



STAT271

Statistics I

S2 Day 2018

Dept of Statistics

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General Information

Unit convenor and teaching staff Associate Lecturer Suzanne Curtis suzanne.curtis@mq.edu.au 12 Wally's Walk (E7A) Room 622 To be determined
Credit points 3
Prerequisites STAT272
Corequisites
Co-badged status
Unit description This is a unit in statistical methods for the analysis of data in which attention is given to the theoretical structure underlying the techniques. It aims to equip students with a wide understanding of statistics such that they are able to employ appropriate methods of analysis in various circumstances. The techniques learned are widely used in the sciences, social sciences, business and many other fields of study. This unit is designed for students majoring in statistics and/or actuarial studies. Topics include: inference about one and two sample problems using normal theory and non-parametric methods; analysis of variance; multiple comparisons; and regression.

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:

Understand and apply the concepts of parameter estimation (point and interval), including asymptotic properties.

Correctly identify and implement standard normal and nonparametric inference procedures for one, two and multiple populations.

Understand basic analysis of categorical data (binomial, multinomial and bivariate).

Understand the theory and uses of simple and multiple linear regression with practical application using RStudio.

General Assessment Information

Software: The supported statistical software for this unit is R/RStudio and Minitab (versions 17 or 18 or Express). Students will be given guidance on how to use the software and be expected to conduct their analyses using R/RStudio and/or Minitab for the assignments. Students should also note that the final examination will involve data analysis that contains inline R code and output that students need to interpret to answer the exam questions.

Assignments: Due dates/times and submission details will be specified separately for each assignment. The assignments will be made available at least one week prior to when they are due. Some marks will be allocated for clarity of reasoning and presentation in each assignment.

In Class Tests: The tests (of 45 minutes duration) will be held during a lecture in the weeks indicated. Specific dates are yet to be determined. Students are permitted to take into the test room one (1) A4 page of personal summary of formulae or notes, hand-written or typed on one or both sides of the page. Students will be permitted to take this sheet with them at the completion of the tests. Some formulae will be provided (as per statistical tables available on iLearn); all necessary statistical tables will be provided.

Examination: The final examination will be of 3 hours duration with 10 minutes reading time. All material covered in the unit is examinable. Relevant statistical tables will be provided at the final examination. These will be the same as the ones made available during the teaching of the unit. For the final examination students will be permitted to take into the exam room a nonprogrammable calculator and two (2) A4 pages of formulae or notes, hand-written or typed on one or both sides of the page. Students will not be permitted to take these summary notes with them at the completion of the exam, and it is recommended that a photocopy or scan be made if a student has a desire to retain them.

Serious and unavoidable disruption to studies and special consideration: Late submissions, extensions to assessment due dates or alternative assessments are not possible unless a student experienced a **serious and unavoidable** disruption to their studies or had a documented illness. In this case, students are required to notify the Faculty on the ask.mq.edu.au system and apply for special consideration. This special consideration process needs to be approved before any alternative assessment is offered.

Specific late assessment submission/completion policies: In the case of a late submission for an assignment, if no special consideration has been granted, 10% of the earned mark will be deducted for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission - 20% penalty), up to a maximum of 50%. After 5 days, including weekends and public holidays, a mark of 0% will be awarded for the assignment.

NOTE: It is not the intention of this late penalty policy to cause a student to fail the unit when they have submitted their assignment no more than 5 days after the due date and they would have otherwise passed. In this case, if deductions for late assignments result in the final unit mark for a student being less than 50, when otherwise it would have been 50 or greater, the

student's final mark will be exactly 50.

Special Consideration (final examination): If you receive special consideration for the final exam, a supplementary exam will be scheduled in the supplementary exam period of 17th December to 21st December, 2018. By making a special consideration application for the final exam you are declaring yourself available for a resit during the 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
Assignments	10%	No	Weeks 6 and 12
Test One	15%	No	Week 8
Test Two	15%	No	Week 11
Exam	60%	No	University Examination Period

Assignments

Due: **Weeks 6 and 12**

Weighting: **10%**

Two assignments with specific due dates yet to be determined.

On successful completion you will be able to:

- Understand and apply the concepts of parameter estimation (point and interval), including asymptotic properties.
- Correctly identify and implement standard normal and nonparametric inference procedures for one, two and multiple populations.

Test One

Due: **Week 8**

Weighting: **15%**

Class Test One

On successful completion you will be able to:

- Understand and apply the concepts of parameter estimation (point and interval), including asymptotic properties.
- Correctly identify and implement standard normal and nonparametric inference procedures for one, two and multiple populations.

Test Two

Due: **Week 11**

Weighting: **15%**

Class Test Two

On successful completion you will be able to:

- Understand and apply the concepts of parameter estimation (point and interval), including asymptotic properties.
- Correctly identify and implement standard normal and nonparametric inference procedures for one, two and multiple populations.
- Understand basic analysis of categorical data (binomial, multinomial and bivariate).
- Understand the theory and uses of simple and multiple linear regression with practical application using RStudio.

Exam

Due: **University Examination Period**

Weighting: **60%**

Final examination

On successful completion you will be able to:

- Understand and apply the concepts of parameter estimation (point and interval), including asymptotic properties.
- Correctly identify and implement standard normal and nonparametric inference procedures for one, two and multiple populations.
- Understand basic analysis of categorical data (binomial, multinomial and bivariate).
- Understand the theory and uses of simple and multiple linear regression with practical application using RStudio.

Delivery and Resources

Lectures: STAT271 is delivered by lectures (3 per week) and tutorials (1 per week, commencing in week 2). All teaching material will be available on iLearn.

Tutorials: Students are to attend one tutorial per week, as per the class allocated at enrolment. Tutorial Exercises will be available from iLearn at least five days prior to the tutorial. Students are expected to have attempted these prior to the tutorial. Solutions will be explained, with emphasis on any area students had trouble with. At the end of the week, these solutions will then be placed on iLearn.

Required and Recommended Texts and/or Materials Recommended: Mendenhall W, Wackerly D and Scheaffer R. “Mathematical Statistics with Applications”, Seventh Edition QA276 .M426 2008 Copies of this book are held in Special Reserve in the University Library. The Library also holds copies of the sixth and previous editions as well as the Student solutions manual. The following books are useful references for this unit:

Authors	Title	Library Call No.
Bain, L.J. & Engelhardt, M	Introduction to Probability and Mathematical Statistics	QA273.B2546/1992
Conover, W.J.	Practical Nonparametric Statistics	QA278.8.C65/1999
Hogg, R.V. & Craig, A.T.	Introduction to Mathematical Statistics	QA276.H59 / 1995
Larson, H.J.	Introduction to Probability Theory and Statistical Inference	QA273.L352/1982
Walpole, R.E. & Myers, R.H.	Probability and Statistics for Engineers and Scientists	TA340.W35/1993

Unit Schedule

Topic	Description
1	Parameter Estimation: Point estimation methods, including the method of moments and maximum likelihood. Properties of estimators. Asymptotic (large sample) properties.
2	Sampling distributions: Properties of and distributions of sample statistics. Definition and derivation of t, F and chi-squared distributions etc.
3	Interval estimation: Pivotal quantities and confidence intervals.
4	Inference Theory: Principles of hypothesis testing. Type I and Type II errors. Power. Comparison of competing tests. Relationship between confidence intervals and hypothesis testing.
5	Binomial: Confidence intervals and hypothesis testing for the probability parameter in the binomial distribution.
6	Single population inference: Confidence intervals and hypothesis testing (for location and scale), including related samples (paired comparisons). Classical (normal theory) and nonparametric procedures are considered.
7	Two populations inference: Confidence intervals and hypothesis testing (for location and scale). Classical (normal theory) and nonparametric procedures are considered.
8	Categorical data inference: goodness of fit tests; tests of association; and tests of homogeneity (chi-squared tests).

9	Correlation and linear regression: Model fitting and inference for simple and multiple linear regression.
10	k populations inference: One-way analysis of variance and nonparametric techniques. Multiple comparisons and contrasts.
11	Inference for two factor designs: normal theory (two-way analysis of variance) and nonparametric techniques. Multiple comparisons and contrasts.

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 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.

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://stu>

dents.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

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

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

- Understand and apply the concepts of parameter estimation (point and interval), including asymptotic properties.
- Correctly identify and implement standard normal and nonparametric inference procedures for one, two and multiple populations.

- Understand basic analysis of categorical data (binomial, multinomial and bivariate).
- Understand the theory and uses of simple and multiple linear regression with practical application using RStudio.

Assessment tasks

- Assignments
- Test One
- Test Two
- 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 outcomes

- Understand and apply the concepts of parameter estimation (point and interval), including asymptotic properties.
- Correctly identify and implement standard normal and nonparametric inference procedures for one, two and multiple populations.
- Understand basic analysis of categorical data (binomial, multinomial and bivariate).
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Assessment tasks

- Assignments
- Test One
- Test Two
- Exam

Changes since First Published

Date	Description
23/07/2018	Hyperlinks inserted.