STAT171

Statistical Data Analysis

S1 Day 2014

Statistics

Contents

General Information

Unit convenor and teaching staff
Unit Convenor
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E4A 552
TBA

Credit points
3

Prerequisites
HSC Mathematics extension 1 or (3cp from MATH130-MATH136(P)) or admission to BActStud

Corequisites

Co-badged status
No units are co-badged (taught with) for STAT171.

Unit description
This unit is intended for students with a high level of proficiency in mathematics. The unit provides an introduction to modern statistical principles and practice with special emphasis on data analytical techniques. The aim of the unit is to promote an understanding of the principles involved in statistical analysis and the analysis of simple data sets using elementary techniques. Data analysis will be carried out using the statistical package Minitab. The unit includes topics such as basic probability and random variables; data summarisation and display; data quality; and probability models for data including the normal, Poisson, binomial and sampling distributions and their important properties. Statistical inference techniques are considered such as estimates and their accuracy; tests of means; proportions and other characteristics; regression and correlation; and an introduction to the analysis of count data.

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:

Summarising and displaying data

Probability

Discrete random variables

Continuous random variables

Sampling distributions (including the Central Limit Theorem)

Statistical inference (Hypothesis Testing, Error Types, Confidence Intervals)

Inference regarding a single population mean and investigating normality

Inference regarding two population means

Inference regarding proportions (for one and two populations)

Regression and correlation

Sample size and power

Categorical data analysis (goodness of fit tests, independence tests)

All Topics

Assessment Tasks

Name	Weighting	Due
Web Quizzes	10%	see web quiz schedule
Assignments	15%	see unit schedule
Test	15%	10th April 2014
Exam	60%	University exam period

Web Quizzes

Due: **see web quiz schedule**
Weighting: **10%**

There are eleven quizzes, due at approximately weekly intervals. The 10 best marks are used.

On successful completion you will be able to:

- All Topics

Assignments

Due: **see unit schedule**
Weighting: **15%**

There are five assignments (each worth 3%) due at approximately fortnightly intervals.

On successful completion you will be able to:

- All Topics

Test

Due: **10th April 2014**
Weighting: **15%**

This 45 minute test held during the lecture covers Topics 1-4 inclusive. You may take one A4 page (written on one or both sides) of summary notes into the test.

On successful completion you will be able to:

- All Topics

Exam

Due: **University exam period**
Weighting: **60%**

A formal examination held during the University's examination period. You may take two A4 pages (written on one or both sides) of summary notes into the exam.

On successful completion you will be able to:

- All Topics

Delivery and Resources

Lectures

There are three lectures per week. Students should bring to each lecture a copy of the pdf file of the lecture slides on which to make notes - these will be made available on iLearn in advance of each topic. Some "pop-ups" will be presented in the lectures which are not available in advance. All lectures will have an audio and visual recording made, accessible by students via the Echo-360 facility in iLearn.

Tutorials

Students are required to attend one tutorial per week as allocated at enrolment. It is *strongly* recommended that you attend your tutorial each week. You may only attend the tutorial to which you have been assigned. Tutorials in STAT171 will begin in the **second** week of classes.

Week 2: tutorials will be held in the computer labs (see iLearn for the room numbers). The exercises will be available on iLearn by the end of week 1 of teaching, and should be printed and brought to the tutorial. This tutorial is the only supervised teaching session in the computer labs for STAT171, and will involve using Minitab to analyse some data and Windows software to write a short report.

Weeks 3 – **13** will be held in the tutorial rooms. The tutorial exercises will be available on iLearn

by the end of the previous week and will consist of:

- questions which should have been attempted prior to the tutorial - solutions will be discussed;
- questions denoted (**) indicating “difficult”;
- a “discussion” question for consideration during the tutorials (not available in advance);
- selected textbook and other questions which will normally not be discussed during the tutorial, but a fully worked solution will be made available on iLearn at the end of each week.

There is also available an *optional* set of recommended extra exercises from the previous textbook (“Introduction to Probability and Statistics”, Ed13, by Mendenhall, Beaver and Beaver), which have check answers in the back. These have been selected as useful for test and exam revision or to provide further practice at applying the techniques developed in lectures.

Calculators

Each student will need a small calculator, preferably one that does simple statistical calculations (it should have at least mean and standard deviation capability). You should bring it to all tutorials. A calculator will also be needed for the mid-session test and the final examination. You will **not** be permitted to use a programmable calculator or one with a full alpha character set in any examination.

Textbook

“Statistics” by James McClave and Terry Sincich, Edition 12 (2013).

The text book is available in hardcopy, on-line (via the on-line quizzes in MyStatLab) and in downloadable form. Please see the separate information sheet (available on iLearn) listing the purchase options available.

The Library call number for the eleventh (2009) edition is QA276.12 .M4 2009. *Currently there are five copies of edition eleven available for borrowing on the Library shelves.*

It is expected that all students will have ***access*** to a copy of the textbook. It is ***not*** necessary to bring the textbook to tutorials or lectures.

Other References (Note that many of the older editions of the listed books are also useful references).

Mendenhall, W., Beaver, R. and Beaver, B. ‘Introduction to Probability and Statistics’ (Ed13) (This book was the STAT171 text book for several years prior to 2010.) QA276.M425/2009

Ryan, B.F. & Joiner, B.L., ‘Minitab Handbook’, (Ed 4) QA276.4.R9/2001

Devore, Jay L. 'Probability and Statistics for Engineering and the Sciences' (Ed 4) QA273.D46/1995

Devore, Jay L. 'Statistics: the exploration and analysis of data' (Ed 5) QA273.D48 2005

Moore D.S. & McCabe G.P., 'Introduction to the Practice of Statistics' (Ed 5) QA276.12.M65 2006

Griffiths D. et al, (1998) 'Understanding Data - Principles and Practice of Statistics' QA276.G75

Mendenhall, W. & Ott, L., 'Understanding Statistics' (Ed 3) QA276.12.M46/1980

Hamilton, Lawrence C. 'Modern Data Analysis: a first course in applied statistics' QA276.12.H355/1990

Clarke, G.M. & Cooke D. 'A Basic Course in Statistics' (Ed 5) QA276.12.C57 2004

Koopmans L.H., 'Introduction to Contemporary Statistical Methods', (Ed 2) QA276.K65/1987

Chatfield, C., 'Statistics for technology: a course in applied statistics' (Ed 3) TA340.C45/1983

Huntsberger D.V. & Billingsley, P., 'Elements of Statistical Inference', (Ed 6) QA276.12 .H86/1987

Agresti, A. & Franklin, C. 'Statistics: the art and science of learning from data' QA276.12 .A37 2009

Computing and Software

Students will regularly need access to a computer with internet access. Computers are available in C5C rooms 211, 213, 217 and 219 for those students who do not own their own. Please see the website http://mq.edu.au/about_us/offices_and_units/informatics/help/ for further information such as opening hours and conditions of use.

The following software will be used in STAT171:

- **Minitab** (Version 16): Macquarie University has a license agreement with Minitab which allows students to download a version of Minitab for their computer. Information and instructions for downloading are available from the student portal: https://my.mq.edu.au/ . Click on "Software Downloads" and select "Minitab". - NOTE: you will need to download the *license file* as well as the Minitab software. - For using Minitab on Mac, please see http://www.minitab.com/en-GB/support/answers/answer.aspx?id=754.
- **MyStatLab:** This is the software running the web quizzes. Please see the information sheet on iLearn with access code purchaing options. The questions are associated with the text book. They have been selected to reinforce material introduced in lectures and to give students practice. They are set at two levels with identical questions (but randomly generated numeric components are used): (i) **Practice** (non compulsory) -

many attempts are allowed, with interactive help available. (ii) **Assessment** (part of assessment) - the higher mark of two attempts is used (no interactive help available). Students should use practice quizzes to become familiar with the questions and confident they understand the concepts prior to completeing the assessment quizzes. Please note that at both levels, the quizzes may be saved mid attempt and resumed later (within the available time).

Changes from previous delivery

The sub-topic on odds ratios is noe longer covered (as of 2014).

Unit Schedule

Week	Begins	Work Due	Value
1	3 Mar	Maths background quiz (mark your own)	
2	10 Mar		
3	17 Mar	Assignment One	3%
4	24 Mar		
5	31 Mar	Assignment Two	3%
6	7 Apr		
		MID-SESSION-BREAK	
7	28 Apr	Mid-session test	15%
8	5 May		
9	12 May	Assignment Three	3%
10	19 May		
11	26 May	Assignment Four	3%
12	2 Jun		
13	10 Jun	Assignment Five	3%

Please refer to information on each assignment regarding submission and return details. Late assignments will receive zero marks unless approved for special consideration.

Assignments are to be presented on A4 paper, unless otherwise specified. Some answers may be handwritten (illegible work will not be marked), other questions will need to have word-processed reports submitted. The requirements will be specified on each assignment.

Please note that marks will be deducted for work submitted late. The assignment will not be marked unless it is accompanied by a Faculty of Science assignment cover sheet (available on

iLearn) which clearly shows your name, your tutor's name and your tutorial time and makes a declaration that the work is your own.

Web Quiz Schedule

Due Dates: The eleven web quizzes are due approximately weekly. Please see the separate schedule of available and due dates and times available on iLearn.

Access: Students need to register with their individual MyStatLab access code. There are several purchasing options available. For details regarding these options, please see the separate information sheet on how to register for the on-line quizzes. This information sheet is available on iLearn.

Guided Tour: This is highly recommended as MyStatLab has many features to assist students (including "StatCrunch", a Minitab like tool).

Practice Quizzes

- may be attempted as many times as you like;
- have built in "Help me solve this" and "Show me an example" features;
- are recommended but not compulsory;
- will be made availoable for revision purposes prior tho the exam.

Assessment Quizzes

- may be saved and resumed at any time during the period of availability;
- may only be attempted twice – the higher of the two marks is used in your assessment (if only one attempt is made, that mark is used);
- the best 10 of the 11 assessment quiz marks will be each worth 1% of your overall assessment.

Settings for individual students can only be changed by the lecturer (justification will be required). Closing dates may be extended as required. Students will be clearly notified of this via iLearn.

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

Please note that the University Numeracy Centre (C5A225) can be of assistance with general background mathematics issues, and may be able to assist with some STAT171 content. For assistance with specific STAT171 issues, please use the STAT171 staff consultation hours. These will be posted in iLearn as soon as possible.

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.

This website is also available via the Macquarie home page and clicking on “Students” then “OneHelp – IT Help”. You have the choice of:

* lodging a One Help ticket;

* obtaining assistance over the phone (9850-4357);

* in person at the Helpdesk in C5C244.

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 outcome

- All Topics

Assessment tasks

- Assignments
- Exam

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcome

- All Topics

Assessment task

- Assignments

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 outcome

- All Topics

Assessment tasks

- Web Quizzes
- Assignments
- Test
- 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 outcome

- All Topics

Assessment tasks

- Assignments
- Test
- 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 outcome

- All Topics

Assessment tasks

- Web Quizzes
- Assignments
- Test
- Exam

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcome

- All Topics

Assessment task

- Assignments

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

- All Topics

Assessment tasks

- Assignments
- Test
- Exam

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with

knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcome

- All Topics

Assessment task

- Assignments

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcome

- All Topics

Assessment task

- Assignments

Changes since First Published

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