

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:

Produce and interpret appropriate visual displays and numerical summaries.

Understand and apply appropriate statistical methods and models to provide answers to research questions. Models include one-way ANOVA, two-way ANOVA, simple linear regression, and multiple regression.

Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.

Use statistical software to fit the models and interpret statistical software output appropriately.

General Assessment Information

HURDLES: This unit has no hurdle requirements.

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 assignments or assessments must be submitted by the official due date and time. No marks will be given to late work unless an extension has been granted following a successful application for [Special Consideration](#). Please contact the unit convenor for advice as soon as you become aware that you may have difficulty meeting any of the assignment deadlines. It is in your interests to make frequent submissions of your partially

completed work. Note that later submissions completely replace any earlier submission, and so only the final submission made before the due date will be marked.

FINAL EXAM POLICY: 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.

SUPPLEMENTARY EXAMINATIONS:

IMPORTANT: 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. If you apply for special consideration, you must give the supplementary examination priority over any other pre-existing commitments, as such commitments will not usually be considered an acceptable basis for a second application for special consideration. 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 (<https://bit.ly/FSESup>) for dates, and approved applicants will receive an individual notification sometime in the week prior to the exam with the exact date and time of their supplementary examination.

Census dates

The last day to withdraw from this unit without financial or academic penalty is August 22. The last date to withdraw from this unit without academic penalty is September 28.

Software

The supported statistical software for this unit is R/RStudio. Students will be given guidance on how to use this software and be expected to conduct their analyses using R/RStudio for the in-session assessments. Students should also note that the mid-semester exam and final examination will involve data analysis that contains inline R code that students need to interpret to answer the exam questions.

Assessment Tasks

Name	Weighting	Hurdle	Due
iLearn Quiz	10%	No	Week 4
Mid-Semester Test	20%	No	Week 7
Assignment	20%	No	Week 12
Final Exam	50%	No	Examination period

iLearn Quiz

Due: **Week 4**

Weighting: **10%**

The quiz will assess the material covered in calendar weeks 1-2 of the lectures. It will also assess your ability to use statistical software to conduct statistical analyses. The duration of the quiz will be 60 minutes.

It is your responsibility to find an appropriate location with a reliable internet connection where you can complete the exam. It is advisable to plan this in advance.

On successful completion you will be able to:

- Produce and interpret appropriate visual displays and numerical summaries.
- Understand and apply appropriate statistical methods and models to provide answers to research questions. Models include one-way ANOVA, two-way ANOVA, simple linear regression, and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Use statistical software to fit the models and interpret statistical software output appropriately.

Mid-Semester Test

Due: **Week 7**

Weighting: **20%**

During calendar week 7, a mid-semester test will be available on iLearn. The test will cover material from calendar weeks 1-5 of lectures. The test duration will be 40 mins.

It is your responsibility to find an appropriate location with a reliable internet connection where you can complete the test. It is advisable to plan this in advance.

The test is not supervised, however, it is advisable that you complete this test under general exam conditions (i.e. with no additional help apart from a single page of A4 handwritten notes). This will give you a clear indication of your progress and performance in this unit.

On successful completion you will be able to:

- Produce and interpret appropriate visual displays and numerical summaries.
- Understand and apply appropriate statistical methods and models to provide answers to research questions. Models include one-way ANOVA, two-way ANOVA, simple linear regression, and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Use statistical software to fit the models and interpret statistical software output appropriately.

Assignment

Due: **Week 12**

Weighting: **20%**

The Assignment will be due in Week 12 and to be submitted on iLearn. The assignment will cover all learning outcomes and focus on the material covered in calendar weeks 6-10 of the lectures.

On successful completion you will be able to:

- Produce and interpret appropriate visual displays and numerical summaries.
- Understand and apply appropriate statistical methods and models to provide answers to research questions. Models include one-way ANOVA, two-way ANOVA, simple linear regression, and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Use statistical software to fit the models and interpret statistical software output appropriately.

Final Exam

Due: **Examination period**

Weighting: **50%**

The Final Examination will be a two hour written exam (plus ten minutes reading time) and will be held during the examination period. The relevant statistical tables will be attached to the examination paper. Students will be permitted to take **one A4 sheet, handwritten** into the final examination. This sheet can be one-sided or two sided. This sheet **must** be submitted with your final exam paper at the conclusion of the final exam. The final exam will assess all the topics of STAT680, but mainly lectures of calendar weeks 6-13.

On successful completion you will be able to:

- Produce and interpret appropriate visual displays and numerical summaries.
- Understand and apply appropriate statistical methods and models to provide answers to research questions. Models include one-way ANOVA, two-way ANOVA, simple linear regression, and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Use statistical software to fit the models and interpret statistical software output appropriately.

Delivery and Resources

Lectures

Students are expected to view the livestream lecture or recorded content available on echo360 and work through the relevant SGTA activities.

Textbook

There is no prescribed textbook.

Software

You are required to use R/RStudio to perform data analyses. You will use R/RStudio as part of the SGTA classes, and you can use the software in the E4B labs when they are not booked for classes. You can find more information on RStudio at their web site: <https://www.rstudio.com/>. The software is freely available to download at no cost for all standard operating systems (Windows, Mac OS and Linux) at <https://www.rstudio.com/products/rstudio/download/>.

Additional References

These recommended books are available in Reserve at the library.

- Moore, D.S., McCabe, G. P. and Craig, B.A. (2017) Introduction to the Practice of Statistics, Ninth Edition (W.H. Freeman)

Unit Schedule

Week (begins)	Lectures	Work due
1 (29 Jul)	Course introduction; One-sided tests; Type I and Type II error; Introduction to R/RStudio	
2 (5 Aug)	Modified two-sample t-test; Assessing normality and equal variance assumptions	
3 (12 Aug)	One-way ANOVA	
4 (19 Aug)	One-way ANOVA and multiple comparisons	iLearn quiz
5 (26 Aug)	Transformations; Non-parametric tests; Power; Sample Size	
6 (2 Sep)	Data management; R Markdown; Simple linear regression	
7 (9 Sep)	Simple linear regression and model validation; Multiple regression	Mid Semester Exam
	<i>Mid-Semester Break</i>	
8 (30 Sep)	Multiple regression and model validation	
10* (14 Oct)	Extensions and examples of multiple regression	

11 (21 Oct)	Two-way ANOVA	
12 (28 Oct)	Two-way ANOVA and multiple comparisons	Assignment
13 (3 Jun)	Two-Way ANOVA and multiple regression connection	

*Labour Day occurs on 8 Oct: Hence there is no lecture for week 9 of the semester. Hence, week 9 content will resume in week 10.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway \(https://students.mq.edu.au/support/study/student-policy-gateway\)](https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/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 improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

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.

Graduate Capabilities

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- Produce and interpret appropriate visual displays and numerical summaries.
- Understand and apply appropriate statistical methods and models to provide answers to

research questions. Models include one-way ANOVA, two-way ANOVA, simple linear regression, and multiple regression.

- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Use statistical software to fit the models and interpret statistical software output appropriately.

Assessment tasks

- iLearn Quiz
- Mid-Semester Test
- Assignment
- Final Exam

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Produce and interpret appropriate visual displays and numerical summaries.
- Understand and apply appropriate statistical methods and models to provide answers to research questions. Models include one-way ANOVA, two-way ANOVA, simple linear regression, and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Use statistical software to fit the models and interpret statistical software output appropriately.

Assessment tasks

- iLearn Quiz
- Mid-Semester Test
- Assignment
- Final Exam

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Produce and interpret appropriate visual displays and numerical summaries.
- Understand and apply appropriate statistical methods and models to provide answers to research questions. Models include one-way ANOVA, two-way ANOVA, simple linear regression, and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Use statistical software to fit the models and interpret statistical software output appropriately.

Assessment tasks

- iLearn Quiz
- Mid-Semester Test
- Assignment
- Final Exam

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Understand and apply appropriate statistical methods and models to provide answers to research questions. Models include one-way ANOVA, two-way ANOVA, simple linear regression, and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.

- Use statistical software to fit the models and interpret statistical software output appropriately.

Assessment tasks

- iLearn Quiz
- Mid-Semester Test
- Assignment
- Final Exam

Changes from Previous Offering

Lecture hours reduced from 3 hours to 2 hours.

Removal of the Kernel smoothing content and assessment.