



Division of Economic and Financial Studies

STAT171: Statistical Data Analysis

Unit Outline

First Semester, 2005

Unit convenor: Mr. Stephen Brown

Read this document carefully!
Refer to it when you have questions about the unit, before contacting your lecturer.
Also refer to the STAT171 web page, which contains up-to-date information and announcements.

ABOUT THIS UNIT

STAT171, Statistical Data Analysis, is a 3 credit point unit run by the Statistics Department in the Division of Economic and Financial Studies.

The 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 to be able to analyse simple data sets using elementary techniques. You will also be required to analyse data using the statistical package Minitab.

Students should note that STAT171 and STAT170 are equivalent pre-requisites for almost all units at Macquarie University. The exceptions are STAT272 and various actuarial units. Academic advice should be sought if a student is unable to determine which of these two introductory statistics units would best suit them. Actuarial students should also note that a Credit (not Pass) grade is needed in STAT171 as the prerequisite for ACST211 Combinatorial Probability.

TEACHING STAFF

- Convenor: Mr. Stephen Brown C5C471 9850-8552
scbrown@efs.mq.edu.au
- Other Staff: Ms. Suzanne Curtis C5C467 9850-8584
scurtis@efs.mq.edu.au [Please note that Ms. Curtis is half-time.]

Other staff will be involved in convening tutorials.

Consultation times for all staff will be posted on the web when details become available in the second week of teaching.

CLASSES

Lectures

You are required to attend three lectures per week (beginning in week 1), held at the following times:

Monday	5 – 6 pm (X5B T1)
Tuesday	1 – 2 pm (X5B T1)
Thursday	1 – 2 pm (X5B T1)

Lectures for weeks 1 & 7 - 13 will be convened by Mr. Stephen Brown (Lecturer-in-Charge). Lectures for weeks 2 - 6 will be convened by Ms. Suzanne Curtis.

A copy of the lecture notes will be made available each week in the lecture. Copies will also be available in ERIC (the Economics Resources and Information Centre – C5C244), and on the STAT171 website: <http://www.stat.mq.edu.au/units/stat171>

Tutorials

You are required to attend one tutorial per week as allocated at enrolment. The timetable for classes can be found on the University web site at: <http://www.timetables.mq.edu.au/>.

Tutorials in STAT171 will begin in the **second** week of classes.

Attendance at tutorials forms part of the assessment for this unit – see the later assessment section.

To ensure that student numbers are equivalent in each of the tutorial groups, you may only attend the tutorial to which you have been assigned. To **change** tutorial class, you may use e-student up until the end of week 1. After this, you must see Ms. Suzanne Curtis, but late tutorial changes will only be approved with sufficient justification.

Lists showing the allocation of students to their tutorial class will be posted on the web by the beginning of Week 2. The list of tutorial allocations placed on the STAT171 web-site is the official list, and supersedes your printed timetable, as the information on e-student may become out-of-date.

Tutorials in week 2 will be held in the C5C computer laboratories. The exercises for this week will be handed out in the class, and will involve using Minitab and Windows software to analyse some data. A report based on one of the data sets will be due at your tutorial in week 3, and will count 2% of the 5% tutorial participation part of the assessment.

Tutorials in weeks 3 - 13 will be held in the tutorial rooms. The tutorial exercises will be given out during lectures one week prior to the tutorial and will consist of three sections:

- (i) Questions for review and discussion during the tutorial - no solution will be made available for these exercises outside tutorials. It is expected that **all** these questions will be attempted by the students prior to their tutorial. The work will be collected by your tutor at random throughout the semester for marking, and will count 3% towards your assessment.
- (ii) Selected text book and other questions which will normally **not** be discussed during the tutorial (unless there is sufficient demand), but a fully worked solution will be made available on the STAT171 website at the end of each week; and
- (iii) A set of recommended extra exercises from the text book, 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.

REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

Textbook

Mendenhall, William, Beaver, Robert J. and Beaver, Barbara M. (2003)
'Introduction to Probability and Statistics' Eleventh edition (Duxbury Press)

It is expected that all students will have access to a copy of the text book. There are four copies in the Library Special Reserve QA276.M425/2003. It is not necessary to bring the text book to tutorials or lectures.

The previous edition of the textbook has fewer exercises than the current edition, and as such is not sufficient for completing the tutorial exercises. However, there are five copies on the Library shelves at QA276.M425/1999. Where possible, exercise numbers will be quoted for both editions.

Other References

Ryan, B.F. & Joiner, B.L., (1994) 'The MINITAB Student Handbook', (3rd ed)	QA276.4.R88/1994
Devore, Jay L. (1995). Probability and Statistics for Engineering and the Sciences (4 th ed)	QA273.D46/1995
Moore D.S. & McCabe G.P., (1993) 'Introduction to the Practice of Statistics'	QA276.12.M65/1993
Griffiths D. et al, (1998) 'Understanding Data - Principles and Practice of Statistics'	QA276.G75
Mendenhall, W. & Ott, L., (1976) 'Understanding Statistics'	HA29.M5332/1976
Hamilton, Lawrence C. (1990) 'Modern Data Analysis A First Course in Applied Stats'	QA276.12.H355/1990
Clarke, G.M. & Cooke D. (1998) 'A Basic Course in Statistics'	QA276.12.C57/1998
Koopmans L.H., (1987) 'Introduction to Contemporary Statistical Methods', (2nd Ed)	QA276.K65/1987
Chatfield, C., (1983) 'Statistics for technology'	TA340.C45/1983
D.V. Huntsberger & Billingsley, P., (1987) 'Elements of Statistical Inference', (6th ed)	QA276.12.H86/1987

Calculators

You will need to equip yourself with a small calculator, preferably one that does simple statistical calculations (it should have \bar{x} and σ on it). **You should bring it to all tutorials.** You will also need your calculator for the mid-semester test and the final examination. You will **not** be permitted to use a calculator with an alpha character set in any examination.

Computing

Much use will be made of the computers located in the student laboratories in C5C. In Week 2, instruction will be provided on the use of the statistical package Minitab, as well as the Windows operating environment. After that, you will be expected to use the computers regularly without supervision. If in difficulty, you should see your tutor or a Statistics staff member during their office hours. Computer rooms set aside for individual student use are: C5C213, 215, 217, 219. However, these rooms **may be booked by a class** – you should **check** the timetable on the door for usage availability.

The Minitab home page is <http://www.minitab.com>. Various download options are detailed here for home use.

UNIT WEB PAGE

The web page for STAT171 can be found at: <http://www.stat.mq.edu.au/units/stat171>

The website should be consulted frequently, and will contain pages with:

- Information – STAT171 home page
- Administration – weekly announcements (including a list of handouts each week)
- Lectures – Lecture notes (one or four per page) for downloading
- Tutorials – Tutorial exercises (with solutions to non-discussion questions)
- Assignments – Due dates, Assignments, cover sheets and solutions
- Assessment – specifications of weighting of assessment tasks for grading
- Contact Information – Consultation Hours for all staff
- Links – useful links + to Minitab home page

Files containing unit material (lectures, tutorials etc.) are password protected. The password will be announced in lectures.

ASSESSMENT

This unit will be assessed as follows :	Assignments	10 %
	Tutorial participation	5 %
	Mid-semester test	10 %
	Final examination	75 %

The composition of the non-examination component of the assessment is as follows:

<u>Assignments</u>		<u>Tutorials</u>	
Assignment 1	3%	Minitab report	2%
Assignment 2	3%	Tutorial exercises	3%
Assignment 3	4%		

A satisfactory performance is required in all aspects of the unit. **To pass the unit you must pass the final examination.**

Mid-semester tests and Final Examination

One compulsory mid-semester test (of 45 minutes duration) will be held during lectures. The test will take place during Week 7 of teaching (Mon 11th – Fri 15th April).

If you are unable to attend the test, you must notify either Stephen Brown or Suzanne Curtis as soon as possible after the event, providing suitable documentation.

The Final Examination will be of 3 hours duration with 10 minutes reading time. All material covered in the unit is examinable.

For both the Mid-semester test and the Final examination you will be permitted to take into the exam room one A4 page of formulae or notes, written on one or both sides of the page. No formulae will be provided, however all necessary statistical tables will be provided.

LEARNING OUTCOMES

The topics to be covered in STAT171 are:

1. Data summarisation and display
2. Basic probability, Conditional Probability, Bayes Theorem
3. Random variables and probability distributions
Specific probability distributions including the Binomial, Poisson, Normal
4. Sampling distributions and their properties
5. Estimates and their accuracy: Confidence Intervals
6. Hypothesis testing: two & one tailed tests
Type I and Type II errors
One sample tests of means
7. Two sample tests of means
8. Introduction to Experimental Principles and Testing for normality
9. One and two sample proportions tests
10. Simple Linear Regression: calculation and hypothesis testing
confidence intervals vs prediction intervals
residual diagnostics (including normality plots)
11. Correlation
12. Analysis of categorical data goodness of fit tests
independence tests
Odds ratios
13. Power of a test and sample size
14. Non-parametric statistics nonparametric vs parametric tests
Sign test
Wilcoxon Two sample rank sum test

It should be noted that the order of presentation of the topics may differ from that listed here.

In addition to the discipline-based learning objectives, all academic programs at Macquarie seek to develop students' generic skills in a range of areas. One of the aims of this unit is that students develop their skills in the following:

Foundation skills of literacy, numeracy and information technology;
Communication skills;
Problem-solving skills;
Critical analysis skills;

TEACHING AND LEARNING STRATEGY

It is expected that a typical student will need to spend a total of 12 hours per week working on the material in STAT171. This time includes attendance at all classes, reviewing notes etc. as well as preparation of work for submission. Some students may be able to spend less time than that recommended, whilst others will need to spend substantially more time.

Lectures will be used to introduce the topics, usually with at least one worked example. The supplied handouts of lecture notes will contain most, but **not** all, of the material from lectures. It is recommended that you review the material from the previous lecture before attending the current lecture.

Tutorial exercises are designed to encourage students to regularly review the material presented in lectures, and then to independently apply the techniques to a range of situations. Students will be encouraged to actively participate in the discussion of the appropriate methods to be applied to the problems presented.

Assignments

Assignments are used as part of the formal assessment, but are primarily to be considered as a learning tool – to give you experience at communicating the results of your analysis in a meaningful way. Marked assignments will be available for collection at your tutorial no more than two weeks after the due date.

The assignments will be due **by 10 am** on the due date as specified in the Unit Timetable (see further on). They must be submitted via the STAT171 Assignment Box in ERIC (C5C244). Marks will be deducted for work submitted late. The assignment will not be marked unless it is accompanied by an assignment cover sheet which clearly shows your name, your tutor's name and your tutorial time and makes a declaration that the work is your own work.

Assignments are to be presented on A4 paper. 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.

For all tutorials and assignments:

Whilst you are encouraged to discuss the work extensively with your peers, it will be expected that the final material handed in will be your **own** work. Any work that is copied from another student **will** result in disciplinary action for **all** students involved. You should read the section headed "The Dangers of Plagiarism and How to Avoid It".

There is no specific word length for any section of the assessment tasks. However, students should note that all real-world problems need to be properly answered: with definitions of any variables used, the specific hypotheses being tests, a brief rationale for the analysing technique and a meaningful conclusion.

Test

The class test should encourage you to consolidate your understanding of the unit material, before moving on to the later topics. It should also give you experience in demonstrating your knowledge in preparation for the final examination.

Class tests and assignments are compulsory, and any student who does not complete these may be excluded from the unit under Bachelor Degree regulation 11(1).

If illness or misadventure prevents you from completing an assessment task during the semester, you should contact Stephen Brown or Suzanne Curtis as soon as possible, and submit your documentation with the "Advice of Absence or Other Circumstances" form to the Student Centre *as soon as possible and no later than the last teaching day of semester*. This form is available from <http://www.reg.mq.edu.au/Forms/USSAbsence.pdf>

Examination

The final examination will include any material covered throughout the unit.

The University Examination period in First Half Year 2005 is from 15th June to 29th June. You are expected to present yourself for examination at the time and place designated in the University Examination Timetable <http://www.timetables.mq.edu.au/exam>

The only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for Special Consideration. Information about unavoidable disruption and the special consideration process is available at <http://www.reg.mq.edu.au/Forms/APSCon.pdf>

Note that there is a Division policy regarding requests for special consideration for examinations and the granting of supplementary examinations on the website: <http://www.efs.mq.edu.au/supexams.htm> . Please be aware that you will not be contacted to be advised that you have been granted a supplementary examination – you will need to consult the website for this information.

PLAGIARISM

The University defines plagiarism in its rules: "Plagiarism involves using the work of another person and presenting it as one's own." Plagiarism is a serious breach of the University's rules and carries significant penalties. You must read the University's practices and procedures on plagiarism. These can be found in the *Handbook of Undergraduate Studies* or on the web at: <http://www.student.mq.edu.au/plagiarism/>

UNIVERSITY POLICY ON GRADING

Academic Senate has a set of guidelines on the distribution of grades across the range from fail to high distinction. Your final result will include one of these grades plus a standardised numerical grade (SNG).

On occasion your raw mark for a unit (i.e., the total of your marks for each assessment item) may not be the same as the SNG which you receive. Under the Senate guidelines, results may be scaled to ensure that there is a degree of comparability across the university, so that units with the same past performances of their students should achieve similar results.

For an explanation of the policy see <http://www.mq.edu.au/senate/MQUOnly/Issues/Guidelines2003.doc> or <http://www.mq.edu.au/senate/MQUOnly/Issues/detailedguidelines.doc>.

STUDENT SUPPORT SERVICES

Macquarie University provides a range of Academic Student Support Services. Details of these services can accessed at <http://www.student.mq.edu.au>.

The Division of Economic and Financial Services has student support located in ERIC (Economic Reference and Information Centre) – C5C244.

Copies of all handouts from STAT171 will be placed in ERIC as well as on the web. Some spares may be available for collection, otherwise the material may be photocopied.

STAT171 – First Semester, 2005

Unit Timetable

Week	Begins	Work Due	Details	Value
1	28 Feb			
2	7 Mar			
3	14 Mar	Minitab report	In tutorials	2 %
4	21 Mar	Assignment One	ERIC: 10 am Thurs 24 March	3 %
Note: Public Holidays are Frid 25 th March and Mon 18 th March				
5	28 Mar			
6	4 Apr			
7	11 Apr	Mid-semester Test	In lecture	10 %
BREAK Two Weeks				
8	2 May			
9	9 May	Assignment Two	ERIC: 10 am Tues 10 May	3 %
10	16 May			
11	23 May			
12	30 May	Assignment Three	ERIC: 10 am Tues 31 May	4 %
13	6 Jun			

Tutorial exercises will be collected at random throughout the semester. They will count 3 % towards your overall assessment.

The final examination counts 75 % of your assessment. You must pass the final examination to pass the unit.

