STAT270

Applied Statistics

S1 Day 2014

Statistics

Contents

General Information

Unit convenor and teaching staff
Unit Convenor
Kenneth Beath
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E4A 507
Friday 2-4

Other Staff
Kehui Luo
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E4A532
Thursday 10-12pm

Credit points
3

Prerequisites
[(STAT170(P) or STAT171(P)) and (STAT175(P) or GPA of 1.5)] or admission to GCertSc

Corequisites

Co-badged status
STAE270

Unit description
This unit aims to extend and broaden statistical experience from 100-level statistics units. It focuses on 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, graphical presentation of results, and power analysis are also investigated. The unit has a strong practical component built around a substantial collaborative project planned and carried out during the semester, and graduate capabilities such as communication, teamwork, problem solving and ethics are addressed in this context.

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 and two way ANOVA, simple 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

Name	Weighting	Due
Assignment 1	13%	11 April
Assignment 2	13%	6 June
Class Test	14%	Week 7
Final exam	60%	to be decided

Assignment 1

Due: **11 April**
Weighting: **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 and two way ANOVA, simple 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: **6 June**
Weighting: **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 and two way ANOVA, simple 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.

Class Test

Due: **Week 7**
Weighting: **14%**

Class test covers first 5 weeks material.

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 and two way ANOVA, simple 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%**

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 and two way ANOVA, simple 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.

Delivery and Resources

Textbook

There is no prescribed textbook.

Software

You will be expected to use MINITAB to perform data analyses. We will have some supervised lab sessions during tutorials, and you can use the software in the E4B labs when they are not booked for classes. You can find more information on Minitab at their web site: http://www.minitab.com. A free copy is available to Macquarie students. From the student portal http://students.mq.edu.au/home/ go to Software Downloads (top right) and follow the instructions for Minitab.

Additional References

These are available in Reserve.

Moore, D.S., McCabe, G. P. and Craig, B.A. (2012) Introduction to the Practice of Statistics, Seventh Edition (W.H. Freeman) HIGHLY RECOMMENDED

De Veaux, R.D., Velleman, P.F. and Bock, D.E. (2004) Stats Data and Models (Pearson) HIGHLY RECOMMENDED

Ramsay, F.L. and Schafer, D.W. (2002) The Statistical Sleuth (Wadsworth) HIGHLY RECOMMENDED

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)

Ryan, B.F. , Joiner, B.L. and Cryer, J.D. (2005) Minitab Handbook (Duxbury)

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, with a useful section on Statistical Inference with a sub-section on correlation and regression (but no ANOVA).

HyperStat Online at http://davidmlane.com/hyperstat/index.html is at an intermediate level, chapter 12 and first part of 13, and chapter 15 cover the material (with background in chapter 1). Chapter 5 contains the best online table of the normal distribution (see http://davidlane.com/hyperstat/normal_distribution.html - try it!)

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 (with Elementary Concepts and Basic Statistics for background).

Changes from Previous Delivery

Removed marks allocated to homework.

Unit Schedule

Week (begins)	Lectures	Work due
1 (3 March)	Review One sample tests + One sided tests	
2 (10 March)	Review two sample tests + assumptions; Report writing	
3 (17 March)	One way ANOVA	
4 (24 March)	One way ANOVA Multiple comparisons	
5 (31 March)	Transformations, and Non-parametrics; Power and Sample Size	
6 (7 April)	Data collection and management	Assn 1
	Midsemester Break	
7 (28 April)	Simple linear regression and transformations	Class Test
8 (5 May)	Multiple regression	
9 (12 May)	Multiple regression continued; Ethics	
10 (19 May)	Two-way ANOVA	
11 (26 May)	Two-way ANOVA continued and Multiple comparsions	
12 (2 June)	ANOVA - Regression connection	Assn 2
13 (9 June)	Revision	

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

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy http://mq.edu.au/policy/docs/grading/policy.html

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

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy 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/

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

IT Help

For help with University computer systems and technology, visit http://informatics.mq.edu.au/help/.

When using the University's IT, you must adhere to the Acceptable Use 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 special consideration 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 and two way ANOVA, simple 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

- Assignment 1
- Assignment 2
- Class Test
- 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 and two way ANOVA, simple and multiple regression.
- Understand the assumptions underlying the models, and how they can be checked and if invalid how to modify the analysis.
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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 and two way ANOVA, simple 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.
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Assessment tasks

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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 and two way ANOVA, simple 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.

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 since First Published

Date	Description
16/01/2014	The Prerequisites was updated.