



# STAT270

## Applied Statistics

S1 Day 2016

*Dept of Statistics*

### Contents

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<a href="#"><u>General Information</u></a>	2
<a href="#"><u>Learning Outcomes</u></a>	2
<a href="#"><u>General Assessment Information</u></a>	3
<a href="#"><u>Assessment Tasks</u></a>	3
<a href="#"><u>Delivery and Resources</u></a>	5
<a href="#"><u>Unit Schedule</u></a>	6
<a href="#"><u>Policies and Procedures</u></a>	6
<a href="#"><u>Graduate Capabilities</u></a>	8
<a href="#"><u>Changes from Previous Offering</u></a>	11

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## General Information

Unit convenor and teaching staff

Unit Convenor

Justin Wishart

[justin.wishart@mq.edu.au](mailto:justin.wishart@mq.edu.au)

Contact via [justin.wishart@mq.edu.au](mailto:justin.wishart@mq.edu.au)

AHH, Level 2

Monday 2pm-4pm

Lecturer

Kehui Luo

[kehui.luo@mq.edu.au](mailto:kehui.luo@mq.edu.au)

Contact via [kehui.luo@mq.edu.au](mailto:kehui.luo@mq.edu.au)

AHH, Level 2

Tuesday 10am-12pm (noon)

Credit points

3

Prerequisites

(STAT170(P) or STAT171(P) or STAT150(P)) and (STAT175(P) or GPA of 2.0 (out of 4.0))

Corequisites

Co-badged status

STAT680

Unit description

This unit aims to extend and broaden statistical experience from 100-level statistics units, 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 regression, and multiple regression.

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

Develop report writing skills.

Use statistical software to fit the models.

## General Assessment Information

Note that satisfactory performance in the Final Examination is required for a Pass in the subject.

## Assessment Tasks

Name	Weighting	Due
<a href="#">Tutorial Exercises Week 3</a>	4%	22 March
<a href="#">Assignment 1</a>	16%	26 April
<a href="#">Assignment 2</a>	20%	31 May
<a href="#">Final exam</a>	60%	to be decided

### Tutorial Exercises Week 3

Due: **22 March**

Weighting: **4%**

Tutorial Exercises from Week 3.

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 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.

## Assignment 1

Due: **26 April**

Weighting: **16%**

Covers weeks 1-6

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 regression, and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Develop report writing skills.
- Use statistical software to fit the models.

## Assignment 2

Due: **31 May**

Weighting: **20%**

Covers weeks 7-11

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 regression, and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Develop report writing skills.
- Use statistical software to fit the models.

## Final exam

Due: **to be decided**

Weighting: **60%**

Material to be covered will be notified. Satisfactory performance is required for a pass in the subject.

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

## Delivery and Resources

### Textbook

There is no prescribed textbook.

### Software

You will be expected to use R/RStudio to perform data analyses. You will use R/RStudio as part of the tutorials, 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. (2014) Introduction to the Practice of Statistics, Eighth Edition (W.H. Freeman)
- De Veaux, R.D., Velleman, P.F. and Bock, D.E. (2004) Stats Data and Models (Pearson)
- Ramsay, F.L. and Schafer, D.W. (2002) The Statistical Sleuth (Wadsworth)

There are other books that are useful but not guaranteed to be available in Reserve at the library.

- Anderson, J. and Poole, M. (2002) Thesis and Assignment Writing (Wiley)
- Chatterjee, S. Hadi, A. and Price, B. (2006) Regression Analysis By Example (Wiley)
- Devore, J. and Peck, R (2005) Statistics The Exploration and Analysis of Data (Brooks/Cole)
- Utts, J.M. and Heckard, R. F. (2004) Mind on Statistics, (Duxbury Press)
- Utts, J.M. and Heckard, R. F. (2006) Statistical Ideas and Methods, (Duxbury Press)

### Online Textbooks

- SurfStat at <http://surfstat.anu.edu.au/surfstat-home/surfstat.html> is a complete introductory statistics course.
- HyperStat Online at <http://davidmlane.com/hyperstat/index.html> is at an intermediate

level stats course covering ANOVA.

- StatSoft Electronic Textbook at <http://www.statsoft.com/textbook/stathome.html> is more advanced and material is covered in sections called ANOVA/MANOVA and Linear Regression.

## Unit Schedule

Week (begins)	Lectures	Work due
1 (29 Feb)	Review One sample tests + One sided tests;	
2 (7 March)	Review two sample tests + assumptions; Report writing	
3 (14 March)	One way ANOVA	
4 (21 March)	One way ANOVA Multiple comparisons and Transformations	Tutorial Ex 3.
5* (29 March)	Non-parametrics; Power and Sample Size	
6 (4 April)	Data collection and management; Revision	
	Midsemester Break	
7* (26 April)	Simple linear regression and transformations	Assignment 1
8 (2 May)	Multiple regression	
9 (9 May)	Multiple regression continued; Ethics	
10 (16 May)	Two-way ANOVA	
11 (23 May)	Two-way ANOVA continued and Multiple comparisons	
12 (30 May)	ANOVA - Regression connection	Assignment 2
13 (6 June)	Revision	
	<i>*Public Holiday Monday on 28th March and 25th April</i>	

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

**New Assessment Policy in effect from Session 2 2016** <http://mq.edu.au/policy/docs/assessm>

[ent/policy\\_2016.html](#). For more information visit [http://students.mq.edu.au/events/2016/07/19/new\\_assessment\\_policy\\_in\\_place\\_from\\_session\\_2/](http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/)

Assessment Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public [http://www.mq.edu.au/policy/docs/complaint\\_management/procedure.html](http://www.mq.edu.au/policy/docs/complaint_management/procedure.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of 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/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## Results

Results shown in *iLearn*, 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](http://ask.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](http://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](http://ask.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/](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.

## Late Submission

Late submission of assignments will be only accepted by prior arrangement or in accordance with the disruption to studies policy. All other late submissions will incur a penalty of 10% per day or part day.

## 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 regression, and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Develop report writing skills.
- Use statistical software to fit the models.

### Assessment tasks

- Tutorial Exercises Week 3
- Assignment 1
- Assignment 2
- 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 regression, and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Develop report writing skills.
- Use statistical software to fit the models.

### Assessment tasks

- Tutorial Exercises Week 3
- Assignment 1
- Assignment 2
- 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 regression, and multiple regression.

- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Develop report writing skills.
- Use statistical software to fit the models.

## Assessment tasks

- Tutorial Exercises Week 3
- Assignment 1
- Assignment 2
- 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 regression, and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and, if invalid, how to modify the analysis.
- Develop report writing skills.
- Use statistical software to fit the models.

## Assessment tasks

- Tutorial Exercises Week 3
- Final exam

## Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

## Learning outcome

- Develop report writing skills.

## Assessment tasks

- Assignment 1
- Assignment 2

## Changes from Previous Offering

### Statistical Software

The statistical software package to conduct analysis is no longer Minitab and the course will now use R/RStudio.